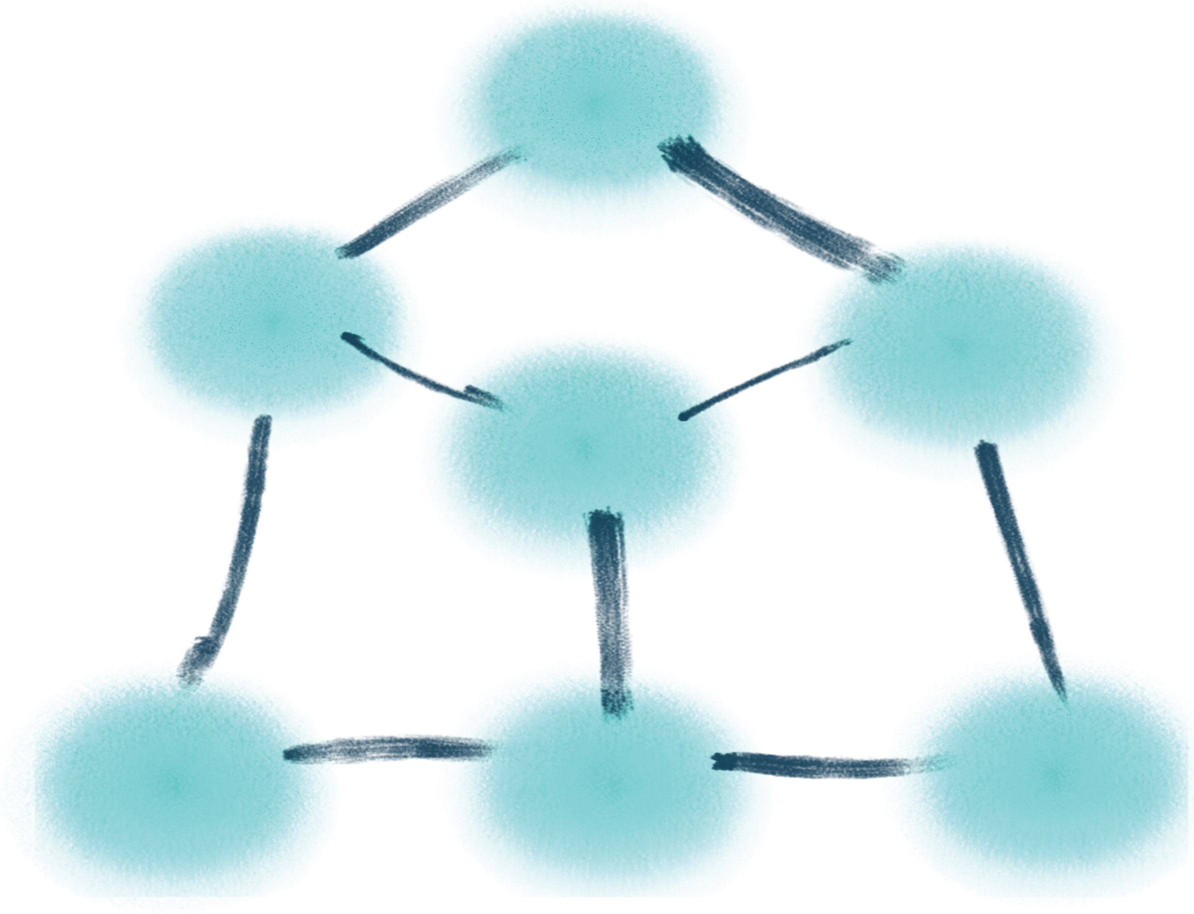

HørHer

A platform for hearing-impaired seeking treatment in Denmark

UNIVERSITY
AALBORG UNIVERSITY COPENHAGEN

EDUCATION
SUSTAINABLE DESIGN ENGINEERING
MASTER THESIS PROJECT

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Abstract

This is an academic study carried out by master students from AAU CPH. The thesis suggests a rethinking of the role of the hearing-impaired individuals within the healthcare of hearing treatment in Denmark. Exploring what problems hearing-impaired individuals are facing, when pursuing hearing aids, obstacles regarding lack of transparency and information within the system were uncovered. Based on Actor network theory and the use of Communities of Practice, this project seeks to provide a solution that can foster greater engagement of the hearing-impaired individuals within the system, while at the same time create greater transparency regarding the different treatment options. Methods used are virtual observation of webpages and Facebook communities, interviews with key-actors, and prototyping of concept, among others. The solution presented is the platform Hør Her, which serves as the primary platform for user-to-user knowledge and experience sharing. Additionally, all available information and guidance regarding hearing treatment in Denmark are centralized through the platform. The solution seeks to facilitate alignment between hearing-impaired individuals, the system of hearing treatment, and the surrounding actors.

Acknowledgements

This master thesis stands as an end of the MSc. in Sustainable Design Engineering at AAU CPH. The project is equal to 30 ECTS points and has been carried out from February to June 2020.

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Disclaimer

COVID19 and the consequences of the lock-down of society and the university since March 13, 2020 have had influence on which activities are possible to stage and carry out as part of the project work. More specifically, this means the studies have been limited to online activities, and other activities such as Lab tasks; on-site ethnographic studies and on-site involvement activities have not been possible.

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1

INTRODUCTION

“It is easy to get your hearing loss treated in Denmark but difficult to choose the right treatment”

- Elise, hearing aid user 20.04.2020

Untreated, disabling hearing loss poses economical risk for the Danish society as the condition of having a hearing loss causes fewer people in the labor market and increased healthcare costs. Hearing loss has shown to create negative social- and economic consequences for the individuals and the society. With a population looking forward to a generally longer lifespan, where people are foreseen to experience a hearing-loss at a younger stage of life, there will be an undoubtedly greater amount of people with a disabling hearing loss in the future (Shield, 2019). Furthermore, dealing with an untreated hearing impairment is a condition that can lead to social isolation and depression.

The amount of people with hearing impairment is significantly high in Denmark. Approximately 800.000 people have a hearing loss in Denmark which means that every 6th Dane above the age of 18 (Høreforeningen, 2020). That makes having a hearing problem the most widespread disability in Denmark. Yet people with a hearing loss are often overlooked as their impairment is invisible to others.

With this project, we intend to shed light on the hearing-impaired population and what obstacles they typically face when trying to find their way through the Danish hearing treatment system. Through user-interviews and survey questionnaires, problematics experienced by hearing-impaired individuals came to surface. Reoccurring issues such as poor information on treatment possibilities and a lack of transparency within the current system were identified. The waiting time on getting an appointment with an audiologist in the public sector was additionally recognized as a frequently cited problem from the hearing-impaired choosing the public treatment option. Investigating the processes and procedures a hearing-impaired typically go through, the hearing treatment system appeared to be both complex and cumbersome.

We see this issue of a non-efficient treatment system, which should be caring for individuals in need of help as a systemic and important, societal issue. As design engineers dedicated to sustainable development, we aim to look at sustainability as more than an environmental focus. The purpose of this project has been to research other aspects of sustainability such as social and economic. We seek to raise awareness of what effort is being put into supporting people who may feel somewhat excluded from society. For hearing-impaired people to take responsibility within the society they live, they need to feel empowered. This is challenging if the individual is confronted with a society that does not take their needs properly into consideration, whether it is during education, at their workplace, or as an overall contributing citizen. This is the first step on the path of social sustainability. Aiming to enhance the support and integration of hearing-impaired individuals at a societal level, could further provide a greater value for the labor market because of later retirements. Therefore, we believe that greater inclusion often comes with an increasing economic sustainable outcome as well.

This project has been carried out with an Actor-Network Theory (ANT) approach, with an additional focus on the notion of Communities of practice (CoP). Going in-depth with the practices in online communities we use the CoP theory as a perspective when practicing virtual fieldwork. Analyzing the hearing-impaired community, we focus on the knowledge sharing between the actors in the network of the hearing treatment system. Asking what, why, and how knowledge is shared to create a better understanding of problems and knowledge they encounter. Through actor mapping, we have been able to visualize where relations between actors could be modified and better aligned in a future network surrounding the final solution. The final solution has been developed following lean startup methodology, where we were able to test our concept at an early stage of development. The thesis research is focused on the hearing-impaired as a primary target group with the goal of understanding their relations and practices online, leading us to the following problem formulation.

1.1 Problem formulation and research questions

Taking experiences from hearing-impaired individuals into account, the common traits of the Danish hearing treatment system are: A non-transparent system and instances of being sent back and forth between the different hearing-specialists. With this project, we aim to address these issues of the hearing-impaired people, to provide a suggestion on how to improve the cumbersome system. Against this backdrop, the problem formulation is as follows.

"How can we design a solution that increases transparency in the hearing treatment system in Denmark, so hearing-impaired individuals can easier access guidance, information, and seek help?"

1.1.1 Research questions

○ What are the main issues seen within the hearing treatment system In Denmark?

○ How can we get closer to the hearing-impaired community during the lockdown, to gain a deeper understanding of the treatment process a hearing-impaired individual goes through in Denmark?

○ How can we strengthen the relation between hearing-impaired individuals and the current hearing treatment system?

1.2 Structure of the report

The thesis consists of 7 chapters, which address all phases of our project. The 1st chapter is an introduction, containing the aim, problem formulation and research questions of the project. In answering the first research-question we draw on previous research and studies within the scope of the project, through the 2nd chapter. This section aims to provide a summary of what has already been achieved to define any research gap of which this project intends to fill. The 3rd chapter explains our research design, which covers key-theories and methodologies applied. This section of the report explains what, why, and how these were used throughout the project. The results of our research design will be presented and analyzed in Chapter 4, where findings and conclusions will be clarified into problem areas, used to establish design requirements for the solution. The solution will be clarified in the 5th chapter of the study where a detailed description has been included. A discussion and reflection on the results are discussed in chapter 6, where we are looking at shortcomings of the project and how the solution can be viewed regarding a wider societal scale. Lastly, the conclusion sums up the results from the research questions accompanied by a closure of our concept as a viable solution to our problem formulation in chapter 7

1.2.1 Abbreviations

Abbreviations were made to ease the reading of the report. These will be given in parentheses after the abbreviated word has been stated for the first time.

Word/Name	Abbreviation
Actor Network Theory	ANT
Active daily living	ADL
Community of Practice	CoP
Danish hearing association	Høreforeningen
Ear Nose Throat	ENT
Hearing Aid	HA
Instrumental active daily living	IADL
Minimal Viable Product	MVP
Obligatory passage Point	OPP

1.2.2 Worksheets

Our work with the thesis is documented in the appendix consisting of worksheets which are referred to in the report: e.g. Worksheet 1 is referred to as [WS1]. See the Worksheet appendix for an overview.

2

EXPLORING THE WORLD OF HEARING-IMPAIRED

A literature review has been carried out to get a clearer understanding of the field and the studies investigating different aspects within the chosen scope. An investigation was carried out regarding the consequences of having a hearing impairment from the perspective of the hearing-impaired individuals. Additionally, the consequences seen in society regarding having untreated hearing-impaired citizens in Denmark are presented. This led us to uncover the current literature on which plans, and strategies are already put into place within the Danish hearing treatment system. Here, systemic issues of the sectors were revealed.

Furthermore, we dived into the previous research done on the online support communities to understand the logic of these, how they serve their purpose in facilitating and supporting their members. Lastly, which opportunities we find as a fitting problem area to further investigate is presented. Starting with the framework of our education we justify how working with the issues of having hearing-impairment relates to sustainability.

2.1 Sustainability in healthcare

Health will in this report be determined by a state of complete physical, mental, and social well-being as described by the World Health Organization in 1948. This means that life must be meaningful and satisfying to each human being. When focusing on proper healthcare for individuals with a hearing impairment, social sustainability has had a primary role. Although the focus of this report primarily is on the social aspect of sustainability the relationship between the 3 pillars is symbiotic and cannot exist without each other. Healthcare comes with an economic cost towards how high the quality of the healthcare itself is, and besides the economical aspect of sustainability and healthcare, there is a physical boundary to what is possible to manifest from the world resources which shows as environmental sustainability. Social sustainability is one of the three-building pillars in sustainability (Harlam, et al., 1987). The 3 pillars of sustainability are a concept of how sustainable societies can be built. Although the focus of this report primarily is on the social aspect of sustainability the relationship between the 3 pillars is symbiotic and cannot exist without each other. Healthcare comes with an economic cost towards how high the quality of the healthcare itself is, and besides the economical aspect of sustainability and healthcare, there is a physical boundary to what is possible to manifest from the world resources which shows as environmental sustainability. Within the sustainability literature, there is a social aspect that is uncovered by the terms of equality, inclusion, social security, healthcare, and the quality of life (Jabareen, 2017). These terms are pointing to the desired social elements in the society.

Regarding social sustainability, we aim to uncover the consequences of having an untreated hearing impairment focusing on the different social aspects for the individuals. The consequences of having a hearing impairment will be used as well though reasoning as to why this topic is of great importance.

2.2 Hearing impairment in numbers

Looking further into the statistics of hearing-impaired people and their use of HAs, EHIMA initiated in 2009; EuroTrak, which was designed as a means for raising public awareness on key issues of hearing loss and hearing care, shedding light on hearing loss prevalence as well as the experience hard of hearing people has with their HA devices (Ehima, 2020). This section presents an outtake of the most relevant results seen in regard to our project-scope of uncovering transparency within the hearing treatment field. The surveys we take standpoint in are from 2012 and 2016.

The following chart represents how many years have passed since the person became aware of their hearing loss until they purchased a hearing aid.

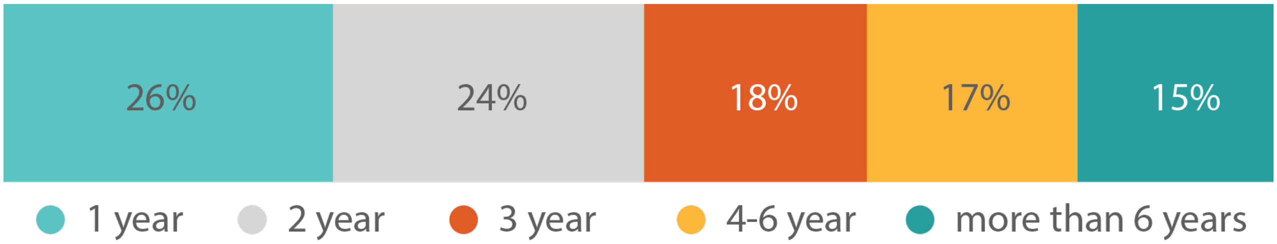


Figure 1- source; Eurotrak Denmark 2016

In figure 1, it took 15% of the participants 6 years or more to get HAs, while the vast amount of the hearing-impaired took between one and two years. Looking further into why people hesitate so many years in pursuing HAs, it shows that people are of the impression that it is a costly affair, and this is holding them back as shown in figure 2.

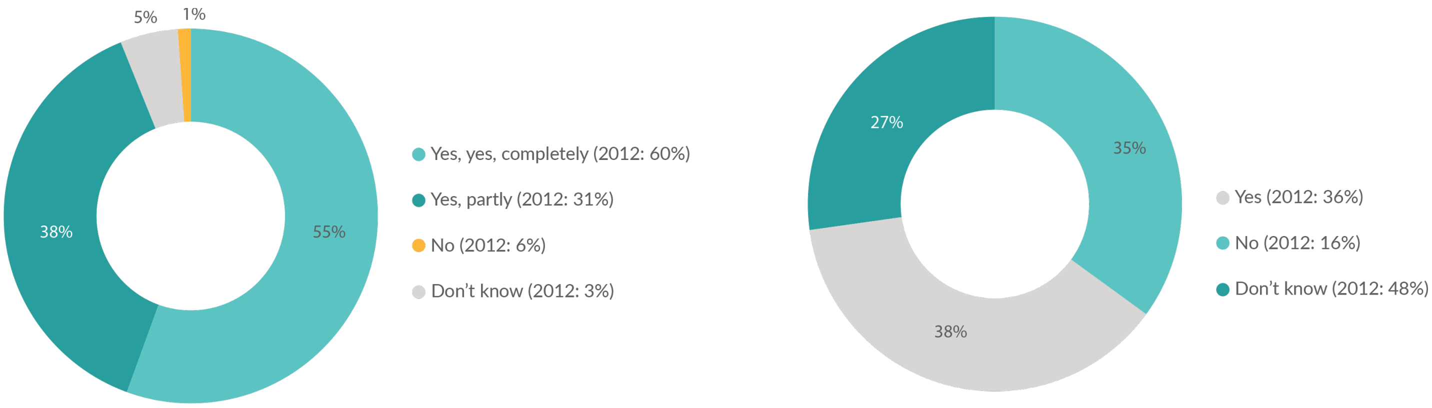


Figure 2- Owners vs. Non-owners, source; Eurotrak Denmark 2016

Non-users seem to be unaware or not thoroughly informed of the fact that it is possible to get hearing aids in Denmark without it being an expensive affair. This lack of information could be an important aspect when it comes to hesitating in pursuing HAs. As seen in figure 3, the fact that it was costless was one of the most important triggers to get a hearing aid.

Furthermore, looking into positive impacts, figure 4 shows that up to 74% of the hearing aid owners participating, declare that wearing their hearing aid improve their quality of life occasionally to regularly.
Looking into what positive impacts the use of a hearing aid has, especially communication capability, social life, participation in social activities and relationships are the areas where the biggest positive impact is seen, looking at figure 5.

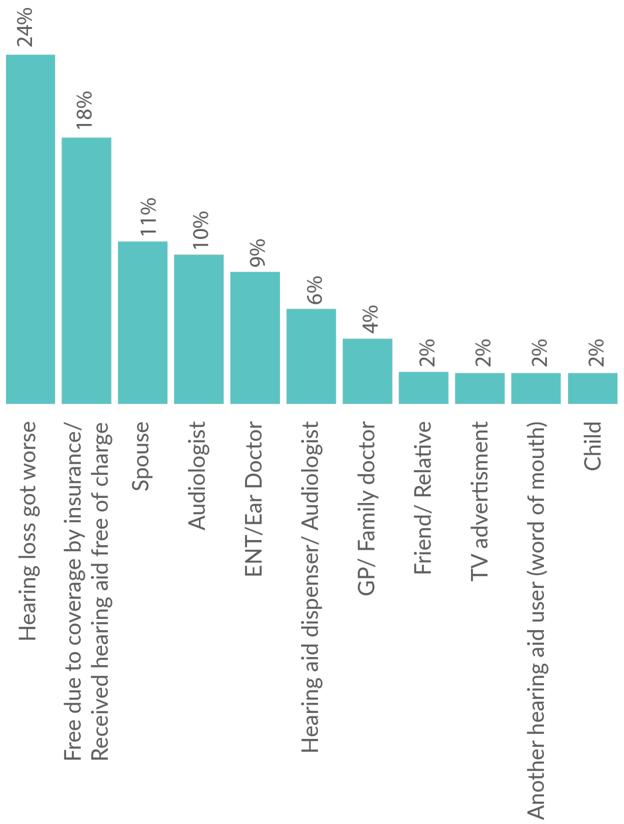


Figure 3- source; Eurotrak Denmark 2016

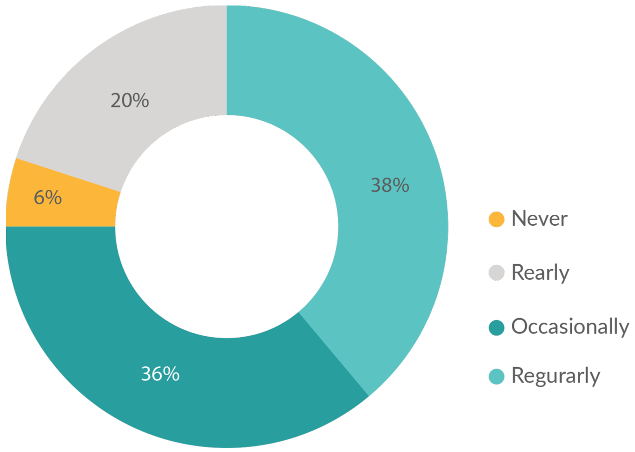


Figure 4- source; Eurotrak Denmark 2016

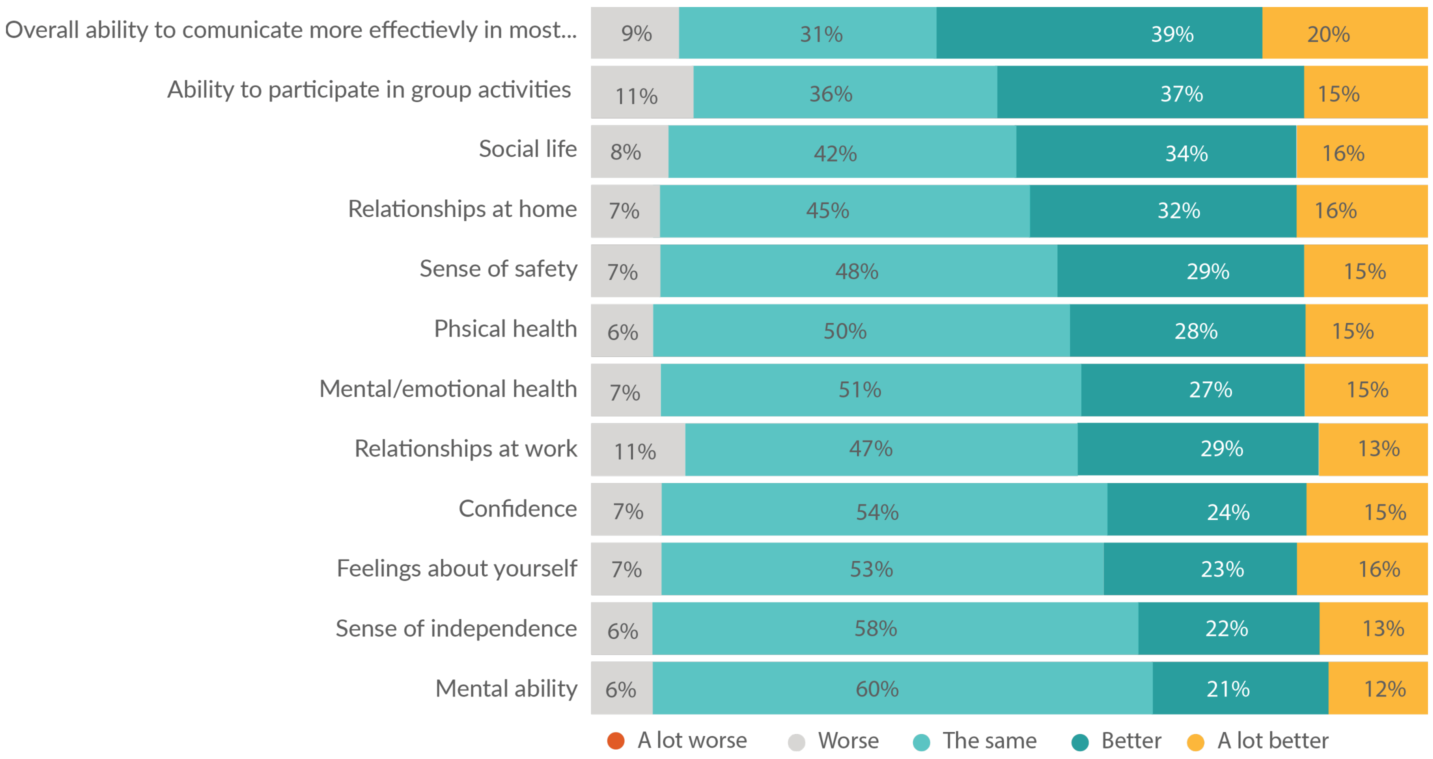


Figure 5- source; Eurotrak Denmark 2016

From the studied survey precise numbers and statistics show that the participants had a period of between 1 to 6 years or more to decide on getting HAs. Which when reflected upon have negative consequences considering the perspectives of untreated hearing impairment. The typical reasoning of not pursuing HAs is according to results a lack of knowledge on the fact that HAs in Denmark can be obtained without economical costs. Looking further into the main reasoning for pursuing it; Worsening on the hearing or being informed that it was free of charge led the majority of participants to take action. Lastly, the general level of satisfaction of the HAs is regarding better ability to communicate and participate in social life, concluded as a positive outcome.

2.3 Consequences of having an untreated hearing impairment

The following 4 chapters will go further in-depth with the various consequences of having an untreated hearing impairment.

2.3.1 The psychologically negative consequences of having a hearing impairment

As the Danish hearing association (Høreforeningen) describes it, the consequences of an untreated hearing impairment is often recognized by increasing frustration and irritability for the individual who tends to withdraw from larger assemblies, and accordingly experience loneliness, isolation, and a reduced quality of life (WS3: Effects of an untreated hearing loss). "More often you must guess what is being said, and these guesses can cause a constant uncertainty as to whether you have understood what has been said. Because you miss sounds and words in sentences, you also need to spend more energy on keeping up with the conversation, which can make communication tiring, both for the person with hearing loss and the environment" (Høreforeningen, 2020). According to Høreforeningen an untreated hearing impairment also presents a greater risk of depression, anxiety disorders, and a higher tendency of early withdrawal from the labor market.

Diving into the literature, several studies have demonstrated a clear association between depression and hearing impairment. However, it is important to be aware of the diversity in methods, size of test groups and strength of associations between the different studies carried out; (Zhang, et al., 2014) in analyzing a large cohort from the 2005-2010 National Health and Nutrition Examination Survey [...] in the US, found that the prevalence of both mild and moderate to severe depression among adults with self-reported, untreated hearing loss was significantly higher than among those without hearing impairment, and increased with the severity of the hearing impairment. For those affected the prevalence of moderate to severe depression was 11.4%, compared to 5.9% for those without a hearing impairment. Yiengprugsawan et al (Yiengprugsawan, et al., 2012 D) in a study of a Thai national cohort of over 87,000 subjects aged between 15 and 97, also found, despite a rather crude definition of self-reported hearing impairment, that this was associated with poor psychological health, depression and anxiety." (Shield, 2019, p. 68).

Furthermore, most studies carried out within the field of hearing treatment field show a coalition between hearing impairment, social isolation, and loneliness: Two recent studies have found that the extent of loneliness or social participation is related to the severity of the hearing loss. Mikkola et al (2015) concluded that self-reported hearing difficulty causes a reduced level of participation in social and leisure activities in adults with normal cognitive ability; however, this mainly related to those who reported major difficulties. Subjects with fewer self-reported hearing problems were as socially active as subjects who reported good hearing. The study of audiology patients by Sung et al. (2015) also found an association between the degree of hearing loss and loneliness: the more severe the hearing loss the greater the degree of loneliness (Shield, 2019, p. 71), whereas loneliness often is seen as one of the main reasons causing depression and similar psychological health issues.

2.3.2 Activities and daily living with an untreated hearing impairment

When it comes to the negative consequences of an untreated hearing loss, it is not necessarily only the psyche that is affected. Conditions of physical health regarding the life of the affected person seem to play a big role as well, according to studies examined; "Health conditions which are considered [...] concerning hearing loss are cardiovascular disease, stroke, falls, decline in general physical activity and reduction in activities of daily living. There has also been increasing interest in links between hearing loss and mortality and the co-morbidity of hearing loss and other diseases, plus the overall impact of hearing impairment on general health and wellbeing." (Shield, 2019). The studies investigated, has shown a considerable correlation regarding hearing loss as a negative factor for the affected persons' physical health.

Various studies have investigated the impact of hearing loss on subjects' capability to carry out activities of daily living. The exact activities determined to differ between studies but in general involve 'personal/functional activities' such as dressing, eating, personal hygiene, or getting in and out of bed and 'instrumental activities' such as cooking, housework, shopping, or traveling (Shield, 2019, p. 83)

The French study revealed that an increased risk of disability in both ADL and for those with self-reported hearing loss who did not use HAs was found; "Regarding disability, the model showed an increased risk of disability in ADL for the group of participants with self-reported hearing problems not using hearing aids. No increased risk was found for those with self-reported hearing problems using hearing aids compared with the participants reporting no hearing problems [...]. Similarly, for disability in IADL, the model showed an increased risk for the participants with self-reported hearing problems not using hearing aids but not for those using hearing aids" (Amieva, 2018, p. 1385). In another study carried out in five Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), 770 patients aged 75 and upwards (Grue, 2009), it was found that hearing loss, vision impairment, and dual sensory impairment were all considerably correlated with a decline in IADL. The chances of IADL loss was more likely for those with moderate hearing loss than for those with mild hearing loss.

Despite some deviations in further studies and their test results, the more accurate studies nevertheless propose that having a hearing loss has a considerable impact upon activities of daily living; "The greater the hearing loss the greater the impact" (Shield, 2019, p. 85). This is seen to have substantial consequences for the support needed for the older population in terms of their independent living, caring needs, etc.

2.3.3 Labor market consequences to a hearing-impaired

Looking into how having a hearing impairment can affect individuals and their work life, both when it comes to retirement, size of paycheck, and type of jobs, a connection has been concluded in earlier studies.

Statistical data reveals that untreated hearing impairment affects the hearing-impaired retirement habits (Christensen, 2006). Seeing an untreated hearing impairment as a contributive factor to earlier retirement, has further been identified as concerning negative feelings caused by being hearing-impaired and feeling less supported by colleagues and management in different work situations. This can cause fatigue during the day for the affected person, both at the workplace and at home. This is contributing to the employees working less or pursuing either earlier retirement or less demanding jobs. There is significant evidence that hearing-impaired individuals earn, on average, considerably less than those with regular hearing. It is somewhat difficult to estimate a ratio for earnings of those with hearing impairment to the rest of the population, as the measurement of earnings has been reported differently by different scholars.

"The data presented by Kochkin (2007a; 2010a) show that people with severe hearing loss earn 77% of those with very mild hearing loss, while the results of Jung and Bhattacharyya (2012) show that earnings of hearing-impaired people are 75% of those with normal hearing. There is nothing to suggest that these figures are inconsistent with the data presented by other authors. It can, therefore, be assumed that hearing-impaired individuals earn around 75% of those without hearing impairment" (Shield, 2019, p. 117). Taking jobs that are less demanding and retiring at an earlier point than the common employee influences these figures as well. It is further noticed that people with a hearing impairment are likely to be seen in lower status professions - and therefore receiving lower income than the broad population. Therefore, people with a hearing impairment are 'over-represented in lower status, lower-paid, occupations' (Shield, 2019, p. 117). It is furthermore observed that a greater proportion of hard of hearing people are unemployed than seen in the general population. It is for that reason with great interest that we strive for equalizing the possibilities for hearing-impaired to fit the people of regular hearing.

2.3.4 Reasons why hearing-impaired do not use their HA

Many of the hearing-impaired individuals own HAs and yet, for a variety of reasons, they do not use them as advised. Thereby these have tried to treat their hearing impairment, however, they failed in doing so. Therefore, these coincidences to count towards the consequences of an untreated hearing loss. According to the World Health Organization, there is an 83% gap between needing and using HAs, where only 17% of ones that could benefit from using the device use one (WHO, 2020).

In the research conducted by Kochkin (Kochkin, 2000), around a thousand people who own HAs were asked to write about their experience with their current devices. Through the analysis of the responses, they found 32 reasons why people do not use their HAs. Some of the main reasons were the poor benefits, where 29.6% of patients felt that the device gave them minimum or no value. Some of the patients commented on how the device is amplifying everything except words. Background noise was the second most common answer, where 25.3% of patients reported that they don't wear hearing aids because they work in noisy situations (Kochkin, 2000). The devices would amplify loud noises, which would be annoying and painful to them. The third reason was fit and comfort, where patients complained about how the device does not fit their ear, is falling out, is uncomfortable or even hurt. The fourth reason was negative side effects, where patients complained about different issues like pain in the ears, rashes, itching, dizziness, sweat, wax, headaches, infections, the problem of chewing or swallowing. The cost was the fifth most common reason. Patients stated that their devices are outdated, and they should be replaced by the new ones, but they cannot afford it. "I don't need help" was the sixth most common reason, where patients indicated that they are socially isolated and therefore they do not need to use it anymore. Others stated that their hearing loss is mild, and some that surgery improved their hearing. Other less common reasons were 'whistle' or 'feedbacks', 'poor service from clinic', 'the stigma', 'doesn't help with severe loss' and 'works only in limited situations' (Kochkin, 2000).

2.4 Consequences for the society

Having identified the consequences for the hearing-impaired individuals we found it necessary to investigate what consequences this has for the society. Reduced hearing contributes to early retirement from the labor market. However, hearing problems do not only affect the individual with a hearing impairment. Hearing problems also result in increased economic costs for society (Christensen, 2006). Untreated hearing loss causes far-reaching problems for the whole society; hearing loss has consequences due to a weakened connection with the labor market and increased costs of transfer incomes in Denmark (Høreforeningen, 2020). According to UHØRT, when hearing-impaired people have reduced working hours or leave the labor market prematurely due to impaired hearing, it is not only the inflicted individual who is affected. At the societal level, hearing disabilities cause a loss of labor productivity and thus raise socio-economic costs. This is calculated to be a production loss of approx. 2.7 billion DKK. This is estimated by including the lower employment rate among people with hearing loss and a lower average on weekly working hours. For this group, 13%, clinically measured, has moderate/severe hearing loss. 27% find it difficult to follow up on a conversation when several are gathered. 16% have problems with hearing in more than one of the everyday listening situations - for example hearing the phone or people speaking in a normal voice. 5% of 50-64-year-olds have a hearing aid.

All the above issues contribute to incurring additional costs to society in connection with the grant scheme and the organization of the hearing-impaired. Additionally, it is a common, democratic problem that a relatively large proportion of the population cannot participate in public debate because it is not available on television, radio, and public meetings. The group's need for captioning or interpretation is not met. Besides that, there is a lack of participation in and contribution to civil society in the form of e.g. volunteering or political involvement (Høreforeningen, 2020). Socio-economic consequences are seen in correlation to hearing impairment; Higher risk of being left out or not having equal abilities of participation when it comes to the labor market, social gatherings, debates, and further aspects as earlier stated. Hearing loss can cause social isolation, and here a hearing aid can help prevent social isolation and improve the life situation among people with hearing impairment (Bech, et al., 1996; Bengtson, 2010).

2.5 Patient-centered care

As an effect on the above-mentioned consequences, we dive into the patient-centered care, which approach is understanding patients' priorities, values, and expectations (Grenness, et al., 2013). It implies that patients should actively participate in their rehabilitation process through a balanced, therapeutic relationship with the specialist. If the specialist follows patient-centered principles, it is more likely that the patients will engage on a higher-level during communication. By doing so, it leads to improvements in how patients and their families are adjusting to and learning how to properly manage the hearing loss (Coleman, et al., 2018).

Patient-centered care means switching the attention from the disease or disorder, to the patients and how they are experiencing and perceiving the condition. The approach emphasizes trust, respect, empathy, and shared decision making. This kind of relationship allows both the audiologist and patient to better understand underlying barriers and solutions that efficiently support self-management. Carrying for patient's emotional issues makes them feel valued and increases the probability of treatment's success and can ultimately improve overall wellbeing (Coleman, et al., 2018).

Even though this approach is promising it is rarely seen in practice. The latest research has shown that specialist focuses mainly on the technical aspects and neglect patients' emotional concerns. If the specialist focuses only on the technical aspects, the patient most likely won't open up about current concerns while there is a lack of space in the conversation for subjects like that, or the matter is not initiated by the specialist (Coleman, et al., 2018). How long the specialist speak in relation to the patient during the appointment, can be an indicator of patient-centered interaction. Recent research has shown that specialists were dominating the conversation by speaking more than the patient, asking closed questions, and interrupting the patient while speaking. Additionally, the input patients would get from the specialist was often vague or complicated for them to understand. Overall, the study showed that patients were expecting more support and guidance than they received (Muñoz, et al., 2017). In the research by Grenness et.al it was concluded that the way patient-centered care occur in practice will be influenced by both the patient (gender, ethnicity, level of education, socio-economic status), and the specialist (gender, experience, intuition), as well as organizational factors such as the time that is devoted to the patient (Grenness, et al., 2013).

Within the hearing treatment system, the role and responsibility of the professionals have shown to be of great influence. Research done by McCormack et al. (McCormack & Fortnum, 2013) has highlighted the importance of the support and counseling provided by the professionals in terms of increasing hearing aid usage (WS6: Hearing aid related difficulties). It was shown that sometimes patients were not happy with the provided service or have been oversold expectations of the devices. (McCormack & Fortnum, 2013) (For further details on HA devises see WS4: How hearing aids function, and WS5: Types and characteristics of hearing aids)

2.6 The hearing treatment system in Denmark

The above-mentioned importance of support and guidance when receiving and actively using HAs, led us in the direction of researching on what kind of system the hearing-impaired individuals are a part of when seeking aid. This will be uncovered in the following sections, where our research takes us into the possible treatments in Denmark.

2.6.1 The history of hearing treatment in the public sector

Healthcare in Denmark is based on a social safety net, where most treatments are done within the public healthcare sector. Healthcare is free of charge for Danish citizens and is covered by the financial law funded by the Danish tax system (Health, 2017). As shown in figure 6, Denmark is split up in 5 regions, each governed by a regional council composed of 41 members. Denmark has a system where the state is organized and divided into 13 counties (1970-2006) each with its healthcare plans created on the guidelines from the Ministry of Health (Health, 2017). The regions were originally initiated to create a more effective healthcare system for the Danish citizens, where these are responsible for the public hospitals, emergency, psychiatry, and for health services related to the general doctor and specialists such as ear, nose throat specialists (ENT).

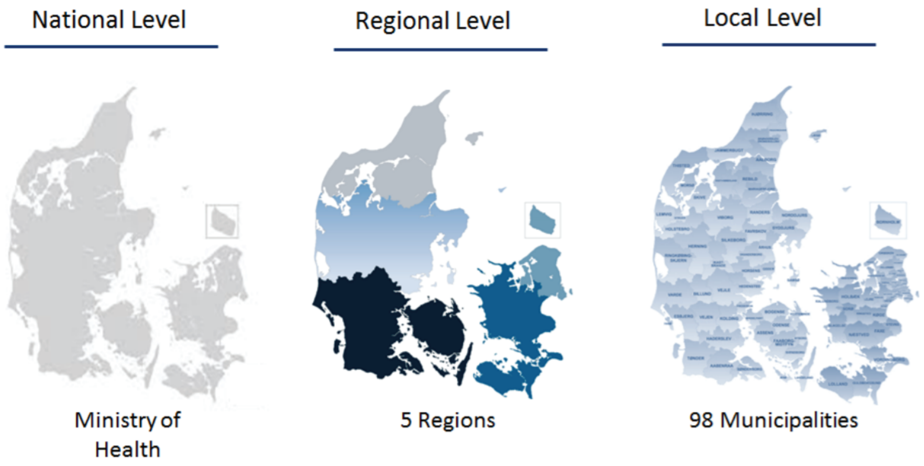


Figure 6 - Regions and municipalities, Source; the Danish ministry of Health report 2017

Each region additionally has the option of adjusting the services and can choose their financial framework according to their regional circumstances. The regions can, if they cannot provide adequate healthcare service, refer a patient to another region where the patient can get the treatment they need. The patient can also choose for themselves where they would like to get their treatment which is called "My choice of hospital" (Health, 2020).

Each region has for that reason their own practice when focusing on the healthcare services they provide regarding hearing impairment. Hearing impairment are treated either at regional hospitals or at ENT clinics (Health, 2017).

Figure 7 shows the healthcare funding in the Danish healthcare system. The Split between regions and municipalities are made to give each section responsibility of their jurisdiction. For hearing treatment this means, that the regions choses the options for HAs, treatment options and the ENT doctor. The municipalities have the responsibilities of other technical equipment and the communication centers for further patient guidance all covered by the direct tax collection through the Financial law (Tobberup, et al., 2015).

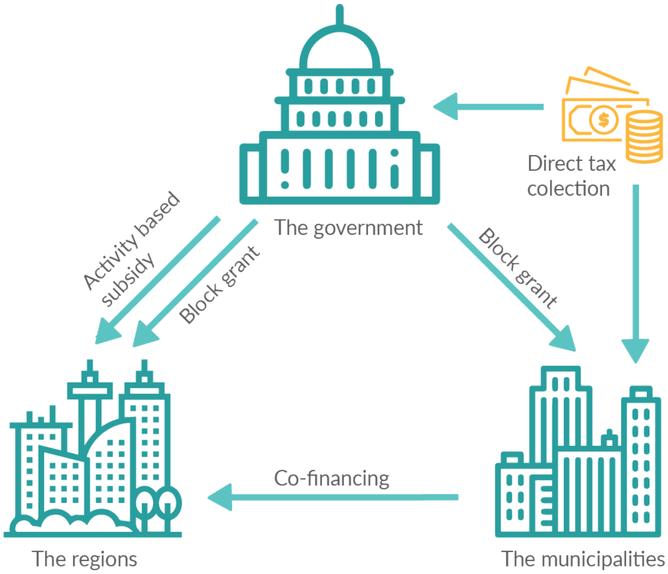


Figure 7- Organizational chart of the financial structure of the Danish healthcare system

Paragraph §5 of the Danish law of the decommissioning of counties and the deployment of regions states the following responsibilities for the Regions (Folketinget, 2005):

The regions must supply healthcare to the citizens of Denmark. This includes general practice doctors, special doctors, and the hospitals.

- The regions must create strategies for the healthcare they supply.
- The regions must publish a strategy for sustainable development.
- The regions must supply healthcare to specific healthcare issues such as hearing impairment.

The change from counties to regions have had its implications to how healthcare is provided in Denmark (Rosenkilde, 2017). The governmental change from counties to regions was neatly explained in the following quote “The plan for the change was to create a ’human beings first’ system but it ended up as a ’bureaucracy first’ system” by Roger Buch, a leading researcher from the Danish journalist forum. The government have created an economical effective system by moving decision taking to a broader panel where big cities and regions get more attention than other less populated regions. .

2.6.2 A fragmented system

The current system can be described as fragmented (see figure 8). Currently, there is an abundance of ways to treat hearing impairment and there is a risk that the individual citizen is being sent back and forth between different actors to get a complete service, whether it being through the public or private sector. That includes diagnosis and information about what it means to live with hearing impairment, hearing aid fitting, instruction, guidance, counseling, education, and follow-ups. For some individuals, it may be difficult to navigate due to complexity and the divisions between public and private services (Tobberup, et al., 2015). For instance, some of the hearing-impaired may find it difficult to seek out knowledge about their possibilities and this may lead to creating confusion, inappropriate hearing treatment, and a waste of resources such as time, money, and materials (Sundheds- og Ældreministeriet, 2018).

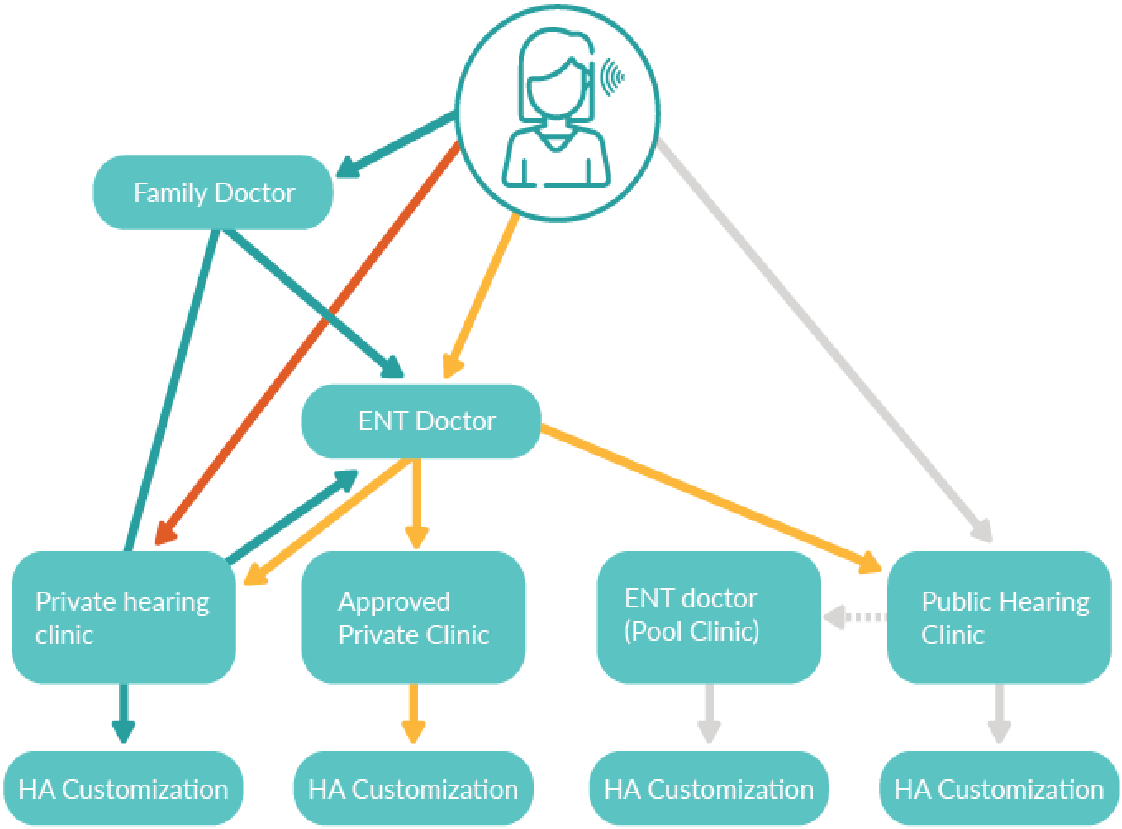


Figure 8 - Illustration of pathways of choices

2.6.3 Geography dependent waiting lists

If hearing-impaired individuals chose to seek help through the public healthcare system, it can take up to 115 weeks to get HA, depending on which region or municipality the hearing-impaired individual live in. In some cases, because of long waiting lists, individuals choose to seek help through the private sector. However, if the person is under 18 or suffers from a complex hearing impairment, those individuals do not have any alternative but to wait for public HAs (Sundheds- og Ældreministeriet, 2018).

Hearing-impaired individuals can easily be in doubt whether the doctor's guidance comes from a professional basis. The way the policies are constructed today, there is nothing to prevent ENT doctors or private audiology clinics to have economic interests when treating individuals and assigning them with HAs. This uncertainty about the professional's financial interests may create a conflict of interest and distrust between the hearing-impaired and healthcare professionals (Sundheds- og Ældreministeriet, 2018).

2.6.4 Government Initiatives

The current hearing treatment system lacks in uniformity of treatment carried out in both the public and private sectors, while the information about choices and treatment options may seem incomprehensible to the citizens (Sundheds og ældreministeriet, 2018). Therefore, in the period from 2019 and 2022 the Danish government is planning to spent DKK 215 million on the two main areas of action; firstly, creating an easier way for the individuals to go through the system, where they will be able to easily navigate between different treatment options and solutions that fits their needs. The second initiative is taken to ensure a better quality of treatment, whether the person choose public or private service. Here the Government wishes to ensure greater transparency and better information on various treatment opportunities. When it comes to the ear-nose-throat (ENT) doctors, they plan to introduce new rules for them in regards to handing out HA devices, where they want to make sure the advice hearing-impaired receive from the specialist is based solely on an objective, scientific basis and not in the interest of profit. In addition, a new digital model for visitation to HA will be introduced by 2022 and this solution should make it easier for individuals with hearing loss to find their way through treatments (Sundheds og ældreministeriet, 2018).

We have used the various goals from the government and the hearing groups as a confirmation of the system needing change and that the lack of transparency plays a role in many of the problems that the hearing-impaired individuals meet. We used the statements and facts stated in the reports published by the Danish Ministry of Health and Høreforeningen as a starting point to our research and analytical framework.

2.6.5 Non-governmental initiatives

Hearing-impaired individuals in Denmark are further supported by voluntary organizations, who are working on ensuring better living conditions and opportunities for the hearing-impaired, so these can communicate and participate in society as citizens with normal hearing.

One of these organizations is Høreforeningen (WS2: The hearing association.dk), the biggest association in Denmark for hearing-impaired which has its branches in almost all municipalities in Denmark. Høreforeningen is aiming to support hearing-impaired and their families by providing them with needed support, guidance, and information. It is community-based, with over 8000 members, including hearing-impaired with their families and professionals from the healthcare system (Høreforeningen, 2020). Høreforeningen together with other organizations like Danske Handicap-organisationer are being a representative voice of this community by being active in the policy-making so this community is not being left behind and that their rights are protected and fulfilled (Handicaporganisationer, 2020).

Furthermore, in May 2019 Høreforeningen has put in place a set of goals they aspire to achieve by 2023. Some of the goals are related to hearing treatment, where they wish a less divided system - optimally one and same entrance to all treatment and a more transparent system. They aspire to have quality assurance of public and private hearing clinics. Those include evaluation and follow-up is on user satisfaction with treatment. Furthermore, the right to free HA devices must be maintained and a sharp separation between diagnosis and sales of HAs should be visible (Høreforeningen, 2019).

2.7 Looking into online communities

Hearing-impaired these days can also seek help in virtual space through online support communities. Moreover, interacting in online communities has been beneficial during the time of the pandemic outbreak that occurred during this research. Here most of the institutions were closed and in-person interactions were restricted by the governmental guidelines in the spring 2020. There, the opportunity of getting closer to the hearing-impaired through their online community was seized. To do so, we needed to reinforce our knowledge and understanding of these communities, their main purpose, logic, and how the members are interacting with each other.

The term "online community" is widely used for individuals who are meeting and interacting in an online environment (Pfeil & Zaphiris, 2009). Moreover, there are different perspectives on what a community is. Some researchers are looking at it from the perspective of creating new friendships, supporting each other while others look at communities from a technological perspective, focusing on the design and evolution of the technologies that facilitate these (Pfeil & Zaphiris, 2009).

In Denmark, these online support communities for hearing-impaired are seen facilitated on Facebook in terms of Facebook groups, moderated by the voluntary organizations that support them. These communities provide opportunities for hearing-impaired individuals to interact with others who have mutual interests or similar problems and life circumstances.

2.7.1 Knowledge sharing in online communities

Today, the online community platforms have the potential and role as being an agent of knowledge transfer. Panahi et al. (2013) claims that online community platforms can facilitate the sharing of tacit knowledge by 1) starting the informal discussion amongst experts 2) fostering collective wisdom by providing space where the new knowledge can be created 3) making tacit, invisible knowledge accessible for others and 4) reducing time and energy to share knowledge online (Panahi, et al., 2013). Using online community platforms resources to boost the accumulation of collective knowledge occurs when members collectively contribute to generating valuable material, for example when multiple members collaborate to address an issue imposed by a single individual (Jalonen, 2014). In this way, the online community offers people the chance to share their expertise, thus opening the way for others to access tacit knowledge (Buunk, et al., 2019). Some would argue that tacit knowledge is hard to translate, especially using the technology. However, e.g. social media like Facebook is perceived to be easy to use and only little effort is needed to be able to share knowledge online (Buunk, et al., 2019). The drawback of Facebook is that you must be a Facebook user, create an online profile to be a member of the group to be part of the community, and consume the content.

2.7.2 Communicating on online communities

With the development of new communication technologies, practices and methods of communicating have changed along the way. Moreover, people are constantly finding different ways on how to communicate and interact on the internet, even though the internet as the medium has not changed much in the past ten years (Preece & Maloney, 2003).

One of the lacking aspects of online interaction is concerning in-person interaction, and the absence of verbal communication. Even though there is an opportunity to communicate in the form of video and audio messages, the text is the main way of transferring messages (Pfeil & Zaphiris, 2009). The drawback of using only the text to convey the message is that it may lead to misinterpretations and misunderstanding while it is not possible to see the facial expressions or the tone which is been used by the person that is sending the message. In response to this issue, emoticons may be an alternative and substitute for real facial expressions (Wolf, 2000).

2.7.3 The ethics on the online communities

The requirements of being a member of an online community are different depending on the platform where the community takes place. It differs in the amount of information required from the members to disclose and it ranges from participating in the community with just a username to having a complete online profile like e.g. Facebook. Some researchers argue that anonymity leads to "flaming", starting arguments and insulting while others argue that anonymity can lead individuals to be more open and more likely to disclose their real thoughts (Pfeil & Zaphiris, 2009). Moreover, honesty is another issue that needs to be taken into consideration when talking about online interactions. Research has shown that spreading lies and purposely bringing harm to individuals is quite common on the internet, nevertheless, in online support communities, it is quite rare. The members of these kinds of communities are creating a culture of trust and honesty. Here members share the same or similar conditions and tend to build strong relationships, supporting each other (Rheingold, 2000).

2.7.4 Moderating and motivating users in online communities

Various factors must be thought into a platform when running an online community. Especially when working on knowledge sharing communities where the information is shared by users of the platform as on Wiki sites. The use of social rewarding in online communities has been discussed according to the different measures that you as a moderator can do in the research article titled Social Rewarding in Wiki Systems – Motivating the Community by Hoisl et. al. They express that online communities can encounter several problems: "like wrong information, copyright violations, or users' misbehavior, for example, spammers or trolls" (Hoisl, et al., 2007). To facilitate a better online community, they suggest the use of social rewarding to be incorporated into the laws and regulations of the website using math equations, calculating the different knowledge contributor's authenticity.

In the first measure, they advise any online knowledge-sharing platform to incorporate published information that is not checked for accuracy and legality in a formal process of reviewing. With this, it is suggested that a large and heavily involved online community voluntarily cross-check each article or other knowledge sharing, to proof the information for its correctness. Users themselves have the option to self-regulate what information they want to share or find helpful. The research suggests the 3 following steps to create a social rewarding system for the users and cross-checking of information on the website (Hoisl, et al., 2007).

1. Amount of references
An index of references used can utilize when any user shares their knowledge in an article format. The amount of references, their length, the number of links pointing to the references, and the number of links pointing to their article can be used as measures in the mathematical equation they present later in their article.

2.Rating of Articles

The shared knowledge can after publishing be rated by other users on the platform. This is incorporated to ensure that a democratic approach to subjective questions can be discussed due to the number of people who have experienced the same problems as the knowledge sharer. Using a predefined pointing scale such as 1-5 stars or alike system will help new readers to the article with most backers.

3.Most Viewed Articles

The last factor to the equations is to include the number of views per article. These are easily configured parameters that count the number of visits to an article. This ensures that non-users of the platform contribute every time they access the shared knowledge.

The approach in their research was focusing primarily on wiki systems for sharing knowledge. It is crucial for such sites that there are plenty of users who shares and produces content as free riders in wiki communities cannibalize the whole wiki society. Therefore, incentives must be made to create users who keep contributing to the wiki where both newcomers and old-time users can contribute new and frequent experiences. This literature will create the framework for when we analyze an already established online knowledge-sharing platform and for our solution boundaries.

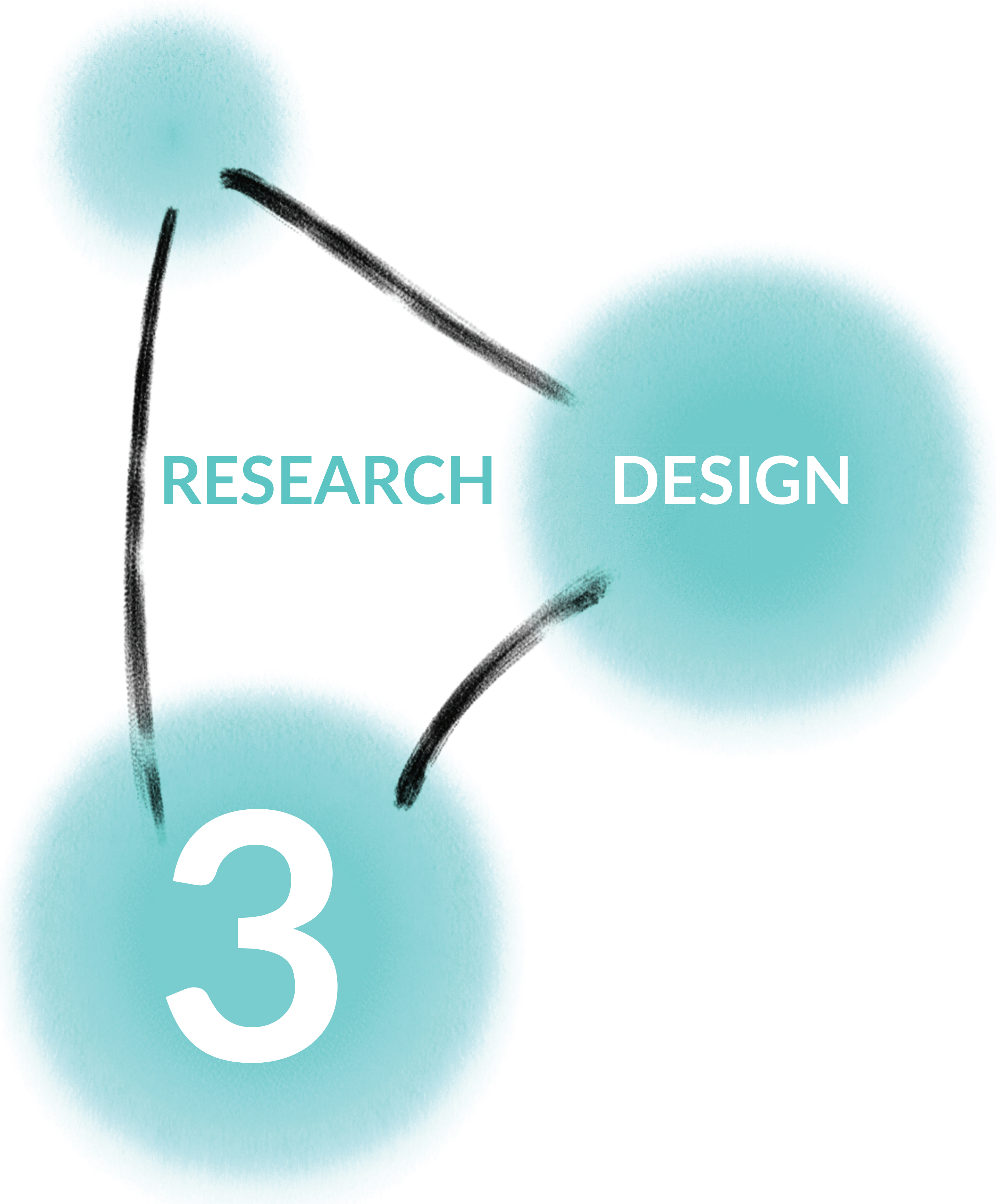
2.8 Overview of challenges for hearing-impaired individuals

Untreated hearing impairment can lead to depression, isolation and other social issues which might lead individuals to isolate themselves from society. Besides psychological consequences, these individuals may encounter physical consequences to their health and overall life quality, making it difficult to carry out everyday tasks. Regarding the work and labor market, an untreated hearing impairment can be put in relation to reduced productivity and early retirement. Furthermore, these individuals are more likely to have lover status and lover paid positions in the labor market than individuals with a regular hearing. This has been seen to have consequences on the economy because of the lack of productivity and early retirement while this leads to big financial losses for the state. When looking into the causes of why some individuals do not seek help, one of the primary reasons is that this group has the perception that the process of seeking HAs is costly, meaning that they are not aware of their free of charge possibilities in the healthcare system.

The way the current healthcare system is organized with the abundance of possibilities, the hearing-impaired can seek treatment. Currently, hearing-impaired individuals are offered support by organizations that are helping them to get easier through the hearing treatment process and make the experience less overwhelming. These organizations are seen to have a role of spokespersons as they represent this group in public - and policy-shaping. Choosing the right treatment can be an overwhelming experience where the hearing-impaired is sent back and forth between different actors to receive full treatment. It is found that hearing-impaired individuals desire more transparency and better information-channels for the hearing treatment system. On that note, the government created a goal until 2022 to create a more transparent system, meaning that it should be easier for patients to navigate in the system and ensure a better quality of treatment. This should be carried out by better involvement of patients throughout the process, however, no further initiatives or actions concerning solutions to these problems are currently to be found in the literature.

Looking into some aspects of online support communities, working as virtual environments, where certain groups of individuals attain to interact with, seek guidance of, or provide help to each other, we found critical which critical functions which need to be put to use when running an online support community. Another view on this is the way the platforms are designed and how these serve their purpose. Are these user-friendly, easy to reach, and what experience do they provide the users with. The current research falls short regarding the use of online platforms as a source of treatment for the hearing-impaired. The literature of online communities has been situated in other contexts and it is therefore interesting to conduct new research within this field.

The findings and conclusions drawn from the literature and desktop research has served as a starting point for further investigation when getting contact to the hearing-impaired through their online community. There, these findings are used when developing interviews and survey questions and on which aspects should we pay attention to when observing the community platform. The findings from the literature review will function as a baseline when conducting online research within the field of hearing treatment in Denmark. It is important to understand the underlying system before diving into it which is why most of our literature review points in that direction.



RESEARCH DESIGN

3

The theory and methodology applied through the process are presented and accounted for in the following chapter. To answer the second and third research questions we chose to look at the system with an Actor-Network Theory approach where an understanding of human and non-human actors, the technological and social elements, as well as the essential relations that affect the hearing treatment system, has been the purpose. In addition, the theory 'Community of Practice' where the view on online communities and knowledge sharing. CoP has been applied as a way of approaching and looking into already existing communities on Facebook. This approach was further applied through the final development of a solution.

3.1 ANT

The Actor-Network Theory approach was taken into use to investigate and answer the research question; 'How can we strengthen the relation between hearing-impaired individuals and the current system of treatment?'. Therefore, to gain an understanding of the overall challenges in the hearing care system, we aimed to build an understanding of the network's relations. A network analysis has been carried out, to clarify where the relations between both human and non-human actors are, arguing which should be re-negotiated to implement at new solution within the network. The primary focus is on the relations between the hearing-impaired and the different ways of getting help in the system. Core-relations has been uncovered and analyzed upon.

Social and technical realities exist side by side in a constantly changing network. Thus, in this project, both actors, human and non-human has been examined as equally important. Meaning that both online support community platforms and hearing-impaired individuals are identified actors with agendas and interests in establishing relationships with other actors. Any actor who has an impact on an activity or organization is considered a key actor or a representative for the other actors who have mutual interests. Some actors have the power to impact the network changing relations, while others are affected by the result (Eskerod & Jepsen, 2009).

Through this project, we aim to identify key actors as spokespersons, where they can help contribute and raise awareness of the project and its agenda. Translation is a common term when assessing the actor-network theory. Here, four stages describe the translation process (Callon, 1986). By Problematization, the main problems of various actors are examined and discussed. Here it is decided who the actors of the network are, questioning their key problems. At the Interessement phase, awareness, and reinforcement of relations between actors in the network were sought to be established, as in the third phase of Enrollment this is essential. In the Enrollment process, actors, their roles, and functions are outlined in the network, and important alliances and claims are established. By enrolling actors, they can become a spokesperson and act on behalf of several actors in the network. Finally, Mobilization ensures that our designated key-actors are represented as spokespersons of their network, as 'one voice representing the crowd' these are critical for the growth of common understanding between actors and the desired movement, approaching a stable network. The integrity of the network can be defined if the actors stick to the spokesperson. Nevertheless, stability is can only be temporary (Callon, 1986). It should always be kept in mind that there is a chance that the chosen spokesperson will not be followed by the actors who he represents, since each actor has individual interest and might disagree or even disagree with the project. If this is the case, all the prior attempts could be in vain, and the moment of translation could become a failure. Additionally, the translation process is not necessarily linear; in fact, the four moments will often overlap or interfere (Clausen & Hansen, 2017; Callon, 1986)

During the four stages, Interessement devices of different shapes have been used to establish relations between us and other key-actors in the network. Interessement devices are defined as "non-human elements which are circulated by key actors to inspire other actors to support the change" (Clausen & Hansen, 2017, p. 346). Furthermore, these are being characterized according to the role they play, as Interessement devices can take various shapes and ways of performing their 'making actors move' (Clausen & Hansen, 2017).

To get an overview of the network and the existing problematics, actors were outlined through an actor-mapping. The actor mapping presents the outcome of our analysis of our gathered data on the hearing treatment system in Denmark. Showing the actors within the system, their relations to each other and how the hearing treatment system can be aided to become better.

3.2 Communities of practice

This terminology created by Lave and Wenger (1991) draws on the social construction of knowledge to understand which practices unite actors within specific communities. Seen with the lenses of community of practice (CoP). In chapter 4.4 we dive into the existing online communities to observe and analyze their practices and the knowledge they share.

CoP is a rethinking of learning-theory from the 1980' to the 1990' when Jean Lave and Etienne Wenger proposed a new theory to the learning model where individuals both with and without practice experience are learning together in a codependency engaging in 'communities of practices'. These can be identified everywhere in society and systems, whereas most individuals are partaking in one or more, even without being aware of it, may this be at work, at home, at school, or in hobbies. Individuals belong to CoP's as they naturally belong with other organizational structures. The extent of participation in a CoP varies dependent on whether the individuals see themselves as core - or margin members of the community, however, to distinguish it as a CoP, ongoing interactions regarding shared interests or concerns must take place between participants (Wenger, 2003).

Some CoPs are recognized, have names, and are formal, whereas others are more undefined, fluid, and informal. Nevertheless, individuals of the CoPs are brought together by joining in shared practices and hereby what they have learned collectively through the engagement of the practice. The CoP functions as a mutual engagement that connects individuals into a social entity including a shared repertoire of communal resources where practices show the routines, sensibilities, artifacts, vocabulary, etc. To function, a CoP needs a common set of information, engagement, and mutual experiences, whereas various resources such as tools, docs, routines, and shared vocabulary can carry and communicate the knowledge being shared. CoPs are easily observed in the physical and geographical orientation and traditional CoP theory from Wenger and Lave is primarily focusing on these, such as work, school, home, and hobbies.

On that background we have additionally taken use of the more specific theoretical framework of online CoPs from the research article; "Identifying factors that encourage and hinder knowledge sharing in a longstanding online community of practice" (Hara, 2006). In their research, they follow nurses working across geographical boundaries and how their knowledge is shared in online CoPs achieving a greater learning curve for the online community. Hew and Hara use a typology of 21 dimensions on which online CoP may differ and be compared created by Dúbe, Bourhis, and Jacob (A. Bourhis, 2005). These are divided into four categories:

1. **Demographics:**
Overall orientation, life span, age, and level of maturity.

2. **Organizational context:**
Creation process, level of boundary crossing, the environment, the degree of formalism and the strture of leadership.

3. **Membership:**
Size, geographical orientation, membership stability, members enrollment process, community experience, level of technological knowledge, cultural diversity and the topic's relevance to them.

4. **Technological environment:**
Reliance on technology and the variety of technology available to the members of the online community.

The characteristics above have been used to identify and analyze online CoP's referring to hearing-impaired people. Here the focus was primarily on what kind of knowledge there was being shared and how, within the various CoPs. Here an important conduit when sharing knowledge is conversation (A. Bourhis, 2005). Conversations occur all the time within online CoPs. Here knowledge seekers request for help from knowledge possessors. These then describe an appropriate solution to the problem and thus teach the knowledge seeker and others the practice and field of knowledge they possess.

Our approach within CoP has been to reveal and analyze the knowledge being shared in various online CoPs. Hence, the theory has worked as a guideline when carrying out observations on groups regarding the information available, and their way of sharing knowledge or personal experiences. We build upon the theory done by Lave and Wenger and mix this with the methodology of having communities online. The theory is in our case situational regarding how we conduct research under these times. It is for this reason that we create our own theoretical standpoint to describe and investigate different online CoP's. This has resulted in a focus on online communities for hearing-impaired people, as our literature review and conducted research guided us to the conclusion that the hearing treatment system in Denmark, lacks when it comes to the support and information from the health care system, found as a repetitive problematic according to HA users. Therefore, looking toward what seems to be needed when such Individuals are in search for more information, has been informative when investigating the problem, as well as inspiring in relation to conceptualizing new possible initiatives in the field.

3.3 Methodology

One of the primary goals for us as a design team has been to gain a micro and micro perspective on the system of hearing-impaired in Denmark. With this we wish to acquire a bigger systematic perspective while at the same time being able to understand the individual actors of the network. On that note, it was important for us to create alliances which could, first enable us to understand how the system is perceived by the hearing-impaired actors. Second, together with these actors we sought to reach a mutual goal and design a solution to their found problems.

The methods applied for acquiring these perspectives and establishing relations with key-actors were primarily a combination of virtual-ethnographic, a survey questionnaire and interviews through email correspondences and phone calls. The choice of this approach is justified and seen as the most appropriate while it has not been an option to set up physical meetings, workshops or other kinds of data generation that require in-person interaction. On that note, we sought to involve key-actors in other non-physical ways.

This has never been the preferred way of interacting with key actors, however, creativity and being able to see solutions rather than obstacles is key within a situation like this. Lastly, for the design phase, we chose to follow lean startup methodology when developing a solution. In the following, these methods will be presented and described how we have used them.

Hermeneutic approach

When interpreting data that is not measurable, we take the hermeneutic approach regarding the alternation of analysis. This means that our interpretation of qualitative data builds on knowledge or presumptions we may possess beforehand, but also on the understanding gained when viewing the data. Hermeneutics describes the work of interpreting research material as a circular motion or a hermeneutic spiral visualized in figure 9, that runs back and forth between understanding individual parts of the data and the interpretation of the data as a whole collection. Going into the field with the hermeneutic approach we use the knowledge we possess beforehand and the initial expectations we have for the data or research in general. This presumption is undoubtedly affecting how we understand and interpret the data. It is in other words the glasses we see it through. Additionally, it is important to be aware that our presumptions are limited to our personal beliefs and can therefore result in us overlooking or misunderstanding things or meanings in the data.

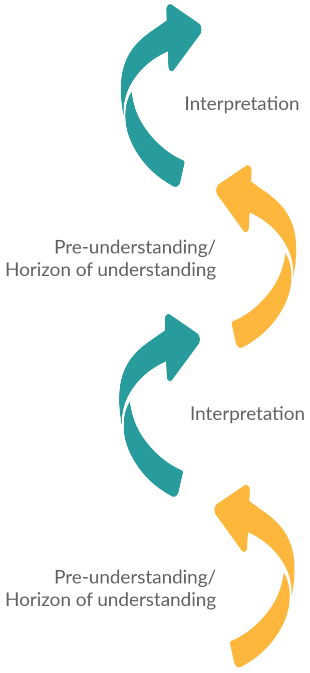


Figure 9 - The Hermeneutic spiral

3.3.1. Survey

A survey was conducted to generate quantitative data regarding hearing-impaired individuals to identify and compare their experiences and opinions. The questions were based on findings from the literature review, and refined to provide us with the main reason for; People not getting HA, not using the HA they got, what obstacles they ran into during the process of getting HAs and overall a general impression on what they see as their biggest obstacles related to having or pursuing HA'. The answers additionally took part in validating the knowledge acquired through literature – and desk research concerning related issues when living with a hearing impairment and pursuing HAs. The questionnaire was shared in different hard-of-hearing Facebook groups and served as an alternative to the physical meetings and design-game workshops initially planned. .

3.3.2 Interviewing hearing-impaired individuals

Phone calls and email correspondence was used as a tool in conducting semi-structured interviews. These qualitative interviews consisted of questions and themes based on initial desk – and literature research. These were agreed upon to gain a persistency within the interviews, as these were to be carried out individually by all members of the team. The questions revolved around four main themes; 'Hearing loss related issues', 'The process of getting HAs ', 'HA specifics' such as adjustments, maintenance, etc. and 'further reflections on getting a HA' regarding subjects as improved quality of life and to what extent it has helped. Before the beginning of interviews, the thesis goal and purpose were presented and the interviewees were informed of their role and were assured that the given information would not be published by their names but through aliases instead (Irvine, 2011).

With the chosen themes, we sought to get around a broad field of questions, revolving phases from the first step of realizing having a hearing impairment to the end of the process where HAs have been pursued. The themes served as a base, however, it allowed us to depart if the interviewee brought an interesting subject or aspect to the conversation. The interviews conducted were chosen to be carried out as semi-structured, as this often led to a more open conversation in connection with the interviewee and their experiences. As reported by J. P. Spradley "It is best to think of ethnographic interviews as a series of friendly conversations into which the researcher slowly introduces new elements to assist informants to respond as informants [...] (Spradley, 1979)

The contact with the hearing-impaired interviewees was primarily established through the teams' connections; Parents' friends, grandparents, colleagues, their network, and so on. This provided us with interviewees from the age of 32 to 92 years old. The responses gained from the interviews have primarily served as a source to get an insight into what problematics hearing-impaired individuals face when pursuing HAs through the Danish hearing treatment system. Furthermore, personas have derived from interview results (see section 5.1).

3.3.3 Interviewing professionals within Danish hearing treatment

To gain deeper knowledge on problems from the professionals' point of view, the team sought to establish contact with these key-actors. These connections were established through Facebook, surveys, and contacts with an ENT doctor. Phone-interviews were carried out with public hearing therapist and former audiologist; Mette Grønlund, ear doctor; Janusz Wajn and private audiologist at Dansk Hørecenter; Rikke Hestbæk.

The interviews were held one-on-one, inspired by the previously presented method of semi-structured interviews. According to IDEO "Experts can get you up to speed quickly on a topic, giving you key insights into relevant history, context, and innovations" (IDEO, 2020) While the crux of the Inspiration process is engaging with the actors we are designing for, we can gain valuable insight by talking with experts. Experts will also provide us with a system-level view of our project area, tell us about recent innovations — successes and failures — and bring us feedback from organizations, institutions, or governments. Interviews are an opportunity to communicate profoundly with actors through dialogue. Addressing the unique skills of the interviewee, and specifically explaining what the interview material is used for, helps to create a positive relation that can provide us with useful information. Informal interviews with poorly organized interview guides help open for wider dialogues. Conducting the interviews through phone can help to make the interviewee more relaxed in the situation, as they themselves have chosen time and where to be at the given situation.

3.3.4 Observation - virtual etnography

When conducting ethnographic research, the basic task is to decipher the environment according to what the researcher observes. This becomes possible when the researcher immerses him/herself and becomes a part of the community and can see it from the insiders' point of view. By doing so, the researcher can tell a story of a community through the words of its members (Pfeil & Zaphiris, 2009). For us to get closer to key-actors and achieve similar ends without physical meetups, virtual ethnography research was conducted in a Danish hearing-loss support community on Facebook. With this approach, we moved from the physical world into virtual space. Here the Facebook group called Høresagen I Danmark was chosen as our primary field of observation for conducting qualitative content analysis as an alternative to real-life observations in the field.

We were primarily interested in knowing how hearing-impaired individuals alternatively seek support, outside of the healthcare system. Questions such as 'How is this Facebook group being utilized in a knowledge-sharing context?', 'What kind of information-flow is existing there?' and 'What are the typical topics people are sharing and discussing?' Were answered throughout the observation analysis.

3.3.4.1 The ethics druring online observations

Before starting the observation and qualitative content analysis of the online support community, the first step was to take into consideration the ethics of observing – as well as the wellbeing of the community members. There is a debate on what is public or private and if ‘observational consent’ should be required. In general, it differs whether researchers agree on consent being required or not (Pfeil & Zaphiris, 2009). In our case, the online community is occurring on Facebook which is generally perceived as a somewhat public page.

Additionally, the fact that the internet is an open space and individuals most likely are aware of their inputs being visible for others to see, it is concluded that members are well aware of the public nature of Facebook and that their inputs and contributions are visible for others to see. Nevertheless, to protect the privacy of the members, their names and full quotes are not disclosed.

3.3.4.2 Procedure of analyzation

The first step for us was to immerse ourselves into the community by going through posts from April 2019 to April 2020. By doing so we got insights revolving the community, its members, and communication patterns. After gaining an overall understanding of the community, an analyzation and categorization of the qualitative data began (See the visual representation of the process in figure 9). Screenshots of various submissions and comments have been taken and printed out in the form of samples to be observed and discussed. These screenshots of discussions will further on be referred to as data. According to the subject of the issue within the conversations, we were able to divide them into four problem area categories presented in chapter 4.6.

To code the chosen samples, the ‘unit of coding’ was chosen regarding our interpretation of what the ‘meaning’ was through the conversations. The choice of ‘meaning’ was chosen to be suitable as we realized that quite often the sample discussion covered several topics and placing the whole discussion in one code of sentence, could potentially leave out important details and distinctions. If per se, the focus was only on the individual comments or sentences, this could cause missing the overall meaning of the topic being discussed. On that note, the whole discussion was to be taken into consideration before assigning meaning to it. Furthermore, the ‘meaning’ can be perceived as subjective and may lead to different results when it comes to segmentation (Pfeil & Zaphiris, 2009). The procedure of gathering samples, categorizing them, and extracting knowledge from these, is inspired by the methodology developed from the paper ‘Applying the qualitative content analysis to study online support communities’ (Pfeil & Zaphiris, 2009). Unlike their per reviewing procedure, we have chosen to make use of the advantage of being in the proximity to each other and “on the spot” per review each other’s analysis.

Procedure:

- Read the whole sample to get an overview of the content and determine the relevance and importance for the research
- If of relevance to the scope; screenshot of the whole discussion
- Divide the messages that share common meaning and pay attention on messages that may consist of several meanings
- Make sure that the whole unit belongs to one segment. If there are more sentences and they do not belong within the segment, these are separated and assigned to a different segment
- Make sure that each discussion sheet is peer reviewed by each team member to determent if there is any inconsistency or biasness

Rules:

- The unit of analysis is 'meaning', which implies that the whole discussion is perceived relevant and needs to be read through before assigning a 'meaning or overall subject to the sample'
- The unit of analysis cannot be shorter than one sentence
- One message may belong to different segments

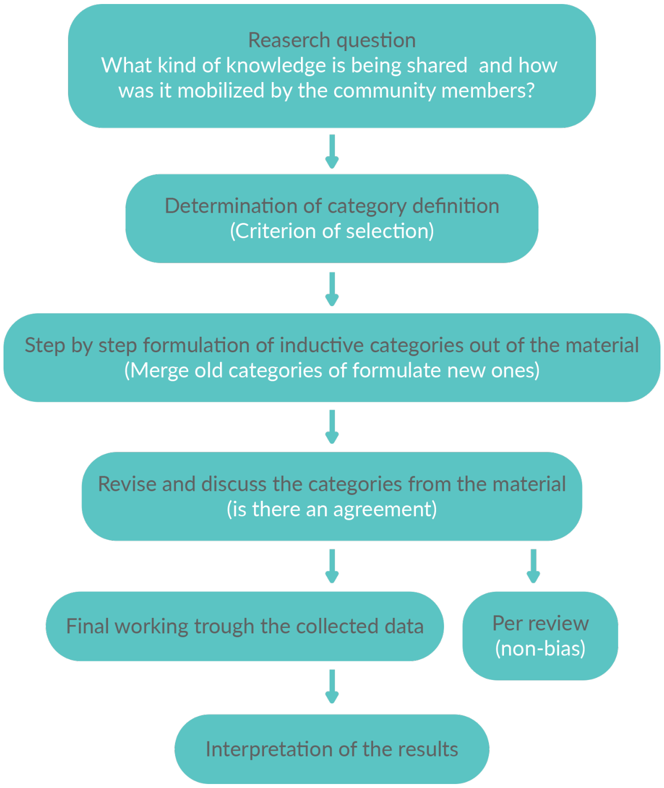


Figure 10 - Procedure of category development inspired by Pfeil 2009 methodolopgy

3.3.5 Observation of the websites, dedicated to hearing-impaired in Denmark

Besides observing online support communities, we were interested in where else hearing-impaired individuals in Denmark could seek information or support on the internet. We discovered that in Denmark hearing-impaired people have the possibility of seeking information and support in several different websites which are mainly moderated by dedicated voluntary organizations.

To conduct observations, we took the role as a hearing-impaired person seeking information. We wanted to understand how information is made accessible and how it is dispersed between different platforms. Furthermore, when looking into these websites we were interested in what the main purpose of the website was; The overall user experience and interface, the role of the user on the website and how well this was executed to serve its purpose.

3.3.6 Design methodology - Lean start-up methodology

In the process of the solution development, a lean startup methodology has been put into use. The lean startup produces a concept that serves as an impression of the concept, where it is being delivered to targeted users in unfinished form. This is done to be further updated according to the end-user's reaction. This cycle is repeated before completing and selecting the final concept to meet the needs of the users. The lean startup is a learning opportunity that reduces uncertainty and encourages end-users to engage in the design (Galbraith, 2014).

The lean startup model moves away from the practice where the concept is first refined into a finished product and then introduced to the users. This process involves several early tests before the product is eventually delivered to the market. In general, this involves several early tests before the product is eventually delivered to the market. This model was found most suitable because of the resource restrictions but also the time we got on our hands to test and deliver a final solution. In chapter 5 the implemented lean startup methodology and the engagement with the end-users is described.

3.3.7 Brainstorm

To brainstorm is a widely used method when there is a need to develop a variety of ideas within a limited period of time. From the ideas generated, most of them will be discarded but few of them will be identified as worthy answers or sub-solutions to the revolving problem. We have through our phase of development applied the brainstorm methodology to create concepts fitting to the problem areas found in the analysis phase of the project. The brainstorming is based on the Nigel Cross Engineering design methods books focusing on the presented creative methods (Cross, 1989). We chose to base our brainstorm on the members in our group Albert, Bruno, and Julie where we see all of us as knowledgeable in the problem area but each with different expertise and backgrounds. One of us took the organizational lead when practicing the brainstorm concept development event. All ideas are welcome in a brainstorm and this should also show from the outcome of the concepts, rocket ship ideas to easy feasible ideas. The brainstorming method from Cross is based on the concept requirements list where a concept has several requirements to fulfill before solving the core problem. More details on how the brainstorm was carried out will be presented in chapter 5.3.

4

RESULTS & ANALYSIS

This chapter presents and analyzes findings from interviews, surveys, and virtual ethnographic observations. The chapter is organized according to the applied method and the actors involved. All sub-sections are summarized through outlined findings, in order to create an overview of results from each analysis. Lastly, the found problematics will be mapped out through an ANT perspective. The understanding of the actors and the relations assists the design team to understand and identify where a future change can create the most value to the hearing-impaired within the network. Here misalignments have further been presented and analyzed upon, seeking to visualize the fragmented hearing treatment system uncovered through the analysis. The gathered main findings will lastly be categorized and presented.

4.1 Analysis of interviews with professional

Professionals working within the field of hearing treatment in Denmark have been interviewed, in order to get their perspective on the current system, and what problems they see as prevalent. An audiologist pedagogue, ENT doctor, and former audiologist within the private sector has been involved in this process.

4.1.1 Interview #1

Mette Grønlund, an audiology-pedagogue, working at a communication center (in the municipality) in Thisted. Three main issues were brought up by Mette during the interview; 'Interessement conflicts regarding some doctors', 'Lack of information for the patients' choices' and 'that the current system seems fragmented'.

4.1.2 Conflicts of interest regarding some doctors

When an individual with a hearing impairment decides to seek help, he/she should start by going to her doctor or an ear doctor. If the doctor decides to give the hearing-impaired a referral, the rules are such that he/ she has a 'free choice on all shelves';

"But after that, the funny thing happens that the doctor then says; "You need a hearing aid - and I can help you with that". Then he/she is sent into a private hearing store owned by the ear doctor herself. - And then the doctor forgets to say that the person can actually get it for free in the public sector"

Mette continues;
"- Or the person has seen the private advertisements in the newspaper or similar, from the local hearing aid business and then she goes in there. The local hearing aid shop, however, will not send him/her for a medical examination at the doctor in town - since the doctor is in principle his competitor with his own hearing aid clinic (this is in Thisted) - so he can't use him - he, therefore, hires his own doctor for the business, who can then do the medical check that is needed".

It is mentioned that she finds this part of the system to be problematic when the doctor suddenly no longer is objective regarding the patient's health and needs. "- After all, a doctor should not be a dealer? A doctor may not sell medicine, but he/she can sell hearing aids?" This gap in the legislation has apparently been 'closed' by regulating the rules so a doctor opening up a new practice, will no longer be able to have a private business besides that;

"- but those doctors who already have it aren't prevented from to continue doing so. - Now, I also don't think that the gap has been closed for that reason - there is always a way to get around the law?"

4.1.3 Lack of clear information on the patient's choices

When asked what her impression is in regard to the information the hearing-impaired are given, she often experiences people coming to her in the communication center. Here it is clear to her, that a lot of the people who have used the private offer, was not properly informed from the beginning when it comes to their possibilities of getting one for free;

"[...] there are many times I explain it to those who come to me (in the communication-center) - I am independent of all that - after all, I just have to guide people (meaning she does have a conflict of interest). When I explain it to people, they become very surprised and sometimes angry; "Does that mean I could have gotten it for free?" "ehm, yes!!!".

Mette is of clear understanding, that the doctors, by law, are obligated to inform the patients properly about their options. it is their duty. Still she experiences that numbers of people seem to get poor information regarding their situation and choices. Furthermore, Patients seem to have an idea of the hearing aid devices offered in the public are either old fashioned or of lower quality;

" - Others have prejudices around the hearing aids, the public can offer in the form of "then they're not as good, are they?" - "uh, yes they are". Some do not believe it. Others become furious and feel cheated. You have to be careful how to weigh your words because you should not tell people that they have been cheated, right? - it negatively affects them. - I do not become a happier person by informing them that"

In addition to that, once you get your hearing aid, the clinic more or less says "Good luck with that - you can come back in 4 years and get a new one". But there may very well be issues between these four years, and then it's an option to contact the communication center in the municipality you live.

“You get a pamphlet home with you if you are in the hospital - and they do so at the private dealers to, I believe. We are at least around, bringing out these pamphlets and they also run out of them - so they must hand some of them over, I guess. So yes, they get this with them home and then they can call or write themselves if they need help. – Well [...] they should get the pamphlet informing about us, with them home every time, but I still find that people don't even know we exist. So probably not everyone gets the pamphlets anyway....”

4.1.4 A system that seems fragmented

According to Mette the different treatments available today is contributing to a widespread confusion for the inflicted individuals. A more accurate process of treating hearing-impaired individuals has become harder while there are suddenly too many actors in the field;

“So in the old days - yes I'm such an old one saying something like that - All the people got hearing aid in the hospital and then they followed up on the 'hearing institute' and it was a much more manageable system. Now you can get H.A. the different all kinds of different places; There are free hospital choices in Denmark, you can buy them privately and you can buy them from the ear doctor - and the ear doctor also hands out H.A from the region (public H.A) - so he is both private and public in the same clinic...”

It is also somewhat more difficult to figure out whether people are aware about the communication centers and the services they can offer, Mette explains. “Then there are those who say, ‘It is probably only those with at H.A From the public who can get help there" - And that is also a misunderstanding. They just have to live in the municipality.”

Explaining the story of her fathers’ HA treatment within another municipality, the talk once again fell on what she calls an administration hell. Within the current system, the service the hearing-impaired individuals are offered depends very much on where in the country they live. Furthermore, the system in some parts of the country seem very bureaucratic;

“Think that you have to ask the municipality to be allowed to do something, instead of just doing your job and getting things done? it is completely insane. After all, I am employed in the municipality, so I am expected to solve the problems myself. But his [her fathers’] communication center belongs to the region - and that region has no money - the money is located in the municipality. So, every time they have to get their hands out of their pockets and do something, then they have to ask the municipality to get some money for it!”

Following the system change in Denmark back in 2007 (see section 2.6.1) where the national counties were shut down and the new regions along with municipalities were shaped “it went completely wrong” according to Mette, continuing “They had no overview of the economy within in the municipality - But it was the region that took over some of the communication centers” – This explains why some communication centers need to apply and wait for allowance to order devices or consultations at ear doctors, when trying to help out hearing-impaired with somewhat ‘simple issues’.

Main findings, Interview #1

- ○ Gaps in the law results in some doctors having a conflict of interest when it comes to recommending HAs.
- ○ Lack of proper information available for patients when it comes to;
  - ● Choices of sector
  - ● Different devices available
  - ● Feasible help and guidance in the prospected 'communication centers´
- ○ A lack of transparency for the patients seeking help
- ○ The fragmented system is affecting the patients in a negative manner
- ○ The fragmented system is part-reason of the long waiting times

Table 1 - summarized issues seen from the audiology-pedagogue's point of view

4.1.5 Interview #2 - A medical perspective

Janusz Wajn, a public ENT doctor with a clinic in Copenhagen. Janusz clinic is therefore one of the so-called 'Public HA pool-clinics' which by 2020 June only exists in the Copenhagen Region. The pool clinics is an initiative which takes some of the workload of the hearing clinics at the hospitals as the public ENT doctor has a certificate which states that he can supply and adjust hearing aids from a pre-defined pool available hearing aids provided by the public sector.

4.1.6 It is a matter of money

When interviewing Janusz and asking regarding what he thinks causes the waiting time in the Public hearing clinics and why this is different from where the hearing-impaired individuals live geographically, he replies that;

"It's a matter of money. The regions control how they use funds, therefore hearing-impaired persons will also experience that some regions are doing better than others when it comes to waiting times"

Janusz can hand out HAs through the public health insurance pool. This initiative is an attempt on lowering the waiting-time at the public HA-clinics and hospitals. Janusz guides on how to adjust the hearing aids and has full responsibility when it comes to adjusting the HAs, he has handed out. Asked if he can adjust HAs for patients who did not get it at his clinic, the answer is that he would like to give advice "but I will not adjust HAs I didn't prescribe myself - this is an unspoken rule in the system"

"- It is traditional not to touch appliances that other professionals have adjusted. The appliances belong to the clinic where they were handed out - This is because professionals are paid to adjust the appliances. So, you end up stealing work from others in the public sector, unless otherwise is agreed"

When asked whether the ENT doctors are a part of the HA business, the answer is both yes and no. Janusz does not sell HAs himself and do not have a saying in which brands of HAs that are sold or purchased, but he often pass-on interviews and 'expert knowledge' to HA companies. Janusz is aware that he is obligated to tell the patients that they can go both the private and public way – "such is the competition law". He on the other hand only informs about the help the communication centers can provide if he thinks the patient needs it. He further mentions, that before the counties was removed, the hearing treatment system seemed less fragmented, while the regions collaborated better on the HA offer.

Main findings, interview #2

○ Unspoken rules can be identified as contributing to a non-effective system, where rules and 'codes of conduct' seem to make the hearing-impaired paying the prize.

○ Poor collaboration between regions in regard to hearing treatment

Table 2 - Most important points from the ENT doctor interview

4.1.7 Interview #3

Rikke Hestbæk, Audiologist at 'Dansk Hørecenter' – private HA Company. In order to get information on the private sector, their typical patients and obstacles. Rikke was a contact achieved through a GN hearing colleague.

4.1.8 Typical Patients within the private sector

In the private sector children and young people under 18 are not able to get treatment. This is a legislation made regarding guarantees, Rikke explains. Dansk Hørecenter are primarily helping out individuals in the age of 60 and above. However, she states that the younger target group is seen to buy the more expensive HAs. This, she assumes, is because they are in labor market and therefore do not have time for the public waiting-lists and must have something durable! "- and they have to look smaller", Continuing;

"Everyone can get free hearing aid through the public. Therefore, the public sector in seen to be the private's biggest competitor. Nevertheless, the public some places has up to 2 years of waiting. With the private it is closer to 2 weeks - here they can get an appointment for further adjustments within two days. We are therefore able to provide better service than the public"

According to Rikke, one of their biggest challenges is that the vast amount of the HA devices handed out is being sent back. – As for now they do not seem to have an exact overview on the reasons hereof;

"- When are the hearing-impaired ready to buy HAs and why are they handing it back? - Where does the difference between who chooses to keep it and those who hand it back lie? We do call them up after a year though, where we try to do a follow-up. 20-30% will come back and the rest may choose public hearing aid..."

A lack of feedback from unsatisfied customers, is leaving Dansk Hørecenter with a lack of knowledge on how they can deal with this obstacle of HA devices being returned when trial phase has expired. It is our impression that some patients ultimately choose to return the devices as it may take long time to get used to the devices. If no experience or help is available for these patients, this can be a crucial factor for many of the people who give up on the hearing aids. (see section 4.2.1) Additionally, Rikke applies individuals are using the HAs from the private sector to get a fast and free trial when testing whether they even want to pursue HAs. Some are assumed to hand it back, just to shift to the public hospitals where it is available for free.

Main findings, Interview #3

○ The public sector is the biggest competitor to the private sector

○ The private sector wins the race regarding having fast treatments (no long waiting-lists)

○ There is a lack of knowledge on why so many people return their devices

○ Lack of transparency and knowledge sharing from hearing-impaired individuals to private sector

Table 3 - Encapsulated main issues seen from the perspective of an audiologist working within the private sector.

Findings from expert interview 1 and 2 are seen to affirm each other. A fragmented system and lack of collaboration across regions are put forward as issues resulting in a non-efficient, fragmented hearing treatment system. It was additionally mentioned throughout the third interview how the lack of transparency and knowledge sharing seemed to be both an issue with the public and private sector of hearing treatment.

4.2 Results from survey

The conducted survey was designed so it covers stages from the early period of a hearing loss, the process of seeking help, and lastly the period of using HAs. Altogether, 106 members have participated in the survey and contributed with their expertise and experience. Participants were beforehand informed on the nature of the survey; what their role was and what was expected from them. The questions were designed so that can enable us to collect both qualitative and quantitative data. In certain questions, participants were able to select one answer, multiple answers, and in some, they were required to write a paragraph. Regarding the questions where they were required to select the answer, they were also given a section where they could elaborate more on their choice. In the following section, we will present the main findings from the survey.

The received answers show that the informants have different backgrounds and occupations, ranging from teachers, health care workers, retired, social workers, electricians, and others. The average age was 52 and the gender ratio was women 75,5%, men 22,6%, and others: 1,9%.

The first part of the survey was dedicated to **the stage before seeking help and getting hearing aids.** On the question "When did you start losing hearing and what do you assume was the cause?" they were required to write down their answer. From their answers, we were able to extract and identify six main causes. Figure 11 shows that the two main causes were hereditary hearing loss, where they were assigning their condition to genetic's, as it occurred with other family members. Additionally, ear infections or diseases like Presbycusis and Meniere's were mentioned here. The third most common answer was congenital, meaning being born with the condition. Others assigned it to be work-related hearing loss, while working in loud environments like factories and schools.

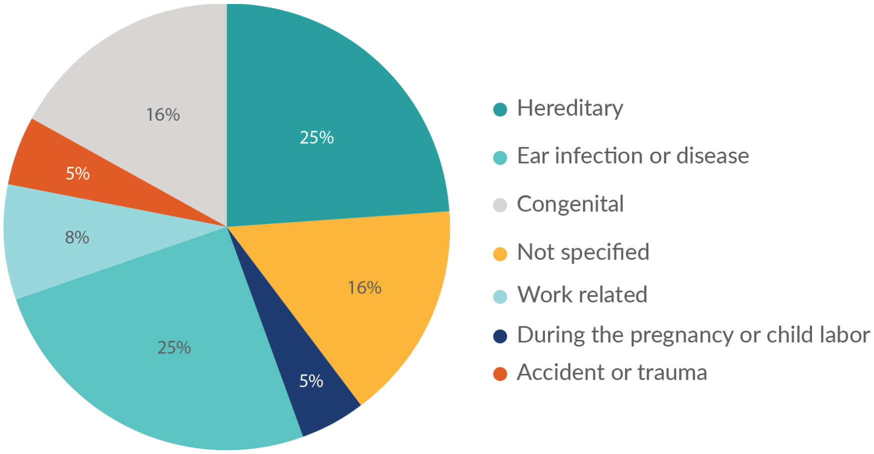


Figure 11 - The causes of losing the hearing

When asked *"What parts of your life were/are affected by your hearing loss?"*, participants were able to select multiple choices and were allowed to elaborate more on their choices (see figure 12). What was visible from their answers is that hearing loss in general affects all aspects of life. Some to a higher and some to a lesser degree. To portray how hearing loss affects different aspects of life we will present some quotes from the participants.

Family life

"Family used to get on to me for talking too loudly or me asking them to repeat a few times and consequences of that kept me from being confident in responses to co-workers and authority figures."

"My dad knows about my hearing loss, but he still gets mad at me sometimes, thinking I am lying about not hearing him when he talks to me."

Social life

"It caused me to socially isolate myself because it was difficult to hear and communicate in groups or in public places. I often missed or misunderstood things sometimes causing anger and frustration for my family, friends and colleagues."

Work

"My work was most effected, particularly meetings in conference rooms where multiple people were talking or there was a combination of people in the room and people on the conference call and/or video."

Commute

"In general hearing loss affects your confidence to a huge extent. This means avoiding social situations. I am anxious if I must travel alone because I cannot hear the announcements and at work, I lost my confidence dealing with colleagues. Because my condition is invisible my communication problems make me feel less able. I often know the answer but if I cannot hear the question life is difficult."

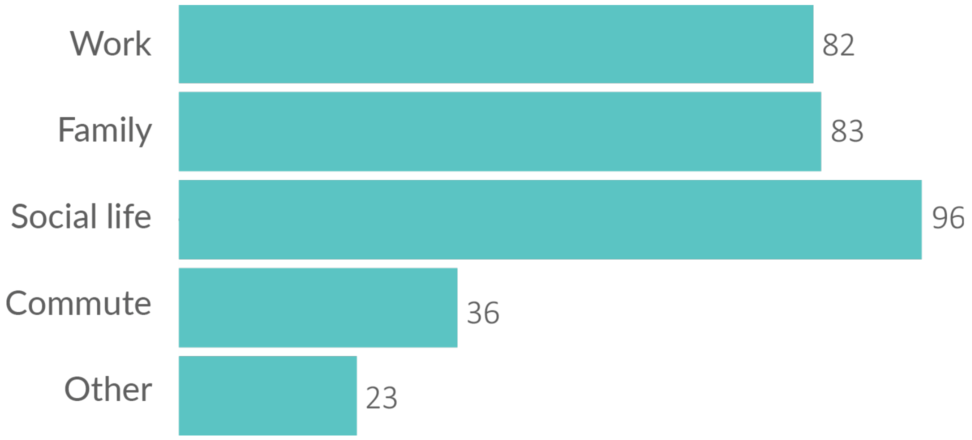


Figure 12 - Life aspects affected by hearing loss

Some participants revealed that they did not seek help and were furthermore asked to select a reason for it. Moreover, they were offered to elaborate further on their answers (see figure 13). According to the responses, reasons for not seeking help range from 'accepting the condition as a part of life and live with it', 'receiving negative comments or feeling stigmatized when using Has', or 'thinking that their hearing is not that bad'.

"It took me about 7 years to acknowledge my hearing loss and accept it. I would rather appear as a foreigner who does not understand Danish than one with hearing loss. It feels like walking with appliances is very stigmatizing."

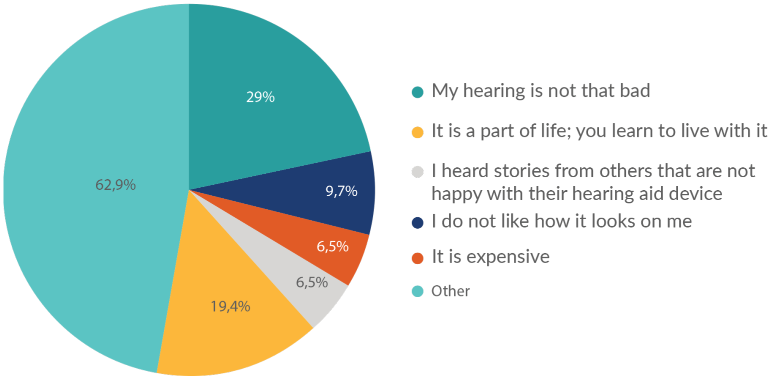


Figure 13 - Reasons for not seeking help

The following section is regarding **the process of seeking help and acquiring HAs**. The participants were asked whether they sought help through the private or public sector. Additionally, they were asked if they encountered any obstacles during this process and if they have an opinion on what could ease or improve this process, if they were to decide. Here the participants provided a plethora of different experiences and perspectives.

Long waiting time was the most common answer, whereas for some individuals the process took over two years before they finally got their HA. How long they had to wait, depended on where they live in Denmark. Several participants had suggestions on how to ease and speed up the process. Here they proposed a better collaboration between the public and private sectors.

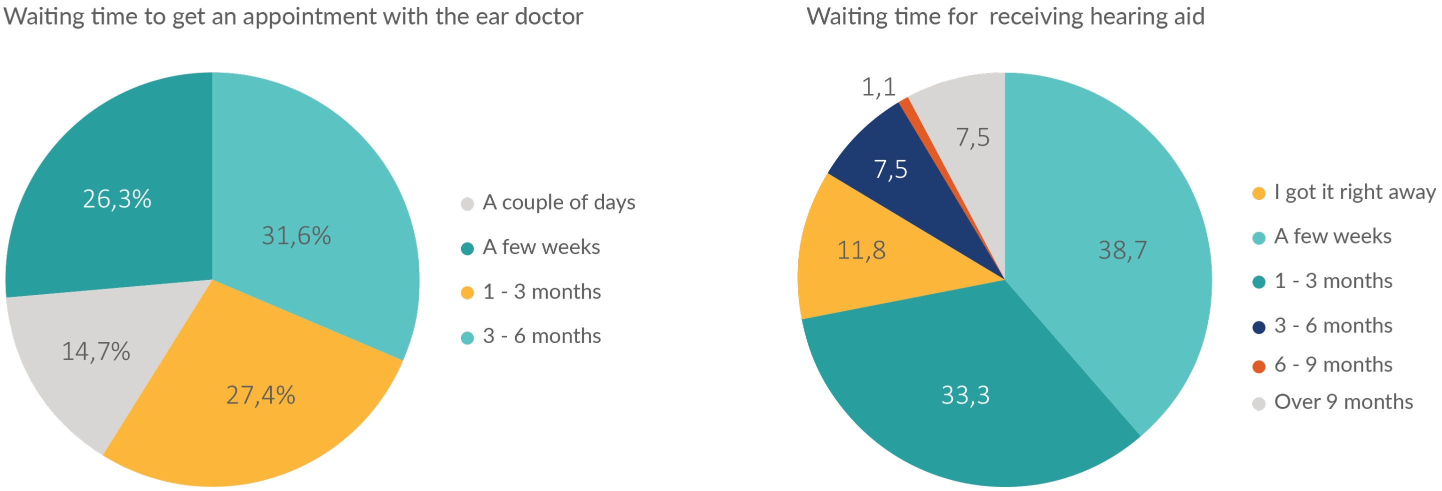


Figure 14- Waiting time

"The public sector should simply stop treating ordinary hearing loss, and everyone should be referred to the private so that you can get help in the time when it is really difficult."

Regarding the technical guidance they received from their doctors, participants explained that it was not satisfactory and that they either had to ask others for help or seek solutions on the internet. The time that they spent on consultations was not enough to learn how to deal with the Has. This was the most common problem when having received the new devices.

"30 minutes of instruction by a hearing pedagogue and a telephone number where you can get help. So, phone numbers!? Hello, we are hearing-impaired."

As a remedy to this problem, some participants recommended that doctors should forward some resources to patients, e.g. websites where they could find tutorials or manuals on how to adjust or maintain their device.

"If you want to know all that the instrument can do, look for it on the manufacturer's website, and they are almost always in English. It Should be part of the hearing aid hand-over".

"I have found out about 'Use and Maintenance' myself. I did not want to bother the audiologists as they are always under time pressure."

For some participants, the lack of patient-centered care was the reasoning for not being satisfied with the process, where one participant described it as "assembly line-like". Overall, certain patients felt that a holistic approach within treatment is lacking. They wished that doctors showed more interest in what patients have to say and how they experience their own condition. Furthermore, some explained that they have encountered different audiologist during the process, and with each one, they would start from scratch (WS7: Audiologists' communication behavior during appointments)

"I miss that doctors dare to act and listen to us, patients. Especially because most of us have great respect for authorities and the few of us who try to speak up, aren't listened to."

Another mentioned problem area was the lack of transparency within the Danish health system, where participants explained that it is particularly difficult and confusing for people with a newer hearing loss. Some pointed out that they should have been more informed regarding their rights and opportunities for treatment while many was not aware that they had the possibility of treatment outside their region. In some cases, this can ease and speed up the process. Additionally, some were not aware that they could get grants for HAs at the approved private clinics.

"I think it would be useful to inform patients about the opportunities for support at the local hearing center, in connection with a call. This way, you will know where to find support and information if there is a long wait."

" Long waiting times. I would like to see shorter waiting times and better information for example"

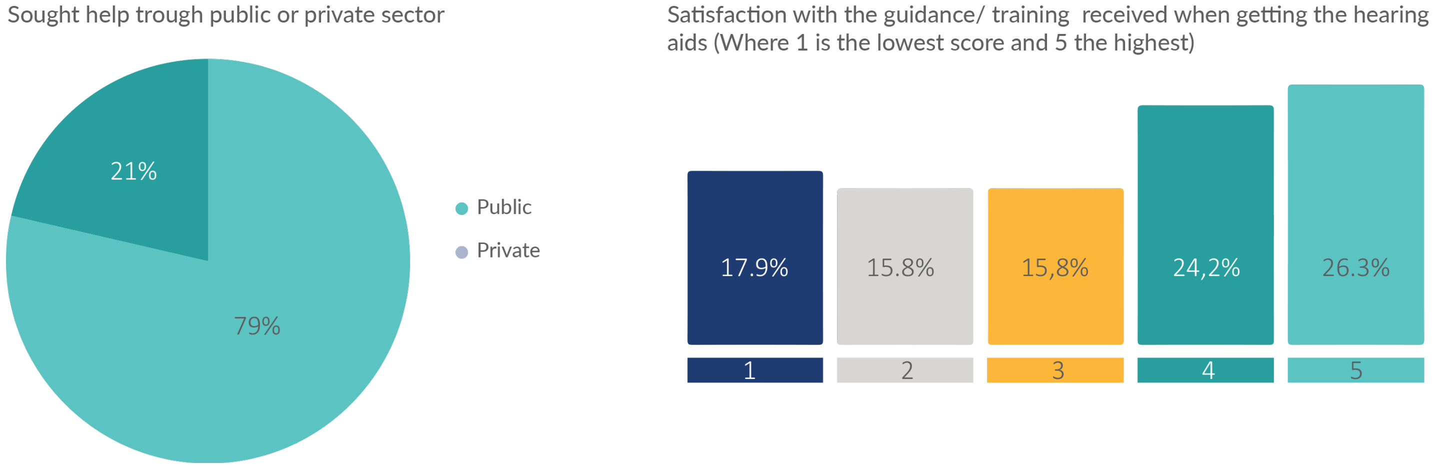


Figure 15 - Public or Private and satisfaction

The last part of the survey was regarding **the period after they got their HA** (see figure 15). The participants were asked if they had any challenges using their HA and the satisfaction of it. Most common answers were regarding maintenance of the device, especially replacing batteries, cleaning, and working with the HA device (WS6: Hearing aid related difficulties) Several participants complained about long waiting times if the device needed to be sent for repairment or if seeking new HA after four years. Then the process starts over, and they need to be on the waitlist again. Overall, participants did express that they were satisfied with their HA and that they used them throughout the whole day.

"I use them all the time, because otherwise I don't understand anything."

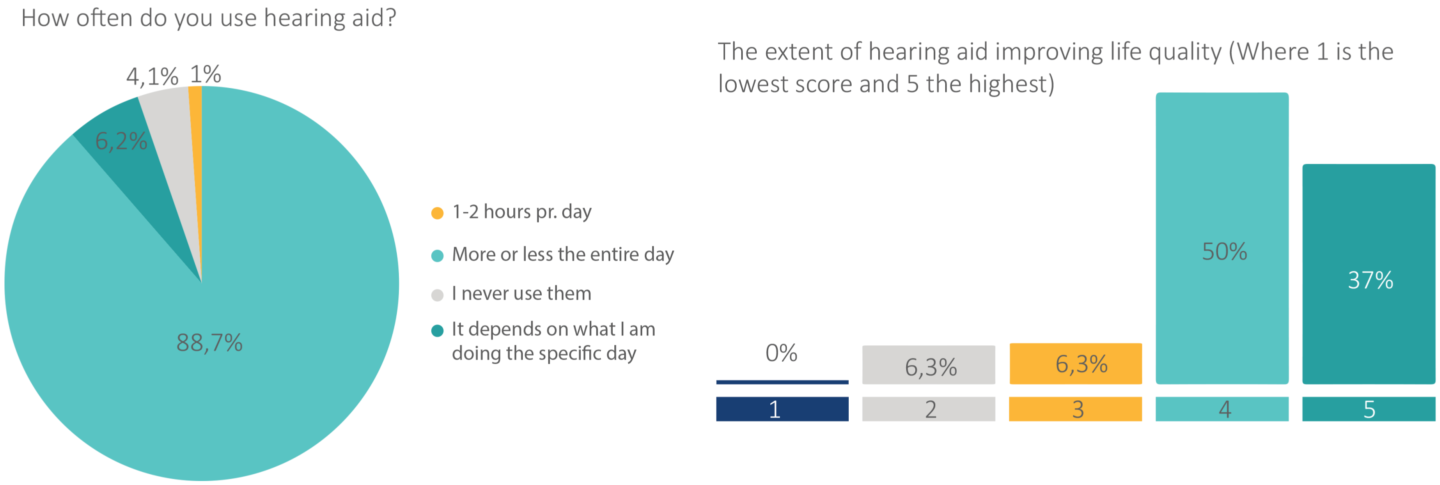


Figure 14- The use of HA and life improvement

In table 4 a summarization of main findings identified through the survey are presented. These findings represent the most occurred trends mentioned within the hearing-impaired community in Denmark.

The main findings from the survey

○ Hearing loss is creating different obstacles in numerous social circumstances

○ The stigma regarding wearing HAs is still present

○ There is a lack of collaboration between private and public sectors

○ Lack of technical guidance received from doctors/ audiologists

○ Lack of tutorials and guiding manuals

○ Lack of transparency regarding choices you have as a patient in Denmark, patients are not aware of their rights and opportunities

○ Lack of holistic approach to treatment

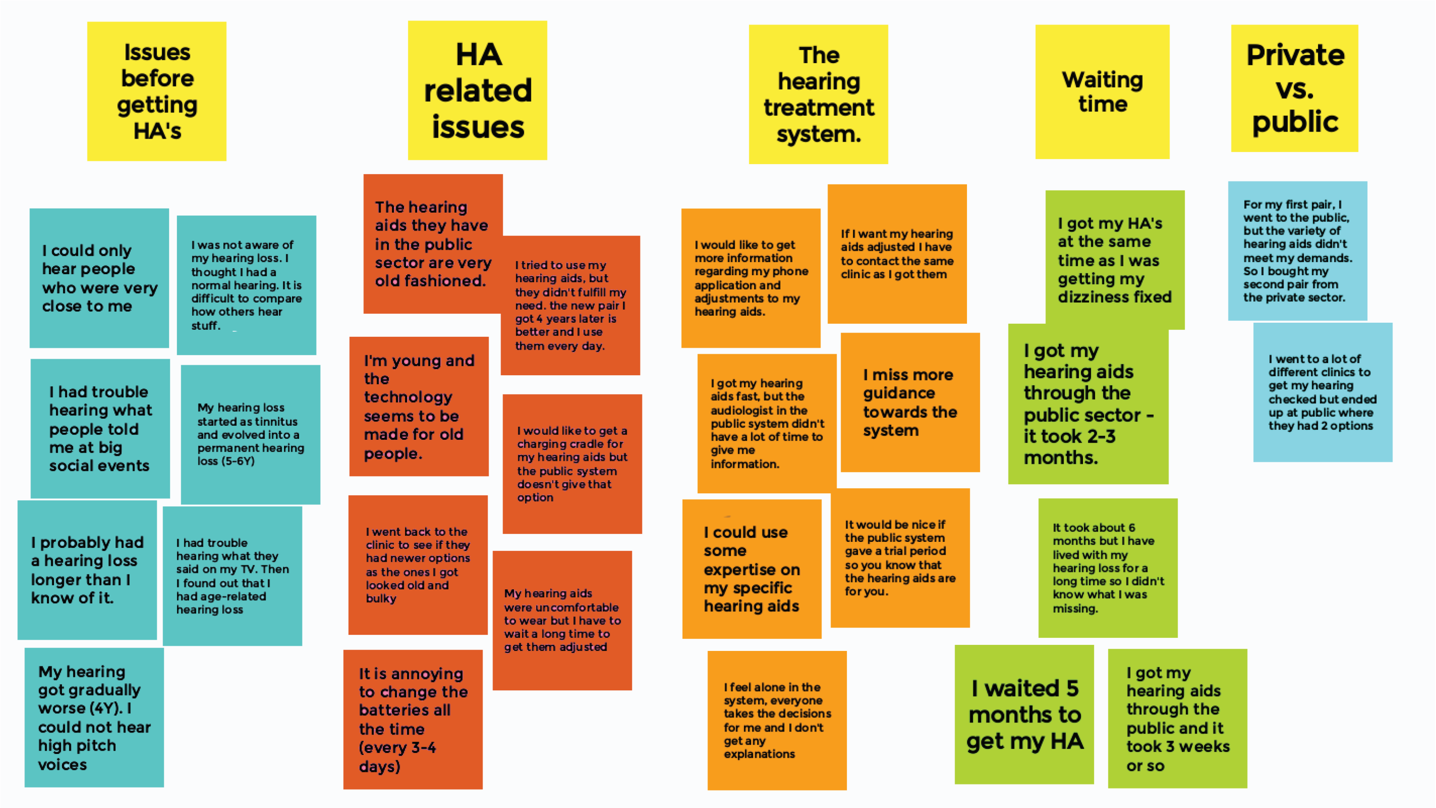
○ HAs holds a great value to the hearing-impaired

Table 4 - Key results from survey questionnaire

4.3 Results of interviews with hearing-impaired

Phone and email – interviews were conducted with hearing-impaired individuals (see WS1 for different types of hearing disabilities), who received HA from both the public and private sector. These were carried out to gain a more detailed understanding of the problems hearing-impaired individuals face during their treatment or more specifically with their HAs.

The affinity diagram as seen in figure 17 was taken into use when analyzing the generated qualitative data. Quotes from the interviews were categorized as the most mentioned problems both within the public and private sectors. The affinity categories are not pre-defined but based upon and specific to the data.



Issues before getting HA's

I could only hear people who were very close to me

I was not aware of my hearing loss. I thought I had a normal hearing. It is difficult to compare how others hear stuff.

I had trouble hearing what people told me at big social events

My hearing loss started as tinnitus and evolved into a permanent hearing loss (5-6Y)

I probably had a hearing loss longer than I know of it.

I had trouble hearing what they said on my TV. Then I found out that I had age-related hearing loss

My hearing got gradually worse (4Y). I could not hear high pitch voices

HA related issues

The hearing aids they have in the public sector are very old fashioned.

I tried to use my hearing aids, but they didn't fulfill my need. the new pair I got 4 years later is better and I use them every day.

I'm young and the technology seems to be made for old people.

I would like to get a charging cradle for my hearing aids but the public system doesn't give that option

I went back to the clinic to see if they had newer options as the ones I got looked old and bulky

My hearing aids were uncomfortable to wear but I have to wait a long time to get them adjusted

It is annoying to change the batteries all the time (every 3-4 days)

The hearing treatment system.

I would like to get more information regarding my phone application and adjustments to my hearing aids.

If I want my hearing aids adjusted I have to contact the same clinic as I got them

I got my hearing aids fast, but the audiologist in the public system didn't have a lot of time to give me information.

I miss more guidance towards the system

I could use some expertise on my specific hearing aids

It would be nice if the public system gave a trial period so you know that the hearing aids are for you.

I feel alone in the system, everyone takes the decisions for me and I don't get any explanations

Waiting time

I got my HA's at the same time as I was getting my dizziness fixed

I got my hearing aids through the public sector - it took 2-3 months.

It took about 6 months but I have lived with my hearing loss for a long time so I didn't know what I was missing.

I waited 5 months to get my HA

I got my hearing aids through the public and it took 3 weeks or so

Private vs. public

For my first pair, I went to the public, but the variety of hearing aids didn't meet my demands. So I bought my second pair from the private sector.

I went to a lot of different clinics to get my hearing checked but ended up at public where they had 2 options

Figure 17 - Affinity diagram with hearing-impaired responses

4.3.1 Period before getting HAs

What seems to be the main problem for the hearing-impaired before getting HAs is that they all experience a gradual worsening of their hearing loss between 2-5 years before they decide to take action and seek help. The type of hearing problems the interviewees experienced was primarily the most widespread impairment of the hearing either due to age, work, or be it genetically related. Their obstacles seem to lay within a long period before they realize that they have a hearing problem.

4.3.2 Uncertainties and long waiting time for treatment

The answers to the process of getting HAs was varying, however, similarities appeared when looking at the obstacles mentioned. First, most of the interviewees went through the public sector to get their HAs. The related obstacles were primarily the waiting time to get HAs, which within the interviewed varied from 3 weeks to 6 months (WS8: Waiting time on hearing aid treatment in Denmark). This creates uncertainty regarding the public system and a feeling of being cheated when some get through the system in a shorter amount of time than others. Additionally, the public sector, its' service, and procedures vary regarding where in the country the hearing-impaired individual is resident.

As most of the interviewed got their HAs through the public, most of the problems mentioned are regarding the system surrounding the HAs rather than the HAs in itself. For e.g.; *"I could use some more expertise on my specific HAs"* and *"Greater accessibility to those who are helping with the adjustments"*. Furthermore, it seems as the HA technology is sort of black-boxed for the users, as what they know of the HAs consists of a microphone and a speaker. The main obstacle mentioned here is that the public sector has a long waiting time when you must get your HAs adjusted, which only can be done by the same audiologist who prescribed the HAs.

4.3.4 The hearing treatment system

The main obstacles for the interviewees regarding the process of getting HAs were described by one of the interviewed in the following quote: *"I feel alone in the system, everyone takes the decisions for me and I don't get any explanations"*. Another interviewee, who got HA' through a private clinic, mentions "In private, money must be earned, so even if there are appliances that can be fully paid for from public grants, they are mainly offering you appliances that are not fully covered by the public grant e.g. 5-10,000 KR. above the limit. Older people, in particular, believe in this advice and are thus "cheated" in my opinion". In general, the interviewees seem satisfied with their HA devices after getting used to these, however, a feeling that proper knowledge and guidance is either hidden for them or too difficult to access, were a common aspect we have taken with us in the further process. In Table 5 a summarization of findings from these interviews is presented.

Main findings, interviews with hearing-impaired

- Hearing-impaired lacks knowledge regarding where to seek help and get treated.
- Waiting time in the public sector varies from region to region and the HAs they prescribe are different from the ones available in the private sector
- Conflict of interest when private clinics need to earn money on individuals' hearing impairment
- Adjustments of HAs is a very time-consuming task as these typically needs several adjustments in the first period of use.
- The Danish hearing treatment can seem cumbersome to enter for the hearing-impaired

Table 5 - Summarization of the main findings from interviews with hearing-impaired individuals.

Results from the survey questionnaire and interviews were primarily in line, specifically regarding the topic of lack of transparency within the system. As a consequence of this, it can seem wearying to enter the treatment system, and gain information on rights and opportunities as a hearing-impaired in Denmark. Furthermore, problems regarding waiting time in the public and the varying waiting lists depending on the specific region, came to surface. This lack of standardization towards the system is in our view seen as a consequence of the system change in 2007. This resulted in regions managing themselves how much money to put into e.g. hearing treatment. Thereby not all regions are investing the same amount of money and a standardized hearing treatment across the country is hard to establish.

4.4 Results of observations; The 'Høresagen i Danmark' Facebook group

In search of a broader insight on the hearing-impaired individuals' obstacles, a virtual group observation was carried out. Here our main interest was to find out how this group served its purpose and what knowledge, or questions were shared. The group described in its own words are; "A group for anyone with hearing problems; hearing-impaired, deaf, CI-operated and for people with tinnitus, hypersensitivity, Meniere or other sound and hearing problems and/or interest in hearing-related issues". Høresagen i Danmark consists of over 1800 members who can submit content that is related to hearing problems, policies, and other information and guidance relevant to the community. Any kind of political posts are not welcomed, as the group is independent of companies and associations and "do not wish to be spammed with advertisements". "Entries or submissions in the group are at the individual's expense and they bear the responsibility for any consequences if they don't respect the code of conduct". Before being visible, all posts are 'screened and approved' by the moderators. The members are being advised to keep a good tone in the debate. Members who are not following the rules of conduct may be quarantined or excluded from the group. Moreover, to be part of the community, the individual needs to disclose the reason for joining and moderators need to approve it.

4.4.1 The Høresagen I Danmark members

The members of the community are individuals with different hearing impairment conditions with diverse ages and professions. Also, both audiologists, working in private and public clinics are members of the group as well. These are not observed to be the most active members when it comes to submitting posts, however, some of them are seen to be quite active when it comes to answering questions or clarifying misunderstandings in some of the comment-fields. Moreover, these actors might be involved in the community for their learning purposes and see this online community as a chance to gain firsthand knowledge on their patients – Nevertheless, this relation seems to be working in a good way, however, at first it is not made visible in the community who these professionals are, unless you go into their Facebook profile and it is stated what profession they work in.

4.4.2 Facilitating knowledge-sharing

Using a Facebook group as a knowledge-sharing platform can in many ways be seen as a community with both pros and cons. The people who have a Facebook profile already know more or less how the platform works which is seen as a positive aspect. On the other hand, it needs to be taken into consideration that the majority of people with a hearing impairment are the more mature part of society and that 43% of the people older than 60 do not have a Facebook profile. Therefore these are automatically left out of this community (Statista, 2020).

Within the group, the members are further advised by the moderators to delete their submissions when they have received their answers or are done discussing the matter; "Help us keeping it organized in the group - Delete your submission if it is no longer relevant...". This might cause in several members asking somewhat the same questions over and over, instead of being able to recognize what has already been written and discussed.

Besides posts being removed, the way the group's discussion room is designed, it could be challenging for individuals to find the discussion that is related to what they are seeking answers for. The discussions are sorted chronologically, from the newest to oldest, and do not provide more structure or e.g. "filters" and search functions that could ease the process of finding the right information.

4.4.3 Knowledge sharing through discussions

A lot of the information available in the community is shared through the discussion, which occurs in the "comment section" of the posts. What came clear to us is that these group members have a more or less common shared language towards the subjects discussed, where they use abbreviations e.g. for the various devices available. Furthermore, if there are still some members in the group questioning these, it is moreover observed that people are eager to help and further explain.

We observed and extracted what has been communicated between the members in the period between April 2019 and April 2020. We ended up with four samples containing 281 comments from the group members. These segmented discussions were further analyzed and assigned with a meaning. In figure 18 we present one example of a segmentation and assignment of meaning to a discussion. In the following, four samples are presented. These were segmented according to most common trends that occurred in the discussions between the members.

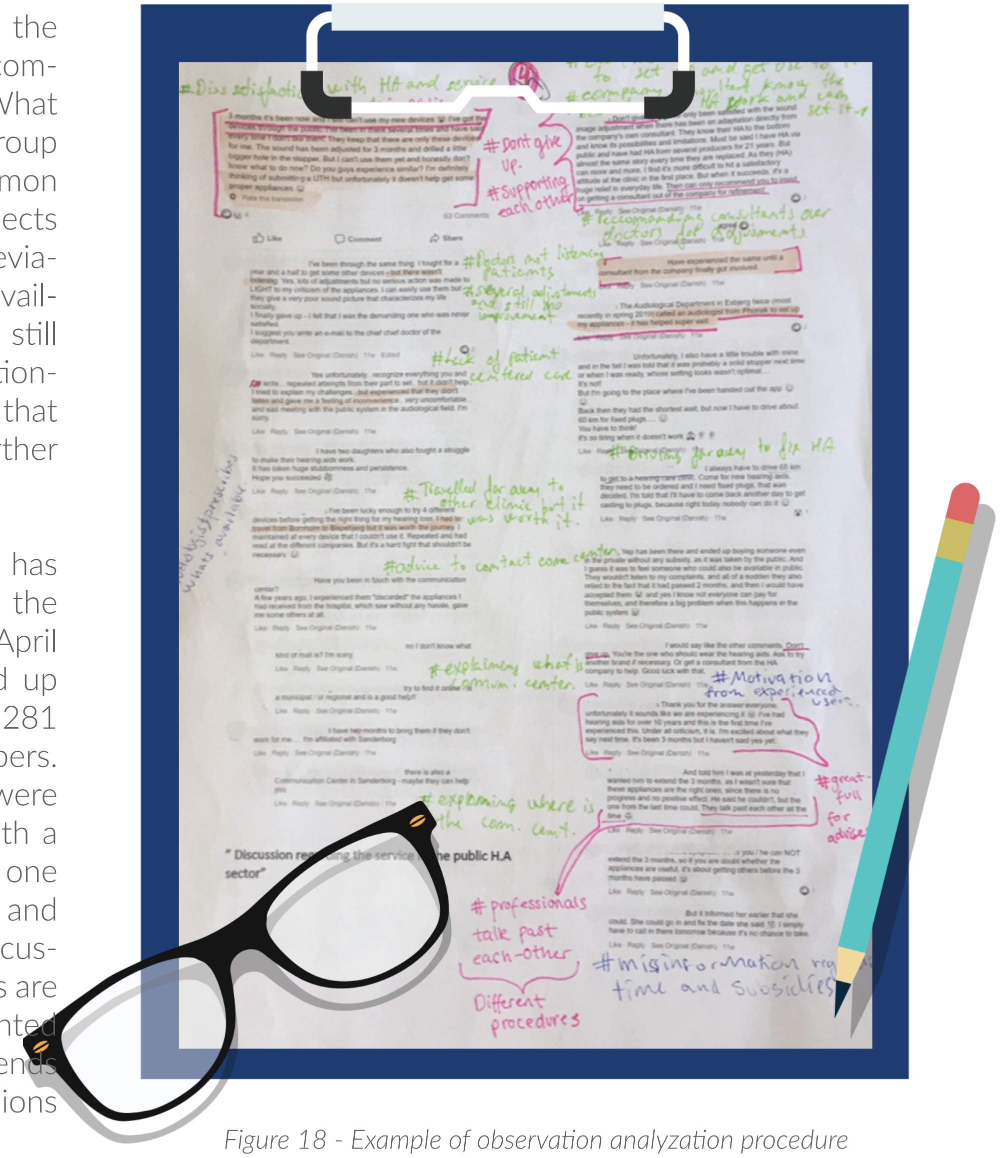


Figure 18 - Example of observation analyzation procedure

Sample 1 - Transparency and insufficient information

In sample 1, the discussions were concerning whether to seek help through the private or public sector. The members were having discussions regarding what is right or wrong within both sectors, while mainly discussing on the background of their own personal experience.

Regarding the private sector, participants of the discussion tend to think that audiologists are 'hiding' prices and options of getting a cheap pair of HAs. Thus, leading to the assumption that audiologists in the private sector are seen as 'sellers of hearing aids' and not placing patient wellbeing in the first place. While some were discussing how is it expensive to get HA through the private sector, other members were explaining that it is not necessarily expensive because of the available grants for HA. One member states that his HA was fully covered by this grant.

Regarding the public sector, the participants of the discussion were complaining about the assortment of HAs in public clinics not being up to date and long waiting times to get treatment. Additionally, some of the members were sharing misinformation. The misinformation's were regarding the communication centers, where they stated "It is only possible to get help from communication centers if the individual seeks help through the public sector" – This is not the case though.

○ First-time users looking for answers

○ Questions on whether to seek help through public or private sector - Divided opinions and experiences

○ *"In public sector waiting time is too long and private is too expensive"* - Free choice of hearing aids and no waiting time, but costly in the private. However, "*The private reduces waiting time in the public"*

○ Free hearing aids, but "*limited assortment and waiting time in the public"* - Missing information of what is available in the public. "– Myth that HAs in public sector are not being up to date"

○ Missing product price information in the private – assumptions regarding prices in private sector; "it is possible to get grants" - Sharing information on subsidies for private HA

○ Audiologists are educated the same place "*but in private they turn into sellers (biased) and in public they are just busy"*

○ Missing transparency in both public and private sector

○ Recommending contacting communication centers

○ Spread of misinformation (misinformation regarding the communication centers)

Table 6 - List of assigned meaning of the discussions in the data sample 1

Sample 2 - Waiting time

In sample 2, the discussion was primarily regarding the waiting time in the public sector. The group members share their concerns and personal experiences on how long they have been waiting to get their hearing aids. What stands out is that they all had different experiences on how long they waited, which differed depending on the municipality the individual lives in. Several members expressed that they are having a hard time finding information on their possibilities, on what others replied with advice stating they have the possibility of seeking help at other municipalities. On that note, one member complained that she is not able to change the municipality where she is being treated due to severe illness and cannot travel – meaning that this option is not suitable for everybody

- The Private sector is more effective
- Confusing system – There is no transparency - Missing information on the available options.
- It is possible to get free hearing aids at the private.
- No standards across regions - Different waiting time depending on the municipality
- Knowledge sharing on waiting time - Hearing treatment is strictly connected with the clinic who handout the HA; This also counts for adjustments during the 4-year warranty process.
- Sharing personal experience - Expert users guide to the public system where moving treatment to other municipalities with less waiting time is a possibility
- Communications centers are available for both the private and the public users.

Table 7; List of assigned meaning of the discussions in the data sample 2

Sample 3- Patient-centered care

In sample 3, members were discussing and sharing their experiences regarding the treatment they received at the public clinics. Some members described their experience of not being listened to by the doctors and thereby felt a lack of patient-centered care. On that note, some members were recommending other channels of getting support and guidance e.g. communication centers and through the consultants or audiologists directly linked to the company that produces HAs. Furthermore, it was discussed whether the doctors received proper training as there are a lot of different devices and still new models are coming to the market every year. This might impose a challenge for the doctors when being the ones adjusting them precisely for each patients' needs.

Moreover, in the sample discussion members showed to be good at supporting and motivating each other. Comments such as 'Don't give up' and other recommendations drawn from their own experiences were being shared. This gave the impression that members of the community are not feeling alone with the challenges they face in their treatment.

- Patients do not feel heard (several adjustments and still no improvement);
- Dissatisfaction with the device and service provided - Lack of patient centered care
- New device – new problems – it takes time to get used to them”
- Recommending (H.A specific) consultants over doctors when it comes to adjustments
- People are driving far to get the needed help
- Advises to contact communication centers for help
- Motivation and support from the once who has had same experiences; “don’t give up”

Sample 4- Technical support

In sample 4, the discussions were regarding the HA devices, their maintenance, and repairment. The ones who were part of the discussion expressed how the procedures are different according to what region or municipality one seeks help (public or private clinics). Members were trying to support each other by telling their story and experience with repairing HA. Furthermore, several members complained regarding the communication channels with the actors responsible for repairing because “mails do not work” and they are forced to make phone calls.

- Specific, technical Hearing aid questions
- Waiting time on repairment
- No national standards: Different municipalities, regions and public or private choices. In the public, the repairs are done by the audiologist who handed it out.
- Information issues - hard to get in contact with the company repairing the hearing aids.

4.3.4 Conclusion on Facebook-group observations

By observing Høresagen i Danmark Facebook group, we concluded that being part of this online community is of great value to hearing-impaired individuals as through interaction with other likeminded, they have the opportunity to ask for support and support others. What was visible is that experienced hearing-impaired, as well as doctors and audiologists' from both the private and public sectors, seem to be somewhat committed in the knowledge sharing, participating and contributing to the discussion.

What is important to keep in mind from these samples is that all these discussions are individual truths towards problems and solutions. In most cases, the members do not use any references besides their own claims. Furthermore, at some points, we came across members spreading misinformation, e.g. regarding the role of communication centers where we fact-checked with the communication center employee who clarified these rumors. The sharing of misinformation within communities like these can and does occur. This is an important aspect within knowledge-sharing communities we will bear in mind.

Concerning the platform itself and how it facilitates the community and knowledge sharing, looking from the functional - and interactive perspective, we concluded that there are still some drawbacks on how it is conceived, how features are available, and how it is being utilized by the hearing-impaired. We identified that a "knowledge drain" is occurring due to the design of Facebook, making it difficult for individuals to find needed information. On top of that, 'finished' discussions are being removed from the discussion page.

The way this Facebook group facilitates the hearing-impaired community, how they interact with each other and the problem arias identified in the discussions will be kept in mind for later in the design process.

4.5 Results of websites observations

We have identified four websites that are going to be observed. To have a more structured way of looking at them, we created a list with criteria to pay attention to. The aspects that we were looking into were:

- The main purpose of the website
- The overall user experience and interface
- The role of the user on the website
- Good and bad. How well was it executed to serve its purpose?

Audilogi.dk

The purpose of the website is to share knowledge regarding the technology and hearing treatment system in Denmark. It is divided into two parts so that it serves to both hearing-impaired - and professional users. Hearing-impaired can access information regarding the hearing treatment in Denmark, both private and public, as well as information regarding their HA devices. The section dedicated to professionals contains information regarding the new technologies, upcoming courses, new treatments, and different kinds of documentation and guidelines. Overall, the design is seen as simple and intuitive. What could be a drawback is that the website is "heavy on text", where other ways of conveying a message, e.g. illustrations, photos, videos are of minimal usage. Furthermore, the text size is small for an individual with bad sight. The users role on the website is mainly to inform themselves. If they have questions they can get in contact through the available mail (audiologi.dk, 2020).

Hearpeers.dk

The purpose of the website is to provide information about hearing loss and hearing implants through operation. Users can get in touch with mentors who themselves have undergone the transformation with hearing implants and share their experiences. The website has two main roles; One being educative by providing information regarding the different types of hearing loss and hearing implants, and the other is getting in contact with mentors, receiving free of charge guidance and support. The design of the webpage itself is straightforward and simple where the textual content is backed up with videos visually explaining the message. The process of getting in the contact with mentors seem straightforward and easy. The only issue here, is that the initiative is only for hearing impaired who are interested in getting hearing aid implants, also known as CI operatives (Hearpeers, 2020).

Hoereforeningen.dk

The website is part of the Hearing Association, which works on improving the living conditions of people with hearing impairments, tinnitus, and Meniere's disease, as well as for deaf people and CI operatives. Through the website, users can access information regarding different hearing impartments, treatments, HA devices, read stories told from other hearing-impaired individuals and become a member by paying a yearly membership fee. The organization is community-based with over 8000 members but the website itself does not facilitate the community in a way for them to interact with each other in the virtual space. The website is user-friendly, where the content is intuitive structured. Since the website contains a big quantity of content, primarily shared through text, it might take time for the user to find what they are looking for (Høreforeningen, 2020).

Densocialevirksomhed.dk

The website belongs to the Capital Region Communication Center, specialized in helping citizens limit the consequences of their communication difficulties and is one of the 30 communication centers across Denmark. Through the website, users can get information on services that the center is providing. Furthermore, users can access information regarding different hearing loss conditions (Center, 2020).

When looking into where hearing-impaired can seek help on the internet regarding their condition or information on the treatment, there are several websites where they can find this information. What we notice is that a lot of information is dispersed amongst them, meaning that some information is only provided on certain websites. We gained the impression that these websites have overall information regarding the hearing problems, while some are specialized on specific problem areas, e.g. hearpeers.dk is specialized with hearing implants or densocialevirksomhed.dk provides info primarily on communication center services. It is our impression that if a person wants to get thorough information on their possibilities, it can take time to get familiar with the existence of these different websites.

Moving on to the user experience of these platforms, some of them are having very small lettering where text is the only tool used when conveying the message. Furthermore, it was noticed that the user participation on these webpages is minimal if not non-existing, meaning the concept of online communities is not present at any of these. The only way the individual could communicate, seek answers, or contribute in some ways is through email.

4.5.1 The actor mapping

In order to sum-up and gather the knowledge we have gained an actor mapping has been conducted. Here we visualize where the relations between both human and non-human actors are, while arguing which could be re-negotiated in order to solve problems in the field. The essence of the actor mapping focuses on the relations between the hearing-impaired and the different ways of getting help in the system. The non-human actors are here amongst others illustrated as money and resources, online support community platforms, time, and HA devices. The actor-mapping and the core-relations will be presented in figure 19 and further described below.

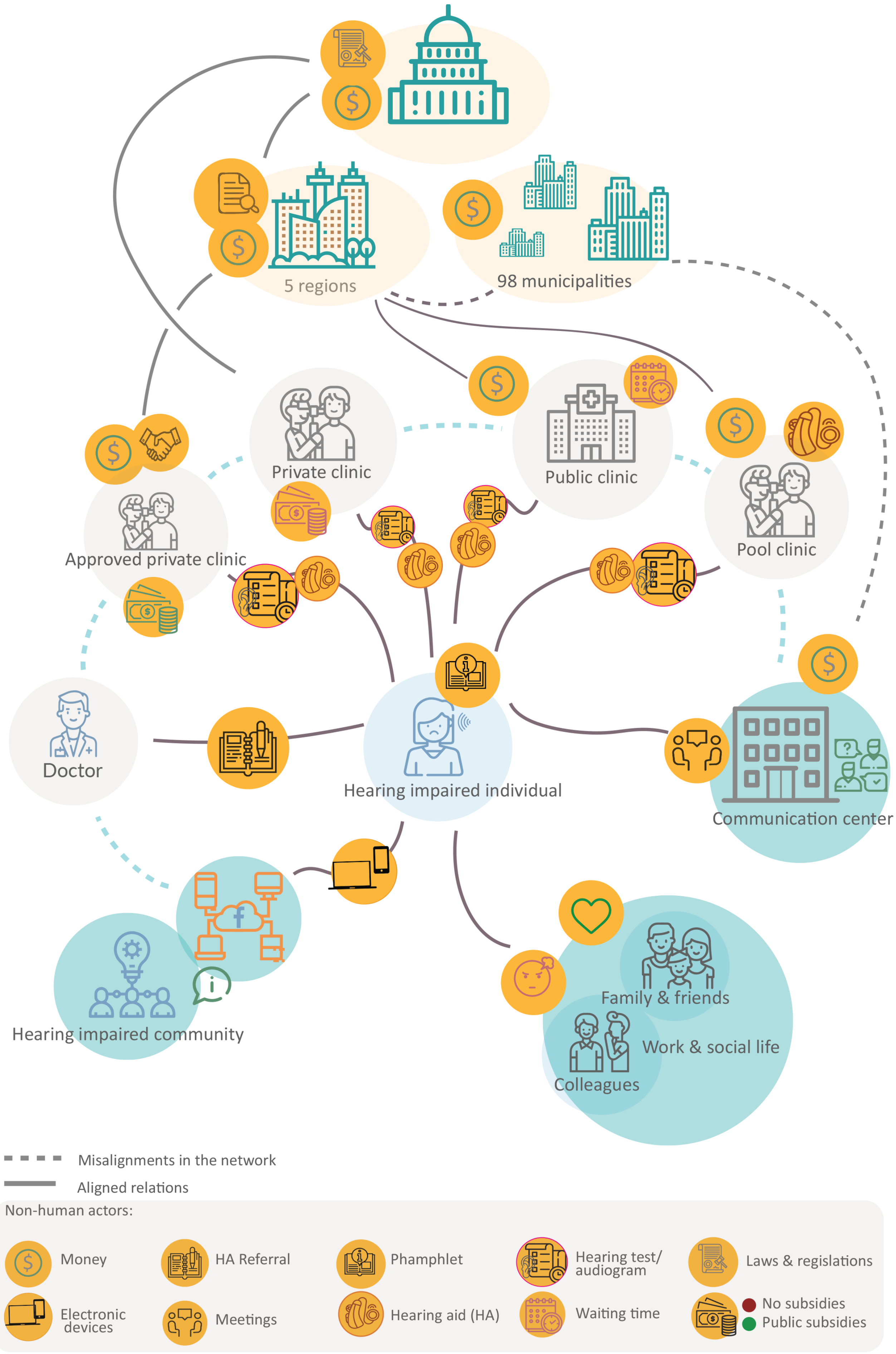


Figure 19- Illustration of the current, mis-aligned actor network

Hearing-impaired and private/public clinics

As a hearing-impaired in Denmark, it is possible to get HAs both through public - and private clinics. Through the public, it is costless however 'time' as an actor seems to play an important role when choosing this sector. Besides, going through the private sector 'money' is observed to be the primary non-human actor being the main driver of the sector. A financial contribution is anyhow possible if the HAs are purchased in a private clinic, approved by the Ministry of Health (Audiologi.dk, 2020). With a referral from the ENT or private doctor, the hearing-impaired have free choice of treatment. This means that even if the person has been in dialogue with one HA clinic, they are not required to choose their final treatment here.

This relation between the hearing-impaired and the treatment clinics is somewhat established by the doctor prescribing the referral. Doctors are obligated to inform their patients of available options within the system, however we have become aware that this relation, where information and guidance to the system should be shared, is not properly aligned. From conducted research, this issue of inadequately disclosure of information was repeatedly mentioned. Furthermore, a direct relation between the hearing-impaired and the private clinics are strengthened through non-human actors such as commercials and clinics that are near the citizens. These are the private clinics' use of interessement devices towards their possible customers. However, this relation can be problematic, given that people suffering from hearing loss are not being properly informed or aware of his/her options and involuntary or unknowingly buy expensive devices that could have been purchased through the public clinics.

According to 'Fremtidens hørerehabilitering' (Tobberup, et al., 2015) there are different issues with the system as it is functioning today. Here they describe the current system as 'fragmented' for the individuals seeking treatment. We confirm this notion from analysis of interviews, survey answers and observations. There are manifold ways to treat hearing loss, and each risk being sent to many different actors to get the full needed guidance or treatment; From diagnosis and information about what it means to live with a hearing loss, to hearing aid customization, associated aids, instruction, guidance, advice, and training as well as final readjustment. Here a better alignment between the different offers in the system could be of preference. These are for now as we perceive it, primarily focused on their individual competitiveness instead of a more collaborative approach where the patients are not the ones who are getting caught up in the system. be of preference. These are for now as we perceive it, primarily focused on their individual competitiveness instead of a more collaborative approach where the patients are not the ones who are getting caught up in the system.

‘Hearing-impaired’ and ‘The Communication centers’

The communication centers are part of the specialized social area, which covers offers for disabled children and adults with special needs. With the Structural Reform in 2007, the municipalities assumed full authority and funding responsibility for the area. The tasks in the communication area are lifted by the communication centers as well as by the national and regional offers in Denmark. There is a free offer from the communication centers if there is a need for the provision of technical aids, teaching, or further counseling and guidance to the hearing-impaired or their relatives. With the Structural Reform in 2007, the communication area in Denmark has undergone a major change. After the structural reform, some communication centers became regional, other municipal, and in addition, came the creation of entirely new municipal solutions (Audiologi.dk, 2020).

After receiving HAs, the hearing-impaired will in many cases experience a period where they must get used to their HAs and the fact that they have a disability. If there is a problem with the setting of the device, it is possible to get further help at the specific clinic who treated the hearing impairment. It is a rule of thumb that all clinics only do adjustments on the HAs they supplied.

We observe the current relation between the hearing-impaired and the communication centers to be unstable, as the services these communication centers offer, are provided late in the process of treatment, after the hearing-impaired has received his HA.

The alignment of the communication centers and the hearing-impaired is currently based on actors such as informational pamphlets and the professionals at the HA clinics. These are the actors supposed to support the information and strengthen the awareness of these communication centers. However, a lot of people are not making use of this offer – either because they are unaware of its existence, misinformed, or not in need of it. Furthermore, due to the lack of cross-country standardization, there are many different names for these centers, not to mention the help they can provide seem to vary. This is according to Mette (interviewed audiologist at Thisted communication center) highly depending on the profiles working there

‘Hearing-impaired’ and ‘online community platform’

The existence of the Facebook community we perceive as a proof on the hearing-impaired needs not are being fully met by the offered governmental and institutional support. When these are not able to provide a certain kind of support, the members of the community are seen to turn to each other. Through the development of technology and more people being technology-literate, communities with members of certain health problems, find ways to utilize and mold technology so it can suit their needs. This is what has been observed in the case of hearing-impaired in Denmark. Here they managed to utilize the social media platform into a relatively large community, supporting them when they need it. Moreover, other actors from the hearing treatment system, like doctors, other experts and representatives of companies producing Has are joining and being a part of this community. These actors are seen to contribute in supporting the community, nevertheless, we further assume that there are other interests at play here; Getting wiser on hearing-impaired individuals, learning and upgrading their existing expert knowledge or looking for possible new market opportunities. Though this is not necessarily looked upon as being negative interests.

The role of this Facebook community is perceived as being of great importance in the network while it facilitates the hearing-impaired actors, providing them with their own knowledge sharing space. We need to bear in mind that this community itself is part of a larger network, where they are contributing for this platform to exist. On that note, aspects that need to be taken into consideration is the role of Facebook itself. As a social media platform, it is not specialized on facilitating online support communities. This infrastructure and the way the platform is preconceived influences how the users add and consume the content. At this moment, the members are adding content on the discussion page, but the content is being “moved down” when new content is being added. Within this way of managing the content, we have identified a knowledge drain occurring while the hearing-impaired community cannot easily access that knowledge by e.g. using a search option. Furthermore, the individuals who are not using Facebook or have a profile are excluded from this community and the information being shared. We could assume that the actor who is monetizing the most in this configuration is Facebook itself and therefore, we are questioning whether it is the most optimal solution for the hearing-impaired and other actors in the hearing treatment system, regarding the knowledge accumulation and accessibility.

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‘Hearing-impaired’ and ‘their HAs’

There are presumptions of HAs from the public, more frequently wind up in the drawer than HAs paid off pocket. Nevertheless, we can neither confirm nor deny this presumption. According to our own analysis, the relation between the hearing-impaired person and the HA tends to depend considerably on the treatment and guidance received from the chosen clinic – not the price itself. The better the instruction and guidance, not to mention the hearing-pedagogical part of getting used to it, the bigger the chance of a strong relation between the HAs and the hearing-impaired. – though, as illustrated in the actor-mapping this can seem like quite a maze for some, as help and information are fragmented, available from various sources, yet contradictory and some places impartial.

There are lots of different opinions and experiences when it comes to people and their HAs, therefore this relation should be seen as subjective as well. However, from the survey and interviews carried out, people seem to be generally satisfied with their decision of getting HAs once they have gotten familiar with these. To further understand the core-relations unfolded through this ANT perspective, further analyzations have been carried out with interviews, surveys, and observations.

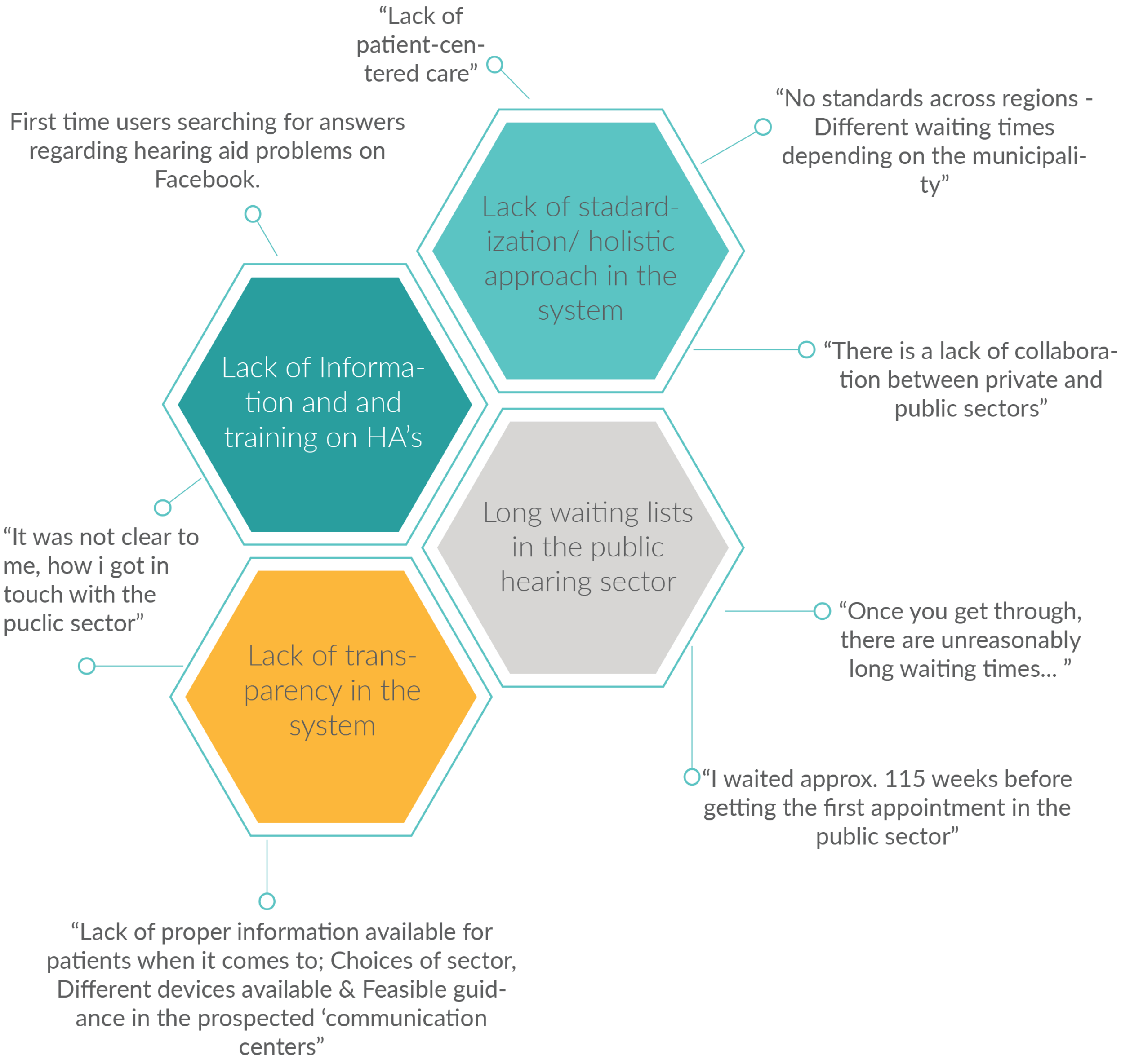
Sub conclusion

Organizational and informational issues have been uncovered as one of the primary reasonings of the current, unaligned network. The relation between the hearing-impaired and their HAs seems to be strengthened when receiving thorough information and guidance during treatment. However, many hearing-impaired people are not aware of this available help at the local communication centers, as this is a relation that in many cases relies on information given by the audiologists. This is seen to be one of the negative consequences of the inadequate disclosure of information provided. We identify an unaligned network when it comes to the information circulating between the involved actors, especially among the hearing-impaired and the treatment offers. It is our understanding that in many cases, the hearing-impaired individuals do not feel that they are taken by the hand. Additionally, the network illustrates the many different entries there are to the diverse treatment options. This is seen as confusing for the hearing-impaired individuals seeking treatment. Based on that, there is no successful alignment occurring between individuals and these treatment opportunities.

To create an overview of the most important issues uncovered from conducted analysis, these have been converged and narrowed down. It is from these uncovered problematics the final problem formulation and design requirements have been formulated. The problematics are based on the analysis of own research data and findings from the literature review. To get an overview of the different findings generated through our research, we categorized and arranged them into groups. These groups originate from the findings and thus are specific to the information within these. Finally, the groups are categorized and labeled by the points and themes of the findings.

4.6 Uncovered problematics

To create an overview of the most important issues uncovered from conducted analysis, these have been converged and narrowed down. It is from these uncovered problematics the final problem formulation and design requirements have been formulated. The problematics are based on the analysis of own research data and findings from the literature review. To get an overview of the different findings generated through our research, we categorized and arranged them into groups. These groups originate from the findings and thus are specific to the information within these. Finally, the groups are categorized and labeled by the points and themes of the findings.



"Lack of patient-centered care"

First time users searching for answers regarding hearing aid problems on Facebook.

"No standards across regions - Different waiting times depending on the municipality"

"There is a lack of collaboration between private and public sectors"

"It was not clear to me, how i got in touch with the puclic sector"

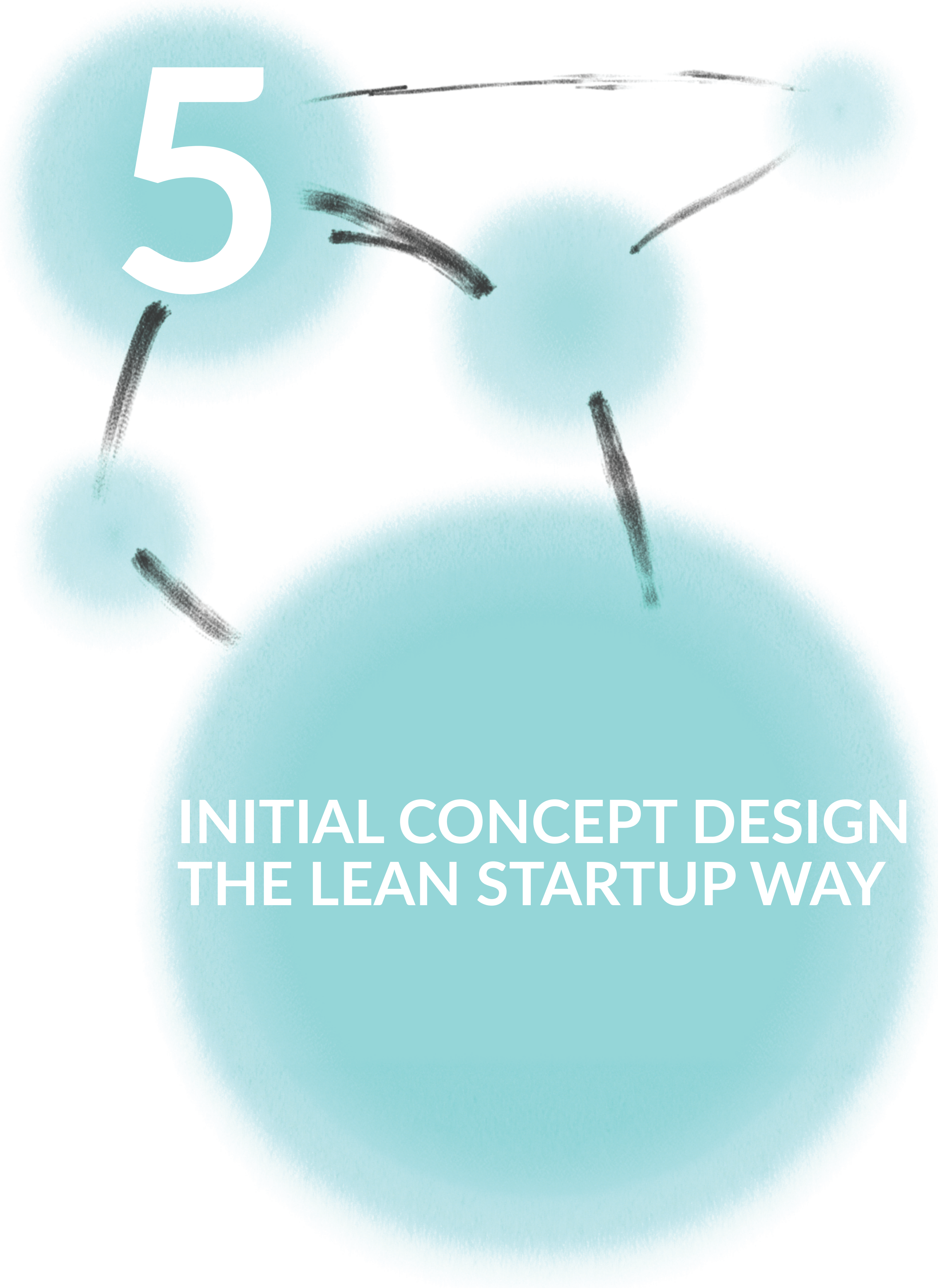
"Once you get through, there are unreasonably long waiting times... "

"I waited approx. 115 weeks before getting the first appointment in the public sector"

"Lack of proper information available for patients when it comes to; Choices of sector, Different devices available & Feasible guidance in the prospected 'communication centers"

Figure 20 – Uncovered problematics

The initial categorization of the findings has been arranged with color-coding (WS9: Coding of found problematics) where mutual findings get a common color. We have identified 4 main problems illustrated in figure 20, which will be of our focus for the solution phase. Each of the 4 Problem areas will be elaborated and explored in the use of persona methodology in chapter 5 of the initial concept design.



5

INITIAL CONCEPT DESIGN THE LEAN STARTUP WAY

Through the design phase a concept solution, answering the problem formulation, has been created and used to initiate further user involvement and feedback for a future final solution. Through this chapter, the concept design is presented using the lean startup methodology (described in chapter 3.3.8) whereas the iterative process has been illustrated in figure 21 below.

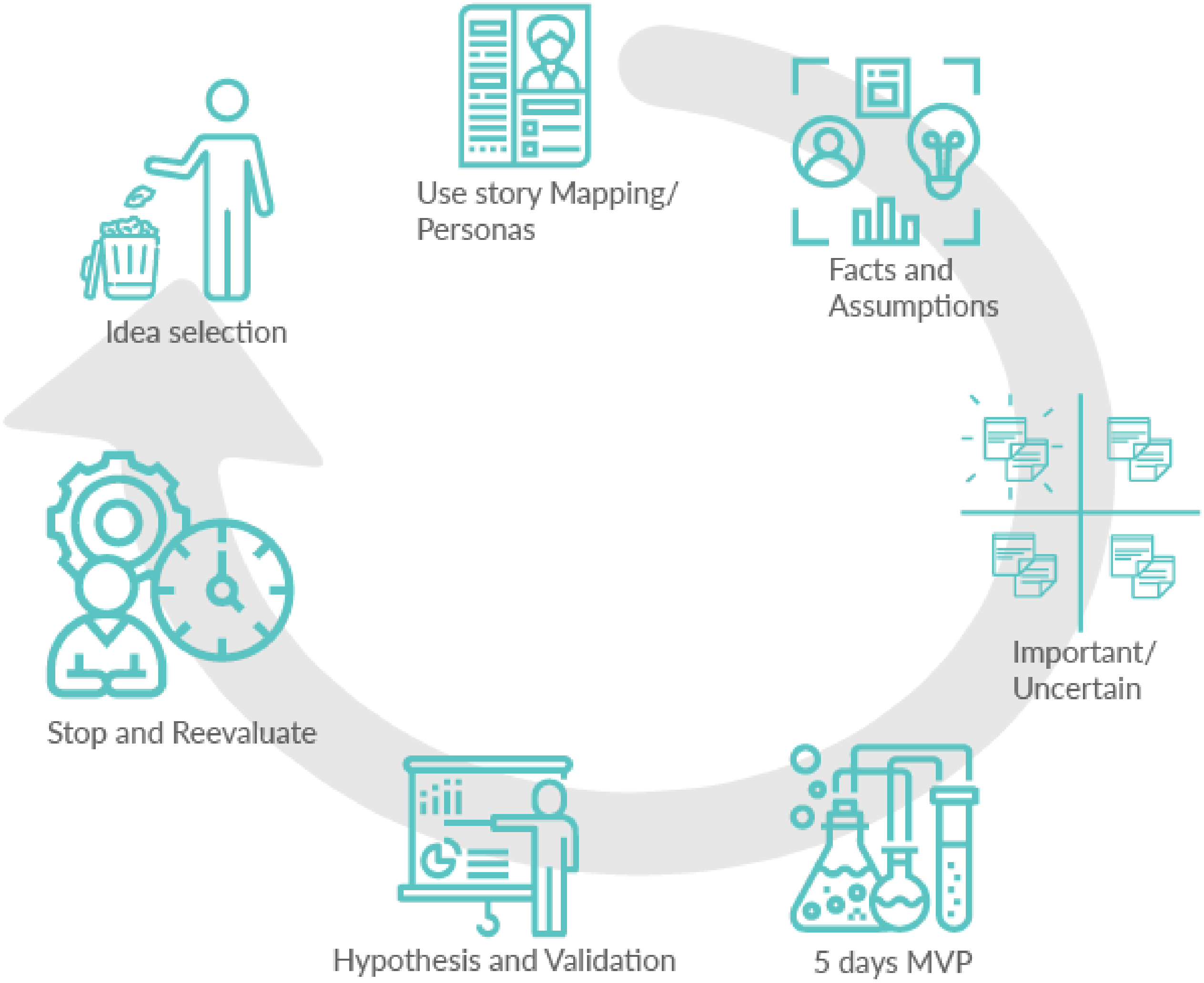


Figure 21 - Lean start-up process

5.1 Personas

To go further into the process of designing a solution, that follows the lean startup logic and methodology, four personas were created, based on the analysis of the conducted surveys, interviews, and from the observations on the Facebook group. The personas were created exclusively based on the collected quantitative and qualitative data of the targeted group. From the gathered data we were able to portray a detailed description that entails formal information related to age, gender, civil status, occupation, where they live, but moreover, we were able to portray narratives that include their background, their problems, frustrations and what is their ultimate goal. The personas segmentation is based on four main problem areas identified in the analysis, which are: long waiting time in the public sector, lack of technical guidance, lack of patient-centered care, and lack of transparency in the healthcare system. The personas will be kept in mind throughout the design process and referred to when making important decisions related to the design, functionality, and features that should be added to the solution.

47

Karen

Project manager

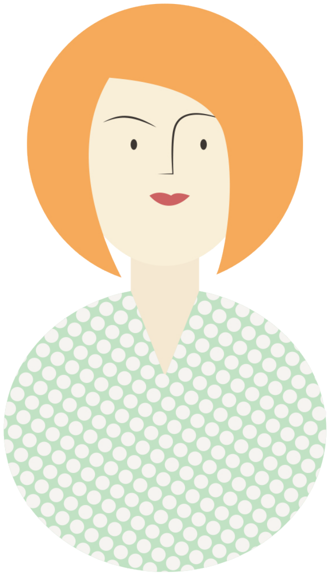
Gender ○ Female

Civil status ○ Married

Location ○ Copenhagen

Backgrund

Karen noticed that she is losing her hearing in her late 30's. The most likely reason could have bene genetics because her mother and aunt suffer from the same condition. She's wearing hearing aids for over ten years now, that she acquired trough public audiology clinic. She is using them throughout the whole day and her family life was not much affected. What was mostly affected is her work, particularly meetings in conference rooms where multiple people are talking or there is a combination of people in the room and people on the conference call and/or video.



Long waiting time

Frustration

> "Waiting for a long time is so frustrating. It is important that these gets shorter."

It's been 10 years since Karen acquired her hearing aids and she started to notice that they are outdated not working as they use to. Back then, it took her over a year and a half to get hearing aids trough public clinic and she's not sure whether should she go through it again or choose to go through private audiologist or clinic.

Goals

To acquire new hearing aids without waiting too long.

Frequent user ○○○○○

Level of training ○○○○

Psychological support ○○○○

Satisafction with HA ○○○○○

68

Gorm

Retired senior

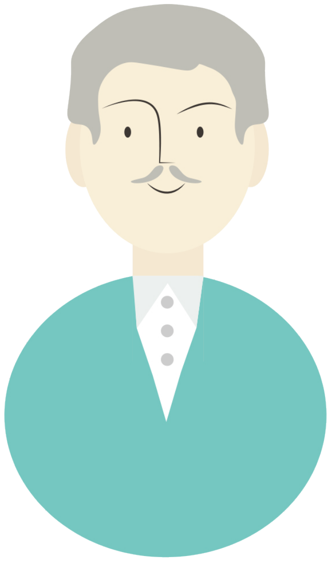
Gender ● Male

Civil status ● Married

Location ● Vejle

Backgrund

Gorm started losing his hearing when he was around 50 years old. His hearing loss is age-related and the first one to notice was is his wife Stine. Stine had to yell at Gorm and there were a lot of "What's?". The family used to get on him for talking too loud and for constantly asking to repeat. Since Grom struggled to follow the conversation and was making his family annoyed he started to socially isolate himself. In the end, Stine was the one who set up the appointment with the ENT doctor to start the process of him getting help.



Lack of technical guidance

Frustration

> "I received minimal guidance for hearing aids, their cleaning and possible settings."

It took a long time for Grom to get used to his first hearing aids and now he's got new ones. For him the start is overwhelming, he is not sure how it should sound or how loud it should be. The new HA has an app and he is not well skilled with technology. The counselling session was short and not enough for him to learn everything. He is forced to ask for assistance and help of his family.

Goals

Be able to take care of his hearing aids by himself and not depend anymore on others for assistance.

Frequent user ●●●

Level of training ●

Psychological support ●

Satisafction with HA ●●●

21 Mette

Student

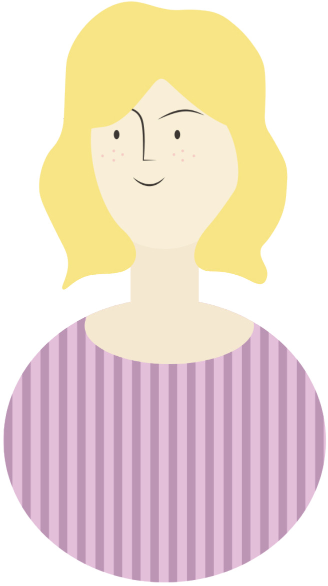
Gender ● Female

Civil status ● Single

Location ● Aalborg

Backgrund

Due to several ear infections during her teenager years, Mette started losing her hearing. In the beginning, she was not taken seriously. Her professor (before they knew about her hearing loss) thought that Mette is ignoring her and being rude. She always had to sit in front rows in order to participate in the lectures. She stopped going out with friends because she couldn't follow the conversation and instead she would stay home. It took a while for Mette to get hearing aids, she was embarrassed because she was afraid of being stigmatized. The one who persuade her was her mother who started noticing changes in Mettes behaviour.



Lack of patient-centerd care

Frustration

> " I miss that doctors dare to act and listen to us, patients. The few of us who try to speak up, aren't listened to. "

From the beginning of the process, Mette would encounter different ear doctors and each one would start 'from scratch' with her. She had a hard time dealing with the illness but also with her fears of being judged or looked at. Due to Mette's perception of HA and lack of support and guidance (other than technical), laid to Mette's not frequently wearing her HA.

Goals

Be able to get rid of her anxiety of wearing hearing aids in public.

Frequent user ●●●
Level of training ●●
Psychological support ●
Satisafction with HA ●●

---

68 Peter

IT engineer

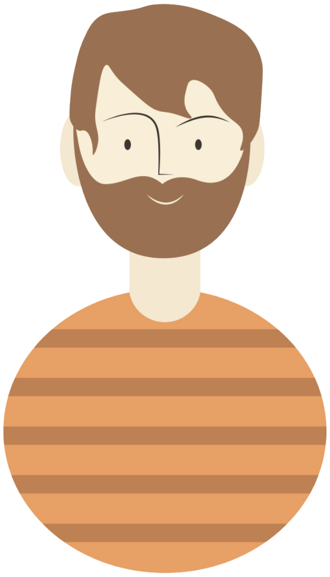
Gender ● Male

Civil status ● Partnered

Location ● Randers

Backgrund

Peter started loosing his hearing in his mid twenties. The genetics may have played a role as well as attending venues with loud music throughout his young adult life. The lost of hearing affected his life to a huge extente. He started feeling anxious if he has to travel alone because he couldn'd hear the announcements. At work he lost confidence dealing with colleagues. Because his condition is invisible, his communication problems made him feel and look less able.



Lack of transparency

Frustration

> " It was not clear to me how I got in touch with the public sector. "

Peter sought help trough the private audiologist and acquired expensive hearing aids. At the time he was not aware that he could get them free of charge at the public clinic, but also that he could have got subsidies for the ones he got at the private clinic.

Goals

Educate himself on how the system works and learn about his rights and possibilities.

Frequent user ●●●●●
Level of training ●●●●●
Psychological support ●●●●●
Satisafction with HA ●●●●●

5.2 Concept requirements

Before the conceptualization of a feasible solution answering the problem statement, a summarized list of requirements was based on findings from research and analysis. Additionally, personas, their needs and goals were kept in mind when defining the requirements. The requirements list is built on the basis that each problem statement must be answered with a concept requirement and argue to whom the requirements belong in the main stakeholders list.

Problem statements	Concept requirements	Key-Actors
There is a lack of transparency regarding the hearing treatment system.	Solution must create better overview of options for hearing-impaired	• Hearing-impaired • Healthcare professionals • Relatives
Patients feel alone in the system and with their problems.	Solution should facilitate interaction and knowledge sharing	• First time Hearing-impaired • Experienced Hearing-impaired • Facilitator • Moderator
	Solution must include patient journey examples, so the new patients knows what to expect from their treatment.	• First time Hearing-impaired • Experienced Hearing-impaired
Patients are not technically skilled, that is especially problem with new devices	Solution must provide easily understandable guidelines	• Hearing-impaired
Misinformation	Solution must monitor the information flow to provide the correct information	• Hearing-impaired • Healthcare professionals • Relatives
Waiting time is different in each municipality	Solution must provide easy, accessible information on waiting time of each region	• Hearing-impaired • Family
Patients are not aware that they can get treatment subsidies in the private sector	Solution should provide guideline on how to apply for grants	• Hearing-impaired
Not all patients are aware of communication centers and its services	Solution must promote communication centers as important actors when it comes to guidance, support and treatments of patients	• Hearing-impaired • Family

5.3 Brainstorm on concepts

In developing a new concept, an affinity diagram was established on the four common problem areas that were previously unfolded. A way of making sure the hearing-impaired individuals and their insights were included within our concept brainstorm, the four personas were used as spokespersons for the hearingimpaired actors, whereas problematics from each persona was represented within the brainstorm questions. Furthermore, an important criterion for the concept development was that the concept needed to function while undergoing a pandemic. This decision was made on the background of the current national lock-down circumstances, where modern technological solutions have shown to be of great importance and that the final concept should be tested out in the nearby future.

The questions for the concept development were as following:

1. How can we avoid that hearing-impaired feels alone in the treatment process?
2. How can we improve the experience for the people who are just starting or repeating the process?
3. How can we improve the sharing of expert knowledge from users, audiologists, ENT doctors, etc.?
4. How can communication centers be brought into the treatment at a higher degree?
5. How can we lower the overall waiting time for getting hearing aids in public treatment?
6. How can we improve the accessibility of already existing knowledge for the hearing-impaired, audiologists, and other knowledge seekers?
7. How can we improve the technical hearing aid help for hearing-impaired, audiologists and ENT doctors, etc.?

A picture showing how we brainstormed and explained can be seen in figure 22.

Figure 22 - Brainstorm process 08-05-2020

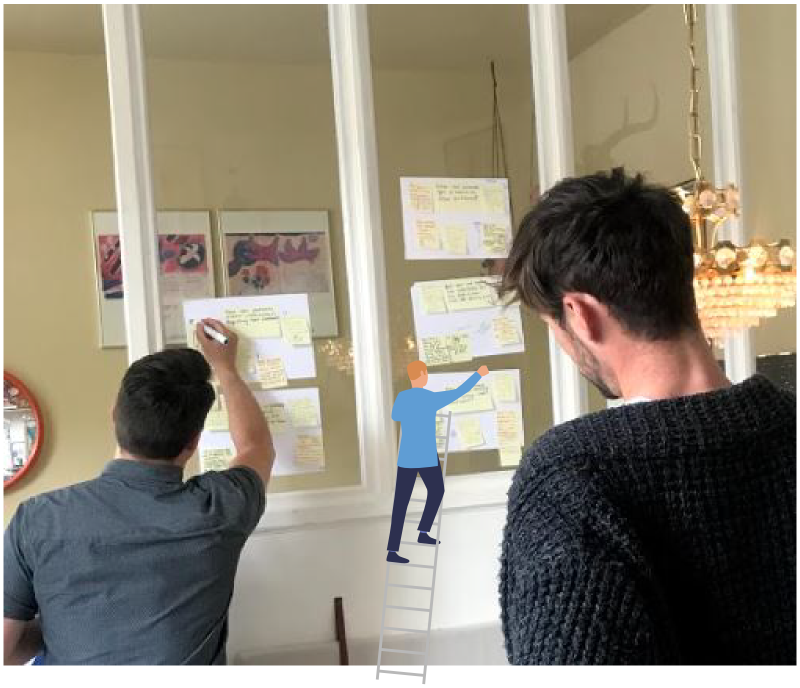
The brainstorm process went as following:

- The various brainstorm questions were presented to each participant of the brainstorm so that everyone in the brainstorm session was aligned with the concept scope.
- A timer was set to 4 minutes for brainstorming each of the concept questions.
- It was agreed that the participants had to come up with both feasible and wild ideas in the brainstormto expand the pool of possible solutions.
- The tools used in the brainstorm were post-it notes and pencils to draw and describe their ideas.
- After the time for each brainstorm question ran up, each participant was to elaborate on their ideas using a pitch format presenting their drawings and thoughts.

Brainstorm votation:

Having conducted the brainstorm, the concept ideas were further rated with critical eyes on the feasibility of each idea. As we wanted a solution which covers all the questions, we set up a process of voting on what we found as the best ideas answering these. Each participant got two votes for the respective idea and the participants needed to explain their votes to others as a measure of quality control to their choice. ts.

Figure 23 - Brainstorm idea votation 08-05-2020



By putting up the highest-rated ideas, an overall concept solution was created containing the most voted concept elements from each brainstorm question as shown in Figure 23. Here some of the similar solution areas were linked together such as “a YouTube channel containing technical expertise guidance” and “an online support community for hearing-impaired to share and obtain knowledge” in a category of having the solution online as a measure of creating transparency. With the online solution in mind, we started mixing up the brainstorm ideas into the format of being an online webpage/Platform. Using the criteria of “solution is based on an online platform” a new concept iteration was initiated where aspects of the platform were discussed. Using our research of already existing webpages for hearing treatment, we created a list of requirements for our platform to contain. These are specified as parts of the platform’s tabs and functions. In the chapter below we will disclose the first iteration of the concept created as an interessement device for the future users to give comments and critics on as described in the Lean start-up process.

5.4 The initial concept design ‘Hør Her’

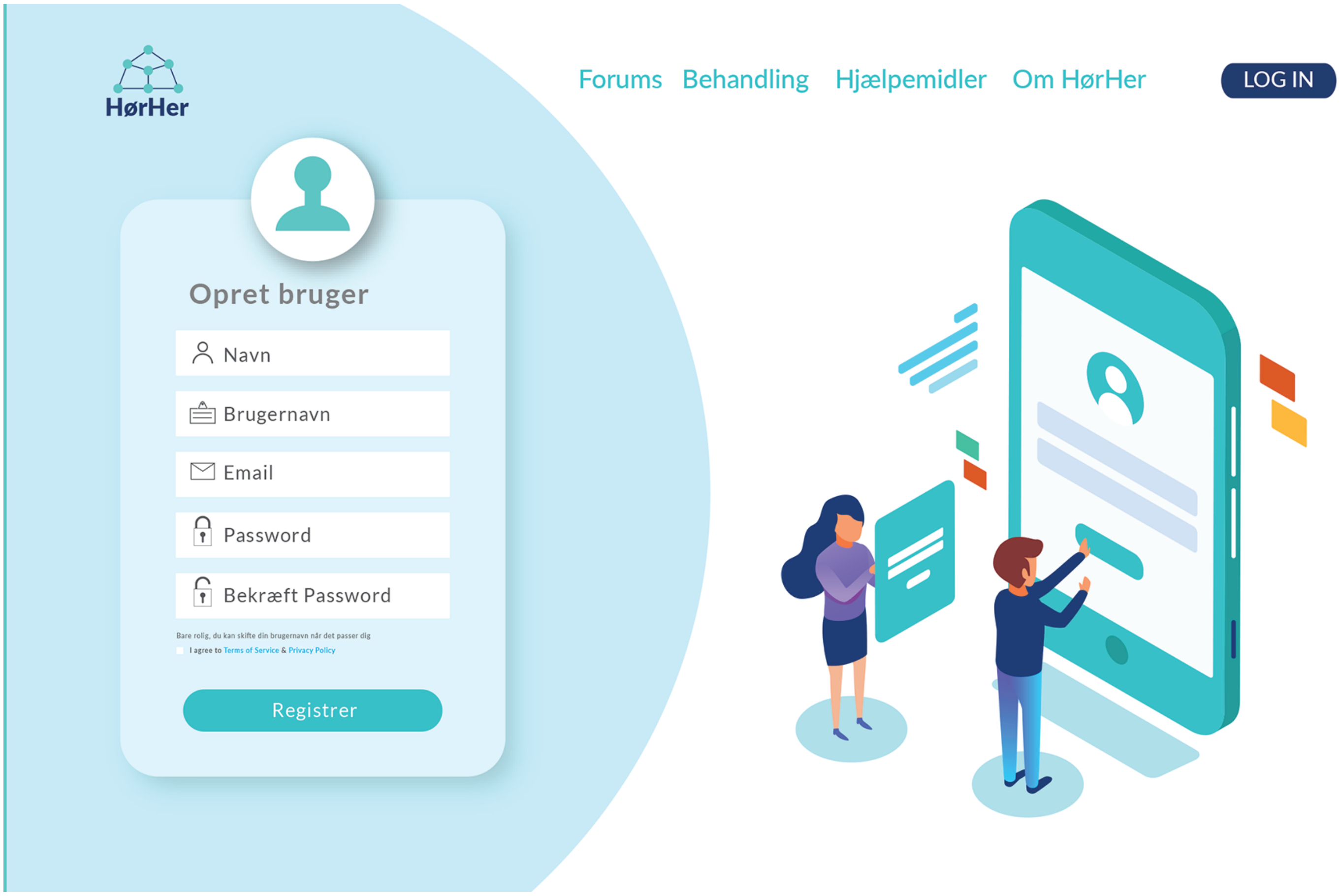
As a prior solution to the problems identified during our study in answering the problem formulation of increasing transparency within the hearing treatment system, we created the concept Hør Her (Listen up); An online platform for transferring knowledge. The platform is envisioned to be based primarily on gathered knowledge found on various other websites, on the content created by the users, and lastly on user-to-user interaction. Using the lean start-up methodology, a concept was created as a minimal viable product (MVP). Furthermore, the concept of the platform with its functions is described.

Establishing a new community of practice for the hearing-impaired:

Hør Her (Listen up) is a knowledge-sharing platform based on online user-to-user interactions where knowledge can be shared between experienced and inexperienced users, healthcare professionals, HA providers, and researchers. The focus of the platform is for us to screen and collect all available information online and organize it so the users of the platform easily can access the information they need in their process of choosing their treatment or maintaining their hearing aid solution. These screenings will be done in cycles so that the information found in Hør Her is up to date.

Social mission:

The mission of the platform is to provide a central online space where users can access important and thorough information, interact with other individuals suffering from hearing loss and experts from the field of audiology. Moreover, we see hearing-impaired as the experts where the role of the platform is to facilitate and empower this group to actively participate in the community. Their contribution will be through sharing their firsthand experiences and knowledge, adding content to the platform, and through this interaction with likeminded users. On behalf of that, the hearing-impaired users are to be seen as the central and most important aspect of the platform.



Opret bruger

Bare rolig, du kan skifte din brugernavn når det passer dig

☐ I agree to Terms of Service & Privacy Policy

Creating a user for the platform:

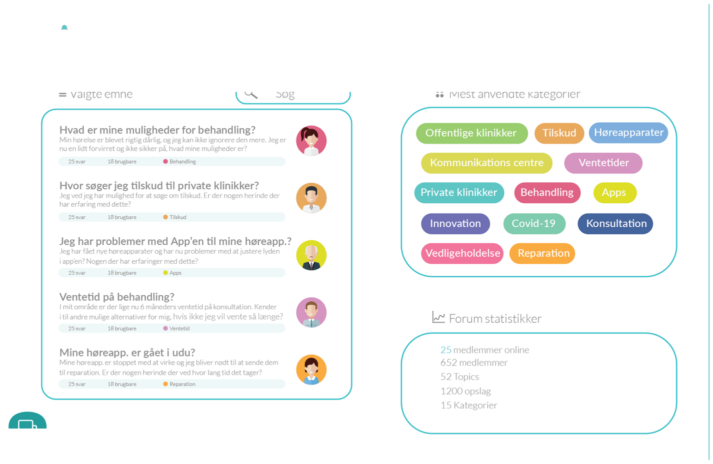
To be a part of the online platform community, it will be required to go through the signing-up protocol. The sign-up form entails:

- Username (optional, whether they choose their real name or not)
- Photo (optional)
- NemID verification (optional) – A method of verifying credibility for the Danish citizens.
- Select whether you are hearing-impaired or healthcare professional or other.
- If hearing-impaired, what is their condition?
- If using HA, what kind of hearing aids are they using?

Activities and contributions will be visible on the Hør Her members profile showing their achievements and their current questions and answers. The profile will also include information provided by the member. Their profile will have an option to start a chat or send direct messages to other members

Debate forums

Found through the observation of the Høresagen i Danmark Facebook group we found that users tend to help each other when possible within their online community. Many of the users have answers regarding the fragmented hearing treatment system as they possess expert knowledge of hearing treatment and technical knowledge of hearing aids. The platform will allow for this knowledge base to grow in the debate forums where discussion points could include, Choice of hearing aids, Use of communication centers, Choice of treatment, innovation within the hearing treatment, and others. The discussions will be stored and tagged so they 'pop up' when search upon within the platform. We want as many diverse perspectives on problem-solving which is why the members are encouraged to share their approach and choices in their treatment. It is the aim to show that members can have the same experiences either going to the public or private and that new members are not alone with their hearing treatment as many before having described the ups and downs with their choice of treatment.



Hvad er mine muligheder for behandling?
Min hørelse er blevet rigtig dårlig, og jeg kan ikke ignorere den mere. Jeg er nu en lidt forvirret og ikke sikker på, hvad mine muligheder er?
25 svar · 18 brugbare · Behandling

Hvor søger jeg tilskud til private klinikker?
Jeg ved jeg har mulighed for at søge om tilskud. Er der nogen herinde der har erfaring med dette?
25 svar · 18 brugbare · Tilskud

Jeg har problemer med App'en til mine høreapp.?
Jeg har fået nye høreapparater og har nu problemer med at justere lyden i app'en? Nogen der har erfaringer med dette?
25 svar · 18 brugbare · Apps

Ventetid på behandling?
I mit område er der lige nu 6 måneders ventetid på konsultation. Kender i til andre mulige alternativer for mig, hvis ikke jeg vil vente så længe?
25 svar · 18 brugbare · Ventetid

Mine høreapp. er gået i udu?
Mine høreapp. er stoppet med at virke og jeg bliver nødt til at sende dem til reparation. Er der nogen herinde der ved hvor lang tid det tager?
25 svar · 18 brugbare · Reparation

25 medlemmer online
652 medlemmer
52 Topics
1200 opslag
15 Kategorier

Collecting and categorizing data

The platform will be connected and forward members to other websites that contain useful content for them, e.g. producers and institutions. Concluding from our analysis of various websites it was made visible that the following information areas should be available for new and experienced hearing aid users: Waiting time of treatment options will be fetched from public and private servers and then listed at our platform going from lowest to the longest amount of waiting time in each region. The selection of HA in the public sector will be made visible showing the different types of HA the public can offer, which regions offer them, and lastly a guide to the different types of HA strengths and weaknesses. Discussion rooms with useful answers and information will be stored and categorized to guide new and experienced users in the right treatment.

Rating system

Inspired by the Yahoo forum discussion rooms (Lana, 2020), the platform will function as a bay of best answers regarding the hearing treatment system. The most favorable answer or the most useful comment will be visible to the members as a quick solution for their search. Problems that are solved by the users will be marked as solved and go into the knowledge database and made searchable for members or new users. When replying to a discussion point, members will be evaluated by other members according to their involvement on the platform, their contribution in helping or assisting other members by assigning "stars" or upvote on the comments or discussions. After gaining certain numbers of stars, the member will receive a contributor badge. Albeit the ratings are not to create competition but to create engagement for the users to use the platform. Reward systems have shown from our literature review that users of websites can be motivated to use functions when rewarded. Having a rating system integrated into the platform motivates the user to share their experiences and knowledge getting positive feedback from others who found the shared information useful. Showing the rating of who provides the answer also gives the knowledge-seeker a proof of the quality of the information shared as the experienced knowledge-provider has been backed up by other users on the platform before giving him online integrity.

Belønning

NÅR DU BIDRAGER MED RÅD OF ERFARINGER, KAN ANDRE GIVE DIG STJERNER

Geographical reach

The platform will not be focused only on the local communities but rather on the level of the whole country, where hearing-impaired from all regions and municipalities will be considered.

Søg efter svar

FÅ BRUGBAR INFORMATION PÅ SIDEN ELLER FRA ANDRE LIGESTILLEDE

Search function

Making the information searchable for the members will create an easy path for the knowledge seekers to obtain the right information for them. Ensuring that the discussions are searchable through tags, the members will have the possibility to get the opinions from likeminded who stood in a specific situation. On that knowledge-background other hearing-impaired users can avoid the same mistakes and take an easier path to treatment. Managing the relevant files, the users enter a query and the inbuild search engine provides the users real-time results from various webpages ranking the best answers to appear first in the top.

Technical section:

The technical section will include video guides for the hearing aids and other hearing technical devices. The videos will guide to technical aspects such as battery change, adjustments you can do by yourself, cleaning, and walkthroughs of the technical equipment that follows the Hearing Aids.
The video guides will be accompanied by illustrated guidance showing the technical aspects of the hearing aids and other technical equipment. The technical section also includes a list of the available hearing aids from both the public sector, showing what options the hearing-impaired have options regarding their hearing loss if going through the public sector.
It was chosen that the technical section should also include a list of the available online hearing test as it was uncovered that many of the hearing-impaired have a period of up to 5 years before getting their hearing treatment. The Communication centers will play a bigger part in the technical and audiological guidance available for the hearing-impaired with links to consultation booking.

Kommunikations Centre

FÅ OVERBLIK OVER TILBUDENDE I DIN KOMMUNE

Teknisk støtte

VIDEO VEJLEDNINGER OG ILLUSTREREDE APPARAT-SPECIFIKATIONER

Search function

The members need to follow the rules of conduct that forbids the use of harsh language, spreading misinformation, and any kind of conflicts of interest e.g. using the platform for personal profit. The platform will be moderated by the NGO employees. Members will be able to “flag” other members if they notice misbehavior or inappropriate content to the moderator who then can decide whether the information should be moderated or not. Moderators of the platform will assist members and ban ones from the platform if they repeatedly break the rules of conduct. The mechanism will be put into place that will monitor the inappropriate behavior on the platform.

Enrolling the users

Using the key example from Latour (Latour, 1990) we mapped a possible enrollment of actors using our online platform. The key example describes how different measures can be made to enroll more actors possessing anti programs towards an idea or solution. The actors can then be persuaded to follow the program set up by the designer nudging them to leave their previous antiprogram. In our case, we want every adult hearing-impaired in Denmark to use our platform, which at first glance seems like a target hard to overcome. A possible enrollment of the hearing-impaired and healthcare professionals to the platform is mapped in figure 24.

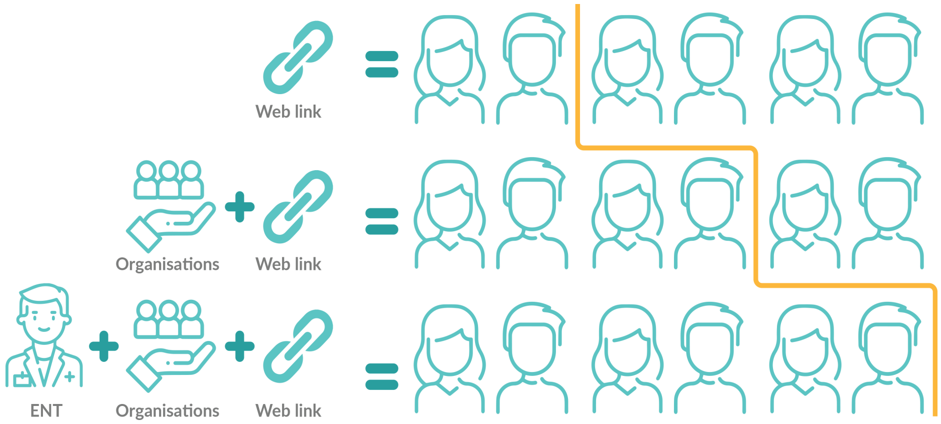


Figure 24 - Enrolling the users to our platform – the key example

After finalizing a working platform, we expect that the hearing-impaired and professionals we have been in touch with will be enrolled in a Beta version of the platform. But we see that organizations such as Høreforeningen could help us enroll even more actors as they have a direct link to many users through their many years of existence. Having the ENT doctor or private clinic onboard will then create an unavoidable enrollment for the hearing-impaired as the hearing-impaired will be met by the Hør Her platform when going into the systems access points. Weaving together a story of enrollment we see that the success criteria for the Hør Her platform is that the hearing-impaired can take deliberate answers based on the knowledge shared on Hør Her.

5.5 Testing and evaluating the concept

The goal of using lean startup methodology is to find out what is the right solution that targeted group would use, as quickly as possible. This methodology consists of build-measure-learn loop framework. In the learning stage, we learn by creating the hypothesis which was in our case “Actors in the hearing aid sector will be willing to contribute with their expertise and be part of the online community “.

Procedure:

- Create a user experience vision (brief description of the concept)
- Examine the concept and identify critical assumptions (avoid wasting energy on high risks)
- Build an early version of the concept to validate assumptions (Smoke Screen MVP)
- Release and Measure (show with a small segment of users the name of the concept, short idea description and the link to the video)
- Pivot or Persevere

To validate our hypothesis, we decided to conduct the experiment with the targeted group by creating a minimum viable product (MVP). MVP is used to achieve validated learning and that means knowing whether something works by testing it. MVP will only contain the most important and necessary aspects of the concept that is enough for us to know whether to move on with the idea or not. It is created rapidly with a short amount of time, with as little resources as possible to find out whether it is solving the user’s problem, and if they will be willing to use it.
There are different kinds of MVPs that could be used for validated learning. In this case, it was decided to use “smokescreen” MVP. This means presenting a concept to the involved actors without it being finished, as creating a website with all the functions mentioned above would take a lot of time and resources, an MVP in the form of a video presentation was created. The MVP was for that reason not a functional platform but a showcase of what the platform could contribute with and how it would look like. The video was accompanied by a one pager description of the MVP in Danish language and international subtitles so that the target user group would be able to understand the content and experience the MVP. The video sharing platform, YouTube was used to store the video as this makes the video easy to share, like and comment while additionally giving the viewers the possibility of choosing subtitles in their preferred language. ***Underneath is a link to the video used as MVP:***

The MVP was shared through:

- Emails to previous interviewees (Hearing-impaired, Audiologists and ENT doctor)
- Facebook groups which we used for our shared survey and observations.
- Group meeting with experts from Force Technology and Høreforeningen.

The video functioned as an interessement device for us to get on board the hearing-impaired, healthcare professionals and NGO workers. By mentioning each responsibility area and opportunity for the different stakeholders we seek to wake the interest from them and enroll them into the design phase, receiving comments regarding possibility of changing the concept for the better.

5.5.1 User´s feedback

Categorizing the possibilities for our platform to change for the better through pivoting or preserving. The terminology of pivoting the concept aspects means that we change / pivot our concept to fit into what the users giving feedback suggest of change before they would accept and use the concept. Preserving the concept aspects means to keep the good aspects of the concept in the new concept configuration. We have included the comments we got from the "testers" of our platform concept. The comments were given in the text as messages on Facebook, email correspondences, and Facebook comments. The comments will be used as a reflection of what could be improved for the next iteration of the concept.

Interviewee	Comments	Pivot	Preserve
Kristian (Hearingimpaired, IT- teacher)	Driving a platform with that much information will demand a lot of the NGO driving it. I could use some research and exploration of the field to back up why this could help me. The Video looks very professional and is ethical pleasing to watch.	•Collaboration with existing platforms could benefit the interest of new users and help with the workload of implementing the concepts. • Include our research in next concept MVP so the interviewed can go deeper into the arguments for the platform itself.	• Preserve the visuals. • Preserve that the platform is driven by an NGO and not a private company.

Esben (Hearing-impaired, retired teacher)	Over a longer period, the private clinics have expanded their practice where hearing aid producers create their own clinics in completely other names than the hearing aid brand. This creates a misleading of why Audika audiologist prefer to sell Oticon products. It would be nice to make it clear that many of the private clinics offers free trials. I like that the search bar is like Yahoo that you can upvote the best answers to the problems.	•Implement a list ofinsurance prices. •Include a mapping of the private hearing aid clinics and the company owners. • Include an option of free trial places in the private clinics.	•Preserve the list of hearing aid prices and create an easy to find list of free hearing aids at the various private clinics. .
Äida (Hearing-impaired and board member of Force technology)	You hit a soft spot regarding the knowledge sharing of the system. The current webpages are created and maintained by professionals who are not hearing-impaired. I would rather get advice from someone who have experienced the treatment themselves.	•Create criteria for the knowledge providers that the platform is for user to user and not healthcare professional to user (such as private or public).	•Preserve that it is a primary user to user knowledge sharing that happens. .
Janusz Wajn (ENT doctor)	It is a really good idea! Especially the discussion forums. Now it's just the enrolling to the platform and I think that is going to be difficult.	•Make the discussion room fill more within the platform. •Make sure that the ENT doctor share information regarding the platform.	•Keep the discussion room. •Keep the other functions.

Pivoting our concept to fit user needs:

Based on comments from both the hearing-impaired, the audiologists, and the healthcare professionals we decided that our concept should pivot into a merged collaboration with Høreforeningen. We will be able to fulfill the hypothesis of creating transparency in the hearing treatment system for the hearing-impaired by taking the best parts of our concept such as the discussion room, the special search function, or the system mapping and implement them to the already established platform. By doing so we ensure that as many users as possible get introduced to our online community while having a foundation to build upon. Høreforeningen has approximately 8000 members who could be easily enrolled in the new features we bring in our platform. Another common point was regarding the MVP itself as a presentation of our concept.

It was difficult for some of the users to differentiate the speaker from the background music which we included in the first version of the video. Furthermore, some of the hearing-impaired viewers wanted subtitles to the video to read what our concept description and understand the presentation.

Preserving the best parts of the concept:

Many of the positive responders told us that the idea of users contributing with their expert knowledge made great sense for them regarding their future choice of treatment. It was also established that users found great interest in the information regarding the different price levels for HAs at the various private clinics as many of them just bought the first pair of HAs, they were introduced to by the seller/audiologist. The visual representation of the platform worked well in conveying the ideas about the concept. The inclusion of communication centers also received positive feedback as the hearing-impaired said that having a place where you can get guidance and adjustments with less waiting time was appealing to them. The rating system to show the top answers was not commented on besides one comment saying that they liked the Yahoo inspired search, when it was as specific as our field of work. The data gathered from the platform both through user experience and other gathered information will ensure that the quality of the treatment is controlled continuously updated through discussion posts and research newsletters.

5.5.2 Feedback from board meeting with representatives from Force Technology, Høreforeningen & EFHOH

On Wednesday 27th of May 2020, we held an online meeting on Zoom with the Hearing aid and rehabilitation team from Høreforeningen. The meeting attenders were Aida from EFHOH, Ole and Fritz from Høreforeningen (both hearing-impaired), Carsten a consultant from Force technology, two writing translators from Høreforeningen and the two of us (Albert and Julie) from the thesis group. The purpose of the meeting was to get feedback on our MVP and to negotiate a possible collaboration with Høreforeningen. Having a timeframe of 30 minutes we started with presenting our problem formulation followed by the concept solution and ending with an open discussion.

Feedback

The following quotes represent the main feedback from the meeting attendees. The new insights and feedback helped us understand the pros and cons of our “first version” of the Hør Her platform. The meeting is visualized using pictures in figure 25.

Ole, hearing-impaired and former vice president of Høreforeningen said: “The idea of having one overall entrance point to the hearing treatment system in Denmark have been tried before by Høreforeningen, and we didn’t succeed, so you will properly need some luck with that.” “I think you need Governmental support on this if you want it to succeed”. Aida, hearing-impaired and secretary in EFHOH said: “I really like your idea. It’s a first of a kind. We also identified that most of the hearing-impaired are lacking behind regarding online communities and it makes sense that you didn’t develop the platform yet, that you want to include the future users in the development of the platform. Helping each other is a fine cause and making sure that the information is accounted for would make it perfect”.

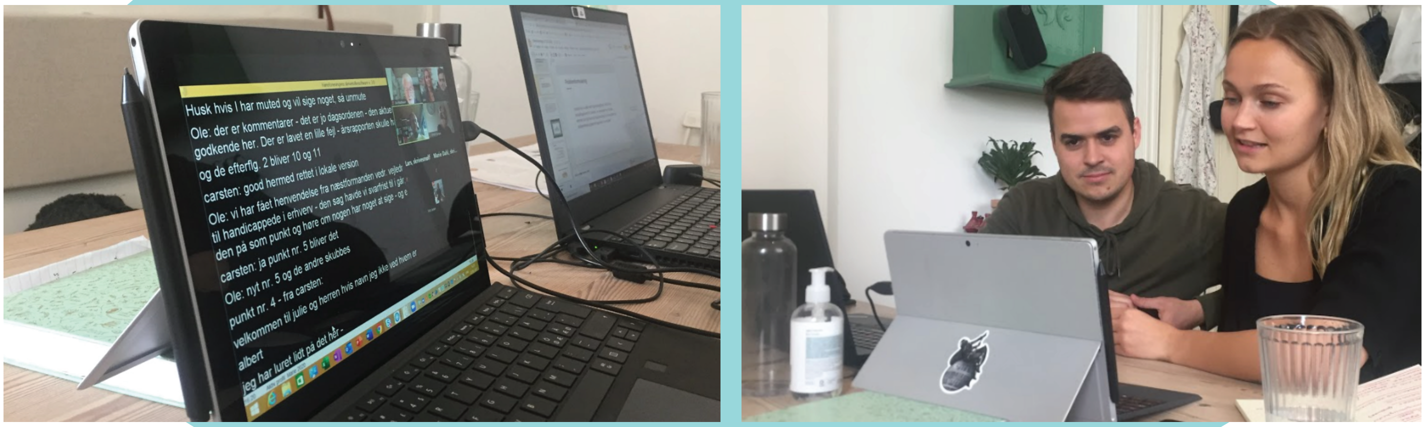

Husk hvis I har muted og vil sige noget, så unmute
Ole: der er kommentarer - det er jo dagsordenen - den aktue
godkende her. Der er lavet en lille fejl - årsrapporten skulle h
og de efterflg. 2 bliver 10 og 11
carsten: good hermed rettet i lokale version
Ole: vi har fået henvendelse fra næstformanden vedr. vejledr
til handicappede i erhverv - den sag havde vi svarfrist til i går
den på som punkt og høre om nogen har noget at sige - og e
carsten: ja punkt nr. 5 bliver det
Ole: nyt nr. 5 og de andre skubbes
punkt nr. 4 - fra carsten:
velkommen til julie og herren hvis navn jeg ikke ved hvem er
albert
jeg har luret lidt på det her -

Figure 25 - Albert and Julie presenting at the board meeting 25.05.2020 - Photo of how the meeting was conducted

The overall feedback from the attendees at the meeting was positive. They had critical perspectives regarding the maintenance of the platform, where questions such as “how to ensure the quality of the user information” and “how to get hearing-impaired enrolled?” were asked. We answered them using the research we have done on running online wiki-sites giving examples of other online user-to-user platforms who use the same methodology such as Yahoo answers (Lana, 2020). The attenders also pointed out that a “one entrance” to the hearing system idea was a goal they had themselves but did not achieve through their various projects. Lastly, the attenders said that they were interested to go into a collaboration implementing and developing the user-to-user platform and that they wanted us to join the next board meeting as well presenting a functioning prototype of the discussion room and the results from the tests.

Ending the feedback Carsten, a consultant from Force technology said: “We have tried to run the user-to-user platform on Facebook for quite a while but the maintenance of moderating and the amount of misinformation are lowering the quality of the discussions. We see this as a great opportunity to fix and improve those issues and the function of a platform.”

5.6 New actor mapping

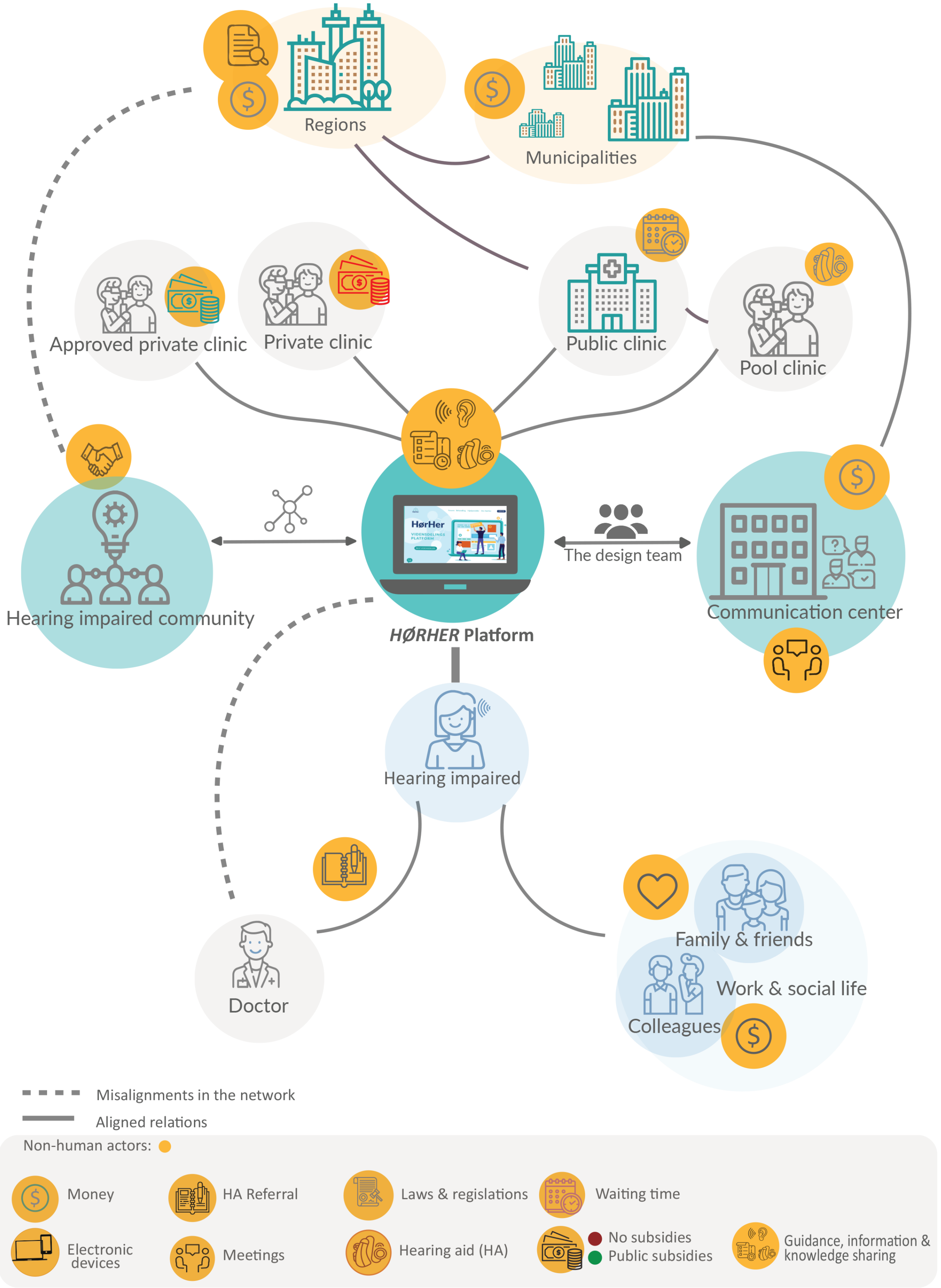


Figure 26 - Illustrating a future aligned network, with the platform functioning as a non-human actor, strengthening the relation between hearing-impaired individuals and the different treatment options in the current system.

5.5.1 Four moments of translation through the eyes of OPP

Through the analysis of the future actor-network see figure 26, the obligatory passage point (OPP)is put into place. The OPP is a part of translation process, and with this, we strive to illustrate the hypothetical pathway needed for a successful implementation of our final concept. There is a need to recognize what it will take to make this happen, as we aim to make the future network better aligned, the OPP (Callon, 1986) here serves as a point where key actors need to go through to make a change happen.

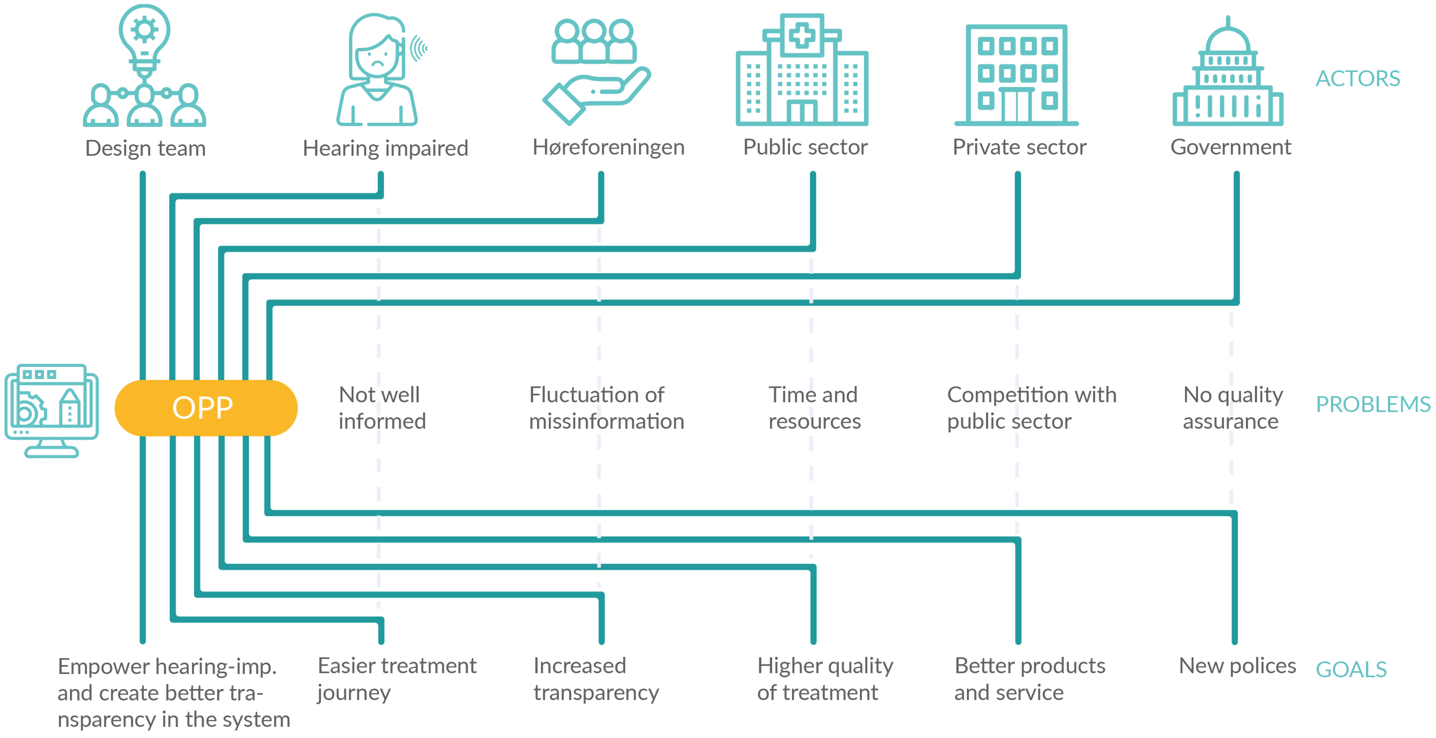


Figure 27 - Obligatory passage point

In this case, the passage points establish what obstacles the key actors need to pass for them to be successfully aligned. The OPP is part of the 4 stages of translation and illustrates the future pathway needed for a successful implementation of the final solution. These actors have been identified since they represent the key actors in the established network of hearing treatment in Denmark. This can also be seen in the actor mapping where the relations between the actors are illustrated before and after the implementation of the solution.

This understanding of the OPP has been used to ensure that key actors and their interests are taken into account through the stage of problematization and to further make clear what obstacles they need to overcome to ensure the wished mobilization of these in the future solution. In the OPP illustration seen in figure 27 we have placed ourselves and the platform solution as the OPP, the different actors need to pass to reach their individual goals and solve their problems.

The hearing-impaired individuals need to use the platform actively for it to become the center-point of information and knowledge sharing within the system. If this succeeds it will provide these actors with better information and hearing treatment. One way of securing they become aware of the new platform could potentially happen through their first visit to the doctor. Here the doctor informs about the platform and provides the patient with a user-login. By doing so, the doctor can easily pass on the most urgent information, while leaving the rest up to the guidance's available within the platform.

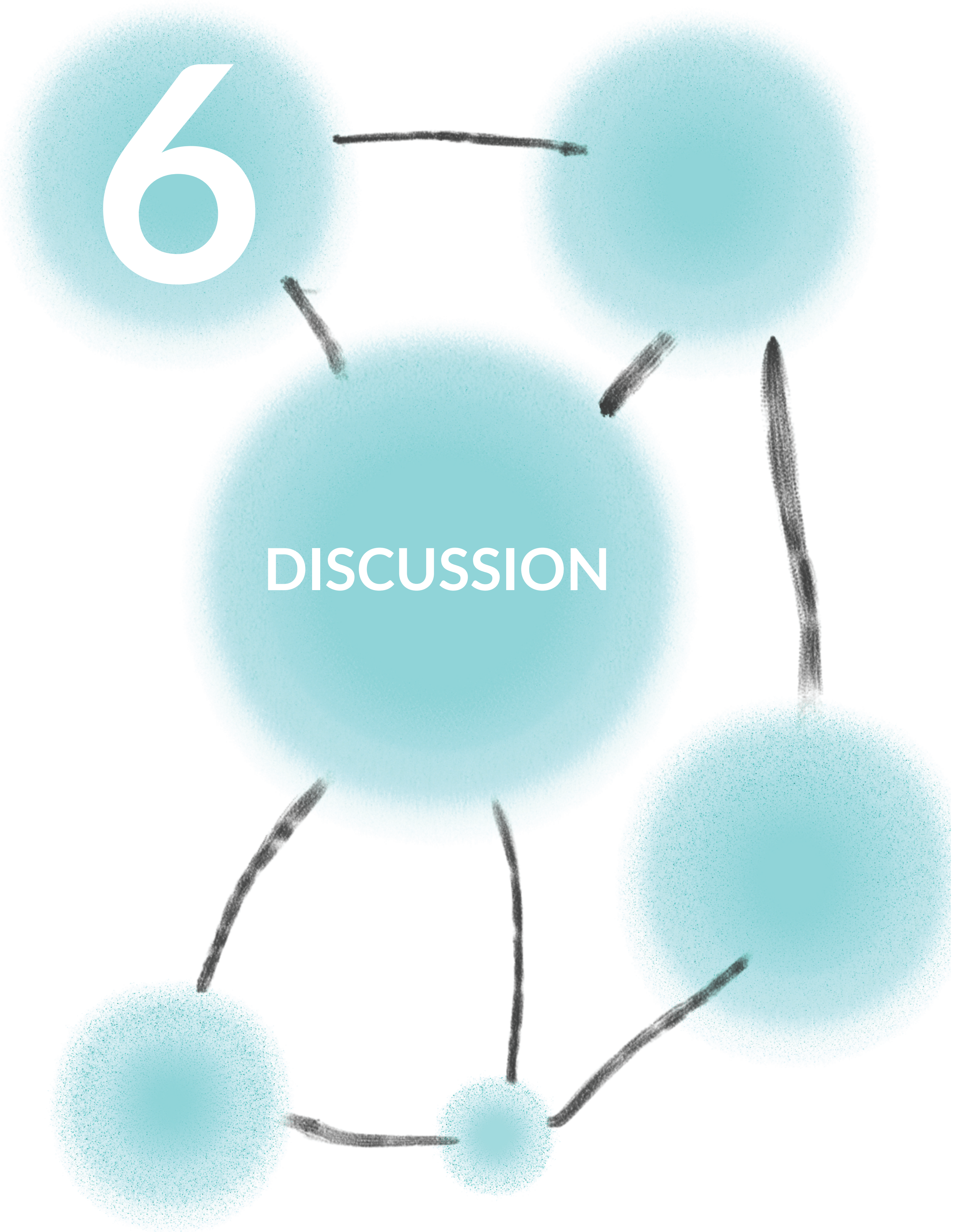
Høreforeningen has through many years been the spokesperson for a 'one way into the system'. We identify it as a hard task to solve, as the many ways of treatment can be useful for different hearing-impaired individuals. However, changing the focus towards one primary unbiased information channel can help in less hearing-impaired individuals feeling misinformed or confused about what treatment option to choose. The implementation of the platform could additionally happen within Høreforeningen's current webpage, as this already contains a lot of knowledge, however, it is text-heavy and without a user-to-user chat-forum. A wished implementation process is mapped in the chapter 7.1 Implementation plan.

Both the public and private sectors we seek to mobilize through the interessement device of the direct user-to-user information these could access. Furthermore, it is our impression that both the public and private sectors strive to provide a good service. Being visible on this platform could be a step in the right direction towards a higher quality of treatment and services. Initially, it will not be of great importance having the government as a part of the translation-phases, however, based on the knowledge and experiences shared from HA users and hearing-impaired individuals, this platform could in the future serve as an important database for further research and studies within the Danish health care sector. Aligning us with a patient organization as Høreforeningen, who already has a well-established contact and relation with actors within the government, could serve the future platform in a positive direction.

It is to be considered, that the current platform not yet is seen to be a final solution. In the ideal world of design engineers, more key-actors will need to be involved to secure a successful mobilization of key-actors and implementation of the platform. Furthermore, this process of aligning actors and making hearing-impaired individuals discover and comprehend the new platform is not something that will happen over a night. Implementing new solutions and new practices around the hearing treatment system will take time and further user-involvement. Additional thoughts and reflections upon this will be unraveled and discussed throughout the next chapter.

6

DISCUSSION



6.1 Conducted research

At the initial stage of this project, the plan was to have a participatory design approach in designing a solution aiding hearing-impaired individuals. Initial workshop meetings and in-person interviews were set up with hearing experts and with HA users in an activity center for the elderly. However, due to COVID19, the Danish government decided to shut down all physical activities connected to our project, except the most necessary healthcare infrastructure. On that background, the project was put on hold for the moment, especially because the individuals at the activity center were elderly people and thereby more vulnerable to the virus.

A restructuring of our strategy was necessary as we needed to find an alternative way to contact the targeted community and involve them through the process without meeting up physically. Our focus and hereby also the research questions were adjusted throughout the project according to new findings and uncovered issues within the field of hearing treatment. From conducting research emphasizing enrollment of hearing-impaired individuals at a sooner state of their hearing loss, we deviated to focus on the current problems the hearing-impaired face, when seeking treatment. This change of focus was backed up by healthcare professionals as e. g. Janusz Wajn who described that contacting someone who is not aware that they have a hearing problem is close to impossible as they haven't accepted their hearing loss. Although we recognize that the issue of not being aware of having a hearing impairment creates problems for both the society, the individual, and their relatives.

Nevertheless, us shifting our research from the physical to the virtual world, we sought to get closer to the targeted group through their online communities on Facebook and through telephone interviews. As a guide on how to conduct this kind of approach, the literature on online support communities was revised to understand what the logic of these are; What kind of relation do the hearing-impaired have with the platform itself and what are the relations with the other members of the online community. When observing the online community platform, initially we had the approach of not involving ourselves in the discussions but rather passively observed these relations. Furthermore, to gather and analyze data we were inspired by the methodology of Pfeil & Zaphiris (Pfeil & Zaphiris, 2009) that provided us with inspiration on the structure to the process described in chapter 3.3.7.

The moment we involved ourselves in the community was when we applied for permission to post our survey on the community page and when seeking people willing to further participate through phone and email interviews. By using this online ethnographic approach, we were able to get closer to the hearing-impaired community in Denmark and gain a deeper understanding of what obstacles is typically met through the process of hearing treatment in Denmark. Nevertheless, the method fell short when it came to comprehend the reasons for each individuals' choices throughout their treatment. Here methods like follow the actor could have assisted us better in getting a more detailed experience regarding the hearing-impaired and the obstacles they claim to face. Furthermore, we sought to involve the actors throughout the design process. When posting our MVP as an intersegment device in the Facebook community, we did not receive as much constructive feedback as expected. The reasoning for this might be that it can be overwhelming for one member to "step out" and participate with new suggestions to the concept, as the facilitation of a safe space for them to come out at give their opinion was not properly accomplished.

A different approach here could have been establishing a safer space by electing a smaller number of members from the Facebook group to act as spokespersons for the entire community. Sharing the MVP in a different format, outside of the Facebook platform for e.g. a shared Google drive document could have served as a safer interactive space for feedback and discussions in real-time. Some of the respondents also said that they would have liked to try out the platform as a part of the test.

By the use of ethnographic methods, we were able to reinforce knowledge gained through desk research and further expand this knowledge according to the firsthand experiences of the involved actors. From those, patterns and issues were divided into four main problems: Lack of transparency in the system, Lack of patient-centered care, Lack of technical guidance, and Long waiting time in the public sector. When stating 'lack of transparency', we mean that due to lack of uniformity in treatment, where there are different pathways, with a combination of insufficient information and education, this has shown to be incomprehensible for many to understand. In many cases, this leads to poor choices. e.g. some individuals wished that they knew about communication centers before starting the process of seeking help, while they believe they then would have made different choices regarding their treatment.

What was brought up by the hearing-impaired and from the expert working at the communication center was that patients are not properly aware of their possibilities, e.g. that they can get subsidies for their HAs received at an approved private clinic or that they can be treated within another municipality. Lack of patient-centered care was described as a problem for some hearing-impaired when they were going through the treatment. They described it as an assembly-line-like, where they were not satisfied with the care provided to them. They would spend approximately thirty minutes on counseling discussing formalities regarding the HA. They were expecting that specialists would show more compassion and interest into how they were experiencing the hearing loss in their everyday life and what their daily activities were for the HAs being customized for specific environments. Lack of technical guidance refers to patients who were not satisfied with the instruction received from the specialist. For some thirty minutes was not enough time to learn how to use, adjust and maintain the device. Furthermore, some patients were feeling uncomfortable to further ask for more instructions or wished they were given some sort of manual with easily understandable instructions. Moreover, some even questioned if the audiologist was trained and educated on the newest technologies and treatment.

Further problems came to surface during the observation and analyzation of generated data. However, it is important to mention that there are individuals out there with positive experiences from both the private and public sector. Nevertheless, the design team found the system to be somewhat fragmented and difficult to gain exact guidance from. This showed to be backed up by several hearing-impaired individuals.

What we became aware of through our research was that hearing-impaired individuals play a rather passive role in the current network. We believe that a patient-centered solution can improve the hearing-impaired relations with the Danish hearing-treatment system. Some of the hearing-impaired stated they got the impression of being told by professionals, who do not suffer from hearing loss, how they should feel about their condition. What they are implying is that it is not possible for one to truly understand hearing loss if not suffering from it. We argue that hearing-impaired should play a more active role in the system, primarily because they are the ones who possess the firsthand knowledge on how it is to live with their condition, but also on how the treatment in the current healthcare system is carried out. Therefore, they must be given the agency to participate, contribute and make improvements for themselves and likeminded individuals in the system. From the observations of the online support community on Facebook it was clarified that these citizens are eager to support each other with knowledge, personal experiences and information. The hearing-impaired online community proved to be a great place where these positive relations occur. Additionally, it especially became useful during the period of lockdown, where many turned to the page for advice while the institutions were closed.

Why do we see a need for the Hør Her platform when existing platforms of discussion already exists?

Although knowledge sharing already exist within groups on Facebook aiming to aid the hearing-impaired, we found that the current available webpages are not involving the users properly. Running a hearing treatment platform has up till now been made on the backbone of professionals guiding the hearing-impaired in the direction of treatment. We find this knowledge sharing from the professionals useful however argue that an inclusion of the experience from the users can help strengthening the transparency within the system.

We found already existing user experience in the Facebook group 'Høresagen i Danmark' fitting the needs of a community of practice, however, this community also seemed to be somewhat exclusive, as users need to have a Facebook profile to be a part of this and needs to In addition to that, the Facebook groups are seen to be 'fragmented' into smaller communities with a number differing from 200- 3000 members. We plan to include future and current HA owners to our platform where the access point will be scattered all over the system making sure that as many hearing-impaired individuals as possible gets mobilized in the network and CoP. Thus, we seek to gather the smaller knowledge sharing communities within the Hør Her platform, aiming to enroll and mobilize key actors' such as doctors, audiologist and Høreforeningen to support and align the network surrounding the platform. These doctors and organizations can play a crucial role as a collaboration partners when using the platform as an interessement device for the users. We also find it necessary to emphasize that Facebook is a multimillion-dollar corporation with own plans and goals. Information shared on Facebook is owned by Facebook who can put this information to use in any way they want to. Making sure that the shared data is handled correctly on the Hør Her platform will ensure that the hearing-impaired seeking knowledge is uncolored by subjective opinions as the data will be accounted for by referencing. Overtime we see that the Facebook community might become obsolete with a successful implementation of the Hør Her Platform. It is therefore important that we enroll all the actors from the existing Facebook groups and other online discussion rooms, these being the moderators and members of the group, so that we do not leave anyone behind in the system.

Through further observation of the Facebook community, we realized some aspects of the Facebook platforms' logic and design that does not serve well to the community and even contributes in valuable knowledge being lost. The discussion page where the interactions and discussions occur, does not provide structure for the members being able to go back and find needed information, while it only provides a format where submissions are presented from the newest towards the oldest. On top of that, the members were advised by the moderators to remove ended discussions, to make the page "neater". Since we see these individuals as experts with valuable knowledge and willing to selflessly contribute with their experiences, a platform where better structure and easier accessible knowledge is proposed.

Because of a non-existing quality assurance and no current activities on collecting this kind of generated data (Sundheds- og Ældreministeriet, 2018), the Hør Her platform is a solution where all data is gathered at one place. In future scenarios, this platform could be further assistive when creating new policies and regulations, ensuring a better treatment according to hard of hearing people's needs while making sure that this communities' rights are fully respected.

6.2 Choice of theory and methods

Reflections on the MVP concept approach, Actor-network - and Communities of practice theory. Where did it came in handy and where did these seem to come of short?

As the initial issues found revolved around individuals and their way of getting HAs, it came naturally to focus on the socio-material networks surrounding these human and non-human actors. Using ANT as a framework allowed us to gain a vivid and nuanced understanding of problems found during the initial research process and helped highlight the current relations between human and non-human actors.

During the project, enrolling different key-actors has been a bit of an obstacle due to the occurring pandemic and the field of the subject being within the healthcare sector. During the process of the project, this sector has been under more pressure than regular, where nothing was as usual. Additionally, dealing with key-actors where the majority are of the older population this further constrained the teams' possibilities in meeting these face-to-face. Consequently, feedback gained throughout the project has been somewhat limited/restricted. Greater actor involvement, we assume could have been achieved through more social meetups and face-to-face conversations. When doing physical meetings, interviews, and workshops it is our experience that stronger relations are built between the designers and the involved actors. With a stronger relation, the willingness to share more knowledge is often experienced. Stabile relations have therefore shown to be harder for the team to establish when only being able to get in contact with actors through phone or mail. In hindsight, video calls could have been a better tool when conducting interviews, as the actors would get a better feeling of who they were sharing their knowledge with and through that gain a better relation to us. Furthermore, the engaging of hearing-impaired individuals might have been less challenging, if the team had been more active in the Facebook groups, as these actors could have helped the team getting further in touch with a broader network of actors.

As it has been close to impossible, meeting up and gaining a deeper relationship to our key-actors, we therefore turned to the notion of online communities combined with the theory of Communities of practice (CoP).

CoP theory was applied to analyze how communities behave online and what knowledge practices that tie the individuals together. Although CoP theory usually is applied in a wider term to describe how practices unite individuals in their daily physical activities, the perspective of CoP contributed in creating requirements for the concept, regarding the inclusion of hearing-impaired' insights. Combining the CoP theory with the methodology of online communities made it possible for us to use the CoP theory within the online groups and in summarizing observations. It is important to emphasize that the CoP theory was modified to fit our use in this thesis project. Normally being used to outline which practices tie communities together, it has been used in combination with the methodology of online communities to describe the current situation in existing online communities. We plan to use the CoP theory more into detail in the future work of the project, by e. g. going into the field analyzing which practices ties the community together at first hand.

The prototype (MVP) functioning as an interessement device did not work as intended with involved actors having low technical skills, where some of them did not know how to open the link to the MVP. Here, we should be aware that some actors are not proper technical skilled. This raise further doubt on whether a solution in the form of a webpage-platform will be equally as hard for these users. The solution is created with the aim of making it easier for certain actors to find their way into the system, however for this solution to succeed, it demands certain skills and know-how from the end-users. To further ensure a successful enrollment of actors with lower technical skills, it is a part of the final solution that a login and presentation of the platform are given during the initial treatment at the doctor. This is done to ensure a greater enrollment of hearing-impaired individuals who are getting familiar with the platform.

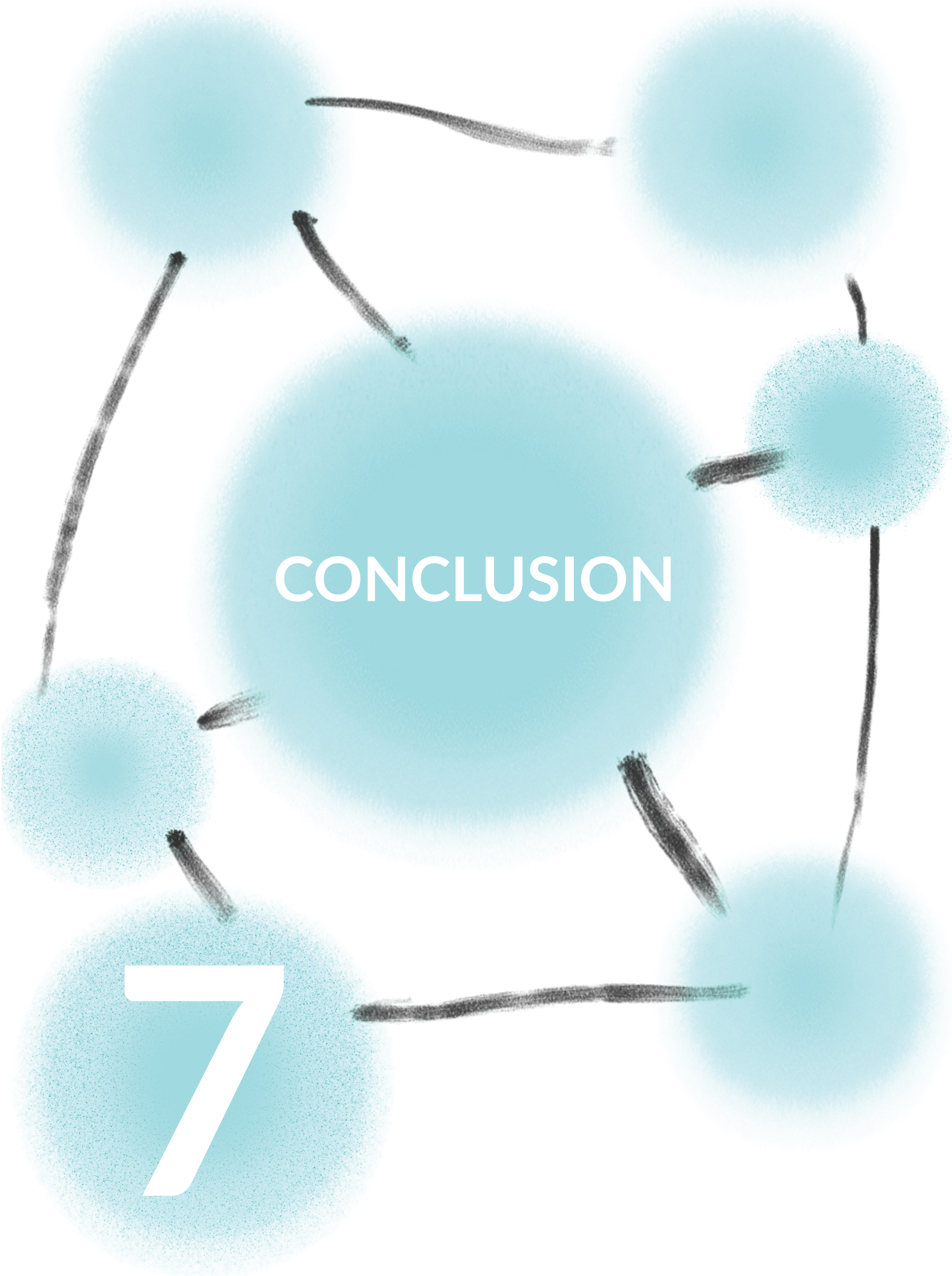
Using MVP served us well, as this resulted in being a successful interessement device towards key-actors at Høreforeningen. Actors who at the beginning of this project turned down a possible collaboration. However, through the use of our minimum viable product, we succeeded in getting invited to a meeting with important actors, in relation to the future implementation of the solution.
On the other hand, our MVP more of less failed to succeed when seeking feedback within the Facebook community. Part-reason for that was that people called for an actual link to the platform, meaning they had a hard time visualizing the use of Hør Her, when not being able to try it out manually. Nevertheless, this will be the next step towards the final solution.

6.3 Sustainability

Social sustainability has been the focus of the conducted research within the field of healthcare for the hearing-impaired. What we would like to shine through in this thesis is that the platform and the idea of user-to-user knowledge sharing can be expanded to other areas of healthcare as well. We expect that likewise an immense amount of knowledge is lost due to the lack of sharing from the individual experiencing it. Looking further into the current system of health care within Hearing treatment, it occurred that there seems to be a lack of innovative solutions. The reasoning for this might be the bureaucracy ruling in the current system, as we see it. "Social innovations are new solutions (products, services, models, markets, processes, etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships and better use of assets and resources. In other words, social innovations are both good for society and enhance society's capacity to act" (Valentine, et al., 2017, p. 18. Concepts such as innovation and learning networks (Wenger & Snyder., 2000) pave the way for a transformed understanding of innovation that involves close collaboration between practice, leadership, science, and politics. The government is identified as a key actor when it comes to social innovation. We, therefore, see great interest in enrolling the Danish government regarding the implementation of our concept. On the other hand, we want to emphasize that the government should be a contributor for policy making and funding of future social innovation within the healthcare sector in Denmark and that the platform should be driven by a NGO having a primary focus on the patients and their needs.

7

CONCLUSION



Addressing our problem formulation of creating better transparency in the hearing treatment system we conclude that an implantation of a user-to-user knowledge-sharing platform empowers hearing-impaired individuals to actively participate in the community, sharing their knowledge and experiences. Additionally, the platform includes easily accessible knowledge while operating as a one-stop access point for the users who seeks information. Hør Her represents the first measure as a goal of creating transparency for all actors in the hearing treatment system. Moreover, we suggest that the generated data on the Hør Her platform can be further put into positive use on a governmental level, when creating new policies revolving the hearing treatment system in Denmark. Gathering and categorizing the various experts' knowledge that is currently scattered on the Facebook platform and other dedicated websites, would be in the interest of all involved actors in hearing treatment system in Denmark. The experienced patients are a part of the solution themselves giving their perspectives and knowledge-creating, what we identify as, firsthand transparency in the hearing treatment system. With the research carried out, we were able to gain an overall understanding of the Danish hearing treatment sector. A further identification of misalignments in the network was carried out with an actor-network perspective. This identification was achieved for us to be aware of where in the current network the primary obstacles were seen, and a possible solution could fit.

The current hearing treatment process was perceived as a complex and fragmented system where some hearing-impaired people experience being “tossed around” between the different professionals to get a complete treatment. It can be an overwhelming experience when seeking treatment, especially if an individual does not possess a thorough understanding of the system and their possibilities and rights as a Danish citizen. In our perspective, this is happening due to the system not being uninformed regarding how hearing treatment is organized and depends on each region or municipality. Issues uncovered when seeking help through the private sector are that the private sector is mainly driven by profit and the way policies are put into place. Nothing is currently preventing the private clinics in selling expensive HAs to the hearing-impaired seeking help in a complex treatment system. This has shown to create heated discussions in various groups and has polarized the hearing-impaired into two matters of belief; you can either go private or public only one of them is the right choice. We suggest that the information regarding the hearing treatment system should be centralized so the hearing-impaired who are seeking help can make their decisions based on sufficient knowledge.

One of the issues when seeking help through the public sector is the waiting time. In some cases, it takes up to 115 weeks to get an initial appointment, depending on which municipality the treatment is offered. However, the biggest obstacle uncovered within the hearing treatment sector is the lack of transparency and information regarding the hearing-impaired individuals' choices of treatment, not to mention the absence of collaboration between the sectors. We see the solution idea as an initial step towards a Danish hearing treatment with greater transparency and guidance available to the users. A one-way to treatment has not been created, however, this may not be necessary if the users are offered a centralized platform of information.

We suggest that the following implementation plan is initiated, and that further research is conducted in a re-opened society, benefiting from being able to conduct physical co-designing processes and supplementary going into the field to observe the different treatment processes.

7.1 Implementation plan

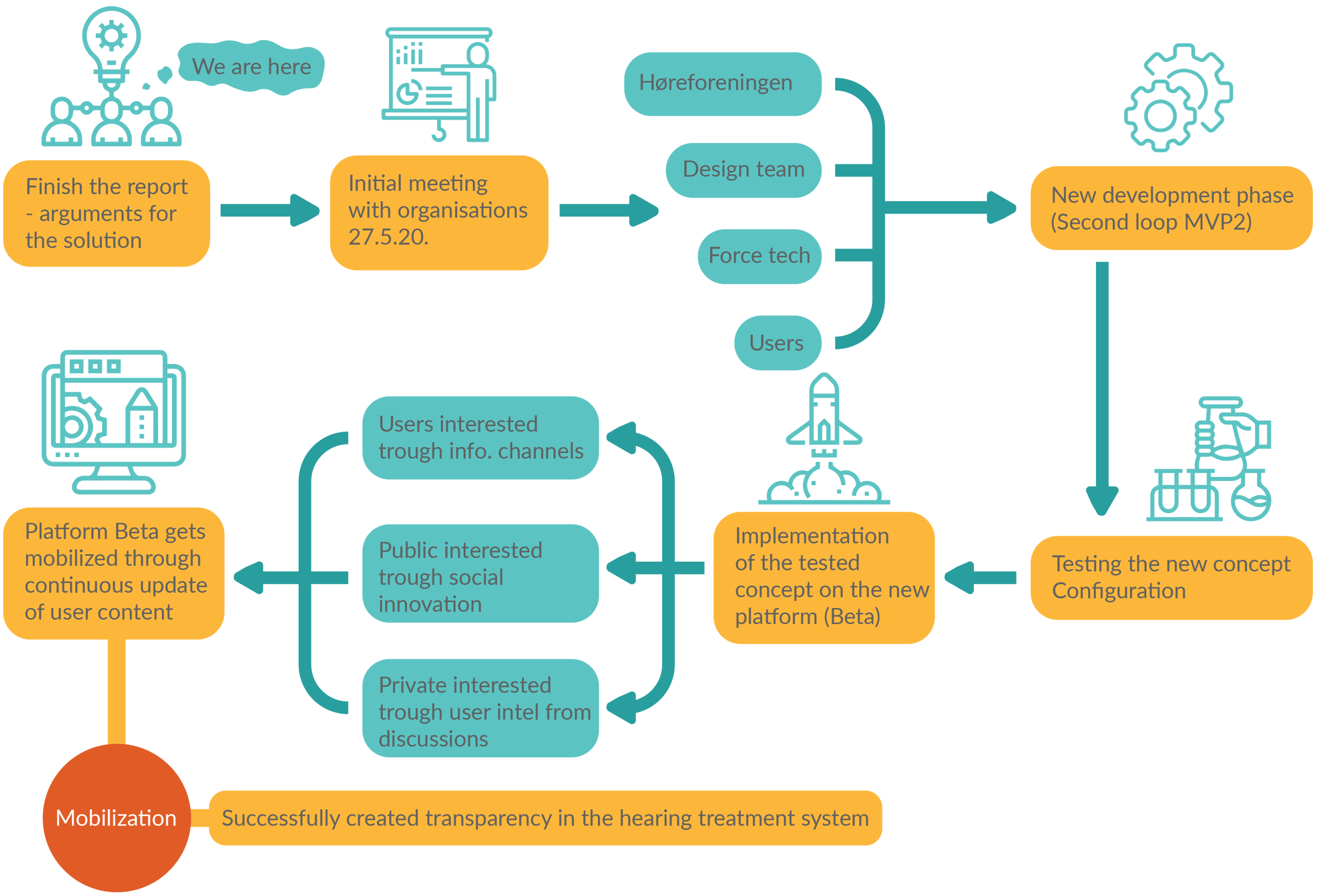


Figure 28 - Implementation plan

Our first version of the platform concept was described in the MVP video where user comments were received according to the lean start-up methodology. The MVP helped in confirming that the initial functions of the platform could contribute to a more transparent hearing treatment system. Following the Lean start-up methodology, we must now implement and pivot our concept to fit the comments given during the first cycle of the iteration process. The current developed concept still needs a lot of work and for that reason, we need collaborators and other allies within the treatment system. We have visualized our preferred strategy to the new plans of the platform implementation in figure 28. Using the four moments of translation, we have strived to uncover how a successful mobilization of important key-actors would looks like. Using our thesis as a problematization tool will ensure that our upcoming collaborators understand why there is a need for our concept Hør Her. We plan to share the thesis with the associations, Høreforeningen and Force technology before meeting them to discuss the outcome of our project. We will problematize the specific situation of the knowledge-sharing platform to show how an inclusion of hearing-impaired experiences and knowledge will strengthen the hearing treatment system making it more transparent for new users or healthcare professionals.

As mentioned in the testing of the first concept configuration we meet interested actors at Høreforeningen and Force Technology to talk about a future collaboration and development of the platform. From this, we propose that a new concept development phase is initiated starting from the concept requirements we introduced in this thesis. We expect that this process will enroll actors from Høreforeningen and Force technology as we plan to include them, the future hearing-impaired users, programmers, and other NGO's in a new co-design process. Where the requirements get further detailed and resolved for. This iterative process will be conducted using the lean start-up methodology. When the concept is approved for the test, we plan the implement it to a beta version of the Høreforenings platform. During the beta testing, we want to include 3 of the main actors we see could benefit from our concept, the hearing-impaired users for greater transparency, the public treatment system for qualitative insights, and the private treatment system for optimization of their processes. We see that our concept is mobilized when our spokespersons from Høreforeningen and Force technology take responsibility for running the platform features, implementing any new suggestions from the key users. A successful implementation will ensure that the hearing treatment systems transparency is exponentially being broadened by hearing-impaired sharing new experiences for their treatment or asking new transparency-related questions for the private or public system to answer and broaden. Having the platform mobilized we plan to continuously update any new features and knowledge shared and suggested by its users.

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9.Appendix

Worksheets

WS1: Hearing disabilities

WS2: The hearing association.dk

WS3: Effects of an untreated hearing loss

WS4: How hearing aids function

WS5: Types and characteristics of hearing aids

WS6: Hearing aid related difficulties

WS7: Audiologists' communication behavior during appointments

WS8: Waiting time on hearing aid treatment in Denmark

WS9: Coding of found problematics (1) & (2)

Qualitative data

A1: Transcribed interviews with Hearing impaired individuals and professionals

Accessible at:
https://drive.google.com/drive/folders/1o7qtXmf8c3IQw410M7ZnEl3yPnqFWTDZ?usp=sharing

A2: Samples from Facebook-group observation

Accessible at:
https://drive.google.com/drive/folders/17bTfvshsioL1SBXCX-8KfKO_HLTbyUP1Z?usp=sharing