Aalto University
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Master's Program in Product Development

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Gathering and Communicating Empathic User Understanding in Product Development

Master's Thesis
Espoo, July 31, 2020

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ABSTRACT OF
MASTER'S THESIS

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Title:	Gathering and Communicating Empathic User Understanding in Product Development		
Date:	July 31, 2020	**Pages:**	vii + 58
Major:	Mechanical Engineering	**Code:**	ENG25
Supervisor:	Professor Katja Hölttä-Otto		
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Empathic design has been shown to be beneficial for finding users' latent needs in the early stages of product development. The method encourages designers to empathize with the users in order to gain a deep understanding of their thoughts and behavior. Research on empathic design methods has been conducted, but less attention has been given to communication of the findings. Due to the inconvenience of involving the whole product development team when interacting with users, proper communication of user understanding is crucial.

This thesis examines how user understanding is currently gathered and communicated in a global engineering and service company to identify current methods and challenges. The work is based on literature research, interviews with ten workers from a chosen case study, and a thematic analysis of the interviews.

The results show that the main challenges are related to communication and they were caused by lack of understanding toward colleagues and lack of common time. A proper way of maintaining the findings is also missing.

Keywords:	Empathic design, Communication, User understanding
Language:	English

Aalto-yliopisto
Insinööritieteiden korkeakoulu
Tuotekehityksen maisteriohjelma

DIPLOMITYÖN TIIVISTELMÄ

Tekijä:	Teresia Borgman		
Työn nimi:	Empaattisen käyttäjäymmärryksen kerääminen ja välittäminen tuotekehityksessä		
Päiväys:	31. Heinäkuuta 2020	**Sivumäärä:**	vii + 58
Pääaine:	Konetekniikka	**Koodi:**	ENG25
Valvoja:	Professori Katja Hölttä-Otto		
Ohjaaja:	Jaana Hyvärinen MA		

Empaattinen muotoilu on osoittautunut hyödylliseksi menetelmäksi käyttäjien tarpeiden löytämisessä tuotekehityksen varhaisissa vaiheissa. Menetelmä rohkaisee muotoilijoita empatisoimaan käyttäjien kanssa luodakseen syvän ymmärryksen heidän ajatuksistaan ja käyttäytymisestään. Empaattisia menetelmiä on tutkittu, mutta löydösten välittämiseen on kiinnitetty vähemmän huomiota. Kakki tuotekehitykseen osallistuvat eivät voi osallistua käyttäjäymmärryksen keräämiseen, minkä takia löydösten välittämistä tulisi tutkia enemmän.

Tämä diplomityö tutkii, miten käyttäjäymmärrystä kerätään ja välitetään globaalissa teknologiaa ja palveluja välittävässä yrityksessä. Tavoitteena on tunnistaa nykyisin käytettävät menetelmät ja haasteet. Työ perustuu kirjallisuustutkimukseen, haastatteluihin kymmenen työntekijän kanssa, sekä niiden perusteella tehtyyn temaattiseen analyysiin.

Tulokset osoittavat, että suurimmat haasteet liittyvät ymmärryksen välittämiseen, mikä johtuu riittämättömästä ymmärryksestä työtovereita kohtaan ja yhteisen ajan puutteesta. Toimivan säilytysjärjestelmän puuttuminen tuotti myös haasteita.

Asiasanat:	Empaattinen muotoilu, Tiedonsiirto, Käyttäjäymmärrys
Kieli:	Englanti

Aalto-universitetet
Högskolan för ingenjörsvetenskaper

Aalto-universitetet
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Magisterprogrammet i produktutveckling

SAMMANDRAG AV
DIPLOMARBETET

Utfört av:	Teresia Borgman		
Arbetets namn:	Insamling och kommunikation av empatisk användarförståelse i produktutveckling		
Datum:	Den 31 Juli 2020	**Sidantal:**	vii + 58
Huvudämne:	Maskinteknik	**Kod:**	ENG25
Övervakare:	Professor Katja Hölttä-Otto		
Handledare:	Jaana Hyvärinen MA		

Empatisk design har visat sig vara nyttigt i produktutvecklingens tidiga skede för att identifiera användarens behov. Metoden uppmuntrar designerna att empatisera med användaren för att åstadkomma en djup förståelse av deras tankar och beteende. Forskning i empatiska designmetoder har idkats, men mindre uppmärksamhet har ägnats åt kommunikationen av resultaten. I och med att det inte är lönsamt att hela produktutvecklingsteamet är i kontakt med användarna, blir kommunikationen av resultaten viktig.

Detta diplomarbete undersöker hur användarförståelse skapas och kommuniceras vidare i ett globalt teknologiföretag. Syftet är att identifiera nuvarande metoder och svårigheter. Arbetet bygger på en litteraturstudie, intervjuer med tio arbetare, samt tematisk analys som baserar sig på intervjuerna.

Resultaten visar att de centrala svårigheterna är relaterade till kommunikation. De orsakas bland annat av bristfällig förståelse för kollegor, samt brist på gemensam tid. Avsaknaden av ett fungerande system för att förvara studierna identifierades också som ett problem i arbetet.

Nyckelord:	Empatisk design, Kommunikation, Användarförståelse
Språk:	Engelska

Acknowledgements

I wish to thank my supervisor Katja Hölttä-Otto for all the support and guidance. A big thanks also to Antti for helping me with the code book and introducing me to the practicalities of research in empathic design.
Thank you to my advisor Jaana Hyvärinen and the company for giving me the opportunity to work with an interesting project. Thank you also Susanne and the design research team for the guidance and comments. I would also like to thank all the interviewees for their time and the interesting conversations we had.

Ett stort tack till Janne som kämpade på mig dagligen och hjälpte till med kodernas validering. Tack även till Cessi som korrekturläst arbetet nogrannare än någon annan ens kunnat försöka.
Tack till alla nya och gamla bekantskaper som gjort studietiden till något mycket mer speciellt än jag någonsin kunnat tänka mig.

Espoo, July 31, 2020

Teresia Borgman

Contents

Introduction

During the past decades, companies have realized that new methods are needed to gain a deeper understanding of their users, in order to provide suitable products and services [20]. To achieve this, a new branch of user-centered design has emerged. Empathic design enables a deeper connection with the user, by encouraging designers to empathize with them [36]. By experiencing emotions caused by the users' experiences, designers can gain a better understanding of the users' thoughts, actions, desires, and behavior [2]. This deeper understanding can lead to a better chance of identifying the users' latent, unarticulated needs, which increases the likelihood of finding new business opportunities [22].

Many techniques focusing on need finding encourages to empathize with the user. However, gaining a deep user understanding, requires close interaction with the user, which is both resource and time consuming [28]. To properly conduct empathic design, the whole company therefore has to understand the requirements of the method. Without a wide understanding, the researchers are not likely to receive the required tools for properly conducting the research, which results in a poor result. [36]

It is seldom efficient for all persons involved in the development process to meet the users. Hence, proper communication is a crucial part of empathic design. Since processing information and communicating it further, is seen to decrease the richness of the data, research that considers better ways of communicating empathy is be needed. [28, 37]

This thesis examines how empathic design is conducted in a global engineering and service company and aims to identify current methods and challenges. The research is conducted by interviewing gatherers and receivers of user understanding from a specific project and analyzing the interviews.

The findings from the study show, that the main challenges that occurred, are caused by a lack of communication, difficulties in finding common time and a need for a proper way of storing findings.

1.1 Problem statement

Plenty of research on the benefits of conducting empathic design has been made and many are emphasizing its importance. Still, there is little literature explaining how it could be implemented in practice or properly communicated to contain the original message. This thesis explains how empathic design is currently used and aims to identify current practice and challenges.

1.2 Structure of the Thesis

The first chapters of this thesis introduces the theory and current research regarding the topic. Chapter 2 deals with the definition of empathy and Chapter 3 introduces common ways of communication within companies. Chapter 4 provides an overview of what empathic design is, and what aspects have been researched.
The methods used for the study are explained in Chapter 5 and the examined project is described in Chapter 6. The findings from the study are presented in Chapter 7 and discussed further in Chapter 8.

Defining Empathy

The Cambridge dictionary defines empathy as

> *"The ability to share someone else's feelings or experiences by imagining what it would be like to be in that person's situation"*[7]

Even though empathy can easily be defined in a dictionary, there is not an agreed consensus on what it actually means among researchers, despite the many attempts. [5, 6, 8]

Empathy was first introduced in 1873 [20] in the German art history as the word *"Einfühlung"* where it was used as a projection into what one observed. Later on in the early 1900's when the term was introduced to the fields of sociology, psychology and psychotherapy by Theodor Lipps and Edward Titchener among others, it was translated to *"em"* (into) and *"pathos"* (feeling), giving us the current word, empathy. [2, 6, 20]

Both Lipps and Titchener saw empathy as an inner imitation of what was observed i.e. being exposed to another one's emotions leads to a reaction in the observer where they imitate the emotions to a smaller extent. This experience, today called motor mimicry, was seen to build a deeper understanding of what was observed. In contrast to Lipps and Titcheners idea, where empathy was seen as an active attempt where the observer is making an effort to share the feelings, a more passive interpretation was made by Kohler in 1929. He argued that empathy should be seen as a way to understand an other's feelings rather than sharing them. This was achievable through observing and interpreting a person. This new idea changed the view of empathy at that time, leaving out the action followed by understanding. [6]

2.1 Points of disagreement

Many more have provided definitions of the phenomenon ever since, and the central points of disagreement according to a review on 43 definitions done by Cuff et al. [5] seems to be the following aspects:

- **Should Cognitive and Affective empathy be separated?**
  In psychology empathy is divided into two sections, cognitive and affective empathy. The cognitive part refers to the ability of understanding another and being able to enter the role of the actor, gaining the ability to predict an other's action and behavior. Affective empathy again, is the experience of the emotion that sometimes leads to an action following this emotion. [2, 20] Another disagreement regarding cognitive empathy, is whether perspective taking, and cognitive empathy are the same or if perspective taking is a way to achieve empathy. [5]

- **Character of the awoken emotion**
  The character of the awoken emotion in the observer has also divided opinion. Some state that it can only be considered to be empathy if the emotion awoken in the observer is identical to the one being observed, while others argue that a similar response is enough. A few even states that the character of the emotion does not matter. [5]

- **Are emotional cues necessary to evoke empathy?**
  Many argue that empathy can only be directed toward an emotional other, meaning that emotional cues need to be addressed by another living creature, to be able to evoke empathy. Others state that empathy can also evoke towards fictional characters or by referring to one's own memories and experiences. [5]

- **To what extent should observers and actors emotions merge?**
  Some definitions encourage to maintain a clear separation between one's own experiences and the emotions being conveyed by the others emotional cues. This is done to maintain an awareness of which emotions would be considered as empathy and which the observer would feel in the same situation. In order to gain a better understanding, merging is needed to some extent. The difficulty is to define what the right amount of merging would be to gain a deep understanding, without confusing own emotions with empathy. [5]

- **Constant ability or situation dependent?**
  There is disagreement about whether empathy is an ability among humans that is constant, but vary between individuals, or whether it is dependent on context specific factors, such as surrounding. Some studies show that differences in the ability to emphasize occur due to anatomic differences and genetics, supporting the statement that empathy would be a constant. Whereas some other studies show that the level of a person's empathy towards another can vary depending on the target group. As an example, sex offenders tend to have a normal level of empathy, except toward their victims. [5]

- **Should behavioral outcome be included in empathy?**
  Studies disagree on whether the behavioral outcome, that often occurs after an emotional connection, should be included in empathy. An argument for separating it that also supports that empathy is situation dependent, is that a person feeling unsafe or threatened usually doesn't react with an action even though they normally would. There is also discussion about the character of the behavior. As an example, psychopaths tend to have a good understanding of humans, but the behavioral outcome can be to manipulate victims, which can be agreed not to be included in empathy. [5]

- **Is empathy an automatic response or can it be controlled?**
  It is disagreed upon whether empathy arises automatically when being exposed to someone else's emotions, or if it can be controlled. Some evidence show that empathy often evokes unconsciously when receiving emotional cues. There is also neuroscientific evidence of increased activity in empathy related areas in the brain, when asking people to empathize, meaning that empathy could be evoked by command. [5]

This variety in understanding the meaning of empathy could perhaps be explained by individuals having a different capability to empathize with someone else [20].

2.2 Definition used in thesis

Due to the unclear definition of empathy, and to avoid confusion when researching related topics, it is important to clarify what one means by empathy. [5] In this work empathy is seen as a part of a design approach that enables designers to gain a deep understanding of users. In the previously mentioned points of disagreement, the main argument is where to draw the line of what to include in empathy. In this work a whole design approach is studied and therefore the aim is not to identify or take a stand on the discussion of what to include. To have a better understanding of what is meant by empathy in this work, thoughts regarding the points of disagreement are shortly discussed.

Empathy as a part of a design approach is gained through exploration of the user's world by experiencing their thoughts and feelings (cognitive). A deep understanding requires merging to some extent with the user, but awareness of "the owner of the thoughts" is necessary to be able to reflect upon the user's emotions (affective). The character of the awoken emotion should be similar to the users, to ensure truthful understanding. Additional emotions, such as inspiration are also beneficial for motivating the designer.

People practicing empathy in design are not always able to meet the user and there is evidence of gained empathic understanding through using different tools, e.g. fictional characters, and therefore an emotional other is not considered to be necessary to gain empathy.
There are studies supporting the view that the ability to empathize is constant, situation dependent and controllable. Therefore, in this work people are seen to have an individual starting level of empathy, that is molded by their own experiences, but can be improved through practice. The ability is dependent on context specific factors, including surrounding but also the designer's own mindset. Empathy is an automatic response to an other's emotions, but it can be fostered by command or through practicing tools that enhance empathy [43] .

A behavioral outcome following the understanding is advantageous, since showing appreciation or understanding toward a user can make the user more comfortable and eager to help the designer to dig deeper into their lives, revealing more information. Translating this understanding into products and services could also be seen as a long-term behavioral outcome of the understanding.

Communication within companies

Changes in business trends during the past few decades have led to a more complex product development process. Multi-disciplinary teams are a commonality nowadays [12, 18] and it has become more common to develop the products in one location, producing it in another and sell it in a third. Spreading the development process has been crucial for global companies in order to gain an understanding of a wider range of users [27]. It has both increased the importance of communication, and brought more challenges, due to new communication barriers such as distance and cultural differences. [32]

Effective communication has been shown to have a curvilinear correlation with successful projects in product development [18]. It requires usage of many communication media but also knowledge of which media is most suitable for certain information types and for different needs required by the team. [27] It is also important to balance the amount of communication to reach the wanted outcome. Evidence show, that too poor communication can decrease a team's performance [17], while too extensive communication can lead to team members being overwhelmed, also resulting in a declined performance [9].

Allen [1] has identified three different types of communication that occur in a company. These three types are 1) Coordination, 2) Information and 3) Inspiration. Coordination is used for coordinating work among individuals, to stay up to date on what others do. This is important especially in projects that have many subsystems that later need to be successfully assembled. Communication of information is crucial for keeping workers' knowledge updated. This is important when there are fast changing factors, which often is the case in product development. The third

communication type, inspiration, increases creativity and motivation among workers. [1] Inspiring workers has been shown to have positive effects on the project outcome [40]. All three types carry different kind of information and therefore also require different media for efficiently communicating the information.

3.1 Differences in communication media

The media used for communication is often defined by the character of the information. [1, 23, 32] There are several options available, of which email, phone calls, video calls and face to face communication are the most commonly compared among researchers. Achieving an effective communication includes a combination of these, due to their different benefits. [27]

Emails have been shown to be the most effective tool for communication over different time zones, due to its flexibility and asynchrony. [14] It is a rather slow media, [18] but since it is in written form it gives the receiver time to analyze the content, which allows a better understanding. [45] This is beneficial for complex information [45] and in situations when the communicators do not share a language, since it gives time for proper translation. The other media, which are verbal, do not perform as well in multilingual situations because it is difficult to look up words on the spot. Emails are also better for storing information, compared to the verbal ones, since it automatically leaves a trace. [45] On the downside, research has shown that emails are often interpreted in a more negative tone than intended, which can harm co-workers' relationships, increasing the likelihood of conflicts at workplaces [4].

The verbal media are more suitable for emotional transfer, since they also transfer the tone of the message. [11] They allow more feedback from the receiver, e.g. through tone and body language, which is important for ensuring understanding or to notice misunderstandings [18]. Phone calls are often used for less complex and less detailed transfer of information [1], since it does not allow visual data or leave an automatic record. [18]

The richest media for communication is face to face communication [18, 45]. Meeting someone in person builds up a social connection between the persons, which lowers the effort of contacting them in less urgent matters. This enables a more casual exchange of information, which

increases team spirit. [18] It is not always possible or beneficial to gather employees in one place, especially in global companies with employees around the world. In long distance communication, video calls are therefore a good option, although they require scheduling in advance [1]. This leaves out spontaneous discussions when bumping into people, which have been shown to improve teamwork. [13].

A newer media, that has become more popular in workplaces is instant messaging or IM [35]. Research shows that it is preferred even over face to face conversation for informal discussions, because it is less intrusive and allows participants to multitask while chatting [16]. [33] Unlike the other media, IM shows the receivers status of availability, signaling to others when people are available for contact [34, 35]. Research shows that IM is mostly used for informal discussion, short questions and clarifications and for scheduling meetings through the other media. [16] In some companies IM has been negatively influenced by the statement that it is prone to interrupt workers [16, 33], although a recent study has shown that IM only causes 5% of workplace interruptions [34]. IM is often preferred over email in casual conversations, due to a more social experience [21] and its fast answering time [35], and over video calls due to its privacy [16] and spontaneous character [35].

It is important that those who define the communication tools used in a company understands the needs of their team's communication. Managers tend to communicate less complex information and therefore use phone calls and emails more frequently than engineers and scientists. One problem that occur due to this is that managers generalize from their own experiences and expect the same tools to work within the whole company. This can result in less efficient communication and restricted opportunities for face to face communication among teams in different locations, which can be crucial in product development. [1]

3.2 Communication barriers

Despite the many options for communication, Roschuni et al. argue [39] that a proper media or clear representation of information is not enough for good communication. The communicator should also be aware of their audience and meet their needs. Factors that can affect the delivery of a message can depend on lack of understanding of the audience, but also on physical barriers such as distance. These communication barriers should be

considered in communication to ensure mutual understanding.

McDonough et al. [27] have conducted research on differences in communication among countries and have identified differences in their demands on information and internal communication patterns. A comparison between product development teams in France and the United states shows that the teams have different demands on their data. The French team preferred to gain a big picture first, requiring data of the whole problem, while the U.S. team preferred starting with smaller details, requiring more detailed information of a smaller spectrum. Another finding is that U.S. teams are more comfortable with approaching and even questioning their managers and team members, compared to Japanese teams. Regarding communication with other departments within the company it was common for U.S teams to directly contact the other department. In Japan on the other hand, this was not seen as appropriate. Instead their contact to other departments was passed by the managers of both teams before reaching the person intended. Adding handovers to communication is likely to increase the risk of modifying the content along the way, resulting in more misunderstandings. The study also identifies differences in complexity of discussion depending on the native language of the participants. Situations where workers communicate in another language than their native, constrained the complexity of the content. [27]

Another factor that is considered as a communication barrier is distance between the people communicating. According to Allen [1] people working closer to each other have a better relationship, leading to a more frequent communication through all media. When people are likely to run into each other, they are more prone to discuss informal and less urgent matters, which improves their relationship and collaboration [27]. However, the study shows a drastic change in frequency of weekly communication within the first 50m, after which the frequency stays almost the same as illustrated in Figure 3.1. This means that the likelihood of communicating with a colleague who is located 50m away almost equals a colleague who is 500km away. The change is even more drastic vertically, meaning that communication is less likely for people working on different floors.

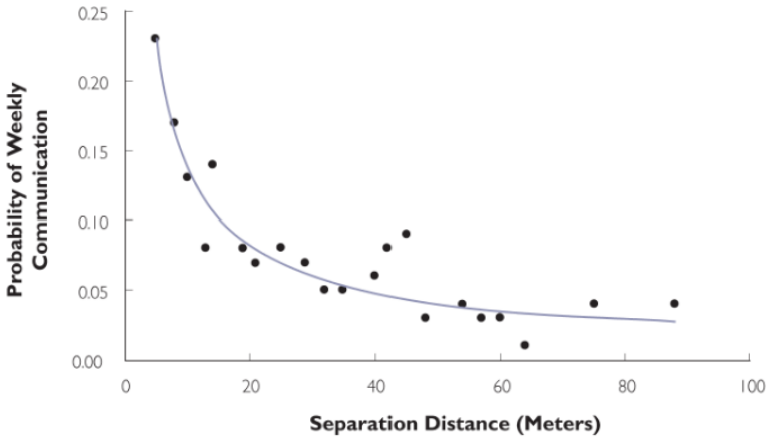

Figure 3.1: The frequency of technical communication in companies [1].

Variation in the level of understanding the content and team size can also be seen as a communication barrier. The variations of understanding can be caused by differences in educational level or field, or different personal point of views. [38] Teams tend to use field specific terminology which can cause confusion or misunderstandings when communicating across different departments [30]. The team size also affects communication. Smaller teams tend to have a closer relationship and more frequent communication with each other. One reason for this is that smaller teams often work with similar things and have common interests [1].

Personal factors can also cause disturbance in communication. They are more difficult to predict because they are not definite. Such internal distractions can be headaches or worries [38] that weaken the concentration and can lead to a less constructed message or poorly receptive receiver.

Empathic design

Empathy entered the world of design in the late 90's as a result of companies realizing that their current methods, including interviews and polls, were not enough to develop successful products [20, 36]. They became more aware of the need to fully understand the user, to be able to both identify and fulfil the user's needs with suitable products and services. [43] As a result, a new approach to user-centered design was created. This encouraged designers to be more empathic, allowing them to gain a better understanding of the users and their needs. [20]

The new approach called Empathic design is a way to become closer with the user through empathizing with them. [36] This means that the designer creates an understanding of the users experiences, thoughts, desires and behavior by experiencing emotions caused by the users emotions [2]. Some researchers use the phrase "stepping into" the user's life to describe this process of exploration. After gaining a deep understanding of the user and having emotional response, the designer should reflect on these emotions, and translate it into user-centered products and services. [20, 36] Finding a balance between these elements is argued to be the core of empathic design but also its greatest challenge. [20]

To gain a better understanding of what empathic design includes, Postma et al. [36] compares it to the four principles of user-centered design. These principles are presented in Figure 4.1. The first principle is to find a balance between rationality and emotions, which helps designers to understand what kind of emotions their product will evoke in the user and what makes the user like it. In empathic design this is identified by observing users and comparing their actions with assumptions of what they think and feel. The second principle is the need for empathic inference of the user, which in empathic design is to gain a deep understanding of the user through empathy. The third principle encourages to involve users in

the developing process as partners, where they are seen as experts and can give input throughout the developing process. In empathic design this connection should be maintained throughout the process to sustain a deep understanding of users. The fourth principle is to increase collaboration between designers and researchers, which is important in empathic design to ensure that users' perspectives are considered when making decisions.

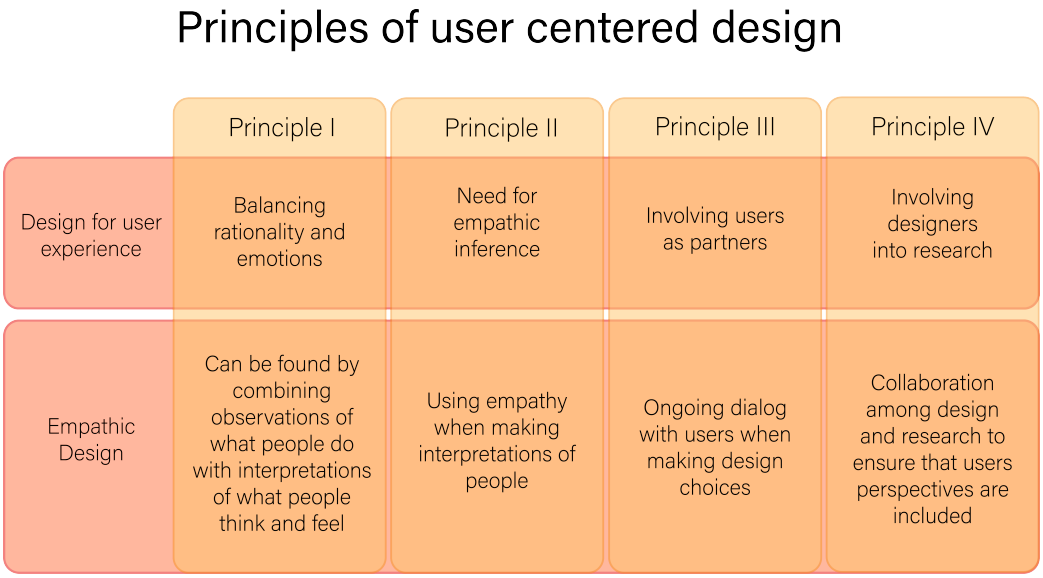

Figure 4.1: The four principles of user-centered design compared with empathic design.

One of the greatest benefits of using empathy, is that it helps in finding latent needs, which can lead to new business opportunities [22]. Latent needs can be difficult to find, since they are needs that the users have but either do not know about or are not able to articulate. These can be situations where users have been blinded by their real needs by their habits or where the users want to please the designer and therefore lie. [15, 22] Another problem is that even though a product meets all needs, the user might not want to use the product anyway. One example of this is a young girl who had a leg operation and has to use a walking frame to help the leg to heal. She associates walking frames with elderly people and feels ashamed of using it, and therefore avoids it, which results in a longer healing process. [44] These examples show that there is a need for the new empathic design approach, that can identify this kind of problems before the product or service has been produced, and save both time and money. Due to this ability to identify latent needs, the approach is most suitable in

the early stages of product development. However, as the world and the user's opinions might change during the development time, it is beneficial to update the understanding regularly, making empathic design useful throughout the process.

4.1 Gaining empathy in design

Empathic design has been praised by many researchers and designers due to its numerous benefits. Even though there are many successful examples of empathic design, there is little literature explaining how it can be implemented and practiced. [20, 36]. This is due to the approach being relatively new and most of the work being exploratory. This means that there is not enough research or evidence to show that a certain method is performing better than others [19]. A common language and agreement on what aspects should be studied is also missing, making it a difficult field to enter. [20]

Many researchers agree that empathic design can best be practiced by direct interaction with the users, [20], which ideally would last throughout the design process. [28] In direct contact, the understanding can be gained through listening to what the users have to say and by observing what they do. These methods are also used in traditional design research. The difference in empathic design is that after the insights of what users say and do are gathered, these outcomes are interpreted and compared with each other to gain an understanding of what the users feel and why. [40] The structure of the interviews and observations might also vary between traditional design research and empathic design.

4.1.1 Current tools

Methods from other fields has been adapted to the field of design, to find a way to practice empathy in design. [43] Some examples that were found in the reviewed literature are presented below.

Framework for empathic design
Kouprie and Sleeswijk Visser [20] have created a framework for gaining empathy in design, that is based on methods used in psychology. Based on their review they have identified four stages that a designer should go

through when emphasizing with the user. The stages reflect different relations between the designer and the user and they are the following:

1. **Discovery**
   The first step is to approach the user either in person or by familiarizing oneself with material about the user. The interest toward the user increases which makes the designer more eager to explore the user and their environment.

2. **Immersion**
   The second stage includes an active role-taking by the designer by stepping into the user's world and releasing their own view for a moment. This stage requires the designer to be open-minded and through this experience the designer's knowledge about the user will expand.

3. **Connection**
   In this stage the designer compares their own experiences and memories with the ones experienced by the user in order to create a better understanding.

4. **Detachment**
   In the last stage the designer recalls his own view, stepping away from the user's world to be able to reflect upon the users experience. By reflecting on the experiment, the designer gets new insights and inspiration for generating ideas for solutions or products.

Leonard and Rayports method

A similar approach was made by Leonard and Rayport [22] where similar stages are identified as in Koupries and Sleeswijk Vissers method, but it goes a step further into the developing process by including ideation and prototyping. This method includes the following steps: 1) observation, 2) capture of data, 3) reflection and analysis, 4) brainstorming solutions 5) prototyping possible solutions [22].

Lead users

Lin and Seepersad [24] propose that designers become lead users to discover latent needs. This is done by making the designers experience the product in radical ways, e.g. through modifications in the environment or in the user's abilities. These new ways of experiencing the product increase innovation and understanding toward different users. [24]

4.1.2 Building an empathic environment

When practicing empathic design within a company, it is not enough to only practice it within the design team. The success of the outcome often depends on how receptive the company is towards the design approach. If the company does not see or understand the benefits of the method, the design team might not receive the support and resources they need for a fruitful outcome. [36] On the other hand, the company's trust in the method depends to some extent on how well it has worked in previous projects.

Sanders and Dandavate [40] include user-centered design approaches into architecture and planning. A project that was planned to take a few years but after five years they are only beginning to see some progress. This example shows how complicated it can be to practice user-centered design approaches in a company. From this journey, Sanders identifies five levels on which empathic design should be embedded within a company, to have a fruitful outcome. These five levels are presented in Figure 4.2 and include 1) Tools and techniques, 2) Methods, 3) Methodology, 4) Mindset and 5) Culture.

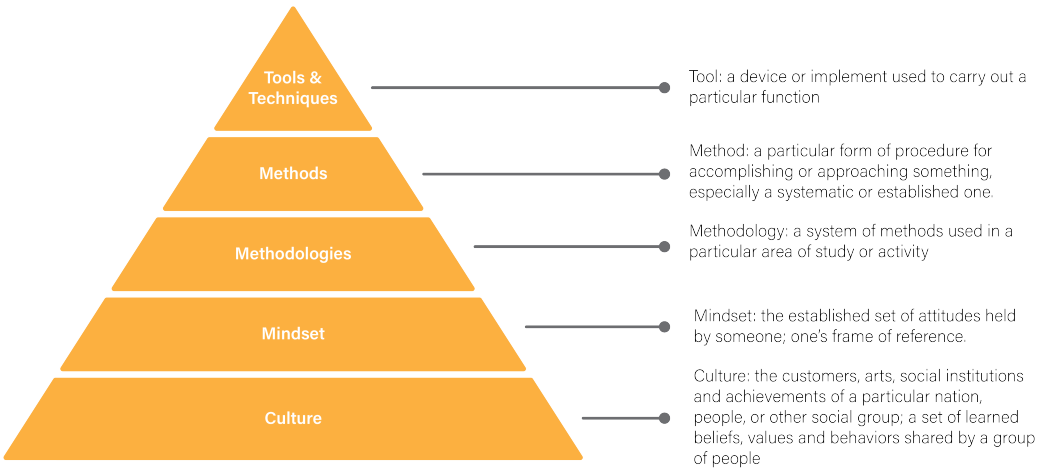

Figure 4.2: The 5 levels on which user-centered design should be embedded to have successful outcome.[40]

Battarbee et al. [3] also highlight the importance of sharing the empathic mindset beyond the design team, to accomplish an impact throughout the organization. To accomplish this there has to be support and understanding towards the design team from the rest of the organization. In other words, it is important that the organization as a whole understands the importance of the design team creating empathic user understanding.

4.2 Communicating user understanding

Even though user understanding is best received from direct contact with the user, it is seldom efficient to send all persons developing a product to meet the user [28, 37]. Hence, proper communication is crucial. The main challenges in communicating user findings is to transfer the information in a way that benefit the receiver and to maintain the richness of the data, enabling receivers to develop empathy. [36, 42] Since the current ways of communication are seen to be lacking rich data and are delivered in an inconvenient form, new ways of communication are needed. [28, 47]

4.2.1 Current ways of communicating user understanding

According to Sleeswijk Visser et al. [42] the most common way to communicate user understandings is through written reports. The reports often contain a summary of how the results were gathered, in what way they were analyzed and what the main insights were. [42] Written reports are good for communicating extensive amounts of data [42] and for cognitive understanding [43]. However, they often lack affective data, which is essential for gaining empathy. [43]

Several studies show that designers generally prefer visual communication [28, 41, 42], making written reports inconvenient [42]. Therefore, visual techniques that promote empathy by bringing the user closer to the audience, have been developed. [15] Empathic design techniques that are commonly referred to in research are shortly explained below.

Empathic design techniques

- **Storyboards**
  Storyboards are a way to visualize situations to provide a better understanding for the reader of what is happening. They are often built like comic strips and were originally used for planning movies. In product design, storyboards can for example be used to visualize scenarios of interaction between users and products. [46]

- **Customer journeys**
  Customer journeys are used to map the process that a customer goes through while using a product or service. By visualizing the process,

designers can gain valuable insights of each step that the customer has to go through during the process. [25]

- **Personas**
  A persona is a fictive character that is made to represent a certain user group. To personalize the personas, they are given names and a face that suits the user group. The character is also presented with a description of its persona and life status, what they like and dislike and their specific needs for the developed concept. The aim with personas is to make them feel like real persons and through them give rich information about real users. [31]

- **Cultural probes**
  Cultural probes are physical packages of information that contain information of the user that they have documented themselves. These packages can e.g. include maps, cameras, and postcards, and are first given to users, with instructions on how to use them. As an example, the user can be instructed to mark the places they have visited during the past days on a map. After a specified time, the probes are collected from the users. They can then be used by designers during workshops to give inspiration in the development of products or services. [10]

These techniques have been designed to work well among designers, since they require the ability to change one's mindset from reflective to emotional, which is practiced in design education. [3] Since the transition is less familiar for non-designers, it becomes harder to benefit from the methods to the same extent as designers do. For this reason, methods for communicating with non-designers have been explored for the past years. Different ways of co-designing have been proposed, where stakeholders are included in the ideation process to increase common understanding. [43]

4.2.2 Enhancing empathy in communication

Empathy can be enhanced in communication by choosing a suitable format for communication for the receiving audience. This requires an understanding of the audience and its needs. Roschuni et al. [39] propose using similar methods as in user research to familiarize oneself with the audience.

Interactive communication techniques also enhance empathy. Gaining empathy is an individual process, but the understanding can be increased

through discussion in teams. [20] For that reason, communication of user research would benefit from an interactive format. Interactive tools also help participants to gain a playful mood where hierarchical structure between participants is forgotten. This mindset is seen to evoke exploration of new perspectives and increases motivation [3]. [43]

4.3 Limitations

Even though empathy has potential to increase user understanding, possibly leading to a blooming business, it has its flaws. Empathic design relies on people's ability to empathize with users. [26] However, when taking personal matters into account, it becomes more complicated. The level of gained empathy depends on the designer's motivation and emotional state, which means that even stress or tiredness may affect the amount of empathy that can be gained [20].

Every person also has their own empathic horizon, meaning that it is easier to empathize with people who are similar to oneself, due to nationality, gender, culture or education. This means that variations in the level of gained empathy occur, depending on whether the user happens to be within the designer's empathic horizon or not. [20]

In some cases, the receivers of the user data are skeptical about the given information. McGinley and Dong [28], show that designers feel mistrust in the data they receive, since it is analyzed and interpreted before being transferred to them. Similarly, Postma et al. [36] found that the receivers doubt that all aspects are covered with the empathic design method. However, due to lack of time and inconvenience of having too many persons attending user research, communication is essential. A better understanding of and trust for the method is therefore needed.

Methods

This thesis examines how empathic user understanding is currently gathered and communicated in a global engineering and service company. The thesis is based on a literature review, interviews of ten workers from the company and a thematic analysis of the interviews.

In order to familiarize with the company's current status of using user-centered design methods and their project development process, two managers were interviewed. Different aspects of the product development process, including methods, participants, origin, and ways to identify user needs, were discussed to gain an overall understanding of projects within the company. The commonness of empathy as a design method and its benefits, as well as ways to communicate understanding from user studies were discussed to establish an understanding of how broadly user-centered design is practiced within the company. These interviews show that the processes vary depending on the project's character, and therefore one project was chosen to be examined closer. The chosen project had started a few years earlier and is presented further in Chapter 6.

The case study's product is made accessible to end users through other businesses and therefore both the customers, who are buying it, and the end users, who will be using it, are considered in the need finding. Due to the product being publicly accessible, the customers are also considered as end users. For this reason, both gatherers of user and customer understanding, including three service designers and one user experience (UX) designer were interviewed. During the interviews, the methods, and tools for both gathering and communicating user and customer understating were discussed. The discussion guide for the interviews is found in Appendix B. These designers will from now on be referred to as gatherers of user understanding.

An interview was conducted with the project manager, to verify current understanding of the process and to decide upon the receivers to interview. Lastly, three receivers were interviewed, including an UI designer, an industrial designer, and a hardware designer, to gain different points of view on the matter. The discussion guide of the receiver interviews is found in Appendix C. These designers will be referred to as receivers of user or customer understanding.

All interviews were semi-structured to allow a freeer discussion, with the intention of gaining a deeper understanding. The interviews lasted for approximately 1h, with some variation. The first six interviews were held face to face in a conference room, while the last four were held through video calls, due to the outbreak of Covid-19. Three of the video calls worked well and no major differences was seen between them and the previous ones. Technical issues occurred during one call which affected the interview, but this was solved by changing it to a phone call.

The interviews were recorded and transcribed, to allow a better understanding of the content, after which they were analyzed through thematic analysis to find central themes. The process contained finding relevant information from the interviews and categorizing them into main codes and sub codes. The first version was made by adding citations on post-it notes and gathering similar ones together. A common theme was then identified to all groups, creating a total of 21 themes. One interview was given to a doctoral student to categorize, after which the categorizations were discussed to verify a good structure. A second version, consisting of ten themes, was made based on the feedback. One more iteration was made and a visualization of the found codes, some sub codes and some of their references are shown in Figure 5.1 to give an idea of the structure. The codes were then transformed into a code book which display on what basis the codes were created. Each code has a few examples to give a clearer picture of what is included. An example of one of the codes is shown below in Table 5.1 and the complete code book is shown in Appendix A.

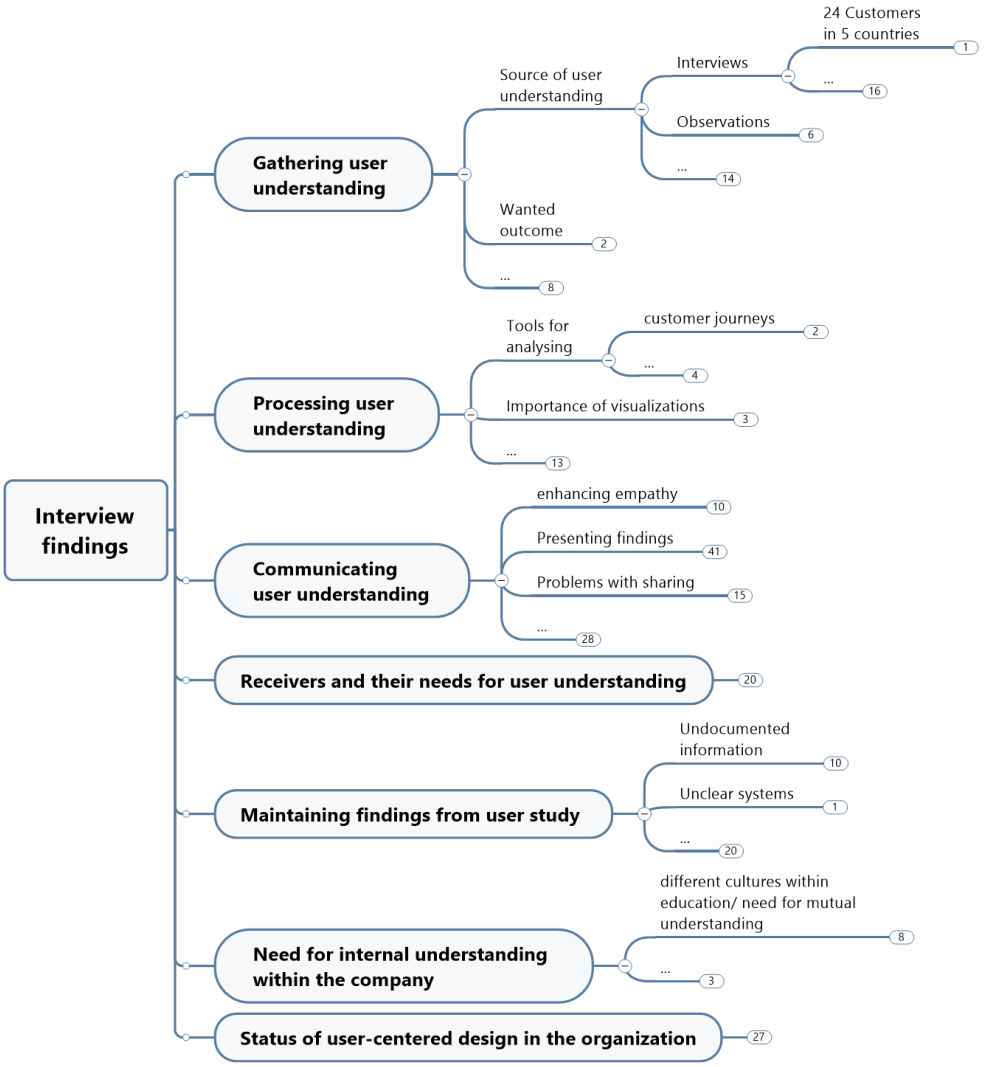

Figure 5.1: A visualization of the main categories and some of the subcategories that were found in the interviews. The numbers and "..." indicate branches that are hidden due to limited space.

Gathering user understanding	
Description	Ways of gathering user and customer understanding.
Qualifications or exclusions	It includes different methods, people, sources, techniques, and tools, but also challenges that occur during the process. Validation of user understanding is also included since it is seen to deepen the understanding.
Examples	*"In the beginning we do interviews where we don't even know what kind of answers we are looking for. We ask for user needs and make concepts based on them. "* *"Sometimes we film interviews but it takes time and it is hard to get permissions. The interviewees are already a bit afraid of the audio recorder so filming the interview might prevent them from speaking openly"*

Table 5.1: An example of the structure of the codes.

To validate the code book, the inter-rater reliability (IRR) was calculated. It included 54 randomly generated quotes of the total 334, with a minimum of seven quotes of each code. The quotes were given to a rater as an excel file, where the quotes from the interviews were presented. The length of the quotes varied from parts of a sentence to a few sentences. The quotes where then categorized by the rater according to the code book. The rater knew the aim of the thesis but did not have any previous knowledge of the design method. After categorizing the quotes, the rater complained that a lack of context in the quotes made accurate categorization difficult. The quotes were made clearer by highlighting the relevant parts of the quote or adding a comment to provide more context. The quotes where then categorized a second time.

The results were gained through calculating Cohen's kappa value of both the whole categorization as for each category individually. Cohen's kappa shows the agreement of the categorizations between two raters, where 1 shows full agreement and 0 shows no agreement. The kappa value is calculated with the following formula:

$$\kappa = \frac{(p_0 - p_e)}{(1 - p_e)}$$

where p_0 is the percentage of matching categorizations and p_e is the probability of matching categories by chance.[29]

The κ value of the whole code book is 0.83 and each category's individual κ values are presented in Table 5.2. The amount of quotes from each code are also shown in the table.

Code	**Amount of quotes**	κ
Code Book	**54/334**	**0.83**
Status of user centered design	7/31	0.57
Gathering user understanding	7/68	0.85
Processing user understanding	7/14	0.85
Communicating user understanding	11/141	0.82
Maintaining findings from user study	7/28	0.91
Receivers and their needs for user understanding	8/27	1.00
Need for internal understanding within the company	7/25	0.71

Table 5.2: The κ values of each code.

The code books' κ value is seen to have a strong level of agreement according to Cohen's suggested interpretation. The interpretation is shown in Table 5.3. [29]

κ	**Level of agreement**	**The % of reliable data**
0 - 0.20	None	0 - 4%
0.21 - 0.39	Minimal	4 - 15%
0.4 - 0.59	Weak	15 - 35%
0.60 -0.79	Moderate	35 - 63%
0.80 - 0.90	Strong	64 - 81%
Above 0.90	Almost perfect	82 - 100%

Table 5.3: Cohen's suggested interpretation of the κ value. [29]

Case study

Due to the reason that different methods were practiced within the company when gathering and communicating user understanding, one project was chosen to be studied closer to gain an understanding of one whole project rather than pieces of different ones. The chosen project's agenda was to renew an older product. The different stages of the project are visualized below to give a better understanding of them.

1. **Looking for business opportunities**
   Information is gathered from different aspects and used as a base for the first concepts. The concepts are validated with customer groups and developed further until the three requirements are fulfilled, including 1) concept brings value to customer, 2) a business opportunity is found, 3) technology risks are manageable.

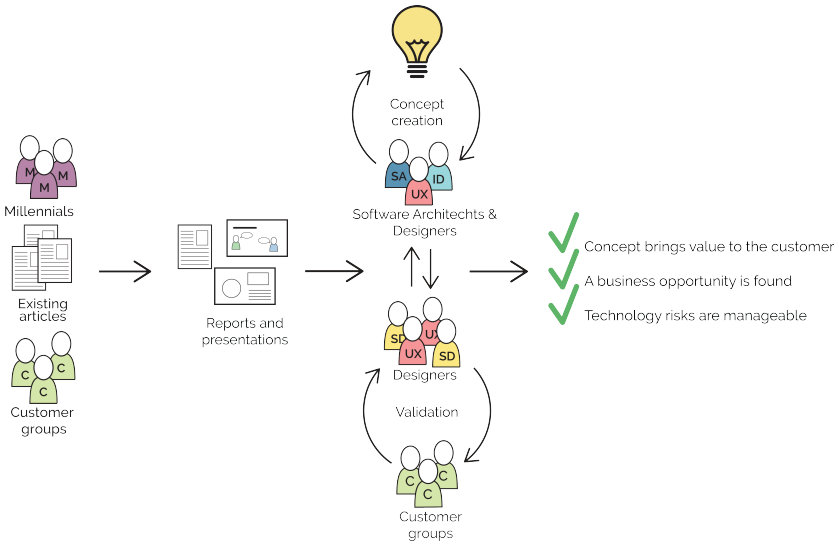

Figure 6.1: Identifying business opportunities for a potential project.

2. **Decision to start project**
   When the three requirements are fulfilled the decision to start the project is made. Now, the project core team is established, resources and budget are defined, and requirements are locked.

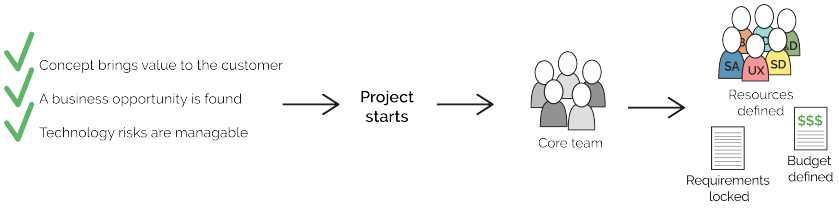

Figure 6.2: Project is started for identified business opportunity.

3. **Development and iteration**
   Concepts are developed further and then validated with customers and users. The loop continues through different phases of concepts, starting from paper prototypes and ending in a final version of the product.

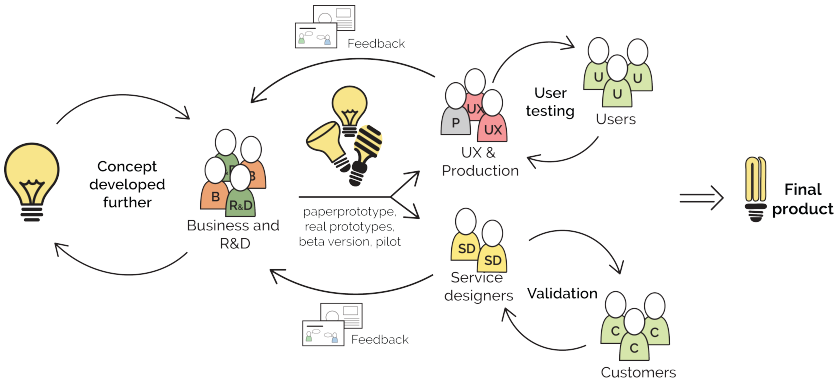

Figure 6.3: Process of iterating concepts.

This thesis focuses mainly on the validation shown in Figure 6.1, the validation and user testing in Figure 6.3 and the communication of the findings from those studies. During the interviews, the product was still being iterated and not yet released.

Research Findings

This chapter presents the findings from the conducted interviews. First, the current status of user-centered design is presented, followed by the process of gathering, processing, communicating and maintaining user and customer understanding. Finally, identified challenges and the interviewees ideas for improvements are presented. To gain a better view of the categorization of the findings and how they are linked, the processes are visualized in Figure 7.1. The information is first gathered, and the gained raw data is processed. The processed data is then included in documents that are communicated further or stored for later use. The first three stages are dependent on the previous stage, while the communication and documentation can happen simultaneously. An internal understanding is needed both for gatherers and receivers to allow good collaboration. The status of user-centered design can be observed throughout the process.

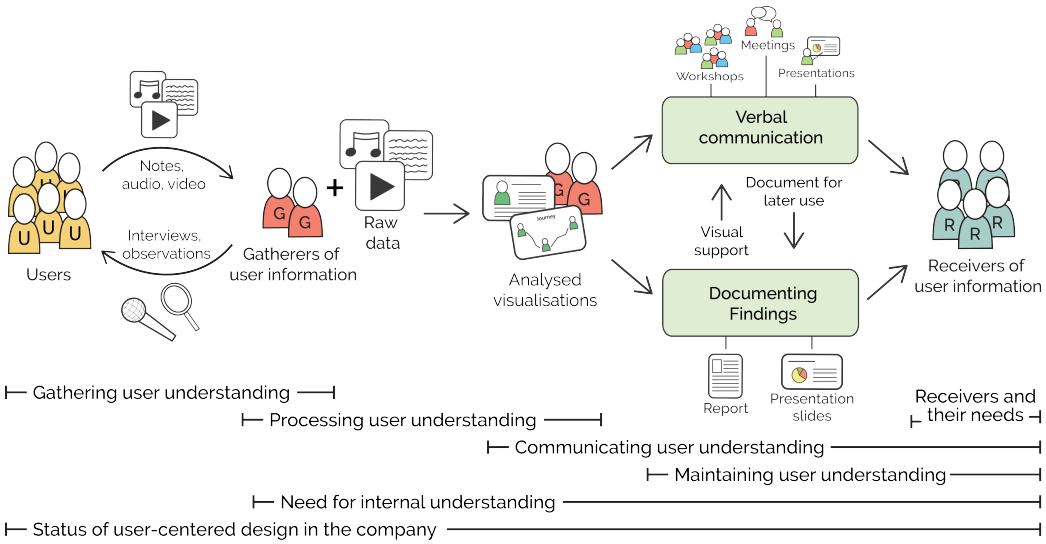

Figure 7.1: Visualization of the found categories and their linkage

7.1 Status of user-centered design in the company

In 2014 the company started to change their mindset into gaining a more user-centered approach to their design methods by bringing a service design team into their process. One of the designers describes the change as

> *"We were the odd guys inside the company"*

and

> *"There was a lot to learn regarding empathy, both for the design teams and others to understand the benefits from using it"*

Becoming more user-centered was seen to prevent the company from doing expensive mistakes and instead *"fail early and cheap"* as one of the gatherers state. It was also seen to remind workers of why and for whom the products were produced.

The company wanted to achieve a deep understanding of both the user and the customer to gain a better understanding of what requirements the final product should really meet. In order to understand this, thorough research should be made. It was important to understand that there was not only one kind of user but a whole environment of users with different needs and ambitions that had to be considered when designing new services and products.

Becoming more user-centered had been highlighted for a longer time and it had also started to show some results. People had become more interested in hearing about users' and customers' needs and were more willing to make an effort to meet them. There were still aspects that needed to be improved but two of the interviewees seemed to be hopeful of the outcome.

> *"If and when new products are launched, and bring success through design, the appreciation of the design teams and the user understanding will increase naturally"*

> *"When people learn how to benefit from empathy, whatever it is, it will improve our processes and way of working"*

7.2 Gathering information

Before the actual decision to start the project was made, information was gathered from many aspects to find an opportunity for a new product or service. The business team looked into articles to see what was happening in the field, who were the decision makers and what was currently highlighted. An external design consultancy travelled to different countries and discussed with customers to find needs for a product or service. A study to map the millennial's thoughts about the world and their values was carried out. Through these investigations a need for a new product was found and more specific research about users' and customers' needs could begin.

The project specific research was mostly done by the service design team, who collected understanding from customers and the user experience team (UX), who gathered user understanding. Even though the research methods had become more user-centered, the gatherers would have preferred to start the studies from scratch. In that way they would be able to ensure that bringing certain features to the market would genuinely come from users' needs and not just because the competitor has a similar product. In this case, the first customer study was made by an external consultancy. Since designers can feel mistrust against raw data that has been gathered by others [28], the interviewees wish for starting from scratch might reflect mistrust in the previously gathered data.
Other sources of understanding that were identified were direct feedback from customers through the business team or frontlines and knowledge that have been gathered from previous projects. There is however a need to confirm the previous knowledge with the customer to ensure that it is up to date.

7.2.1 Gathering customer understanding

Customer understanding was mainly gathered through interviews with the customers. The information received from the pre-studies was used to make hypotheses about possible outcomes, that were used as a base for the discussion. A template of the customer journey and a discussion guide was also prepared to help keeping the interview focused. Generally, other teams in the project were asked to complete the documents if needed but it was not a standard procedure and there would be room for improvement, according to one of the gatherers. The agenda of the interviews mainly focused on how customers measure success, what they value and what they

are struggling with, and discussion about the hypotheses. The gatherers often showed pictures, 3D models or videos of the concepts during the interviews to make the discussion more concrete and to ensure mutual understanding.

To receive a wide understanding, a total of 24 customers were interviewed from five countries, enabling insights from different cultures. The interviews lasted for approximately 1,5h and were held by two designers, which was seen to allow a deeper understanding than interviewing alone.

> *"When you have two pairs of ears and two brains, the other one might interpret the information differently"*

The gatherers state that working in pairs is optimal time wise, since it enables discussion, which was seen especially useful when analyzing the findings, speeding up the process. Kouprie and Sleeswijk Visser [20] show that a broader understanding can be gained by choosing interviewers with different backgrounds, since it gives different ways on interpreting the situation. Even though supported by the gatherers, one of them state that it was not seen as an option in the company due to limited resources.

The interviews were usually held in a conference room, which was unfortunate according to one gatherer, since it did not allow them to experience the real environment where the customer would use the product. The interviews were audio recorded to gain a more thorough understanding since it was hard to take in all the information during the actual interview. Audio recording was considered crucial and one gatherer state that interviewing without audio recording was seen as a waste of time.

> *"When you listen to the recording afterwards, you understand the double amount of what you understood during the interview, especially if you have interviewed a specialist. In one sentence there can be a kilometer-long content"*

The gatherers would also prefer video recording to some extent because it would make it easier to transfer the understanding further. They are however concerned that by bringing a camera into the interview situation would make the interviewee uncomfortable, resulting in shallower answers. One of the gatherers also say that it is hard to get permission for filming and GDPR makes it even more complicated.

One designer had realized from previous experience that bringing several interviewees together often result in deeper discussions among the

participants and therefore it is preferred to have more than one participant representing the customer. In an interview, these deeper discussions were seen to have a higher probability of bringing up themes that gatherers would not have been able to ask themselves and can therefore result in more thorough results.

Another way to increase understanding, preferred by the gatherers and also supported by Svela et al. [43], is to work together with the customer. This had been used in some cases, but it was not a common practice in the company.

> *"The ideal situation would be to create concepts together with the customer"*

One of the challenges regarding customer interviews was finding voluntary participants. The interviews were often agreed on through the frontline, who are the company's contact to the clients. They were overly cautious about their customers and not keen on disturbing them for design research matters. The gatherers had to carefully explain why they wanted to meet with the customers and were hoping for a change toward an easier access to customers.

7.2.2 Gathering user understanding

User understanding was mostly gathered from observations, interviews, and user tests. In the beginning of the project, users were observed in the environment where the developed product would be used to observe their behavior that was documented with pictures, videos and written notes. Like the customer interviews, observations were made in several countries to gain a broader understanding. The locations were chosen based on the location of the company's customers. Understanding was also gathered through interviews with users representing different user groups, including users with a different approach to the product such as operators and end users, but also users with differences in disability. An online survey was also carried out to reach more users.

When enough understanding was received and concepts were created, user testing were carried out both to validate understanding and to deepen the current understanding through observing users handle the product. Two gatherers highlight the importance of validation since it is the main way of checking if the users have been correctly understood.

> *"Every once in a while, we should check the user's pulses to see in what direction it is going"*

One of the designers also point out that the development process is long, and users can change their mind along the way, which makes validation even more important.

The user testing were held along the development process and had a varying structure. One way of conducting user testing was to simulate a situation where a prototype was used. To make the situation more real, company workers were used to simulate a crowded environment. The test subjects were chosen in a way that they did not preferably have previous knowledge about the product or any prejudice. After the simulation, the participants were shortly interviewed to see which features of the product they liked and disliked.

In another stage, the prototype was rigged in the company's building for a longer period of time and left unattended. Cameras were placed in the room to be able to observe how the users behaved and which features of the prototype were used. This set up was used with different concepts and afterwards users were asked which one they preferred and if they had noticed any differences between the concepts.

7.3 Processing findings

After the user and customer understanding has been gathered, the information is processed by the gatherers, both to deepen their own understanding and to transform it into a suitable form to be communicated further. The interviews and observations were analyzed, and the findings where then visualized to give a better understanding of the process as a whole.

> *"When you map the processes you can more easily point out things that cannot work as planned because the needed tools or knowledge is not available, and something need to be done about it"*

Different methods were used for visualization including scenarios, customer or user journeys, 'jobs to be done' and 'end to end' processes. Scenarios were used to create an imaginary environment where the new product would be used. A user journey was created to build on the scenario, which mapped the journey of the users, visualizing the needs and problems they have in the environment. In this way the implementation of the product became more concrete and latent needs or possible challenges

could more easily be found. While the customer journeys were used to map the user's journey, the 'end to end' process was used to map the products' journey. This method included mapping how the product was built, installed, serviced, maintained and operated, and was therefore seen to be useful for giving the whole project team an overall view. The 'jobs to be done' visualization was mostly used within the design team while the other ones were presented to other departments. However, the design teams were trying to figure out how others could benefit from the jobs to be done visualization as well. These visualizations were often included in presentations and reports to be communicated further. In some cases, a video was also edited from the recorded interviews and observations to collect the main findings and to better capture the emotions.

7.4 Communicating understanding

After transforming the findings into a presentable form, the information was communicated further through presentations, reports and different workshops. The format depended on the receiving audience, which was mainly the project team but also managers, stakeholders, the business team and in some cases the whole organization. The presentations and workshops often focused on a narrower aspect chosen depending on the audience, while the report contained the whole study.

7.4.1 Report

A report was made in the end of each user and customer study. Microsoft PowerPoint was mainly used for the reports, since it was an easy way of presenting findings and everyone had access to the program, which was not the case with Adobes programs. One of the gatherers commented that PowerPoint was preferred over Word, since nobody would probably read any Microsoft Word documents. The report could occasionally be presented in a video format, but it was less common.

The reports presented information of how the study was conducted, the analyses, the findings, and recommendations on what could be done. The content was very visual, which was important for all the gatherers, and it included lots of pictures and visualizations of the different maps. The user was also brought closer by using quotes and storytelling. The content was

structured depending on the projects demands, which was unfortunate both according to one gatherer and two receivers, because it sometimes filtered important information due to being irrelevant for the ongoing project.

The reports were very summarized and usually consisted of an executive summary, meant for those who did not have time to engage into the research, and a more detailed part. It was important for the gatherers to have a more detailed section that allowed going back to check why certain decisions were made. This was seen to be especially important for new members that joined the project and there was room for improvement according to the gatherers. The detailed part was reported to include empathy aspect to some extent while the summary did not. Another comment from one gatherer was that there was more data available, but it could not all fit into the current reports. One report that was shown during the interviews was already over 100 pages long. It was more preferable to include more raw data to complement the analyzed data.

> *"There is more data but a report like this cannot really contain much more than it already does"*

7.4.2 Presentations and workshops

The findings from the studies were mainly communicated further through presentations, demonstrations, and workshops. User understanding was presented at demonstrations which were organized for the whole project team and different aspects of the project and demonstrations of prototypes were presented there. The variation in participation was quite large since it varied between 10 to 50 people and those who had time, joined. The main findings from user studies were also communicated in planning sessions that were meant for the R&D department. After the demonstrations and presentations, one gatherer emailed the material that was presented to the participants to allow them to explore the findings later.

Customer understanding on the other hand was presented through workshops, where the research findings were presented through the previously mentioned mapped journeys and storytelling. For each study, several workshops were planned, but due to lack of time only one session was organized in many cases.

> *"We try to organize a few sessions and try to get the right people to participate, but now when it is so hectic it is only organized once and those who have noticed it are participating."*

The main benefit with these "walk through" workshops according to one gatherer, was that they gave an understanding of the whole process which allowed workers to see each other's tasks. This was seen to improve collaboration, since it concretely showed how the workers' tasks were linked. Another benefit with the workshop was that it was presented in common language. Different departments tend to have their own vocabulary which is also identified by Mead [30]. These differences were seen as a possible communication barrier and therefore the gatherers wanted to make the workshops as clear and easy as possible to understand. In addition, the presentations became more clear because of storytelling. As one gatherer state:

> *"When you have one story you do not think about the whole big mass of information and different solutions. You focus on one thing at a time which in my opinion calms the discussion"*

According to another gatherer, the customer story could be brought even closer to the audience through acting it out, since it was seen to simulate real life better.

Due to the interactive character of the walk through, the gatherers considered it to be important to have the participants physically attending the workshops. The workshop tasks could include discussions in smaller groups and completing posters which could not be done online with the available tools. The designers had tried to figure out ways to enable online participation, but a solution had not yet been found.

> *"For some reason people just work better face to face. Sometimes it is just worth flying people together and have them participate in a full day workshop. It is so much more efficient."*

Both user and customer understanding was communicated through presentations. Presentations to the whole organization were held through innovation talks and more casual presentations were held for smaller project units, where the focus was narrowed to the findings relevant for that group. Most of the presentations were held face to face but were usually also streamed through Microsoft Teams. Those who were streamed used to be taped so that workers who could not participate had the chance to see it afterwards. However, the tapes ended up staying within the design team, and taping was seen as unnecessary because nobody watched the tapes.

7.4.3 Additional ways of communication

Transferring information within teams was done through meetings and casual discussions. Meetings were often held through video calls, which was considered compulsory nowadays.

> *"Insisting that everyone should be physically present is not part of today's world anymore"*

In the meetings research findings and the practice of executing them were discussed and team members were able to comment and give advice on other's projects.

Other ways to transfer information, identified in the interviews, were the knowledge from previous projects. Workers have gained understanding of users and customers from previous projects and by sharing their knowledge within the new team, all members' understanding is expanded. One risk mentioned by a receiver, was however that the information can become outdated and can no longer be reliable. An example of information transferred with gatherers was mentioned by one gatherer. The designer had conducted the research for the project and had been moved to a later part of the same project to be part of the development of the product. It was seen to be a good way to transfer understanding, but it was not preferable for the designer. Being in a consultant role, was though seen to be beneficial.

7.5 Receivers and their needs

The interviewed receivers of user understanding valued the work done by the designers. It was seen to help with iterations because when properly done, it gave clear guidelines for developing the product and it guides it towards a better direction. The receivers wanted to gain overall information about who the users and customers were, what they valued and different challenges that they had. All of these were given through the designers work and all receivers were happy with the knowledge they received and did not see a need for more. However, a few changes in the format and delivery were requested. One receiver complained that the information is delivered too late and was hoping to receive the information before concept creation. It was however pointed out that even though the information is given too late for the ongoing project it is still useful for later projects.

Two of the receivers were also hoping for a clearer presentation and structure in the presentation and report. They suggested bringing guidelines for the structure to limit variations between designers and to gain more consistency. One gatherer pointed out that they had received directions from a manager to exclude some visualizations to make them less messy. The designer was not very fond of this decision since the visualizations were considered to be important for the gatherers. The gatherers were familiar with different methods and visualizations for transferring user information and used different ones both depending on character of information and personal preferences. As the receivers were less familiar with the methods, it led to confusion. The receivers were also hoping for an easier way to find certain information either through a clearer structure or by dividing the report into smaller packages.

7.6 Maintaining information/understanding

Microsoft teams had recently been taken into use for managing projects and it was the main place for storing the documented research findings. Most of the data was available for the whole project team but some information was restricted due to privacy matters.

There was a desire among the interviewees to change to a better tool for sharing information, but at that moment Teams was the only tool approved by the company. One of the gatherers describe the tool as clumsy and wishes that there would be a smarter tool that could be used in the future.

> *"Teams is a bit clumsy. You can basically just read and wink that here are these documents. Of course, it works as a library."*

Wishes for the new tool include a nicer look, better sharing possibilities and being able to simultaneously work on material.

Most interviewees agreed on that there would be room for improvement in the structure of storing documents. Documents were not stored in logical places, making them hard to find.

> *"If I think about where I should find all the information that has been gathered during the past year, I have no idea where I would even start looking for it"*

> *" We have really extensive and comprehensive reports, but they are spread all over the place"*

One receiver stated that improving the storing possibilities would maximize the benefit of the information. If the documents were easily accessible, they could be used on a broader scale. Findings could more easily be shared between projects and overlapping research could be avoided.

Another way of maintaining information that was discussed with one receiver was the information that people carry with them. Plenty of information was stored in peoples' heads and either never documented anywhere or not uploaded for broader access. This was seen to be especially problematic when experienced workers left the company and the information was not accessible anymore.

> *"We have a few people who have absorbed loads of information, and they are able to operate in this environment really well. But if they leave, there are only small crumbs of information left and no one has necessarily time to gather the crumbs and take it all in [...] They become very hard to replace"*

These situations were also seen to be problematic for new members joining the team. When information was not properly documented it became difficult to motivate why certain decisions were taken.

7.7 Identified challenges in current process

The biggest challenges that were identified in the interviews are related to communication and maintaining understanding. Communicating findings was seen to be challenging by both the designers and the receivers. One reason for this was seen to be lack of common time. If attendance in a presentation or workshop was not possible the current way to receive the same information was by reading the report or the presentation slides. It was considered unlikely that people would read a dozen pages long report due to lack of interest and time, and even if they did, it would not provide the same understanding. Attempts to solve this challenge had been made, but a proper solution was yet to be found.

Another challenge was the number of handovers in the process. One receiver explains that especially before a project had started, customers were asking for improvements or new products. These wishes go through several people, starting from the frontline, before reaching the developers

for whom the information was most relevant. Similarly, communication from research findings can also go through several people. In the best-case scenario, there is only one handover that is the gatherers between the user and the receivers. However, if the project team is not participating in the events where findings are communicated the number of handovers rises. The interviewed receiver states that on each handover the receiver focuses on the information relevant for them, which filters the message and changes its form, risking loss of information. A few interviewees called it "the broken telephone"

A point of disagreement among the gatherers were the existing tools. A few of them were unhappy with the current tools and were hoping for a more suitable one for their needs. They had tried different free tools but the company was not willing to invest in the payed version. Another designer thought that the problem was more in lack of communication and the user-centeredness of the company, rather than the tool.

> *"Even though we would have a fancy interactive system it would not solve the problem. It is more the culture and organization than the tool."*

Differences between educational cultures within the organization also caused challenges. According to the gatherers, the most challenging thing was the communication with the engineers. Some of the gatherers did not know how to properly reach them and were considering to change their way of communicating.

> *"A bigger problem is how to communicate this to engineers. I do not know, maybe we should change to an engineering language somehow."*

The gatherers also felt that not enough feedback was received from the engineers. They were not sure if the presentations and workshops was experienced as beneficial in their present form and they were often concerned if the message had been understood correctly.

> *"Sometimes I wonder if the message has reached its audience"*

> *"Maybe they understand, maybe they don't. I don't know."*

Disagreements also arose on whether decisions should focus on users and customers' needs or cost and efficiency. The discussions tended to get very

technical and one designer found it hard to argue for the users' and customers' needs, since they did not have the technical understanding to follow the discussion. It used to be common to prioritize lower costs and more efficient processes over meeting users' needs. However, during the past years, users had been considered more, which was seen to be a result of successful communication of user and customer understanding.

> *"Nowadays we are prepared to do more work and even increase the cost of certain things, to provide a better solution for the client"*

There were also differences in the understanding of what user understanding meant. The gatherers thought that engineers relied too much on personal insights and assumptions, while they themselves tried to point out that the data needs to be validated and up to date.

> *"Engineers often tend to have many opinions but they are not necessarily based on any real research or validated data, rather on individual experiences "*

Eliminating assumptions and making workers realize why proper customer and user research is important was seen as a motivator for one of the designers.

7.8 Methods for enhancing empathy in the process

Bringing the user or customer experience as close as possible to the audience, was seen as the best way to enhance understanding. The best way of achieving this would be to meet the users or customers.

> *"The best way would be to somehow experience it yourself. Especially those who find it unnatural to take others perspective should try to understand why something is experienced as challenging"*

Meeting the customer and user was possible for smaller groups and therefore it was achieved when gathering information. However, in most cases it was not possible or efficient to bring a larger group to specifically meet the customers. Though, it was encouraged for those who participated in concept creation to join user testing to be able to see the simulated

situation. Unfortunately, due to lack of time this seldom occurred.

When direct contact was not possible, visualization became an important part of enhancing empathy, which was highlighted several times during the interviews, by all gatherers.

> *"The more you visualize, the better"*

> *"Visualization is extremely important, it makes the stories concrete"*

> *"I try to use videos and pictures to make the information easier to understand"*

In addition to visualizations, videos were also occasionally used. When showing videos, participants commented that it was very hard to ignore what the users or customers were saying when they saw it with their own eyes. It was seen to be a good way to communicate empathy since it made experiencing the persons situation easier.

Inspiration was also seen to be important by all interviewees to enhance understanding in communicating findings. The way of presenting and considering the audience affected the audience's interest of the topic, meaning that a good presentation is more likely to successfully transfer information.

> *"Simply reading presentation slides means that people will not remember anything of the presentation. The more you think about the way you present and how you act in the situation and how you as a speaker consider the audience, is crucial."*

There were slight disagreements on inspiring the audience. Some saw it as extremely important to inspire the audience while another thought that a designers task is to be objective and was concerned that it affected the message. All agreed though that inspiration would help with transferring understanding.

7.8.1 Interviewees ideas of improvement

During the interviews, some ideas for improved communication and maintaining of information were discussed. Several of the gatherers were hoping for a project room or physical library were anyone could meet the

user or customer. Information about different user and customer groups would be gathered here and current information could be displayed.

"It could allow meeting the user and step into their world"

A similar idea was to build an education module that presented information of different users and customers. It would provide a basic understanding, but different groups or projects could also be chosen to find more specific data. One main thing with this solution was to provide the data without assuming that the worker has previous knowledge of the users or customers. In this way it could be useful for a broader audience within the company.

Another interviewee was imagining a hologram or simulation that would allow the workers to access the real environment and product experience. A similar idea, developed by the university of Lapland, had been used previously where the experience was brought closer through acting it out and using a background video and physical requisite.

The last idea was to display the workers' capabilities and skills so that knowledge within the company could be utilized better. This would encourage workers to collaborate more when they would know who they should turn to in need of help.

Discussion

The project followed many of the recommended methods presented by previous studies, for gaining understanding of users. As Kouprie and Sleeswijk Visser [20] and Postma et al. [36] state, empathic design is practiced by first gaining an understanding of the user and then reflecting upon it to deepen the understanding. In this project the understanding was gained through several sources, including direct interaction with both users and customers, which was seen to be the best way of gaining empathy according to Kouprie and Sleeswijk Vissser [20]. The understanding was then reflected upon through analyses and visualizing the information to deepen the understanding. Since there is no evidence that certain methods for empathic design works better than others, due to the method being recently developed, [19] no further improvements can be proposed to the process of gathering information.

The main challenges in the process were found in communication and maintaining of information. The identified challenges regarding communication were a need for mutual understanding between internal groups, and lack of common time, which also increased the number of handovers, resulting in a higher chance of misunderstandings. The challenges with maintaining information were caused by an inefficient way of storing gathered information.

Many discussed arguments were caused by lack of understanding towards co-workers. Gaining empathy toward colleagues and understanding their perspective in a similar way of understanding users, would help to improve collaboration. Focusing on building an empathic environment and making the whole company understand the reasons for changing to a more user-centered process, is important. For the gatherers to be able to conduct proper user-centered design, the management has to understand their needs. In the project, the gatherers were unsatisfied with the current tools

approved by the company. More research is needed to find out the reason, but whether the reason was lack of understanding towards designers or the other way around, designers not understanding why the management cannot approve the tools, understanding one and other would solve the argument.
More importantly, the conducted research has to be used in the development process for the method to have an impact. Therefore, developers need to understand the benefits of the method to be willing to use it in the process. Improvement, in terms of making more effort to meet the user's needs, was already seen in the project. However, in this research only three receivers were interviewed and more research need to be done to gain a better understanding to what extent the findings are used.

The project would benefit from paying more attention to communication barriers when communicating findings. Dividing a project team in different location is seen to be harmful for communication [1]. The examined project was located in more than one location, separating e.g. designers and engineers. This might partially be the reason why all designers who were communicating findings from user studies, found communication with engineers challenging.
Another reason for challenging communication between these two groups is differences in educational background. One designer felt being left outside of conversations because the discussions became too technical for their understanding. This prevented the designer from doing their job, which is to represent the users and customers opinions.
Educational differences also caused challenges in the presentation of user findings. Designers liked to use various tools for visualizing findings from studies, but receivers were not always familiar with the different methods, leading to confusion. Some of the used visualizations were developed to serve designers' needs, since they required the ability to switch between a reflective and emotional mindset [3]. This might explain why designers found the visualizations helpful and the receivers found them confusing.
Visualizations are however often helpful for creating a common understanding, since they are considered to avoid language barriers. The type of visualization just needs to be chosen better to benefit the audience.

Another identified problem with communication was the need for increased communication between teams. According to Roschuni et al. [39], the communicator need to have an understanding of their audience in order to communicate the findings in a way that benefit them. In this project, the designers communicating the information were hoping to receive more

feedback on their presentations, in order to improve their work. The receivers again had ideas for improvement, but they had not reached the designers, indicating a need for increased communication and better understanding of the audience.

A clear area in need of improvement, was the way of storing information. A lot of fine research was conducted within the company, but since there was not a proper way of storing it, much of the information was lost or not used to its full potential. Information that is properly stored in logical places, allows a larger audience to benefit from it. This could save time that normally would be used to search for documents or conduct overlapping research.

Conclusions

In the examined project the methods used for gathering understanding from users and customers were heavily based on the methods commonly described and supported by research. As the field of empathic design is still relatively young there is little evidence indicating that one of the methods for gathering understanding is superior to the others. Hence, no suggestions for improvement could be made on this front.

A clear area in need of improvement that was identified in the interviews was the storage of research findings. Some of the interviewees were unhappy with the storage of the gathered information, suggesting that the difficulty in finding documentation of earlier user understanding research resulted in redundant work. By providing a better way of storing findings, the information could be used on a broader scale and overlapping work could be minimized. Better documentation could also improve the understanding of information for those that cannot attend presentations and in cases were information is handed over to new employees or other projects.

Improved communication within the company and awareness of one's colleagues needs, would be useful on many levels. Some uncertainty was identified among the gatherers regarding how successful the communication to the receivers actually was and if the format met the receivers needs. On the other hand, receivers had wishes of improvements regarding the presentations, but they had not been communicated to the gatherers. Educational differences also caused challenges in communication as one designer felt left outside the conversation, while the different visualization and presentation formats caused some confusion among the receivers.

Establishing an empathic environment, where the whole organization understands the benefits and requirements of empathic design, is important for a successful outcome of the method. There was dissatisfaction of both

tools used for communication and the storage of findings. Increased focus on the empathic design from the management level would likely provide the gatherers with more suitable tools and improve communication Participation in these events varied and should be increased. Some of the interviewees also doubted that those who did not participate would take the time to read the slides on their own. Understanding the importance of participation due to richer communication can increase participation and broaden knowledge, resulting in fewer handovers. Increasing the focus of empathic design on a wider scale can result in a culture were the project benefits more from the method and the company is able to provide products that better fit the customers' needs.

Due to the scope of this thesis, it is difficult to draw conclusions regarding the extent of which empathic design was used in the company. Further interviews are needed to gain a broader outlook on the situation and to confirm that the methods used in other projects are similar to the ones identified in this project. To minimize the effect of personal opinions and biases, more interviews per position are also needed.

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Code Book

Status of user-centered design in the organization

Description	Aspects that make the company user-centered and motivates them to enhance it in the company.
Qualifications or exclusions	It includes current status, improvements that has been made so far, and how the change has been noticed. Wishes and ideas of improvement that has not been carried out are excluded here.
Examples	*"We have at least slightly succeeded in influencing the product from users perspective"* *"Now we are perhaps more willing to make more effort and even increase certain costs to make solutions that are better for the customer"* *"I think that is one reason why service design is so popular because it allows us to make the mistakes early and cheap"*

Gathering user understanding

Description	Ways of gathering user and customer understanding.
Qualifications or exclusions	It include different methods, people, sources, techniques and tools, but also challenges that occur during the process. Validation of user understanding is also included, since it is seen to deepen the understanding.
Examples	*"In the beginning we do interviews where we don't even know what kind of answers we are looking for. We ask for user needs and make concepts based on them. "* *"Sometimes we film interviews but it takes time and it is hard to get permissions. The interviewees are already a bit afraid of the audio recorder so filming the interview might prevent them from speaking openly"*

Processing user understanding

Description	Ways of processing the gathered information, before transferring it onward.
Qualifications or exclusions	It includes methods for analysing and processing the data, that deepens the understanding. Different maps and visualisations are included here but it excludes the concrete outcome, such as reports.
Examples	*"When you map the processes, you can more easily point out things that cannot work as planned because the needed tools or knowledge is not available and something needs to be done about it."* *"One document that we have used is an excel with "jobs to be done" method [...] we brought customer roles into it and what they want to achieve in each step"* *"We created this scenario [...] drew a imaginary building layout, and started thinking of how it is used"*

Communicating user understanding

Description	Ways of communicating user understanding and findings from user studies.
Qualifications or exclusions	It includes different events and media, through which user understanding is communicated. Challenges and ideas of improvements are also included. The format of the communicated data and its structure is included here, but visualization that are created for analyzing findings are excluded.
Examples	*"We usually organize a few events and try to get the right people to attend but now when it is busy it often remains at one event and those who have noticed it attend."* *"If you would be shown a video you would immediately understand what the user thinks but then again the video is filtered [when editing] when you chose which parts should be included "* *"We organized a workshop where we explained the findings through storytelling"*

Maintaining findings from user study

Description	Ways of storing and maintaining findings from user studies.
Qualifications or exclusions	Both physical or cloud storage are included here, but also e.g. knowledge that people have gathered in their head. Documentation formats, such as word document, are excluded.
Examples	*"We have really extensive and comprehensive reports but they are spread all over the place"* *"If I think about where I should find all the information that has been gathered during the past year, I have no idea where I would even start looking for it"* *"We have a Microsoft teams site where all studies are stored"*

Receivers and their needs for user understanding

Description	Who are receiving user findings and what are their needs for the information. What challenges do they face when developing products and what is their state of mind when designing
Qualifications or exclusions	It excludes the way of receiving user findings and focuses on the receivers and their problems and needs.
Examples	*"It is good to have a basic understanding to whom we are developing this product for and who the end users are "* *"I would like to have a broad understanding of the user and preferably from different marketing areas"* *"I would like to have the user findings in an earlier stage. Now it mostly comes too late"*

Need for internal understanding within the company

Description	Situations where a need for understanding different parts in a company arise.
Qualifications or exclusions	It include lack of feedback, or arguments that are caused by lack of understanding towards ones colleagues.
Examples	*"I don't know if our management would approve this or would they just look at it as designers goofing around"* *"It becomes difficult to argument for solutions that are better for the user when the discussions become very technical"* *"When working in different teams where every team has a slightly different culture and slang words it often results in miscommunication during meetings"*

Discussion guide - Gatherers

1. What is your task at the Company?
2. How does the current product development process work?
3. How is user understanding gathered? What kind of tools are used and why?
4. How do you use empathy in gaining understanding of the users? What benefits does it have?
5. How is user understanding communicated within the project?
6. How are the findings documented and for whom?
7. How are the findings communicated and for whom?
8. Are you happy with the current methods of documentation and communication? What would you change and why?
9. Are these methods good for communicating empathy and deep understanding of the user?
10. Would you be willing to change the method if a better one is found?
11. Do you feel that the receivers can understand the user properly after the communication? Are there any challenges?
12. Can you verify that the understanding has been transferred without misunderstandings?
13. Do you feel that you can transfer the findings in a way that benefit the receiver? inspire the receiver? evokes empathy in the receiver?
14. Are you aware of what the rest of the project team need to know about the user?

Discussion guide - Receivers

1. What is your task at the Company?
2. What do you want to know about the user when developing products?
3. How important is user understanding in your work and how do you use it?
4. How is user understanding communicated to you? from whom and in which form?
5. How well do you understand the user after the communication? Are you able to empathize with them?
6. Is the communicated information easy to understand and use in its current form?
   (a) Is there something you would like to change?
   (b) Is something missing in the current ways?
   (c) Does the current way inspire you or does it matter whether it does?
7. Is there a way to verify that the information has been communicated without misinterpretations?
8. Do you give feedback to the gatherers? If so, in what form?
9. Are you communicating the user understanding further and to whom?