

# **IMPLEMENTING ACCESSIBILITY IN DIGITAL SERVICES**

Master's Thesis  
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International Design Business Management  
Spring 2021

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**Title of thesis** Implementing Accessibility in Digital Services

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**Degree** Master of Science (Economics and Business Administration)

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**Degree programme** Master's Programme in International Design Business Management

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**Year of approval** 2021**Number of pages** 68**Language** English

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**Abstract**

Digital accessibility has recently gotten more awareness thanks to the EU accessibility directive (Directive (EU) 2016/2102) and Finnish accessibility law (Laki digitaalisten palvelujen tarjoamisesta 306/2019) which require public and certain private organizations to make sure their digital services follow WCAG guidelines for digital accessibility. This has created a need for accessibility awareness and skills. Many organizations are still finding ways to work with the requirements, and the focus has largely been in making the current services accessible.

For this thesis, 13 semi-structured interviews were conducted with working professionals who have worked in projects that include accessibility implementation. In addition, a literature review was conducted to find the consensus in existing research. The grounded theory –method was used to discover main motivators and key factors that influence accessibility implementation in organizations.

This research provides practical suggestions on how accessibility implementation in digital services can be improved and supported by organizations. Based on the findings, a recommendation is made to adopt a more strategic approach with accessibility. Accessibility should be included in the company's product and service development processes from the beginning. This can produce many benefits from cheaper implementation to better usability. Accessibility evaluation should be a continuous process to catch issues early. A good division of responsibilities also helps make sure that accessibility is not pushed to the bottom of the priority list.

In addition, it is important to not overlook the role of members of the organization. Accessibility should not be the sole responsibility of any one department, and different departments should understand how their responsibilities intersect with the organization's accessibility strategy. This can be achieved through offering training sessions and organization supported self-learning on the subject.

A key factor which improves accessibility implementation is personal motivation of individual workers. Despite the legislation, the effectiveness and prioritization of the accessibility work often depends on individual workers' motivation. Accessibility is often prioritized under other work, categorized as an optional extra or ignored outright. There are several ways to boost motivation, most effective of which is showing the impact of the work on real users through user testing. Seeing someone with disabilities use the service or testing the product with, for example, a screen gives context to the sometimes-abstract accessibility needs and guidelines. It is important for managers to build teams' empathy towards those who need accommodations to use digital services.

Organizations should also strongly consider working with accessibility experts, conduct regular audits and test with real users. In the future, especially in the public sector, accessibility will continue to be an important factor when creating any digital services. This should be taken into account when starting new projects, as well as when hiring new employees and outsourcing.

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**Keywords** Accessibility, digital service development

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**Tekijä** Heini Könönen

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**Työn nimi** Saavutettavuuden Toteuttaminen Digitaalisissa Palveluissa

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**Tutkinto** Kauppatieteiden Maisteri

---

**Koulutusohjelma** International Design Business Management

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**Työn ohjaaja(t)** Elina Hildén

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**Hyväksymisvuosi** 2021**Sivumäärä** 68**Kieli** Englanti

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## Tiivistelmä

Digitaalinen saavutettavuus on viime aikoina saanut näkyvyyttä EU:n saavutettavuusdirektiivin (Directive (EU) 2016/2102) ja Suomen saavutettavuuslain (Laki digitaalisten palvelujen tarjoamisesta 306/2019) ansiosta. Lain mukaan julkisten ja tiettyjen yksityisten organisaatioiden digitaalisten palveluiden tulee seurata WCAG saavutettavuusvaatimuksia. Useimmat organisaatiot etsivät yhä parhaita tapoja tuoda saavutettavuus osaksi prosessejaan, ja tähän asti suurin osa työstä on mennyt nykyisten palvelujen muuttamiseen saavutettaviksi.

Tätä tutkielmaa varten tehtiin 13 haastattelua digitaalisella alalla työskentelevien ammattilaisten kanssa, joilla on kokemusta projekteista, joissa saavutettavuus on ollut läsnä. Lisäksi tehtiin kirjallisuuskatsaus, joka antaa syvemmän käsityksen saavutettavuudesta ja olemassa olevasta tutkimuksesta. Haastatteluista ja kirjallisuuskatsauksesta saatujen löydösten perusteella annetaan ehdotuksia siitä, miten organisaatiot voivat käytännössä tukea saavutettavuuden implementointia.

Löydösten mukaan, saavutettavuutta tulisi lähestyä strategisesti prosessin alusta alkaen. Tämä voi tuoda huomattavia rahallisia säästöjä ja johtaa parempaan yleiseen käytettävyyteen. Saavutettavuusarviointeja ja testauksia olisi hyvä suorittaa jatkuvasti prosessin aikana, jotta ongelmat voidaan löytää ajoissa. Vastuu on myös hyvä jakaa selkeästi, jotta saavutettavuus voidaan priorisoida oikein.

Lisäksi tärkeää on huomioida yksittäisten organisaation jäsenten rooli. Saavutettavuus ei koske vain tiettyä organisaation tiimiä kuten suunnittelijoita, vaan jokaisella organisaation jäsenellä tulisi olla käsitys siitä mitä saavutettavuus on, miksi se on tärkeää ja mitä heiltä vaaditaan sitä varten. Organisaation on mahdollista edistää tätä tarjoamalla koulutuksia aiheesta.

Yksi avaintekijöistä, joka vaikuttaa saavutettavuuden implementointiin, on yksilöiden henkilökohtainen motivaatio aiheita kohtaan. Laista huolimatta, onnistunut saavutettavuuden implementaatio usein riippuu henkilöiden omasta motivaatiosta, koska saavutettavuus on vaikea oppia ja se on helppo priorisoida muiden töiden alle. Haastatteluiden mukaan keino kehittää motivaatiota on luoda konkreettisuutta oikean saavutettavuutta tarvitsevan henkilön elämään. Keinoja, joilla konkreettisuutta voidaan luoda, ovat esimerkiksi käyttäjätestausten tekeminen oikeiden käyttäjien kanssa, tai avustavien teknologioiden, kuten ruudunlukijan, kokeileminen.

Organisaatioiden olisi hyvä myös harkita saavutettavuusasiantuntijoiden kanssa työskentelyä, säännöllisiä saavutettavuusauditointeja ja testausta oikeiden käyttäjien kanssa. Nämä voivat säästää kehittäjiä ja suunnittelijoiden aikaa, sillä he voivat oppia tehokkaammin projektin aikana ja mahdolliset ongelmat löydetään nopeammin.

Saavutettavuus tulee olemaan kasvavasti tärkeä aihe erityisesti julkisten, mutta myös enenevässä määrin yksityisten organisaatioiden digitaalisten palveluiden kehittämisessä. Tämä tulisi ottaa huomioon esimerkiksi uusien projektien aloituksessa, rekrytoinnissa ja ulkoistamispäätöksissä.

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**Avainsanat** Saavutettavuus, digitaaliset palvelut

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# 1 Introduction

## 1.1 Background

For a long time, many buildings from schools to hotels have been legally required to have accessible ramps for people who use wheelchairs. However, accessibility has not always been required in the online world. There are many disabilities that affect how users can use digital services, such as websites or mobile applications. According to some estimates, only in Europe, 80 million people would need more accessible digital services, and 5% of EU citizens are not able to use the internet at all due to some form of disability (European Commission, 2020). As the world is moving increasingly online, these people are left out of our society.

Web accessibility has recently become a hot topic because of recent changes to laws in Europe mandating that all public organizations and some public organisations should follow the WCAG accessibility standards in their digital services. Digital accessibility refers to everyone being able to use digital services despite permanent or temporary disabilities. This means that websites are built so that people with different kinds of disabilities can use, understand, navigate and interact with them (European Commission, 2020). The disabilities can also be temporary or situational, and accessibility has been noted to also improve usability for everyone (Bailey & Gkatzidou, 2017).

For most companies, the only thing motivating them to implement accessibility is legislation (Goggin & Newell, 2007). However, even when the law requires implementation, it cannot guarantee it is done well, as following the WCAG guidelines does not guarantee good usability. There are also loopholes to go around the requirements or ignore them entirely.

Besides legal obligations, more and more organizations are starting to understand that accessibility can also have a positive impact on business (Leitner & al., 2016). For one, accessibility has been proven to also improve usability for all users in several cases (Regan, 2004; Shum & al., 2016). Accessibility can also lead to positive reputational benefits (Aizpurua & al., 2016; Bailey & Gkatzidou, 2017; Leitner & al., 2016). Also, as the lack of

accessible services excludes a large pool of potential customers, there is a potential market gap available for companies to reach.

A common problem with accessibility implementation initiatives is that they are often seen as difficult and expensive to implement (Kulkarni, 2019; Leitner & al., 2016; Zimmermann & Vanderheiden, 2008). Accessibility can be difficult to implement, especially for rapidly evolving or new software. Adapting accessibility on web applications does have high initial costs (Leitner & al., 2016) in manpower and resource allocation.

As Leitner & al. (2016) note, when organizations start to implement accessibility, it is usually done by initiators who do not have a strategic plan. Tigwell & al. (2018) mention that accessibility often fails when it is not properly included in the development process. In the case of web applications, adding accessibility after development can cost about 10 times more than including it from the beginning of the process (Zimmermann & Vanderheiden, 2008). As a result of all these factors, many decision makers usually are not eager to support accessibility initiatives and they need to be convinced about the benefits for the business, for the employees and for the end customers.

In practice, modern digital service development is often planned and executed using an agile framework. Unlike strictly plan-driven methodologies like the waterfall model, agile methods encourage continuous iteration that makes it possible to quickly respond to changing user requirements and business needs (Jones & Thoma, 2019). Following an agile working process often improves the end quality of the result, ensures that timely releases are not blocked by changing requests (Garcia & al. 2019).

In modern agile software teams, development is often paired with user-centric design methodologies (later UCD) (Abdelouhab & al. 2014; Chamberlain & al. 2006; Jones & Thoma, 2019). UCD refers to the methods and philosophy of placing the end user's needs in the center of the design and development process. The goal is to make human-computer interaction "effective, efficient and satisfying for the user" (Garcia & al. 2017).

A lot of the literature focuses on idealistic ways to implement accessibility and the main issues with the implementation. This thesis aims to research the current implementation processes and motivations behind actual accessibility. By interviewing people with practical

experience with accessibility implementation, variations and different approaches to accessibility evaluation and implementation can be discovered.

This thesis will add to the literature by researching the current situation after the law has been passed. There are currently no other studies about accessibility from the practitioners' point of view in Finland. Similar studies have been done with practitioners elsewhere than Finland, for example by Patel & al. (2020), but no similar studies were found since the changes to the EU Accessibility Directive came into effect.

The findings from this paper can help decision makers in organizations recognize key factors influencing accessibility implementation in their organization and find ways to allocate their resources more efficiently. The findings should be especially helpful for organizations that are just starting to include accessibility in their processes.

## **1.2 Research objectives and questions**

Since the recent changes to the Finnish accessibility laws have now come into effect, it is a good time to research how the changes have affected the motivations for organizations to improve their accessibility. Objective is to find different motivations and how they have affected implementation, and to determine which motivators are effective. What could be done to increase the motivation towards accessibility in different organizations?

The second question targets the factors that enable and influence organizations and team members to participate in accessibility implementation. The objective is to determine how the resource costs and other burdens of accessibility initiatives can be minimized for organizations and the employees.

The key research questions are:

Q1: What are the motivations for accessibility implementation?

Q2: What factors help make accessibility initiatives easier, cheaper and more effective?



### **1.3 Structure of the Thesis**

Section 2 presents previous literature about digital accessibility and implementation. Section 3 will summarize modern digital service development methods like Agile frameworks and user-centric design to give the reader a background on how digital development is commonly done in organizations. Section 4 connects accessibility and modern digital service development and discusses what the main issues are with accessibility implementation.

Section 5 details the methods of this study and the structure of the conducted interviews, including a table with information about the backgrounds of the interviewees. This chapter also describes how the interviews were analyzed using the grounded theory method.

In section 6 the findings from the interviews are presented and divided into common themes and categorized. In section 7 the findings are then compared with the expectations from the literature study.

Finally, section 8 includes the conclusion, practical implications and limitations of the study, and suggestions for future research.

## **2 Digital Accessibility**

To help readers understand what accessibility is and what it requires, specifically in digital environments, key concepts are explained in this section. Then, the chapter discusses what accessibility means for organizations and why it is an essential part of digital service development. After that, current issues and common barriers for accessibility implementation and the existing solutions are presented. Lastly, accessibility testing is discussed as testing is one of the key factors of successful implementation.

### **2.1 Defining Accessibility**

Accessible design often refers to the process of designing products and services to make them more usable for people with permanent or situational disabilities, by following certain design patterns, code requirements, regulations, or laws (Zimmermann & Vanderheiden, 2008). It is focused on creating and following standards that “widen the scope of users as far as possible” (Persson & al., 2015).

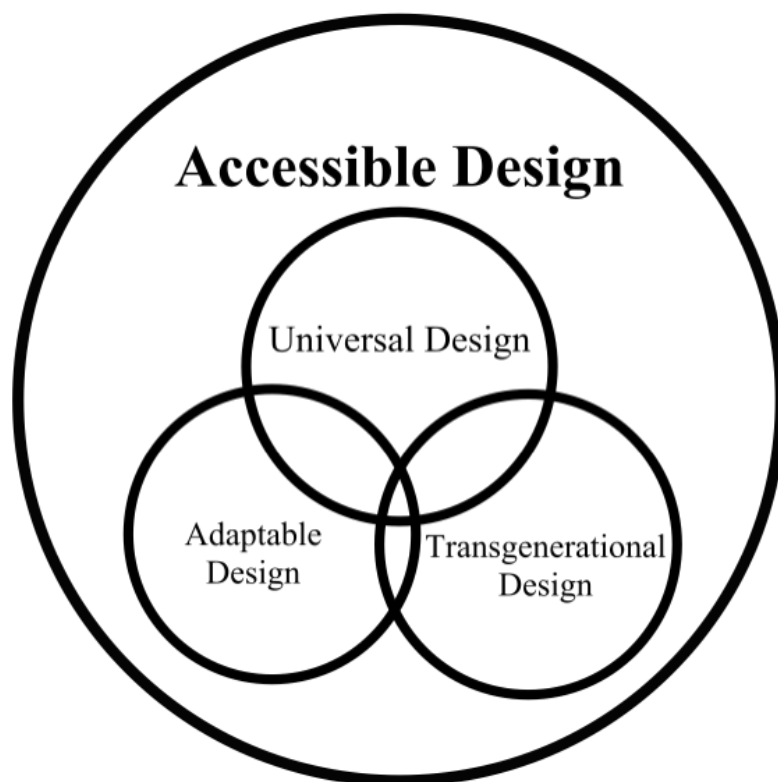
This often requires modification of the product or service after it has already been implemented, partially or fully, which is often costly and even awkward for existing users. For example, adding a ramp to a building after the stairs are finished could be much more difficult, if the architects did not take it into account and leave enough room for it. Adding the stairs afterward requires extra budget, planning, work and resources, which in turn increases the cost of the project (Story, 1998).

Instead, the team could consider and budget for accessibility needs like the ramp right from the beginning of the design process. This is often called universal design. In this case, the accessibility requirements fit the overall design more naturally, and there is less need to make extra modifications after the design is finished and implemented. (Story, 1998).

Another term that can be used interchangeably with “universal design” is “design for all” (Persson & al., 2015). It is defined by The European Institute for Design and Disability (EIDD) as “design for human diversity, social inclusion and equality”. In both cases, the products are designed to be used by the widest possible range of people (Persson & al.,

2015). Inclusive design is also used sometimes as a synonym for these terms (Coleman 1999). All three terms are often associated with the belief that there should not be separate designs for people with special needs. Instead, the “mainstream” solutions should be usable for everyone despite their challenges. While this is theoretically possible, in practice this can be quite difficult to achieve.

Within accessible design, there are several other different principles which are not all listed here. For example, transgenerational design focuses on designing for all ages and does not address conditions that are caused by other reasons, for example, injuries (Story, 1998).



*Figure 1: Relationship between accessible, adaptable, transgenerational, and universal design (Story, 1998).*

Accessibility problems can also be thought of as part of the holistic experience of a product, and subdivided into the technical, operational, and psychological problems (Bailey & Gkatzidou, 2017). Technical problems refer to issues impacting a user’s ability to use the

product in the first place, which is addressed through guidelines and compatibility to assistive technologies. Operational accessibility instead refers to how efficiently a user can make use of the product, for example, how many errors the user makes while using the product. Psychological accessibility is usually the most ignored. It refers to how the user feels about the product. This is important for example in cases where the product is otherwise accessible, but the user does not feel confident using the service. If a user had previously a negative experience with a product or brand, there might be a psychological barrier to using it again, even if the product has improved since then.

## **2.2 Defining Digital Accessibility**

Digital accessibility refers to how websites and digital services such as mobile applications are built so that people with different kinds of disabilities can use, understand, navigate, and interact with them (European Commission, 2020). People with disabilities still have difficulties being a part of society as equal members and as the internet and digital services grow in importance, the digital gap for people with disabilities grows (Goggin & Newell, 2007). Accessibility for web services means increased independence for users with disabilities and less need for societal help for performing everyday tasks (Persson & al., 2015).

It should be noted that making services more accessible often boosts the user experience for users without any disabilities as well. Accessibility also does not only refer to people who are defined as “disabled”. As Shum & al. (2016) suggest, all people have different abilities, so it is not possible to define who is disabled in the first place. A person's disability depends on the context and complexity of the situation. For example, as people get old, they face many disabilities from worsening eyesight to lowered accuracy, and anyone can face an accident or illness that affects how they can interact with websites (Persson & al., 2015).

Accessibility also refers to situational disabilities. Microsoft Inclusive Design Toolkit defines disability as a mismatch that happens between a person and society, and causes physical, cognitive, and social exclusion from society. The exclusion can also be temporary or situational. For example, in a loud crowd, a person cannot temporarily hear well, or a parent of a baby might have only one hand in use (Bailey & Gkatzidou, 2017). Tigwell &

al. (2018) note that accessibility can refer to all problems that are created by technology, environment, and context. This can be seen especially in the context of mobile devices. An example is how mobile applications need to be designed in a way where situational visual impairments (SVIs) are considered. Too low contrast can make it difficult to read a text when browsing the application in bright sunlight, even for people with typical vision (Matausch & al., 2014).

To make websites more accessible, The World Wide Web Consortium (W3C), which includes a variety of organizations and individuals from around the world, has created international standards for accessible websites: Web Content Accessibility Guidelines (WCAG). The W3C Web Accessibility Initiative (WAI) (<https://www.w3.org/WAI/>) creates materials on how to best implement accessibility and follow the guidelines on a website. As of writing this paper, the standard is currently WCAG 2.1, as new versions are periodically released.

The accessibility of a web application is not a binary attribute, or a list of technical requirements, but a relative measurement (Bailey & Gkatzidou, 2017). When deciding about accessibility requirements, the range of accessibility should be decided. This includes what personal, environmental, and task-related requirements the product should fulfil (Zimmermann & Vanderheiden, 2008). Accessibility should be considered from a human perspective as “the range of additional operational, psychological and emotional factors” (Bailey & Gkatzidou, 2017).

### **2.3 Incentives and Motivators**

Accessibility has been demanded from companies for a long time in physical spaces and products, but digital accessibility legislation has only recently become a priority. For example, hotels have wheelchair-accessible rooms and banks have ramps at their entrances, but many of them do not have accessible websites (Bailey & Gkatzidou, 2017).

For most companies, the most important incentive for implementing accessibility is still legislation (Goggin & Newell, 2007). The EU (European Union) created a web accessibility directive (*Directive 2016/2102 of the European Parliament and of the Council of 26 October*

*2016 on the accessibility of the websites and mobile applications of public sector bodies*) which requires public sector bodies to follow accessibility standards on their websites and mobile applications. Having these common standards within the EU also helps companies to have clear goals to work towards, as many member countries do not have their own set of standards for accessibility.

Besides legal obligations, an increasing number of organizations understand that accessibility can also have a positive impact on business in addition to just avoiding repercussions for not following the law (Leitner & al., 2016).

Firstly, the people who cannot use digital services because of different disabilities are potential customers who are lost because they cannot access the services. Just in Europe, an estimated 80 million people are affected, and 5% are not able to use the internet at all due to some form of disability (European Commission, 2020).

Secondly, there is also some evidence that accessibility and usability have a positive correlation between them (Regan, 2004; Shum & al., 2016). This means that improving a web application's accessibility also has a positive impact on all users, including non-disabled users. For example, subtitles on videos are good for those who are hard of hearing, but everyone can benefit from them in loud spaces.

Accessibility guidelines can often be seen as restriction for designers and developers, because the requirements are strict and limit options they can use (Regan, 2004). For example, the contrast requirements limit what kind of color combinations can be used. According to Regan (2004), most issues come from typography, navigation, and layout. For example, several experimental site navigation menus, which win web design awards can make finding content on the website much harder for all users, not just those with disabilities. If accessibility guidelines were followed, several of those navigation structures would need to be simplified. This shows how designing for marginal groups can bring opportunities for all users (Leitner & al., 2016).

Rajšp & al., (2019) note that the size and complexity of the organization, as well as their web applications, influence organizations' motivations to implement accessible design. For

large, complicated organizations, the motivation to implement accessible design can come from social responsibility goals or increasing the customer base or improving image and customer loyalty (Aizpurua & al., 2016; Bailey & Gkatzidou, 2017; Leitner & al., 2016). Accessibility improvements can be a way to avoid negative reputation and to gain positive attention. Instead, smaller businesses often do not have social responsibility strategies that would influence their motivations. However, it can be easier for them to build accessibility into their services from the beginning, especially if web presence is important for the core business. Small companies are also motivated to increase quality of the digital services and the breadth of their potential customer base (Rajšp & al., 2019).

## **2.4 Implementation Barriers**

Despite all the benefits listed above, there are some common barriers to the effective implementation of accessibility.

Adapting accessibility for web applications can also have high initial costs (Leitner & al., 2016). The costs are especially high when accessibility is not considered from the beginning. This, together with the difficulty of measuring the business and UX impact of accessibility improvements, has given accessibility a reputation of being unaffordable. However, as mentioned before, starting to implement accessibility after the fact can cause 10 times higher costs. (Zimmermann & Vanderheiden, 2008).

If the product does not meet accessibility standards and is tested with users only before launch, the product might end up getting launched with defects or delayed (Bailey & Gkatzidou, 2017). Delayed launches cost a lot in resources and lost time, and launching with defects can, in the worst case, prevent many users from using the service at all. When included from the beginning, the results are more integrated into the general design, the user experience is better for all users, and the costs are a lot lower (Zimmermann & Vanderheiden 2008).

A key factor in implementing accessibility is the culture of the organization. It is influenced heavily by management decision-making and the values that the employees have. If there are not enough resources for accessibility implementation or the employees are resistant to

change, implementing accessibility is a lot harder (Bailey & Gkatzidou, 2017; Leitner & al., 2016).

There is a commonly held misconception that accessibility improvements benefit only a small percentage of users (Kulkarni, 2019). According to Crabb & al., (2019), reaching a proficient level of accessibility requires that the attitudes towards accessibility improve as well.

The culture also affects personal motivations towards accessibility. Low motivation can be an issue, as in website development, the employees often learn key job skills on their own. If they are not personally interested in the subject and do not see accessibility as useful or essential in their career, they often do not learn more about it. According to a study by Conn & al. (2020), where they interviewed 16 final-year computing students, most of them were not interested in improving their skills in accessibility. They did not see how it would be an essential skill in the future working life.

Overall, formal education seems to be lacking when it comes to accessibility, according to a survey by Patel & al. (2020). The degree of this issue might vary in different schools, but in general formal education does not seem to equip the students for facing accessibility issues. Patel & al. (2020) also argue that accessibility should not only be a part of technology professionals' education, but for everyone. As the lack of resources is one of the main barriers for implementation, management support is needed for getting enough resources.

Some researchers suggest that understanding the reasons behind the requirements helps to create motivation to implement accessibility. Empathizing with accessibility issues can be difficult without tangible experience on how people with disabilities use technology (Crabb, Heron... 2019). To create a more tangible, clear view of accessibility, Youngblood (2013) recommends introducing them to real people with disabilities and helping everybody understand the struggles involved.

Meeting differently abled people might not always be feasible, so some researchers like Zimmermann & Vanderheiden (2008) suggest using use cases and personas to create tangibility and better connect abstract issues to realistic scenarios. Loitsch & al. (2016) also



researched using personas in a higher education course about accessibility. They created many personas with text and/or video descriptions to represent different disabilities. This was successful as the course participants self-reported feeling more connected to the issue thanks to the personas. More about personas in chapter 3.2.

All these factors relate to the organizations' accessibility maturity. An organization's level of accessibility could be measured with a maturity model as developed by Bailey & Gkatzidou (2017). If the organization has only a low understanding and adoption of accessibility in its processes, the level is low. On the lowest level, accessibility is seen as a legislative burden and the attitudes towards it are negative. As the level of awareness, interest amongst management and inclusion in processes grows, the level of accessibility maturity gets higher. On the highest levels, accessibility is a part of the organizations' strategy and business goals. Accessibility is given resources and for example corporate social programs can emerge.

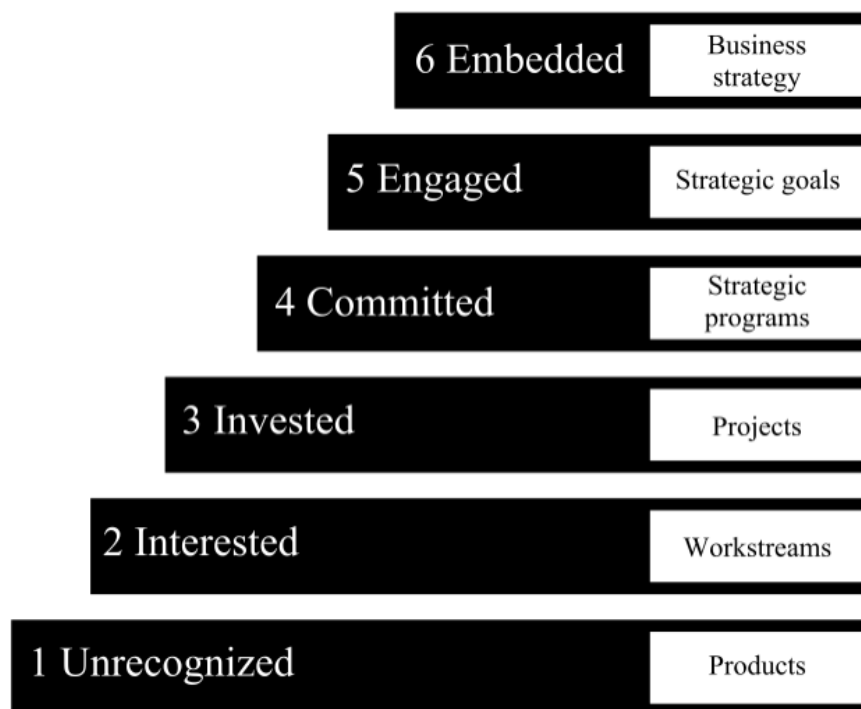


Figure 2: Accessibility maturity model (Bailey & Gkatzidou, 2017)

## 2.5 Accessibility Testing

According to some researchers and practitioners (Leitner & al., 2016; Matausch & al., 2014), accessibility implementation should be done by conducting continuous testing. For example, if a web application's codebase is not tested regularly, there might be errors that are not detected for a long time. The same thing applies to accessibility issues. This is especially true when the web application is subject to frequent changes, and when multiple people are contributing to the content (Leitner & al., 2016; Matausch & al., 2014). In the case of frequent changes, the accessibility checks might need to be automated or held on a daily or weekly basis. This requires dedicated resource allocation for testers and automated evaluation tools (Leitner & al., 2016).

There is a growing number of tools that help developers and designers to follow accessibility guidelines. Guidelines like WCAG can lead to a common set of targets to reach, with developers and designers being given an extensive list of requirements that their work must satisfy. Automated tools like SiteImprove can reduce repetitive checking and make it easier to see what has changed (Zimmermann & Vanderheiden, 2008). SiteImprove is a browser extension that can analyze the accessibility of a web page based on WCAG standards automatically (Stray & al. 2019). However, there is not yet any automated tool advanced enough to catch all accessibility issues, and some manual checking is still needed to make sure accessibility guidelines are met (Stray & al. 2019; Zimmermann & Vanderheiden, 2008). In certain edge cases, the guidelines can be subjective and require a conscious choice to be made. In these situations, a professional is better suited to make the choice than any automated tool.

Another testing tool category is disability simulating tools (Stray & al. 2019). For example, designers can use color filters while working to see how designs look to the color-blind (Youngblood, 2013) or use a dyslexia simulator to see how a dyslexic person would experience a website (Stray & al. 2019). These kinds of tools are mostly easy and fast to include in all parts of the development process (Stray & al. 2019).

However, some types of testing need deep knowledge about accessibility issues and disabilities, and so are more difficult and costly to implement. Bai & al. (2017) mention a

persona walkthrough method, where an expert goes through the service while thinking of the issues a person with some disability would have. For example, a tester could walk through a service while flagging issues that a color-blind or sight-impaired person might face. In this method, the tester needs to have deep knowledge about the disabilities considered to be effective. Another testing tool that requires a lot of knowledge and practice is the screen reader. Using a screen reader correctly requires extensive training, and it might take years to become proficient with it (Stray & al. 2019).

All of this testing means that the costs can get high. According to Bai & al. (2017), accessibility testing is often not considered because of the costs and not knowing how to prioritize different tools. They created a model that helps to prioritize different accessibility tools based on their effectiveness and cost. For example, one category is cheap and easy automated and disability-simulating tools, which are beneficial to use in the early stages of the development process. More time- and cost-intensive methods such as persona testing, detailed WCAG requirement audits and screen readers can be used later to catch issues that are not found with automated tools.

Even if a product can meet all the current accessibility standards, it can be difficult to use for people with disabilities (Lujan-Mora & al. 2012). It is especially difficult to design services for people with cognitive disabilities, as they are hard to simulate (Kulkarni, 2019). Services should be tested with real users to catch as many issues as possible. The tools mentioned above are not perfect substitutes for real user tests. As previously mentioned, Bailey & Gkatzidou (2017) point out that accessibility issues can be technical, operational, or psychological. Guidelines help to assess the technical accessibility but testing with actual users with disabilities is also needed. Operational accessibility, or how well the user can interact with the service, can only be observed when testing with real users. Psychological accessibility, which measures a user's desires, can be measured with questionnaires and interviews.

In practice, the best option is to combine qualitative and quantitative accessibility evaluation methods (Lujan-Mora & al. 2012). Many researchers argue for testing frequently with cheaper methods instead of relying solely on intensive, costly testing at the end of the project (Bai & al. 2017; Stray, 2019).

## **3 Modern Digital Service Development**

This chapter will give some background to modern digital service development processes. Agile development methods, User-Centric-Design are presented, and how they are used together. This chapter focuses on presenting agile instead of for example waterfall models because of its prevalence.

### **3.1 Agile Methods and User-Centric Design**

In modern software development, agile methods are more common than more traditional waterfall methodology. ‘Waterfall’ refers to a process where each phase of development is finished before the next one, so that all the planned requirements are met and well documented (McCormick, 2012). Unlike plan-driven methodologies like Waterfall, agile methods rely on continuous iteration and quick responses to frequently changing user requirements and business needs (Jones & Thoma, 2019). A quality result is ensured without compromising timely releases, despite changing requests (Garcia & al. 2019).

Scrum is an agile framework that is based on frequent and open communication (Paasivaara & al. 2009; Schwaber & al. 2019). In Scrum, a product owner works with team members to divide the work into pieces that are put into a Product Backlog. They are then implemented incrementally during Sprints, which are usually about 2 weeks long. At the end of a sprint, the team reflects on the previous sprint and decides what is included in the next one.

In modern agile teams, development is paired with User-Centric Design (later USD) (Abdelouhab & al. 2014; Jones & Thoma, 2019; Chamberlain & al. 2006). UCD refers to the methods and philosophy of placing the user in the center of the design process. The goal is to make human-computer interaction “effective, efficient and satisfying for the user” (Garcia & al. 2017).

In short, designers that practice UCD use tools like interviews and questionnaires to get to know the users. Based on these they create wireframes, prototypes, and other artifacts that can be used to communicate with project managers, developers, and other stakeholders. (Garcia & al. 2017).

User testing is a common method to find out how actual users would use the product (Da Silva & al. 2015). The design is evaluated by watching intended users using the product and conducting specific tasks that the evaluator presents. The product does not have to be finished to be tested, as it can also be a prototype. However, as Da Silva & al. (2015) have observed, this is not usually well incorporated into Agile. In practice, user testing is exceedingly difficult to perform in Agile processes because of tight deadlines.

Agile Methods and UCD have several similarities. Both use an iterative development process and emphasize good team collaboration (Chamberlain & al. 2006). Both methods are also flexible and accept constant change in the environment (Abdelouhab & al. 2014). The user needs and participation are also central throughout the processes (Abdelouhab & al. 2014; Chamberlain & al. 2006).

However, combining user-centric design and agile is not always straightforward. The whole approach to the process is different. The UCD process focuses on the holistic view of the product from the point of view of the user, while agile and lean methods focus on organizing required tasks to reach the delivery goals (Abdelouhab & al. 2014; Jones & Thoma, 2019). Methods such as Lean UX aim to integrate these approaches, but the issue still exists. (Jones & Thoma, 2019) Agile methods prefer minimal documentation, while UCD prefers communicating with artifacts. Besides, UCD prioritizes understanding users before starting to build a product, whereas agile methods prefer starting coding as soon as possible and iterating later (Chamberlain & al. 2006). Sometimes the role of USD is even ignored in development processes (Lujan-Mora & al. 2012).

Chamberlain & al. (2006) created five principles that are important in integrating UCD and Agile development processes. First, the user should be involved in the process in all stages. Second, collaboration and culture should be at the core of the team, and the communication needs to be extremely close. Third, designers need to do prototyping to make a feedback loop with users and developers work well. Fourth, the designers need to be given enough time to do their process properly before the coding even starts to discover the user needs well. Finally, the project manager needs to work in a way that is not too bureaucratic or strict.

### **3.2 Communication and Collaboration in Agile Teams**

In any organization, effective knowledge sharing is the key to competitive advantage (Melnik, 2004). Traditionally, coding has been focusing on documentation in all parts of the software development lifecycle. However, writing documentation is time-consuming, and the information quickly becomes outdated. Making clear and unambiguous documentation is difficult. Agile methods instead focus on face-to-face interactions and reduce the need for detailed documentation. The focus moves to cross-functional teams and “high-velocity knowledge sharing”. (Hummel & al. 2013; Melnik, 2004)

Agile practices have been shown to have a positive effect on communication within teams (Pikkarainen & al. 2008). In a multi-case study, Pikkarainen & al. (2008) found that methods which are common in agile software development teams such as daily meetings and sprint planning are effective ways to communicate features and project tasks. They also receive help from external communication with other stakeholders outside of the team. Another multi-case study by Paasivaara & al. (2009) noted that the scrum methods also work in globally distributed teams if there is access to multiple communication tools and team members are trained in Scrum practices.

According to Maudet & al. (2017), design breakdowns are gaps that cause issues in designer-developer collaboration. They did 16 interviews with designers and developers and concluded that the key design breakdowns happen when the designer omits critical details, ignores edge cases, or is not aware of the technical constraints. They found that especially in the case of interactions, designers have difficulties communicating the wanted behavior to the developers. In some cases, designers avoided interaction and let developers do what they wanted.

A solution that is suggested by the literature is having close collaboration between developers and designers. A study by Jones & Thoma (2019) found that closer collaboration is the key factor for good efficiency in agile teams. Teams are traditionally given agile training or mentoring to improve teamwork but having frequent and efficient communication is more effective. Pairing designers and developers together is one way to achieve this, as it encourages closer and more frequent communication, and reduces the need for heavy

documentation. Issues are also reduced when the developers were included in the design process from an early stage (Maudet & al., 2017). Early and frequent communication reduces problems later in the process.

One solution to help communication between team members is the creation of Design Systems and component libraries. Design systems are less researched in academic literature but are used in practice. According to Maudet & al. (2017), refactoring, or reusing similar elements and interaction patterns improves user interface consistency. This means that creating new modules is a lot easier if there is a library of existing patterns that can be used again.

Personas are another tool used to communicate user needs. They are archetypes of users that are given names, faces, needs, goals, and tasks they need to accomplish. They are meant to be used as a shorthand gathering point for collected insights from real users, instead of having to include actual users in all parts of the process (Blomquist, 2002). When using a persona, a system is looked at through the eyes of the potential users and designed for their needs (Zimmermann & al. 2008). Personas can be used to reflect the requirements of groups of people that otherwise might get overlooked. They are a good tool for building empathy with the end users.

Ideally, personas are created from data collected in user studies and tests. However, as Chang & al. (2008) found out, in practice, they are often also a product of the designer's biases, ideas and views. They found that even when personas are not officially used, designers might have a type of persona or a result of their own experience in their mind while designing.

Zimmermann & Vanderheiden (2008) present one study about how to utilize use cases and personas in accessibility contexts. They suggest using use cases and personas to empathize with people with disabilities. For example, personas can be created with different disabilities that remind the agile team about the requirements of the user group. In the Zimmermann & Vanderheiden's (2008) model, the personas are also linked to accessibility guidelines.

## 4 Implementing Accessibility in Modern Digital Services

As mentioned before, taking accessibility into account from the beginning of the digital service development process reduces costs and time-consuming fixes at the end of the development process (Zimmermann & Vanderheiden, 2008; Stray & al. 2019). In this regard, some researchers like Lujan-Mora & al. (2012) argue that agile methods are more suited to implementing accessibility than more plan-based methods. In the waterfall model, the accessibility issues might be discovered at the end of the process by default, especially if accessibility testing is not included in planning.

An issue with software development is that the schedules are often tight with little margin for delays and errors. According to Patel & al. (2020) one of the key issues in accessibility is that it is difficult to integrate in processes. Software development cycles are often tight and there is not enough time devoted to addressing accessibility issues.

Agile methods also encourage regular testing (Chamberlain & al. 2006), which is an important aspect of implementing accessibility improvements as well. (Leitner & al., 2016; Matausch & al., 2014; Stray & al. 2019; Zimmermann & Vanderheiden, 2008). However, even in agile processes, testing is often time-consuming and costs resources, which must be budgeted for so that it can fit into the fast iteration cycle.

As mentioned before, user testing can also be hard to fit to agile processes (Garcia & al. 2017). Including user testing for accessibility might be difficult if there are not existing processes for user testing in the organization. However, user testing is especially important to find about the operational accessibility of a service (Bailey & Gkatzidou, 2017).

A straightforward way to include accessibility into day-to-day work that Stray & al. (2019) saw in their case study, is using tools to simulate accessibility issues. Disability simulation tools such as automatic checkers, simulation glasses, or dyslexia simulators can be combined well with the agile process. These tools are a faster and more efficient way to include accessibility considerations to all parts of the process than accessibility testing. Stray & al. (2019) argue that most tools are easy to use and do not need extensive training to learn.



Overall, including accessibility in development processes means a lot of extra work for the team members. Developers are often frustrated with WCAG and how tedious and time-consuming it is (Stray & al. 2019). The best way to make accessibility more implemented is to make it easier for developers and designers to do so. As Crabb & al. (2019) note, accessible components are more likely to be implemented if the developers perceive them to be easy to accomplish.

One way to make the implementation easier is to build accessible components in reusable component libraries that are used from the beginning. Especially on websites that use templates heavily (for example, newspapers), the templates must be built to be accessible, so that all the inheriting child pages are accessible (Vigo & al., 2007).

It is also beneficial to treat accessibility requirements the same as other requirements of functionality and performance. This way accessibility is not given a special status that is debated on, but it becomes a part of ordinary jobs (Zimmermann & Vanderheiden, 2008). One of the main reasons accessibility implementation often fails is that it is not included properly as part of the process (Tigwell & al., 2018). As Leitner & al. (2016) note, when organizations start to implement accessibility, it is usually done by initiators who do not have a strategic plan. This means the decisions are done on an “ad hoc” basis with trial-and-error, which often leads to not including it properly in the processes.

Organizations have had to adapt to the challenges that accessibility poses by creating new job tasks and accessibility expert positions. Many organizations have created new jobs for implementing accessibility. (Leitner & al., 2016). The availability of the skills in-house is one of the success factors of accessibility implementation (Bailey & Gkatzidou, 2017; Leitner & al., 2016). Co-ordinating accessibility efforts is a big challenge for medium to large web applications, and continuous testing requirements add to the challenge. The WCAG guidelines have changed how some jobs should be done, and developers and designers need to adapt their processes to match.

New job titles do not fix the core issues. Martin & al. (2011) argue that the biggest issue with accessibility implementation is the knowledge gap between developers and accessibility specialists. Developers are not experts in accessibility by default, and

accessibility experts can often have little to no experience with actual software development. As Stray & al. (2019) note: “accessibility needs to be a team effort”. They argue that everyone needs to be involved in the accessibility implementation process, and it should not be left for accessibility experts. This fits with the agile ideals of self-organization and communication within a team.

## **5. Methods**

As this thesis aims to gather new knowledge about real-life business context, and the subject is about social relationships and communication, qualitative methods are more suitable than quantitative ones (Eriksson & al., 2011). By using a qualitative approach, it is possible to create a more holistic view on the issue without having a clear hypothesis beforehand. The research will be exploratory and designed to accurately represent real teams' issues with accessibility implementation and the solutions they like.

### **5.1 Data Collection**

For this thesis, the interview targets were designers and developers with real experience working with accessibility implementation, as well as accessibility experts. This allowed to find out more about how accessibility implementation works in real-life situations and processes. The conclusions will be wider and more generalized compared to the results of focusing on one case study. This will help to give a look at the situation in Helsinki at this moment in time. Opinions from multiple accessibility experts were gathered to see if the field is fragmented.

As the interviews needed people with knowledge about accessibility implementation in practice, finding interviewees with the right kind of experience was important. Due to the limited time of the research, and to give sufficient time to go deep enough into the analysis process, 13 interviews were conducted. This number of interviews is aligned with the suggestions made by Baker & Edwards (2012) for a project that takes one semester like this one.

To clarify which problems are important and relevant to the interviewees and to explore these more, semi-structured interviews were used. Semi-structured interviews help to build an intimate understanding of the interviewees (Hermanowicz, 2002) and allow the interviewer to flexibly delve deeper into the interviewee's responses. They are a good method for studying people's perceptions and opinions (Kallio & al. 2016). The interviews can be used to go deeper into the subjects that arise from the interviews themselves, instead

of sticking with a certain goal or hypothesis. (Barriball, 1994). The semi-structured method allows asking follow-up questions and getting into more details than a structured method does (Hermanowicz, 2002; Kallio & al. 2016). As the projects and experiences of the interviewees vary a lot, this also helps me to get more in-depth with the specifics of the interviewee's work experiences.

A semi-structured interview requires earlier knowledge on the subject, as the questions are created based on the research topic area. The research is used to create an interview guide that covers the main topics of the study but is not followed strictly. (Kallio & al. 2016). Before the interviews, a literature review was conducted to get more understanding of the topic, and to be able to ask meaningful questions from the interviewees.

## **5.2 Interviews**

All the interviewees had experience working in projects where they created digital services for organizations that are affected by the Finnish accessibility law. Five of the interviewees work as accessibility experts full-time, while others work as designers or developers with varying levels of experience in accessibility. The projects that the interviewees had experience in varied from placing remarkably high strategic importance on accessibility to doing the minimum requirements for the law. Most of the interviewees (besides interviewees 2 and 4) worked as consultants. This is partly because it was easier to contact consultancies, but also because most digital services especially in public organizations hire consultants instead of hiring in-house employees.

Some of the experts had years of experience in accessibility from before the accessibility directive was even known, but most of the interviewees had started including accessibility in their work only after the law was in effect.

Most interviews were conducted in Finnish. Only interviews 1, 4, and 11 were conducted in English. The quotes from the Finnish interviews in this thesis were translated by the author.

Below there is a table summarizing the interviews. The interviewee experience level has been categorized. Beginners have less than a year of experience with accessibility, and they

might be actively learning ways to include accessibility in the workflow. Medium experience level means two or more years' experience with accessibility, and they are used to including accessibility in their work while not being accessibility experts. Expert level is reserved for those who work almost exclusively on accessibility audits and implementation.

Interview	Experience level	Profession	Consultant or in-house
1	Medium	Designer	Consultant
2	Beginner	Designer	In-house
3	Medium/Expert	Designer	Consultant
4	Beginner	Developer	In-house
5	Expert	Accessibility Expert	Consultant
6	Expert	Accessibility Expert	Consultant
7	Expert	Accessibility Expert	Consultant
8	Beginner	Designer/Developer	Consultant
9	Expert	Accessibility Expert	Consultant
10	Medium	Developer	Consultant
11	Medium	Designer	Consultant
12	Expert	Accessibility Expert	Consultant
13	Medium/Expert	Designer	Consultant

*Table 1: Details about the interviewees and their background and accessibility experience.*

### 5.3 Data Analysis Methods

As different development teams have their ways of working, the data from interviews can be fragmented. This leads to using an inductive approach in content analysis. In the inductive approach, the data is approached from specific statements that are combined to form larger, general statements. (Elo & Kyngäs, 2008). There are no earlier studies dealing with the phenomenon, so the content analysis is more inductive instead of fully deductive (Elo & Kyngäs, 2008).

As there is not an existing theory and only a little literature about accessibility implementation in agile teams, the grounded theory method will be used to find the theory from the data itself. In this method, the theory “emerges” from data that is collected (Eriksson & Kovalainen, 2011). In this research, the data is collected by conducting semi-structured interviews which are then transcribed for the coding process.

The coding process is an essential element of the grounded theory- and content analysis method. Saldaña (2013) defines a code as “a researcher-generated construct that symbolizes and thus attributes interpreted meaning to each datum for later purposes of pattern detection, categorization, theory building, and other analytic processes.” (p.4).

First, the idea is to do open coding to start classifying and analyzing the data. This means finding keywords, phrases, or sentences to describe what is taking place in the data. (Eriksson & Kovalainen, 2011).

The second step is called axial coding, and its purpose is to find connections and incidences that relate to each other (Eriksson & Kovalainen, 2011). The goal is to find categories, which are higher-order concepts. Comparing interviews leads to finding latent patterns that help in the final part of the process. Creating categories helps to describe the phenomenon and create knowledge (Elo & Kyngäs, 2008). The categories and which concepts are included in them are based on researcher interpretation (Elo & Kyngäs, 2008).

The third part of the coding process is selective coding. It is the step where the findings from previous steps are used to form a larger theoretical scheme (Eriksson & Kovalainen, 2011).

In content analysis, the step of generating general descriptions from the categories is called abstraction. The result is possible to be a conceptual system, model, map, or categories. (Elo & Kyngäs, 2008).

#### **5.4 Validity and Credibility**

Qualitative research has been critiqued for being simplistic and not being statistical enough (Morgan, 1993: in Elo & Kyngäs, 2008). This thesis can be seen as an exploratory study into accessibility implementation, but with 13 interviews, the findings are not statistically significant.

As most of the interviewees work as consultants, there is a kind of bias in this study. Consultancies have incentives to make their work seem more important to get more clients. However, as mentioned before, the industry, especially in the public sector generally uses a lot of consultants and outsourcing. In addition, consultants might have more specialist expertise than in-house employees, as their employees often specialize in specific topics like accessibility. They also tend to have experience in multiple projects and industries instead of just one, as many in-house employees do.

It is against the GDPR (General Data Protection Regulation) and also ethically questionable (Gibbs, 2007) to collect data that is not needed for the study. As such, the data collected for the research is handled with care. The identity of the interviewees is hidden, and the data is anonymized. All interviewees have consented to the data collection as per GDPR. As Elo & Kyngäs (2008) suggest, the thesis and the quotes are presented in a way that the informants are not identified.

## 6 Empirical findings

Based on the data acquired from the interviews using the grounded theory -method (Eriksson & Kovalainen, 2011), the following themes were found. The themes are further divided into categories that can be found in the table below.

Themes	Categories	Sub-categories
Current environment in Finland		
Strategy	Process	Including from beginning
		Continuous process
	Motivators	Law
		Financial
		Bottom-up
	Prioritization	Cost vs. benefit
		Detached issues
	Responsibility	Clear division of responsibilities
		Depends on the size of the organization
	Supporting implementation	Training
		Hiring
		Outsourcing
Personal motivation	Learning	Accessibility training
		Self-learning
		Learning while doing
	Professional pride	Quality factor
	Personal experience	Ideology
		Friends, family, self
	Creating "Aha"-moment	Trying tools
Seeing user testing		
Implementation in practice	Communication	WCAG
		Role of knowledge
	Accessibility experts	Varying roles
		Continuous help



	Auditing	Teaching	
		Auditing process	
		Communicating results	
	User testing	Optimal timing	
		Usability	
		Creating tangibility	
	Technical challenges	Part of the process	
		Custom code	
	Tools	Personas	Accessibility tools
			Issues
Design system		Used as examples	
		Basic accessibility requirements	
Automated testing tools		Documentation	
		Cost	
Future		Manual work	

Table 2: Themes, categories and sub-categories found from the interview data.

## 6.1 Current environment in Finland

The interviews reflect the current environment where the law has just recently come into effect. A couple of the interviewees had worked with accessibility already before the law, but most had only started after the law increased awareness about it.

*“So, it was 10 years, just like probably from 2005 onwards, that it was the interest of a very small circle, it was kind of like a really enlightened customer or an actor who wanted to invest in that accessibility at all.”*

*(#5, Accessibility expert)*

According to the interviewees, most of the accessibility related projects in consultancies at the moment are related to bringing existing public organization services in line with WCAG

2.1, as the law requires. The accessibility experts said that there is a lot of demand for this now, as most organizations started to implement accessibility improvements only after the law came into effect.

Different organizations that the interviewees had experience with varied in how they approached accessibility. In some, accessibility implementation was not given resources or support. In one case, developers were expected to learn how to implement WCAG guidelines in a short notice without access to training or help from experts.

Some interviewees mentioned that the EU law and Finnish law are sometimes contradictory, and it can be difficult to navigate the regulations.

Most of the projects that the interviewees worked on were done with agile methods. However, at least one interviewee worked in an organization that used waterfall. In waterfall, the process is different, but accessibility considerations and motivations are mostly the same.

## **6.2 Accessibility Strategy**

In the interviews, there were examples of many levels of accessibility maturity in organizations, but most were hoping for a more strategic approach. There is not a clear definition for accessibility strategy, but this chapter discusses how the interviewees viewed that the processes, responsibilities, prioritization, and implementation are supported and managed.

### *6.2.1 Implementing process*

As the changes in the laws requiring accessibility improvements have recently come into effect, the focus in most organizations has been fixing existing products. Interviewees that worked in accessibility consulting noted that their work has recently focused on getting existing public digital services to follow the guidelines. The interviewees mentioned that as a part of the law, the digital services need to have an accessibility statement, which requires that an auditor goes through the services and notes down all the issues.

*“Especially when that law was new, the deadlines were still ahead, so then everyone might have first had auditing in mind” (#7, Accessibility expert)*

However, all interviews stressed the importance of **taking accessibility into the processes from the beginning**. According to the experiences of the interviewees, fixing an existing service causes delays, costs, and issues late in the process. It was frequently stressed how much easier the process is when at least the most important accessibility factors are included as early as possible in the planning.

*“In a sense, if someone would design a school where there are no ramps and then they would be added when the first wheelchair person cannot get in then it would be a sh\*t model” (#10, Developer)*

Most interviewees’ projects focused on retrofitting existing services to follow WCAG guidelines as well as possible, and one interviewee described how they were approaching the development in an agile way. In this, they would launch the service with a limited level of accessibility and improve it cyclically.

*“It was not like uh we wouldn't launch until everything was totally accessible, we launched with a certain level of Accessibility and then we just improved it improved it improved it” (#11, Designer)*

According to accessibility experts, a more strategic approach to accessibility is growing in popularity. As the organizations learn about accessibility and what is required, they can plan their implementation better and create processes to ensure accessibility is not left to the end of the development.

*“It is probably gradually becoming more common to look a little more at the full picture, and we actually recommend thinking about that whole before starting to do anything, so about how to approach it in the first place” (#7, Accessibility expert)*

As almost all of the interviewees noted, accessibility auditing is not a one-off thing, but it needs to be **a continuous part of the process**. This ensures that the possible issues are taken care of as soon as possible, when it is still relatively easy to do so, and not only in the end.

*“It is not like any one-time thing but an ongoing process and the most challenging part of it is that it is not enough that ‘oh, so now our site is inspected and evaluated, and is a bit repaired, and here is this accessibility statement’, because as soon as you make any changes, then the situation is no longer the same.” (#5, Accessibility expert)*

According to the interviews, accessibility should not just be considered only in one part of the product design and development process, but all of them. This means having accessibility accounted for from planning and design to final implementation. This is because accessibility does not only concern one part of the process, but all stakeholders should be included.

*“That is, it is generally recommended that the organizations have some sort of accessibility strategy in place, or that it is somehow taken into account in the model of how the services are produced, so it is not just that kind of reactive repair afterward because it is quite expensive after all.” (#7, Accessibility expert)*

Most interviews already saw that in the future, as the awareness and understanding increase, accessibility processes will be quite different. As the interviewees that were working on new projects or improving digital services described, most new services were already being built with accessibility in mind.

*“The best situation is always when you start from a clean slate to design and implement a new service, and then accessibility can be taken into account from the very beginning. Like from procurement to the concept design, planning, implementation, and content production, then you can actually get to it as easily as you do not have to make such massive repairs to the existing service.” (#6, Accessibility expert)*

### 6.2.2 Motivators

The **accessibility law** was clearly the most common motivator for accessibility implementation in most projects that the interviewees mentioned. When asked about the difficulty selling accessibility inside organizations, many consultants mentioned that the law has made it very simple. In fact, the accessibility experts expressed that they had a lot of work as so many organizations suddenly needed help with their digital services as the law just came into effect.

*“Well, right now, it is not hard [to sell accessibility]. The directive took care of that. - - When it comes to the law, it must be complied with, or a punishment follows. It is pretty simple.” (#5, Accessibility expert)*

However, the in-house employees and some consultants described a different reality. In some organizations, accessibility is not prioritized and there is not enough support from the management despite the law. One interviewee described how they did not get any external experts to check their work for accessibility, but all the responsibility was put on the developers and their motivation.

*“Of course, we say it is good, but yeah, but we do not have any, uh, external party to come to check it for us. Yeah, we just have it there by the deadline.” (#4, Developer)*

This is partly because, according to the interviewees, there is no precedent about what happens if a service does not follow the law. Still, the law has enabled many projects to use more budget and resources to implement accessibility, especially compared to the situation before the law became into effect.

One interviewee was also concerned that consultants might have in their self-interest the urge to inflate the importance of accessibility because this brings them more customers. This could affect how the consultants prioritize accessibility more than it would be necessary for some projects.

*“Well, in the consultant world, there is a bit of hype about it [digital accessibility], but I think the hype has a bit two-facedness that there is some of getting customers to pump a little more money because it is accessibility. It brings in more working hours.” (#8, Designer/developer)*

Even though the law is the biggest motivator, some consultants had worked also on projects that included accessibility for organizations that are not affected by the law. They described that there is a growing understanding of accessibility and awareness of its **benefits**. Still, only a few of the interviewees had experience working with private organizations that implemented accessibility on a large scale.

*“Yes, there are some organizations that are so enlightened that they want their websites and services to be accessible, but most of them are definitely those who are under the law.” (#5, Accessibility expert)*

Interestingly it seems that on many occasions the push for accessibility did not come from the management or business needs. On the contrary, most of the interviewees mentioned that the approach to accessibility is more often **bottom-up** as employees trying to implement accessibility try to convince the managers and decision-makers of the importance of accessibility. Some of the consultants that were interviewed that conduct trainings about accessibility also mentioned that the management often needs more.

*“It is said from above that we’ll do it like this now, not so much, that overall, you have to justify more to management and others why accessibility is important” (#7, Accessibility expert)*

### 6.2.3 Prioritization

In the interviews, there were two views on prioritization. Accessibility consultants noted how the law has created a clearer definition of accessibility: the digital services need to follow WCAG guidelines to be compliant. However, as will be presented more in detail in 4.4, the guidelines do not guarantee good usability.

What stood out in the interviews was that there was not a lot of considerations about the **cost versus benefits** of accessibility. The focus is so strongly on the law that there has not been a lot of discussion about prioritizing certain aspects of accessibility. For example, a digital service could choose to offer its core flow in a very accessible way but spend fewer resources on less essential functions. Accessibility implementation is still focused on the guidelines and following the law, so most of the interviewees had not had a chance to make decisions on the limits. One developer consultant described that they had difficulties deciding how much they should include accessibility to projects where the client had not requested it. He said that the decision is mostly on the individual developers and depends on how motivated they personally are.

One interviewee who had a wider view of the technical software development process than many of the other interviewees saw accessibility as just one aspect of the development process.

*“Everything is a trade-off. Things can be done like this and that and that way, and all of them are in some way good in some way bad thing. And accessibility then is one moving piece or one, one new dimension that adds to that reflection. Just as security is like one aspect that, if taken into account, then affects everything.” (#10, Developer)*

Currently accessibility is often prioritized as **detached issues** instead of as an aspect of the service. As multiple interviewees noted, it is a common practice to create Scrum tickets for accessibility issues. This means the prioritization is done as a part of the Scrum process, and accessibility is not seen in a full picture, but separate pieces of work. Some interviewees saw this as a threat to accessibility.

*“And somehow, I think it is like that kind of quality factor thinking that it cannot be just some loose tickets, that well, let's do this accessibility as its own thing. Then there is a big threat that it'll be left at the bottom of the barrel to be the last to be done, but that it will always be part of doing it.” (#12, Accessibility expert)*

#### 6.2.4 Responsibility

Planning accessibility strategies requires coordination, representation, and organization. As the interviewees mentioned, there needs to be a **clear division of responsibilities**. If there is not a clear responsibility to keep others accountable, accessibility is easily ignored or forgotten.

To ensure that accessibility is properly taken care of, some interviewees described they have seen some organizations having accessibility responsible, whose only job is to make sure that the digital services are accessible. This is becoming increasingly common especially in public organizations.

*“We also have some customers that have already hired an accessibility responsible in their own organizations, so if there has not been one in the past, one has been hired. I think such a job title will become more common especially in the public sector.” (#5, Accessibility expert)*

In addition, accessibility requirements change, and keeping up with the current and future laws and regulations, as well as industry standards is a lot of work. Communicating to all the different stakeholders and working across organizational silos also takes a lot of time.

*“It would be good if every organization had... There would be someone responsible for accessibility, that is, someone who kind of holds the threads in their hands, who has a good understanding of what the law requires now and what the law requires in the future. What new criteria are coming, and they can then coordinate and organize training for different groups of staff and always provide help and support or organize it there within the organization” (#6, Accessibility expert)*

However, the interviewees also note that the ability to have a dedicated accessibility employee **depends on the size of the organization**. In large organizations, every team might



need their accessibility expert and responsible, while smaller organizations might only afford outside auditors from time to time.

Another point that was raised in multiple interviews was that the responsibility for accessibility should not be put on someone who does not have an interest in the subject. They pointed out that if the responsibility is just given to someone, they might prioritize it poorly if they do not have the knowledge or personal motivation in it. In some organizations without appointed responsibility, some interviewees mentioned that there were individuals that looked into these subjects out of personal interest in the subject. However, if the responsibility is left to the team members themselves without supervision, it might be ignored or prioritized under other work.

*“But I would also say that every project should have a person who really wants to do it. I do not believe in pushing the responsibility to someone like you are now responsible for this and now they do not have any motivation to do the thing, so the kind of personal interest towards the thing” (#8, Designer/developer)*

#### 6.2.5 Supporting implementation

*“When we do not have the resources for it, and we’re not being required to include it in our work then it tends to be a bit forgotten.” (#8, Designer/developer)*

Successful implementation requires that the management of the organization supports the accessibility implementation sufficiently. Many of the interviewees had joined **training sessions** that their employer had organized for them. As some of the interviewees mentioned, that is one way for the organization to make sure that all the employees understand what accessibility is. According to the interviews, one of the biggest issues in implementation is the lack of knowledge and experience, which makes communication and processes more difficult.

Not everyone interviewed had joined accessibility training or had even been offered any by the organization, and self-study seemed to be the main source of learning in these cases.

Most interviewees said that training should be offered by the organization. First, training creates awareness about accessibility and helps to understand the basics. Second, training sessions can give more in-depth information that would otherwise be hard to find and gives participants room to ask specific questions about difficult subjects. It should be noted, however, that consultants have a vested interest in selling training sessions, so further research might be necessary.

*“What we could find by self-studying was maybe the easy cases that can be found on WCAG, but then what came through it [accessibility training] was, for example, some best practices for challenging components” (#2, Designer)*

The training is important for all stakeholders in the company. In many interviews, awareness and knowledge about accessibility seemed to play a key role in how well the accessibility implementation goes in the company. Implementing accessibility involves all stakeholders from content creators to top management and increasing understanding in all groups seemed to be a common theme in how to make the implementation as well as communication easier and better. Accessibility influences many people’s work directly, and for others, they need to understand how to prioritize and support it correctly.

*“At the moment I do many accessibility trainings for different client organizations and also in just open seminars for all kinds of audiences, all the way from top management then to the doers themselves, all content producers and designers and implementers and maintainers.”*  
*(#6, Accessibility expert)*

The people responsible for **outsourcing** decisions need to also be aware of the accessibility needs so they can outsource from a place that can sufficiently take accessibility into account. In the public sector, websites and other digital services are often outsourced from consultancies, agencies, or freelancers. In the interviews, it also came up that sometimes just one part of the process, for example, the design, can be outsourced. Some interviewees that have organized accessibility training sessions highlighted the importance of accessibility also in this process.

*“So, especially if you are in a public administration organization where almost all the work is put out to tender, then there must be a really good knowledge of accessibility and a sufficient understanding that you really know how to acquire achievable services and content.” (#6, Accessibility expert)*

A couple of interviewees also mentioned the role of **hiring decisions** and including interest and willingness to learn about accessibility in the hiring process. One interviewee had joined an organization, where they highlighted the importance of accessibility in the hiring process. This let them find a worker that was willing to push accessibility forward.

*“During the job interviews, there was already talk about that for us, accessibility is important” (#2, Designer)*

One interviewee also mentioned inclusivity in the workplace. Hiring people with different abilities and backgrounds as part of the team helps to create an environment where developing services to a wider range of people is also more natural.

### **6.3 Personal motivation**

In the interviews, the importance of personal motivation was a common theme. Even if the law requires an organization to prioritize accessibility, it is not always well implemented if the team members and managers do not have a personal interest to learn and push for better accessibility.

#### *6.3.1 Learning*

In the interviews, it became clear that learning about accessibility implementation is very time-consuming and hard. As there are over 50 WCAG guidelines, a couple of interviewees mentioned that it is almost a full-time job to be able to learn all of them. To be able to follow the basic guidelines, the employees need to be motivated in the subject, as it is easy to prioritize accessibility below other work.

*“So yes there would be good to be some motivator, because no, it is not easy, especially when you do these assessments, you realize how difficult it is that you really need to know a lot of things” (#5, Accessibility expert)*

As mentioned before, one way to learn about accessibility implementation are **training sessions** organized by the employer. The training sessions seem to be a smaller part of learning, as they are not usually deep dives into specific topics, but more general introductions and answers to audience questions. In most cases, it seems that most of the training focuses on giving the basic understanding and awareness about the subject. A couple of interviews mentioned that there is more detailed training for developers, but none of the interviewees had themselves joined these.

The main source of learning for the interviewees was **self-learning** online through tutorials and websites. Almost everyone that had participated in implementation had at least Googled about accessibility topics, the requirements and what they mean for their own work. There seems to be a lot of resources, websites and tutorials online that cover many WCAG implementation issues the teams might have.

*“Well, yeah, where I learned from is a combination of sources, like the WCAG guidelines, and YouTube videos and the trainings we have in-house. So all of that combined into one a mental checklist of stuff for the basic stuff.” (#1, Designer)*

The role of self-learning means that a lot of the responsibility of learning depends on self-motivation. Being motivated to learn about accessibility seemed to be especially hard for those consultants who did not continuously work with projects that require accessibility.

*“Yeah, if you tell developers that ‘hey now a day every month put the screen down and use just a screen reader’, it requires some discipline, so who does it and it needs to be such a thing that you need to be staying on the map constantly and a basic lazy person like I do not very often remember to do it”. (#10, Developer)*

One interviewee mentioned how it is hard to keep learning about accessibility when there is not a routine for it. If there is no project where you can use the skills, it is hard to find the motivation to learn and keep the skills updated.

*“I do not use the screen reader every day, so accessibility is never even usually in my mind like hey, now I’m going to see how this was here like this and. So it does not build the same kind of routines as other design issues that are so constantly in front of your nose” (#10, Developer)*

Overall, the interviews created a picture that the best way to learn about accessibility implementation is to **participate in projects** and learn by doing. Some interviewees had joined projects with accessibility with little training or knowledge about accessibility beforehand. They learned during the project and found more information either from the internet or by asking from experts or others with more knowledge about accessibility.

*“Actually, in the last project it was that during the project we were researching things and when we started to do some specific component, we thought that what kind of requirements are associated with these components and we read through a lot of WCAG documentation.” (#2, Designer)*

Some interviewees had also achieved a formal certification in accessibility. The certificate was given by an organization called IAAP and required them to complete a test about accessibility. The certification seems to be still not common, but the interest towards these kinds of certifications seems to be growing.

### *6.3.2 Professional pride*

One typical source of personal motivation that came forward in the interviews was that accessibility is seen as a quality factor of work. When creating services, some interviewees expressed that they include accessibility considerations even when they are not specifically required, because they see it as a part of their job. The interviewees expressed feeling proud

when they feel like they have done ‘good work’, and everyone despite their challenges can use the service.

*“Developers would love to make the service accessible because they can be proud of it. Like hi, we made a service that looks good and works well for everyone” (#10, Developer)*

*“Striving to do accessible things, but yes that responsibility is a lot on the team members’ passion so when we set out to create services, we want them to be achievable. Then we can be proud of it” (#2, Designer)*

The idea of having accessibility as one of the quality factors of work did come up in multiple interviews. However, in many interviews with those who are not accessibility experts, it became clear that the level of accessibility depends mostly on the personal interest and knowledge of the developers and designers. This means that for now it depends on the person if they see accessibility as a quality factor or not.

*“But yes, I would see that the direction it is going, it will be more and more like a quality factor so then the whole team and everyone who does the implementation or planning, is more aware and responsible.” (#12, Accessibility expert)*

### 6.3.3 Personal experience

For some, accessibility is an **ideological** matter. When the interviewees were asked to think about the reasons why they have started to work with accessibility, many of them brought forward themes of equality and human rights.

*“Well, if we ignore the law because it is mandatory, motivating or not, then maybe for my part I can say that I have had such a really strong ideological background. Just like the idea of human rights, and I think it is probably for many others too.” (#5, Accessibility expert)*

One clear source of personal motivation was **knowing someone** who would benefit from accessibility standards. When asked about the source of their personal motivation, some interviewees mentioned that they know someone with disabilities or difficulties using digital services. Some interviewees felt that they themselves benefit from accessibility. One interviewee even mentioned that they are thinking of their elderly relatives who would need the digital services to be easier to use.

*“Well, I have friends who are directly affected by accessibility, but there are also, for example, my best friend, a friend who is in a wheelchair”*  
(#9, Accessibility expert)

#### 6.3.4 Creating “Aha”-moment

Even without having a personal connection, there were ways the interviewees felt more connected to people with disabilities. Some interviewees described an “aha”-moment that came when they understood why accessibility is important and why it is done. For some it seems to be enough to become aware of the issue and see some examples of why it is done.

*“What I’ve seen in the trainings is that people tend to get excited about it themselves and think that this is important because that is how things should be done.”* (#7, Accessibility expert)

For some, just examples or abstract lists were not enough to create tangibility about the issue. One way that came up in the interviews that woke interest for some interviewees was **trying accessibility tools**. For example, using a service without a screen and a mouse, just with a screen reader, helped to understand the difficulties some people face every day.

*“After all, it would be great if you did not have to go so far as to really have to meet someone who is blind to understand what their world is like, but often it is like that.”* (#5, Accessibility expert)

A way to create tangibility and motivation towards accessibility is to **see someone with a disability use the services**. Multiple interviewees felt that they would want to conduct more user testing to see how their services work for real users. It would help to remember that

accessibility is not just a checklist, but it affects real users' lives. Some methods that can help create the 'aha' moment are user tests and personas. They are discussed more in detail in chapters 4.4 and 4.5.

*“It was, for me too, very eye-opening, like to see how can a person who is like a four-limb paralyzed person so how can he fill in some form? Not terribly easily.” (#5, Accessibility expert)*

## **6.4 Implementation in practice**

The implementation and processes are different in all organizations, but some points that came up in the interviews to be important for good accessibility implementation are the role of communication, accessibility experts, auditing and user testing.

### *6.4.1 Communication*

According to the interviews, communicating about accessibility is not complicated, especially for the more experienced interviewees. The **WCAG criteria** have made it simple, as it is quite easy to note possible issues by linking to the related criteria. Having structured criteria to link to also helps to find solutions to issues, and for example tutorials for the specific issue.

The interviewees who work hands-on in projects mentioned how communicating about accessibility issues is like any other usability or development-related issues. The interviewees mentioned using Slack or other messaging platforms and face-to-face contacts to discuss with other team members in an agile way. When working in person, a couple of the interviewees said they prefer going up to the other person and asking quick questions at their desk.

*“And if the developer needs further details and what's put in the ticket, then they message me and we go back and forth, or they message whoever else knows in the company about the issues.” (#1, Designer)*



**Lack of knowledge** in team members is what causes the most problems for communicating about accessibility. Most interviewees mentioned that it can be difficult to collaborate with team members and shareholders that do not have the same level of understanding of accessibility requirements or development vocabulary.

*“I do not know if accessibility in itself is a harder thing to communicate. Except that, of course, less is known about it than about some things that have been around for a long time.” (#10, Developer)*

Some interviewees talked about how their companies have different knowledge-sharing methods. Many organizations had a “channel” in a messaging app like Slack, where anyone can ask for help for accessibility-related issues. Some interviewees mentioned regular meetings, where accessibility consultants shared news and tips related to accessibility.

*“Friday info hour trainings - - like raising the level of awareness and in general make people aware that there are these issues, these laws, customers have these demands and this is how we can do them, and here are a few basic tricks that can fix 90% of problems for almost free as long as they are done right at the beginning of the project.” (#10, Developer)*

#### 6.4.2 Accessibility experts

All of the interviewees agree that learning about accessibility is time-consuming and not easy. A couple of the interviewees mentioned how learning everything about accessibility is almost a full-time job, and it does not make sense for everyone to be an accessibility expert. Most interviewees were in favor of having a dedicated accessibility expert available especially for public organization projects.

The role of an accessibility expert **varies in each project**. The interviewees had different experiences from working as or with an accessibility expert, from doing an audit to a single website to working full-time in an organization. Some large organizations might have full-time accessibility experts, or even multiple, while smaller organizations might only afford to get the auditing done.

*“Probably depends a bit on the size of the organization, what does it make sense to be, for example, is there someone responsible in every team? Is there accessibility responsible in the organization? Is there some organization accessibility team that handles certain things or can be asked help from?” (#7, Accessibility expert)*

Having an accessibility expert **available continuously** during the project seemed to be a preferred choice to having only periodical accessibility checks, especially in projects where accessibility is particularly important. According to the interviews, this is easier as questions can be answered while working, when it is the easiest to make changes. When the team members can continuously ask for help instead of figuring out everything by themselves, they can save time and reduce mistakes.

*“It is not like we created everything and then he was the funnel to make sure everything was alright, but it was more like we all worked together”  
(#11, Designer)*

Another benefit that comes with working closely with accessibility experts is that the designers and developers can **learn from the expert** during projects. When asked about working with accessibility experts, many interviewees expressed that going through their work and fixing issues helped them to learn about accessibility.

*“Whenever necessary, an accessibility expert can then support designers and implementers when new services are made and repaired. It is really fruitful that the developer does not have to think by himself how this thing should be done for so long, so you can directly ask someone who knows it well. And then of course learning happens fast.” (#6, Accessibility expert)*

Overall, it seems that accessibility expert as a job title is a growing trend. A couple of the interviewees had worked with accessibility for years, but over half had only started during the past few years.

### 6.4.3 Auditing

Accessibility auditing is a check that is usually done by an outside expert, where the accessibility of a service is compared against WCAG criteria. Auditing is required by law, but most of the designers and developers said they also appreciate if someone outsider comes to check their work for accessibility, especially when it is important to be done well, so they can be sure it is done correctly.

*“Yeah, I think some kind of outsider, an outsider who, in a way, looks at it only from the angle of one subject, that is, does not think about any visuals or anything otherwise, but considers whether it meets the standards.” (#2, Designer)*

In the interviews, **auditing process** was described as follows. In auditing, an accessibility expert goes through a service using checklists and different accessibility tools. The accessibility experts that were interviewed described how they compare the service to WCAG guidelines. They use common accessibility tools but also checklists and tools that are made in their organization specifically for auditing purposes. Compared to for example heuristic evaluation, the process was described to be straight forward as the WCAG criteria usually clear about what is wrong and what is right.

The findings from the auditing are usually combined to an **accessibility audit report**. The report has screenshots of the issues which are linked to WCAG criteria. The interviewees that described the report are from the same company, so the style might be different in other contexts. The report can also include varying levels of help for fixing the issues from linking to tutorials to detailed code examples, depending on the skills of the auditor and how much the client has paid. The issues are also graded on their severity and how much they obstruct using the service.

The report is usually gone through in a meeting with the client. One interviewee described that the meetings are useful in addition to the corrections list that the clients get. An expert can explain the issues more freely in words than only in text or with WCAG criteria. One interviewee that does audits for clients explained how she wants to also portray how the user

might find the issues when they are using it to create a sense of tangibility and to motivate the listeners.

*“Sometimes they are such that you have to try to tell, like describe what it feels like, and when you cannot show it in a video or picture examples, but you just have to explain that ‘hey now as a screen reader user here when I try to scroll up and now suddenly the navigation disappears and I’m really lost so’, so it is so hard to get that feeling from report.” (#9, Accessibility expert)*

One issue with these meetings is that the details that need to be communicated are often detailed and technical. If the audience consists of management or other stakeholders instead of developers, they might not know enough to understand the issues. This can make it difficult to get the message to the right people, which makes the implementation harder to do. It can also affect motivation, as the reasons to make the changes are not necessarily well communicated to the developers.

*“It is sometimes hard to get a message across if they do not even know the basics so if they do not understand HTML code, for example, then it can be really hard to explain certain things that require such accurate code level corrections” (#6, Accessibility expert)*

Often this report is turned into Scrum tickets that are then put into the backlog. Some interviewees felt that this way a lot of the context, images, and feeling is lost in the process. Instead of understanding why something is done, the tickets are separate issues and often do not have a visual element attached. This is especially clear when the developers are not included in the accessibility report meeting.

*“Then if you write \_\_ all the tickets to that Jira, you are missing that visual side. It is just a list of secondary stuff, but you do not necessarily understand the dependencies of their stuff on how they relate to each other.” (#2, Designer)*

As for timing, the interviewees mostly mentioned that the **best time to do accessibility audits** depends on the project. One accessibility expert described a project where they were doing auditing while the project was still in progress. The team in that project liked to get feedback during the process so they could fix possible issues as soon as possible. In any case, those interviewees that were familiar with mature accessibility projects recommended doing multiple audits during the process.

*“[Accessibility audit] let’s say when 2/3 of the project done that the interface is starting to be ready, so that at least roughly that it can actually be used because otherwise, an accessibility expert will not be able to say anything sensible about it” (#10, Developer)*

Still, especially for a project where accessibility is especially important, most recommended also conducting a final audit or even dedicate a whole sprint to ensuring proper accessibility.

#### 6.4.4 User testing

User testing still seems to be rare when used for accessibility. Only one project was specifically mentioned in the interviews that did accessibility user testing regularly. The focus on accessibility seems to be more on following the guidelines and the law instead of making the services usable.

*“What the law requires is they are kind of pretty detailed things and they are pretty technical things and they do not in themselves guarantee that it is really easy and pleasant to use.” (#7, Accessibility expert)*

Even if WCAG guidelines are followed, it does not mean that the **usability** of the service is good. Therefore, many interviewees suggested using user testing to find more about how users use the services.

*“In the end, that [user testing] is really the only possible way to get the real information on how the services are used. Whether they are like this kind of disabled user or any other users” (#5, Accessibility expert)*

User tests are better at finding some issues than testing done by just auditors or the teams themselves. This is because disabled people are used to using accessibility technologies such as screen readers.

As mentioned before, user tests are also a way to **create tangibility** and motivation towards accessibility. Meeting disabled people or seeing a disabled user use a service can create an “aha” -moment and wake empathy. The interviewees also mentioned that seeing their services used by people with disabilities gave them the motivation to continue bettering their work.

*“I'm looking forward to working with those people who really have vision problems or any real challenges. Until now, as I said, it has been more of only trying to do things based on what you've learned or read.”*

*(#2, Designer)*

If a company conducts user tests regularly as a **part of their design process**, a couple of interviewees suggested that including accessibility tests in the process might be quite easy. Even including the elderly or someone with a disability helps to find issues that these groups might face with the service.

As to where in the process user tests should be conducted, some interviewees said they would prefer them to be done continuously whenever some part of the service is done. One interviewee suggested doing them at least if there is a larger project, for example renewing the front page of a website.

The biggest reason that came up in the interviews for not doing user testing seemed to be the lack of available budget. User testing can be costly, and it is not required by the law.

*“But of course, if you're in a limited budget environment, and you do not have the money, or your higher-ups refused to invest in accessibility, WCAG guidelines can help you there.”* (#1, Designer)

#### 6.4.5 Technical challenges

Overall, the interviewees who understood the development side mentioned that following good coding practices and HTML standards is the easiest way to fulfill most of the technical accessibility requirements. Also, accessible sites do better in Google's search engine optimization (SEO).

The biggest challenge that at least half of the interviewees had faced was when something was needed to be done outside of the standards. Making custom components accessible needs a lot of expertise and more time and resources than using standard components. The request for custom elements seemed to often come from either designers or managers that did not have as much understanding of accessibility and coding, or just do not prioritize it as much as more complicated user interfaces. There needs to be a balance between visual "uniqueness" and accessibility.

*"They just wanted to somehow make it cool and then did not really think about breaking the existing conventions that help a lot of users to understand this kind of interface intuitively." (#13, Designer)*

Even if the team is not building fully custom-made components but uses ready-made component libraries, two interviewees noted that they might have accessibility issues. However, especially the ones made by larger organizations, are often still better than fully custom code.

*"Nothing's perfectly accessible. So you should always check for yourself what you are using, and it is quite common that many libraries are pretty good for accessibility, but then have like, for example, the date pickers made very inaccessible" (#1, Designer)*

Another big issue mentioned in most of the interviews was the difficulties in navigating the different accessibility tools. Multiple interviewees that had worked hands-on in projects said one of the biggest issues is that there are many accessibility tools that handle situations differently. For example, there are multiple screen readers that have their own issues, and

they work differently on web pages. This makes it difficult to test and develop for screen readers because the testers would need to try the service with all the different tools.

One solution that was suggested by multiple interviewees was to choose which tools the digital service supports and display them clearly. They compared it to web browser support, which is common on websites. For example, a website can inform its users that it has been tested to work with Google Chrome, but they cannot guarantee that it works well on Internet Explorer.

## 6.5 Tools

Tools that were mentioned in the interviews or asked about based on the literature review were personas, design systems and component libraries, and automated accessibility implementation tools.

### 6.5.1 Personas

In general, the interviewees seemed to have reservations towards using personas in accessibility. From the interviewees, no one had used personas in an accessibility context.

As a couple of interviewees mentioned, personas can **work against accessibility**. Often personas are meant to portray an average user, which means the issues of accessibility are forgotten easier.

*“After all, they are such average users that he is a disabled and Caucasian and middle-class and middle-aged man and then they are designed for, and then the persona may not fit then the whole spectrum of users so maybe if the personas are used, then it is worth remembering that it is not the whole truth” (#7, Accessibility expert)*

In addition, as some interviewees noted, it is impossible to create personas with all the WCAG requirements, as there would need to be so many of them with different abilities that it is not feasible. They mentioned that WCAG guidelines are there to specifically make it



easier by not having to think about all the different disabilities. Most of the needs are met after all when the guidelines are followed.

*“Although this list of requirements of the law is technical and quite detailed, then, on the other hand, it helps that you do not have to think about the personas so much to get the clearest and most critical basics right” (#7, Accessibility expert)*

When asked, the only way some interviewees saw personas to be useful was by using them as **examples** when teaching or discussing accessibility. Examples can create more empathy and make it easier to convey the need for accessibility.

*“Well, certainly it concretizes the thing, which might otherwise be a bit like difficult to conceive. Especially when you first come across accessibility, what it really means in practice for those individuals who are not able to use electronic services in the same way.” (#6, Accessibility expert)*

### 6.5.2 Design system

Design systems or component libraries are not used in all organizations, because they can be quite expensive and time consuming to build and require specific competencies in the planning and implementation teams. However, multiple interviewees suggested them especially for large organizations. They can create savings in the long run, also with accessibility.

*“That it is, of course, a really big, demanding, long process to make it happen, but it will bring significant savings in the future so that you do not have to start designing and implementing the same components again from the very beginning.” (#6, Accessibility expert)*

*“If you think a design system is expensive, you should see how expensive it is not to have one. A lot of problems they solve have ‘invisible costs’,*

*like pointless meetings or sprints that have to be dedicated to rebuilding the wheel.” (#1, Designer)*

All interviewees agreed that having a design system can be beneficial for accessibility. The basic elements of a design system can be audited, and so if the system is then used, a lot of the **basic accessibility requirements** are met from the start.

*“We call it component library, so with which we kind of work to collaborate with the designers to create some reusable components. And then of course, those are actually really nice for us because when we create one component and also, of course, take Accessibility in mind, and then so then we have reusable component that already supports Accessibility” (#4, Developer)*

This however means, as was pointed out in one of the interviews, that the design system needs to have **comprehensive documentation**, so it can be used correctly. Some organizations already have a robust design system with documentation, where current accessibility issues could be easily noted. As one interviewee described, if a design system has a specification for a button, it can include technical details about how it is implemented and design details about where and how it is used. This documentation could also include accessibility information, like how the screen reader would react to the button. This would make it easier to implement because the details do not need to be researched every time the button is used somewhere.

### *6.5.3 Automated testing tools*

Interviewees had varying experiences with automated accessibility tools. Tools such as SiteImprove and Wave were mentioned multiple times. All designers had used plugins or tools to test some aspect of their designs for accessibility. Many also mentioned using just the inspect function in the browser to check details about the code.

Automated testing tools were popular, and the main reason to not use them seemed to be **budget**. An in-house designer mentioned that they would have wanted to use better automatic checkers, but they did not get the budget for it.

Accessibility experts used multiple tools and even specially made software for auditing. However, they mentioned that auditing is still mostly very **manual work**. As they noted, the automated tools are not perfect, and the reports need to be checked by a human.

*“Some things can be found automatically, but a human has to go through the report always to know that what the problem really is.” (#7, Accessibility expert)*

## 6.6 Future

Overall, most of the interviewees had a positive image of the future of accessibility. As the law is now new, there is not as much awareness and available tools, but in the future, as the practices become more commonplace and tools are developed, implementation will be easier. Many mentioned the possibilities of AI (Artificial Intelligence) and machine learning in developing better and automated tools. Especially some testing and checking can be better automated as the technologies develop.

*“Automated tools are evolving so much that manual work like that and testing and auditing by hand will probably be somewhat reduced because such a large part of it will be then already automated” (#8, Designer/developer)*

*“So a bit like the GDPR, it was like that kind of law thing at first and everyone was a little afraid of it and luckily people know now and so simple versions have been made” (#8, Designer/developer)*

Also, as was mentioned in the beginning, the focus has been largely on fixing existing services. For new services, implementing accessibility will be a lot easier, as more often

accessibility can be included from the beginning. The focus moves from fixing details to a strategic approach. In a sense, many expect accessibility to become so common that it will be a quality factor of good services instead of a mandatory add-on. As organizations get used to accessibility, the techniques, methods, and ways to organize get more refined.

Still, multiple interviewees mentioned how accessibility needs to continuously develop as technologies develop. A couple of interviewees mentioned voice UIs and virtual reality as examples: accessibility needs to be considered also when working with for example VR glasses or smart speakers.

Also, one of the interviewees that worked in-house already mentioned that the matter of accessibility was a part of the hiring process. If this becomes one of the qualifications, it will likely affect what potential employees want to learn and practice.

There was also hope for a new generation of designers and developers. A couple of interviewees mentioned they hope the new designers and developers learn about accessibility in schools and are overall more aware of disabilities.

*“Disability Awareness is getting better every day. It is not a perfect world. But people are more conscious that like blind people and people with intellectual disabilities or situational disabilities or temporary disabilities also have the same rights” (#1, Designer)*

## **7 Discussion**

In this chapter, the findings are discussed and compared to existing literature. The chapter will go through what the interviews tell about the motivations to implement accessibility, and what factors influence whether the implementation is successful. Findings from previous studies are also compared to the results from the interviews to see what the similarities and differences are.

### **7.1 Strategic approach to accessibility**

Based on the interviews, most of the organizations in Finland have been on the level where accessibility is largely unrecognized. In the model of Bailey & Gkatzidou (2017), this means accessibility is either not considered or is only seen as a legislative burden.

The importance of including accessibility from the beginning of the development process is one of the main things that makes implementation easier. As mentioned in the literature and the interviews, it is easier and cheaper to address accessibility issues during development instead of adding them on the end (Patel & al. 2020; Zimmermann & Vanderheiden, 2008). The interviewees even gave examples of organizations having to redo their whole website because of bad accessibility. This of course increases costs significantly and delays the launch of the website significantly.

Including accessibility in all processes means it involves everyone, not just developers. A strategic approach to accessibility requires planning and dedicated resourcing. As also Patel & al. (2020) note, everyone from managers to content creators need to be aware and know about accessibility requirements to prioritize and resource them correctly.

In addition, especially in organizations where accessibility is important and required by law, it is beneficial to have an allocated responsibility for accessibility. According to the interviews, having a specific person or persons dividing tasks, assigning responsibilities and keeping up with the regulations and guidelines makes implementation a lot easier. Even if the responsible is not an expert in accessibility themselves, they can coordinate training and make sure accessibility is correctly prioritized. However, as some interviewees noted, the

person should be motivated towards accessibility, or it is easily ignored or prioritized under other things.

In the interviews, the role of the accessibility legislation was very pronounced. Even though some interviewees talked about organizations that are becoming more interested in accessibility for other reasons, most of the projects were for public organizations. Other motivations were mostly ideological, as monetary value seemed to be hard to figure out.

In literature, more varied motivations are discussed. Rajšp & al., (2019) argue that social responsibilities influence large organizations motivation to implement accessibility. Accessibility is also argued to increase the image and customer loyalty (Aizpurua & al., 2016; Bailey & Gkatzidou, 2017; Leitner & al., 2016). However, in the interviews, none of these were mentioned as current motivators for organizations. Especially benefits or negative effects to reputation seemed to not be an issue at least in Finland now.

In the interviews, there was a view that accessibility could become a quality factor, which means that a good quality product should be also accessible by default. This is in line with Zimmermann & Vanderheiden (2008), who mention that accessibility is more likely to be implemented, when it is not given a special status, but it is treated as a part of ordinary jobs.

## **7.2 Personal motivation**

According to this research, personal motivation is a key factor in whether accessibility gets implemented in an organization. This is true even with the laws requiring accessibility, as it is difficult to learn about accessibility and if there is no support or pressure to implement it, it gets easily prioritized under other issues. As Leitner & al. (2016), when accessibility implementation is done by initiators who do not have a strategic plan or support, it will not get properly included in processes. This means the motivation to implement accessibility often comes bottom-up from singular initiators, and management needs to be convinced to support the implementation, not the other way around.

In the interviews, the role of an ‘aha’-moment or an experience of understanding why accessibility is needed was also shown. In literature, one way to create motivation is to create

tangibility and empathy by showing experiences (Crabb, Heron... 2019). For example, Youngblood (2013) recommends meeting real people with disabilities, while Zimmermann & Vanderheiden (2008) suggest using use cases and personas. In the interviews, a common way to get motivation was to follow user testing and seeing an actual user with disabilities use the website. This was especially strong when the service was something the person had been creating themselves. Even those who had not gotten resources to do user testing wanted to get a chance to do them to see how their work is being used. Personas were seen as fewer influencing motivators, but useful especially as examples in accessibility training sessions.

As was clear in the literature (Conn & al. 2020; Patel & al. 2020), formal education does not seem to prepare graduates for facing accessibility issues. From the interviewees, only some had had any education in accessibility, and there was not any focus on digital accessibility.

However, while work offered training was often offered to most of the interviewees, the most common way to learn about accessibility is by self-study. This means that the role of personal motivation is particularly important, as this kind of learning requires interest towards the subject.

In the interviews it was clear that a common way to learn was to dive into projects that needed some degree of accessibility implementation. Learning while doing projects and actively using the knowledge was motivating and the best way to retain the learned information. As some noted, if there is not a project that requires accessibility or the client does not specifically ask for it, there is less motivation to learn more about it and the knowledge is forgotten easier.

Another way to encourage future employees to learn about accessibility is to include it in hiring decisions. As Conn & al. (2020) saw in their study, students were not motivated to improve their skills in accessibility, because they felt it is not useful in their future work. However, if the hiring processes start to include accessibility, there might be more incentive to learn it too. This was also suggested by some interviewees, as they felt that working with someone who does not have enough knowledge about accessibility makes their work a lot harder.

### **7.3 Practical implementation**

If the organization is large enough to afford having accessibility experts in-house or as a part of the project team, most interviewees saw this as the best way to ensure accessibility. This is supported by the literature, where availability of the skills in-house is listed as one of the success factors of accessibility implementation (Bailey & Gkatzidou, 2017; Leitner & al., 2016). Having someone they can always go to ask questions about accessibility and being able to continuously check the process is better than having periodical checks, or at worst, just a check at the end of the process. Working alongside an accessibility expert also helps the team members to learn from them.

In the literature, the knowledge gap between accessibility experts and developers is seen as an issue to accessibility implementation (Martin & al. 2011). However, the interviews tell another story. Communication about accessibility is made easier by WCAG, as anyone who finds an issue can link to a guideline and it is easy to find tutorials and more information about it. In the interviews it was also clear that a big part of development teams daily work is to learn from each other and collaborate. This means that accessibility is not that much different from other issues of product development, and a part of working in modern software teams is sharing knowledge and working with people with different skill sets.

That said, according to the literature and the interviews, lack of knowledge and skills can make collaboration and implementation more difficult (Patel & al. 2020). If, for example, a designer does not understand accessibility, it means the developers or other experts need to do more work or explain accessibility needs to the designer, and there is more back-and-forth about the designs. This was frustrating for some, and they saw that it is the organization's job to ensure everyone has the needed skills for the project, either by choosing team members with the right skills or by offering trainings.

Accessibility auditing or an outside source going through a service to check for its accessibility was not discussed in literature but is a big part of the process according to the interviews. In literature, among others Bai & al. (2017) talk about “persona walkthroughs”, where an expert goes through a service while thinking of how someone with a disability would experience it. Auditing, however, is a different process, where the focus is on the



guidelines and using all the different tools. This way the auditor can consider all different accessibility issues, and they do not need to have perfect understanding of all the disabilities.

The difference might be because in practice, the focus is on following the law, and it requires digital services to have an accessibility statement. The statement needs to outline the status of accessibility in a website, and list all the issues that still exist. This is done by auditing the service, so having auditing done more often is a natural way to go about collaborating with an outside expert.

Having an accessibility auditing is also good to be done by someone who is specialized in accessibility, because they are more familiar with the tools and they focus on accessibility instead of, for example, how it looks.

In the interviews, user testing was seen as a useful tool in finding out about the usability of a service besides accessibility. As also Bailey & Gkatzidou (2017) mention, user testing is the best way to find out about the operational accessibility of a service. Following WCAG guidelines might make a service functional and technically accessible, but it does not guarantee good usability.

Overall, user testing is hard to include in agile processes because of time pressure and focus on development over design (Garcia & al. 2017), but the biggest reason to not include it to processes seems to be the lack of resources. In the interviews it was clear that most wanted to do more user testing, but there was not support and resourcing for it from management. However, as some interviewees noted, if the organization already conducts user testing, including accessibility testing, that might not be difficult or resource consuming.

#### **7.4 Design and Automated Tools**

In the literature, personas were present in multiple papers (Loitsch & al. 2016; Zimmermann & Vanderheiden, 2008), but in the interviews, most had not even thought about using them in accessibility contexts. Personas do not seem to fit well with WCAG guidelines, as there are so many different issues that the guidelines cover that there would need to be a large number of personas to include them all. This means at least in contexts where following

WCAG is important, Zimmermann & Vanderheiden's (2008) suggestion of tying accessibility issues to personas would be impractical.

On one hand, the guidelines are making personas unnecessary, but on the other hand, they are making the issues more abstract. In the interviews, the only place for personas seemed to be as examples when learning about accessibility. In practical work, they were not seen to be useful. So based on the interviews, the suggestion of Loitsch & al. (2016) to use personas to teach about accessibility could be useful.

Both literature and the interviews agree that design systems and component libraries can make accessibility implementation a lot easier. Even though creating a component library is time and resource consuming, it can bring savings in the long run. A comprehensive component library can be audited and directions about how to use different components can be added to ensure good accessibility. This makes it so basic accessibility considerations are easy to consider. As Vigo & al. (2007) note, this is especially important for websites that use a lot of templates.

In practice, all of the interviewees had experience with some tools or plugins to help them with accessibility. The benefits of automated tools like SiteImprove were acknowledged and using them was quite common. However, they are used more as guidelines and the results need to be checked by humans, as was also mentioned in the literature (Stray & al. 2019; Zimmermann & Vanderheiden, 2008). In general, according to the interviews, automated tools are not capable of catching most accessibility issues, but in the future the situation might be different.

Disability simulating tools like color filters, as mentioned by Stray & al. (2019), were less common probably because of the WCAG: it is more important that the guideline values on e.g., color contrasts are followed than how it looks through the filters. However, they are an effective way to show why the contrast is important, and they could be used periodically to check the services.

## **7.5 Clearest similarities and differences**

The issues that the interviewees have seem to be like those found by Patel & al. (2020). In that study, lack of resources, knowledge and support from management seemed to be key issues with accessibility implementation. They also note that including accessibility in the development cycle is difficult. This is something that did not come up in the same way in these interviews, probably because of legal restrictions. There is no choice but to include accessibility, so the prioritization is higher than speed of development. On the other hand, one reason to not have user testing seemed to be the lack of resources and time.

The clearest difference between the literature and interviews was about the wanted level of accessibility. As amongst others Zimmermann & Vanderheiden (2008) and Bailey & Gkatzidou (2017) note, accessibility is not a binary attribute. In the interviews, the view of accessibility was tied to following the guidelines and the law. This is because the law is the most important motivator. However, as awareness about accessibility spreads and more organizations want to be more accessible even if they are not required to. This means there might be more questions about how accessible the organization wants their services to be. Questions like ‘how much resources do we want to use for accessibility issues’ or ‘what user groups we want to be able to use our services’ will likely become more common.

# 8 Conclusions

## 8.1 Research summary

The goal of this thesis is to determine what factors influence and motivate accessibility implementation from the practitioners' point of view. The research questions that this paper aims to answer are as follows.

Q1: What are the motivations for accessibility implementation?

Q2: What factors influence accessibility implementation?

### *8.1.1 Motivations*

The most common motivation for companies to implement accessibility is changes in the legislation, at least in Finland. This also affects how implementation is approached, as satisfying WCAG requirements is seen as more important than other usability-based metrics.

A growing, but still marginal motivation is also the monetary benefits that businesses can gain from accessibility. Other benefits such as larger user base from elderly or disabled groups, better usability and future savings are also affecting the decision to implement accessibility. However, these motivators rely on the decision makers having some knowledge of accessibility and how it affects business. This is still not widespread knowledge, and many companies could have no one in the decision-making roles who knows or prioritizes accessibility.

For proper implementation, this thesis found that the role of personal motivation is still especially important, even when the law mandates accessibility. While the law has increased awareness about accessibility, if there is not motivation in management to implement it well, it gets poorly prioritized and implemented poorly. Despite any trainings offered by the company, most of the learning about accessibility is done 'on-the-job' through self-study and online resources. As an interviewee mentioned, there is always a trade-off. Devoting time to

improving accessibility while under a limited budget and schedule often means less time and resources for other tasks like the core development work. Personal motivation and understanding of the benefits of accessibility can help decision makers and implementers make that tradeoff in favor of accessibility.

As was mentioned before, accessibility implementation often starts bottom-up with initiators instead of the company implementing a holistic, strategic approach to accessibility, which includes accessibility checks at all stages of the design and development process, despite the latter being strongly preferred.

### *8.1.2 Influencing factors*

Accessibility implementation is often easier and cheaper when the organization includes it from the start of the process. Including accessibility in all processes from the beginning of the project helps minimize resource costs and improves the employee working experience compared to if it is considered only at the end, after an audit or change in the law. Many projects now are focused on improving accessibility for existing services, and an interviewee working on these projects compared the experience to retrofitting wheelchair ramps to a building never designed to accommodate them in the first place.

A big factor in the implementation process is the awareness and knowledge of accessibility within stakeholders. Accessibility needs must be communicated and taught to multiple stakeholders at every level, from development to marketing, sales and purchasing to content creation. The best results come from all departments collaborating to create an inclusive product which serves the widest possible range of users. Implementation is also easier when management can dedicate a suitable amount of support and resources, and requirements planning includes accessibility needs along with other technical requirements.

Awareness can be raised for example by holding training sessions about accessibility or having dedicated messaging channels, but as mentioned in motivations, it is not always enough to just tell stakeholders about accessibility. Giving people tangible examples and an “aha” moment of accessibility’s importance and how real people benefit from accessibility gives them motivation and improves accessibility implementation. Best ways to give tangible experience is to do user testing with disabled users. Also trying out different

accessibility tools such as screen readers helps to give context to otherwise sometimes abstract requirements.

Especially now that the subject is still relatively new for many companies, the role of accessibility experts and auditing is considerable. The requirements are so complicated that learning them without help from an expert may take a long time, identifying mistakes and opportunities for improvement in the existing product is much more difficult, and there might be mistakes that can be difficult to fix later. One benefit of working closely with an expert is also that the team members can learn from them during their project and then communicate what they have learned to the rest of the organization. This also means that in the future, the role of accessibility experts might be smaller than now.

Automated testing tools are a good way to find some accessibility issues, according to experts and frontline workers. Also, using design systems or ready-made component libraries can ensure accessibility is included in the design elements. However, they do not fully replace the need for skilled workers who know about accessibility at present. There needs to be a qualified human present to interpret the errors detected and decide which ones to fix. The expectation is that in the future, automated testing tools might get better at recognizing accessibility issues.

Even with automated tools getting more sophisticated, user testing is heavily suggested by experts and frontline workers alike. Testing with real users is sometimes the only way to find issues with accessibility and usability, that cannot be found with auditing or just by following guidelines.

## **8.2 Managerial implications**

According to the interviews and literature review conducted for this paper, the following steps can help improve accessibility implementation in organizations.

*Include accessibility strategy at all stages of the product*

One of the main ways to make accessibility implementation easier and cheaper is to have a strategic approach to it from the beginning. Implementing accessibility in the end of a

process or adding it on an existing service is difficult, costly and resource intensive. Organizations should have a strategy on how to include accessibility considerations continuously during the process so the issues can be found as soon as possible.

#### *Create awareness throughout the organization*

Accessibility does not affect only developers or designers, and there needs to be enough support and resourcing from all stakeholders. As was mentioned in the interviews, everyone from management to content creators and procurement need to be aware about accessibility in order to be able to support the implementation. For example, if an inaccessible third-party tool is bought by another department and its use is mandated for product teams, there might be little they can do to improve its accessibility. Similarly, if the product teams make an accessible template for the content pages, but the content creators use the templates inaccessibly, such as by not including subtitles for videos, the service will not be accessible.

One way to create awareness about the subject in organization is to offer accessibility trainings regularly and encourage knowledge sharing. Training sessions for everyone in the company helps them get an understanding of the basics. There are also different ways to use communication channels and meetings to share knowledge about accessibility within the organization, for example through dedicated Slack channels.

If the employees in charge of hiring know that accessibility knowledge is a priority, they can choose candidates who already have some knowledge or make accessibility requirements clear in job postings, reducing the training burden for the organization and communicating to job seekers that accessibility knowledge is now a core job requirement just like other technical skills.

#### *Conducting user testing if possible*

To ensure good accessibility of the product, conducting regular user testing is helpful. This creates motivation and tangibility on the subject for the people working with the abstract WCAG guidelines. It also ensures the services are usable for everyone and can uncover issues that are not otherwise easy to be found. The experts and the workers agreed that the

guidelines and tools like personas cannot replace user testing, and specific issues are best discovered by interacting with current and potential users of the product.

### *Choosing accessibility responsible*

To make sure that accessibility is prioritized correctly and that there is good amount of awareness and skills in organization, it is recommended to decide a responsible for accessibility. In larger organizations where accessibility is important, the person can be doing that full-time, but even in smaller organizations there should be someone responsible, so it does not get prioritized under everything else.

### *Considering working with accessibility experts and automated tools*

To support implementation and learning of project members, the organization should also consider the role of accessibility expert. The best ways to collaborate with experts depends on the size of the organization and the level of accessibility that the services should have. Following all requirements is very time-consuming, so it can save developers and designers time if there is someone, they can ask from instead of wondering by themselves. In addition, having continuous support during the project limits the issues that need to be fixed at the end. If the organization does not have resources to hire an expert, they should have a plan in place for a way to have continuous checks, for example audits during the process.

In addition, using automated testing tools can help the implementation and saving resources and time during the process. They are the cheapest way to do continuous testing during implementation and can find simple errors early. However, even though they are getting better as time goes on, they are not perfect, and the results need to be checked by experts or in best case, with user testing.

## **8.3 Limitations of the study**

This study is limited to only 13 interviews in Finland. The results might not be applicable to other countries or even areas in Finland, as most of the interviewees are from the Helsinki region. Also, even though the accessibility directive is EU-wide, the Finnish accessibility



law is different from other EU countries. Most of the interviewees are also consultants, so they have different views on the inner decision making in the organizations.

#### **8.4 Suggestions for further research**

The strategic approach for accessibility needs more further research, as it is a relatively new way for many organizations. In this thesis, there were no managers interviewed, but their view on accessibility affect implementation greatly as they decide on resourcing. Still, there is not a lot of research on accessibility management.

One question that the management decides on, and most of the interviewees had not thought about is ‘how accessible a service should be?’. Some interviewees mentioned a future EU directive that might add accessibility requirements for other digital services besides public ones. From a strategic point of view, most organizations will not probably want to follow the full WCAG guidelines, as it might not make monetary sense. However, there are some organizations that are interested in it for different research. Future research could study how these decisions are made and what motivators could be created besides legal ones.

In addition, the importance of personal motivation and ways to create tangibility could be researched more. Also, the impact in practice and how to keep the motivation up needs further research.

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