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XR Accessibility

A Study into the Current State of Accessibility
Implementation in Head-Mounted XR Development

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Abstract

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Head-mounted extended reality (XR), such as virtual reality (VR), faces issues with accessibility as a platform. It is a dominantly visual medium and often relies on body mobility to interact with the virtual environment and complete tasks within the application. However, VR also provides new possibilities for accessible design. As a constantly developing field, XR design does not have well-known standardised design guidelines for solving accessibility issues. This thesis examines the current state of accessibility implementation in XR design and aims to form a conclusion on what to consider as a designer to successfully implement accessibility.

Keywords: XR, VR, MR, Head-mounted, UX, UI, Accessibility, Disability, Impairment

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VR-lasiteknologiaa hyödyntävä laajennettu todellisuus (XR), kuten virtuaalitodellisuus (VR), kohtaa saavutettavuuteen liittyviä haasteita. VR-sovellusten virtuaaliympäristöjen kokeminen perustuu vahvasti näköaistiin ja usein kanssakäyminen sovelluksen kanssa vaatii käyttäjältä liikuntakykyä. VR tarjoaa kuitenkin myös uusia mahdollisuuksia saavutettavaan suunnitteluun. Jatkuvasti kehittyvänä alana XR-suunnittelulla ei ole yleisesti tunnettuja standardeja saavutettavuusongelmien ratkaisemiseksi. Tässä opinnäytetyössä tarkastellaan saavutettavuuden nykytilaa XR-suunnittelussa ja pyritään muodostamaan johtopäätös siitä, mitä suunnittelijan tulisi ottaa huomioon saavutettavuuden varmistamiseksi.

Avainsanat: XR, VR, MR, Head-mounted, UX, UI, Accessibility, Disability, Impairment

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1 Introduction

This thesis is an examination of the current state of accessibility of XR products and services, focusing on head-mounted XR, such as VR. XR stands for extended reality, which “is an umbrella term for any technology that alters reality by adding digital elements to the physical or real-world environment to any extent” (Interaction Design Foundation, 2022). VR stands for virtual reality and falls under XR. In virtual reality, the user is immersed in a virtual space and has their view of the actual world entirely blocked. VR applications are generally built and run on headsets and consist of fully digital environments. In this chapter, I lay out the background of the topic, introduce my research questions, and argue for the relevance of this research. In addition, I explain the purpose of my research as well as my motivation behind it.

I initially became interested in XR accessibility when I noticed many of my peers pointed out some flaws in the user experience of head-mounted XR. These problems with usability often occurred with left-handed people, who wore glasses or experienced VR sickness. Firstly, left-handed people would notice that often VR applications would be designed by default for right-handed users. Secondly, people wearing glasses would sometimes have trouble fitting eyewear in the VR headset. Finally, VR sickness, which resembles the symptoms of motion sickness, would cause people to stop using the app in question after a short while. Even though left-handedness, wearing glasses and experiencing VR sickness are not disabilities, they may significantly affect the user’s experience, the UX, negatively, and in some cases prevent the person from using the product or service at all. Therefore, accessible services would increase the overall usability for all users.

Diving further into the research for this thesis, I found out that “an estimated 1.3 billion people experience significant disability. This represents 16% of the world's population, or 1 in 6 of us” (World Health Organization, 2023). Accordingly, every sixth person requires accessible services. This is a

significant percentage of the world's population and the user pool of digital products, which underlines the scale of need for accessible design.

Furthermore, the need for accessible services is not only limited to people with significant disabilities but also to able-bodied people.

Accessibility is a very topical subject, and due to the European Accessibility Act, many companies are currently trying to match the requirements. In 2025, a law is being enforced in the European Union that "if you service end-users via digital channels or sell products online, you must comply with the European Accessibility Act by June 2025" (Solteq, 2025). Therefore, accessibility is a central concern designers try to factor in in modern web, application and other digital product development. The EAA covers a list of products and services, including smartphones, computers and operating systems, and audio-visual media services (European Commission, 2025). The full list is presented in the Appendices. I have summarised the products and services into the following categories:

- Audio-visual Media Services
- Information and Communication Technology (ICT)
- Public Transport
- Financial Services
- Online Retail.

In this thesis, I am looking into the current state of accessibility in designing XR products and services, focusing on head-mounted XR such as VR. I also aim to form a hypothesis on what to consider as a designer when designing accessible head-mounted XR products. To establish the current state of XR accessibility, I will first investigate accessibility more broadly. I am approaching the research by reading and analysing relevant and recent academic papers, case studies and by interviewing accessibility experts. This thesis is an examination of the current state of XR accessibility through literature review, a case study, and specialist interviews, and therefore, I will not be conducting empirical research. According to George (2024), "empirical research depends on real data obtained through direct observation or experimentation". In the case of developing an XR

product, empirical research would be relevant to accurately evaluate the needs of users and the accessibility of the product. This could be done, for example, through user testing and user research.

The standardisation of XR accessibility guidelines is still a work in progress. I hypothesise that by drawing knowledge from traditional UX design and accessibility guidelines, XR accessibility guidelines can be developed. Even though head-mounted XR faces many accessibility challenges as a medium, designing accessible XR is possible and will improve the overall UX for all users. The hypothesis is based on the research findings and interview conclusions.

This thesis is an observation of the current state of accessibility implementation into the XR design workflow, and refrains from making generalisations about individual disabilities or impairments.

2 Literature Review

In this chapter, I examine recent academic literature on XR design guidelines and XR accessibility.

2.1 Defining Accessibility

The definition of the word accessibility, according to the Merriam-Webster Dictionary (2025), is that something is “easily used or accessed by people with disabilities”. The English word is used for both physical and digital accessibility. However, the terms web accessibility, or sometimes eAccessibility, are used specifically to refer to the accessibility of web content or other information and communication technologies (Wikipedia, 2025). For clarity, I will simply be using the term accessibility.

In the context of digital design, a product’s/service’s accessibility is determined by multiple factors. These are based, for example, on the functionality of the

product and the GUI (Graphical User Interface); in other words, making sure that the website supports reading devices that people with visual impairments use, and that the colours are visible to people with colour-blindness, and the font is easily readable as well as large enough. For a product to be accessible, designers and developers must pay attention to what may affect a disabled user's experience of the final product. It's also important to note that while people with disabilities need accessible products and services, able-bodied people might also need them in some cases or at least benefit from them. The need for accessible services can be situational or temporary. For example, a person with a broken leg is relying on crutches to move and therefore can not use their hands to open a door. In this situation, the person needs an automatically opening door or a button which opens the door for them. In another scenario, a person who has no hearing impairment is watching a video in a noisy environment and can not hear the audio. In this scenario, the person requires subtitles to understand what is being said.

2.2 Understanding Disabilities and Impairments

As mentioned earlier, approximately 16% of the world's population lives with a significant disability. This number is expected to increase due to an ageing population and noncommunicable diseases becoming more common (World Health Organization, 2023). According to WHO (2023), disability is "a complex multidimensional experience". Therefore, measuring it can prove to be difficult. It has become common rhetoric, when collecting data about disabilities, to group disabilities into different categories and "types". The definition of these "types" is also often made "using only one aspect of disability, such as impairments – sensory, physical, mental, intellectual – and at other times they conflate health conditions with disability" (World Health Organization, 2023). This, however, can oversimplify the various and complex experiences of people with disabilities.

Two people with the same impairment can have drastically different experiences in their everyday lives. Gus Alexiou (2022) gives an example of this

in an online article on Forbes reviewing an episode of NPR's podcast Life Kit, where they interviewed a disability rights advocate, Emily Ladau:

Just like non-disabled people, two disabled people with the same level of physical restrictions might have entirely different attitudes to risk-taking and independence.

It's no different from two able-bodied people with a similar physical capacity, wherein one chooses to spend their weekend rock climbing while the other prefers to sit at home on the couch and watch sports.

In the corresponding example of two disabled people with similar ambulatory impairments, one might make a point of walking down to the shops several times a week with their cane or crutches, even if it is a great struggle and takes them five times as long as it should, because ultimately, it helps them feel independent.

The other person with mobility issues may be nervous to take on such a venture – preferring to only exercise at home and have their groceries delivered.

None of these responses is the right one. It's just a personal choice (Alexiou, 2022).

On the other hand, people with different disabilities or impairments can have similar experiences. Additionally, a person with a chronic health condition or another impairment may face similar struggles without officially qualifying as disabled. The generalising division of disabilities into "types" can also lead to a wrongful presumption that "each 'type of disability' has specific health, educational, rehabilitation, social, and support needs" (World Health Organization, 2011).

This said, it is important to be careful with the terminology used when discussing disability and impairments. According to Sheena L. Carter, PhD (2025), "the words 'impairment,' 'disability,' and 'handicap' are often used interchangeably. They have very different meanings, however". The word impairment is used when referring to a deficit or anomaly in an individual's structure or function. These structures or functions may be psychological, anatomical, or physiological. Disability is a result of an impairment. It means

that a person's "ability to perform an activity" is either limited or fully inhibited. A handicap is a disadvantage a person experiences, often because of an impairment (Carter, 2025). For example, a person who has significantly reduced vision is applying to a university online. Reduced vision is a sensory impairment, specifically a visual impairment. Without external support, such as a screen reader, this person cannot interact with a website, which is a disability this person is experiencing. A handicap in this scenario could be that the application website doesn't meet accessibility requirements and doesn't support screen reader technology, resulting in this individual not being able to apply to the university like their able-bodied peers. In this thesis, I am not looking into individual disabilities or impairments. However, I examine what solutions there might be to increase the accessibility of XR products.

Many reasons may cause difficulties for a person to use an XR product. These reasons might be due to an impairment a person has, for example, visual impairments, hearing impairments and mobility impairments. For instance, mobility impairments may cause difficulty using XR if an application requires the use of both hands and full-body mobility. Even though XR is a "very visual medium" and often derives immersion from the movement of the user's body, it is important to note that people with impairments, such as those listed above, can enjoy XR applications if the application meets accessibility requirements (Equal Entry, 2022).

2.3 Review of Key Literature

2.3.1 Designing User Experience for Extended Reality Applications: Proposed Design Guidelines by Steven Vi

In their master's thesis, Steven Vi (2020) presents a set of eleven UX guidelines for XR by collecting and interpreting existing ideas presented by other XR and UX designers. The main goal of Vi's work is to figure out how to design usable head-mounted XR applications. This is done through compiling a set of guidelines that help designers to create more immersive head-mounted XR

applications. The guidelines were also tested in the design process of an XR application.

The derived guidelines consist of eleven main guidelines as well as sub-guidelines for each title:

1. Organise the Spatial Environment to Improve Efficiency
 - a. Keep visual and physical restrictions in mind when arranging content.
 - b. Explore how space can be utilised.
 - c. Group similar objects to make them easier to find.
2. Create Flexible Interactions and Environments
 - a. Build in interactions for both inexperienced and experienced users.
 - b. Let users shape their environment to optimise their workflow.
 - c. Let users define what it means to be comfortable.
3. Prioritise User's Comfort
 - a. Respect users' personal space.
 - b. Physiological considerations.
 - c. Environmental comfort.
 - d. Be mindful of physically draining interactions.
4. Keep It Simple: Do Not Overwhelm the User
 - a. Keep tools and information ready but not distracting.
 - b. Don't obscure the user's vision with virtual elements.
5. Design Around Hardware Capabilities and Limitations
 - a. Sensitive to the capabilities of the hardware.
 - b. Use the strengths of the medium.
6. Use Cues to Help Users Throughout Their Experience
 - a. Use attention directors to help users discover what they can do and where they should go.
 - b. Simplify choice.
 - c. Do not overload the user's senses with notifications.
 - d. Use cues to integrate help and tutorials in the experience.
 - e. Inform the users of actions that may result in errors.

7. Create a Compelling XR Experience
 - a. Make the experience appealing.
 - b. Use audio to enhance the experience.
 - c. Make a complete experience.
8. Build upon Real World Knowledge
 - a. Use real-life inspiration to create affordances in objects.
 - b. Pair actions with outcomes that users expect.
 - c. Consider the use of 3D (volumetric) representation.
 - d. Be cautious of simplified interactions.
9. Provide Feedback and Consistency
 - a. Use feedback to standardise interaction states.
 - b. Use feedback to help recognise errors and unwanted states.
 - c. Design for dynamic exploration.
10. Allow Users to Feel in Control of the Experience
 - a. Don't force actions without the user's permission.
 - b. Provide exits for users to leave unwanted states.
 - c. The application should be "honest".
 - d. Let users control their movements.
11. Allow for Trial and Error
 - a. Permit easy reversal of actions (Vi, 2020).

Vi researches existing guidelines for both traditional user experience design as well as XR design. The most prominent sources are the design heuristics proposed by Nielsen et al. (1990) and the study by Endsley et al. (2017). The research consists of scholarly sources, such as research papers and master's theses, as well as other sources, such as insights from other communities, for example, XR developers. Vi points out that there is extensive knowledge about user experience design for XR among designers, but a lack of academic research. Vi argues that the non-academic sources are a resource that should be utilised in the design process because they have been proven useful by XR designers in practice.

The set of guidelines by Vi (2020) extends “to include the wealth of insights from other communities in conjunction with academic work”. Their research provides designers with a comprehensive and approachable set of guidelines that can be used as a foundation in the design process. Vi’s set of guidelines also gains credibility since their team used the suggested guidelines in the development of an XR application. Their research shows clear interest and motivation. The hypothesis, the suggested guidelines, are compactly summarised based on literature and practical examples of user experience design guidelines for XR. Vi states that most of the resources they used are from grey literature, meaning sources that aren’t published in traditional publishing or distribution channels (Riley, 2025). Vi acknowledges that because of this, these sources may not be as reliable as sources that have gone through an academic review process. However, they still provide valuable information and insight.

2.3.2 Improving Accessibility in VR Games: Accessibility Guidelines by Heilemann, Zimmermann and Münster

The article by Fiona Heilemann, Gottfried Zimmermann, and Patrick Münster (2021) is a comprehensive synthesis of accessibility guidelines collected from existing sources. The work by Heilemann, Zimmermann and Münster is relevant to this thesis because it discusses the current state of accessibility in VR and aims to improve accessibility in VR applications. In this chapter, I review their work.

In their article, Heilemann, Zimmermann, and Münster (2021) underline the fact that there are few extensive accessibility guidelines for video games, and even fewer that include VR. However, due to an increasing number of gamers as well as people experiencing disabilities, the need for accessible video games is rising. According to Heilemann, Zimmermann, and Münster, VR provides new ways for people with disabilities to play games. On the other hand, VR, which is a relatively new technology, is still missing comprehensive accessibility guidelines. They aim to provide a list of guidelines for accessible VR games that developers can follow in their design process. Their list is a combination of

multiple existing guidelines that have been specifically chosen based on their relevance to VR.

Four main points can be drawn from Heilemann's, Zimmermann's and Münster's article. First, there's an increasing need for accessible games due to the rising number of gamers and people who live with some form of disability. Second, VR poses its own accessibility challenges because it often relies on mobility and visuals. Third, despite its challenges, VR is a medium which provides new possibilities for people with disabilities to enjoy games. This is due to it not being bound to a traditional user interface. Finally, there are not many accessibility guidelines for game developers, and even fewer for VR.

The authors attempt to collect the most relevant guidelines for developing an accessible VR game. Heilemann, Zimmermann and Münster reference existing guidelines and create a synthesis based on the sources. Their synthesised list of guidelines highlights the following categories: input and controls, audio and speech, look and design, subtitles/captions, simplicity, VR and multiplayer. Under each category, the authors have collected the most relevant existing accessibility guidelines. The extensive list of sources implies that the authors have studied the topic thoroughly and show a clear interest in the topic. Their sources are also credible, and the article has been academically reviewed.

Accessibility in video games and XR applications is still in development, and there isn't much research on the topic, which makes Heilemann's, Zimmermann's, and Münster's research advanced. The goal of their research is not necessarily to add new information, but to review and synthesise the most relevant existing accessibility guidelines. On the other hand, their research is focused on VR and, therefore, can be considered new information. Their article is aimed at game developers, but is relevant to other designers, too. Heilemann, Zimmermann and Münster point out that their list of guidelines is only based on literature research, and, due to the lack of user research and testing, it may need to be further extended in the future. They have collected an extensive and

comprehensive list of guidelines for accessibility in games as well as VR, based on a variety of sources.

3 Methodology

The methodology used in this thesis is Research into Design (Frayling, 1993), which means theoretical research and analysis of design. The analysis is divided into three work packages:

1. Analysis of recent XR design guidelines.
2. Case study of the accessibility features of the VR game *Half-Life: Alyx* (Valve, 2020).
3. Analysis of specialist interviews.

In this chapter, I explain further how I completed the research for this thesis and why I chose this approach.

3.1 Review and Analysis of Related Publications

In the Literature Review chapter of this thesis, I analyse the current state of accessibility in the field of XR Design by reviewing the following key design documents: *Exploring User Experience Guidelines for Designing HMD Extended Reality Applications* (Vi, 2020) and *Accessibility Guidelines for VR Games – A Comparison and Synthesis of a Comprehensive Set* (Heilemann, Zimmermann and Münster, 2021). I chose these publications because they provide two recent design guideline documents: Steven Vi's (2020) thesis and the article by Heilemann, Zimmermann and Münster (2021), the latter one highlighting accessibility guidelines for the XR design pipeline.

The data collection method used is literary analysis and comparison of the key literary sources. I examine the key sources in relation to my research questions: what is the current state of accessibility in designing XR products and services,

and what to consider as a designer when designing accessible head-mounted XR products.

3.2 Case Study

In addition to the literary sources, I analyse the current state of XR accessibility through a case study. Dr Hayden Coombs (2022) defines a case study as “a methodological research approach used to generate an in-depth understanding of a contemporary issue or phenomenon in a bounded system”. Coombs (2022) divides case studies into three categories: single case study or instrumental case study, collective case study or multiple case study, and intrinsic case study. In this thesis, the case study is an intrinsic case study, which means that the principal focus of the research is on the subject itself (Creswell and Poth, 2018). The case in this thesis is the accessibility features of a VR game called *Half-Life Alyx* (Valve, 2020). The topic under research is the accessibility features of an XR product.

According to Coombs (2022), a case study should aim to thoroughly understand the subject of the case study and to produce hypotheses based on the gained understanding. I aim to achieve this through examining written online reviews, as well as breakdown videos and reviewing the list of accessibility features. I chose intrinsic case study as a research method because it is often used in cases that occur rarely or “when the researcher wants to gain a deeper understanding of a specific issue or situation” (Coombs, 2022). The subject of this case study, *Half-Life: Alyx* (Valve, 2020), can be considered a unique case because it is quite advanced regarding accessibility features compared to other VR games, according to online reviews. For this thesis, I also wanted to provide a practical example of a VR game that has received positive feedback on its accessibility features, and to understand why that is. Therefore, I chose intrinsic case study as a research method.

The data collection and analysis are done by creating a table where all the accessibility features of the subject are listed. After this, the content of the table

is analysed with the support of online reviews and breakdown videos. In the analysis, I aim to answer the following questions:

1. What accessibility features are implemented in the game?
2. How did the game succeed in implementing accessibility?
3. What is still missing from the accessibility features?

Table 1. The accessibility features of Half-Life: Alyx (Valve, 2020). The information in the table is based on an online article by Lonnie Rad (2020).

Accessibility feature	Half-Life: Alyx
Adjustable difficulty	Yes. Four different modes: story, easy, normal and hard.
Different movement types	Yes. Four different modes: blink, shift, continuous and continuous hand.
Height Adjust	Yes. Four different modes: crouch, stand, crouch and stand, and hybrid.
Seated Mode	Yes. Allows the game to be played without having to stand or walk.
Alternative UI navigation methods	Yes. Three different modes: hand selection, head selection and hybrid (both).
Motion sickness reducing settings.	Yes. Disables involuntary/forced character movement.
Light sensitivity settings	Yes. Reduces the strength and flicker of lights in the game.

Accessibility feature	Half-Life: Alyx
Changeable handedness	Yes. Right- and left-handed modes.
Controller turning options	Yes. Two different modes: snap turn and continuous turn.
Single controller support	Yes. The game can be played with a single controller.
Subtitles and closed captions	Yes. Character dialogue is subtitled.

Through the findings in the case study, I aim to form a hypothesis on what accessibility currently looks like in XR products and applications. The results of the case study are included in this thesis to support the theoretical research. By comparing the findings of the case study and the literature review, I aim to answer my research questions: the current state of accessibility in designing XR products and services, and what to consider as a designer when designing accessible head-mounted XR products. I chose this research approach because it will give a practical example of how accessibility is currently being implemented in XR products. Using online reviews as research materials also provides insight into what users who require the accessibility features think makes an accessible XR product, and why.

3.3 Interviews with Experts

To find out more about the current state of accessibility in general, I decided to interview two people with expertise and timely insight. The first interview I conducted was with an IAAP CPACC-certified accessibility specialist at Selko Digital, and the second one was with a senior digital design lecturer at Metropolia University of Applied Sciences (UAS). The interviews were held in

Finnish through email correspondence, but the questions have been translated into English. I present the translated interview questions in the following table. The interview transcripts in Finnish are included in the Appendices.

Table 2. Interview questions presented to Selko Digital (23.10.2024) and a lecturer at Metropolia (27.2.2025).

Interview question	Why is this relevant
1. What are the main principles of accessibility that you want to follow? Is there a list of criteria that is generally followed? What do you think is missing from this list?	This question is important to get the opinion and view of the expert. They can also share what the principles are that they follow and argue why.
2. How can you ensure that these principles are put into practice?	To find out some practical examples of how to implement accessibility.
3. How do you go about checking whether the product/service meets the accessibility criteria? What tools do you/do you use?	This is to see how accessibility testing is done in the industry.
4. What are the most common challenges that make the product/service inaccessible?	To find out about the most common accessibility issues.
5. How do you respond to these challenges?	To find out how these problems are solved.
6. Do you think that accessibility is also useful for people who do not have features that interfere	To establish why accessible services are needed.

Interview question	Why is this relevant
with/impede the use of the product/service? Could you describe it in more detail?	
7. What sources would you recommend for UX/UI designers to learn more about accessibility?	For further learning.
8. What do you think the future of accessibility looks like?	Interesting thoughts about the future to utilise in the discussion chapter.

I selected the interviewees based on their expertise as well as availability. The interviewees needed to have some experience working with the accessibility of digital products. Having XR accessibility expertise was not a requirement due to there being very few experts in Finland. Selko Digital is a Finland-based company that specialises in the accessibility of digital platforms. They arrange workshops, audit for accessibility and provide consultation on accessibility-related queries. The interviewee at Selko Digital is an IAAP CPACC-certified accessibility specialist. The IAAP, or the International Association of Accessibility Professionals, is an association which aims to promote the realisation of accessible digital services (IAAP, 2025). CPACC stands for Certified Professional in Accessibility Core Competencies, and is a certificate granted by the IAAP. The Metropolia UAS lecturer is a senior lecturer in digital design and specialises in design ethics. I approached each of the interviewees via email, introducing myself and explaining what the interview was for. I provided them with the option of remaining anonymous. In the email where I handed them the interview questions, I also ensured that I could use their answers in my thesis research.

I approached the analysis of the interviews through content analysis. Columbia University (2025) states on its website that “content analysis is a research tool used to determine the presence of certain words, themes, or concepts within some given qualitative data (i.e. text)”. I went through the interview transcript and highlighted anything that I found interesting. Later, I collected all the highlighted points and divided them into groups based on common topics that seemed to arise in the interviews. The topics are presented and explained in the provided table.

Table 3. Content analysis of the interviews.

Common topics	Why is this relevant
Common standards	To find out if some universal accessibility standards are followed in the design process.
Faults in common standards	To find out if these standards are lacking something.
Available technology	The current technology used to test for accessibility issues.
Technology limitations	The limitations of the available technology.
Common accessibility problems	What things make a product/service inaccessible?
Social impact	The societal impact of accessible services.

Common topics	Why is this relevant
Current state positives	What is good about the situation with accessibility now?
Current state negatives	What could be improved?

The reason I chose interviews as a data collection tool was to gain current insight about accessibility in general from industry professionals. Having this information together with the data collected from the theoretical research, as well as the case study, helps with forming a well-educated hypothesis. The interviews were held through email correspondence. I chose email as the interview method to make the interviews easily accessible to the interviewees.

Having the interviews via email worked well for this thesis. The interviewees could take their time with their answers and therefore provide thought-out and lengthy answers. Written answers also allowed me to directly transfer the interview answers to the thesis in a way I would not have been able to in a spoken interview. In a spoken interview, I would have had to record the interviews and transcribe them. Therefore, the email interview was more time-efficient. However, having the interviews via email and not in real-time made it difficult for me to ask follow-up questions.

4 Analysis

4.1 Key documents: Summary and Discussion of Findings

The suggested guidelines presented by Steven Vi (2020) consider accessibility, especially guideline 2: Create Flexible Interactions and Environments, and guideline 3: Prioritize User's Comfort, including their sub-guidelines. Guideline 2 encourages the designers to provide the users with a possibility to customise

the experience by building in a range of options that take different physical restrictions and skill levels into account. The sub-guideline 2a specifies that interactions should be built for “both inexperienced and experienced users” (Vi, 2020). Guideline 3 focuses on the user’s comfort. Sub-guidelines 3b: Physiological considerations, and 3d: Be mindful of physically draining interactions, are essential for accessible design. Sub-guideline 3b emphasises the designer’s responsibility to make sure to limit the possibility of the user experiencing motion sickness. This responsibility applies to taking other physiological restrictions. Sub-guideline 3d points out that VR experiences can sometimes be physically demanding. This sub-guideline suggests that the interactions and elements in the virtual space should be placed where the user can easily access them.

Guideline 6: Use cues to help users throughout their experience, and sub-guideline 7b: Use audio to enhance the experience, are also relevant for accessible design. In guideline 6, Vi (2020) states that providing enough guidance throughout the experience prevents the user from feeling confused and frustrated. Guidance throughout the application will provide support for users with different abilities and can be presented using multiple senses. In sub-guideline 7b, Vi encourages the use of audio to enhance the application. The utilisation of more than one sense in the application is important from an accessibility perspective due to differences in sensory abilities. For example, people with lowered vision will benefit from clear audio cues.

The suggested guidelines by Steven Vi (2020) and the research behind them imply that there are commonly used conventions that have proven to be good. Even though Vi’s guidelines are focused on good usability from a general UX design perspective, some of them directly address accessibility. Together with knowledge about common accessibility needs and user testing, these guidelines can be utilised in the accessible XR design process.

The guidelines by Heilemann, Zimmermann and Münster (2021) aim to synthesise the most important things to consider when designing accessible XR

products based on existing sources. The set of guidelines is divided into the following categories: input and controls, audio and speech, look and design, subtitles/captions, simplicity, VR and multiplayer. Each category features accessibility guidelines that the authors deemed the most relevant for accessible XR design. The study by Heilemann et al. proposes good guidelines for XR designers to follow. They point out, however, that the standardisation of XR accessibility guidelines is still a work in progress. However, their guidelines offer a solution to some of the accessibility issues XR faces. Their list of guidelines is quite long, so I aim to summarise some of the key points here.

Under input and controls, Heilemann et al. talk about the interaction with the user interface. Here, they encourage the designers to include customizable controls. Additionally, the controls should be as simple as possible. Under audio and speech, the authors highlight the importance of the use of audio. All events should have a distinct sound cue. There should also be a possibility of voice control, meaning interacting with the application through speech. In the look and design section, the authors talk about keeping the UI elements simple, readable and customizable, for example, by resizing and changing colour.

The subtitles/captions section guidelines encourage designers to use subtitles for all significant audio, including speech and important sound effects. The subtitles and captions should also be presented in a clear manner and should be visible long enough for the user to be able to read them. In the simplicity guidelines, the authors highlight the importance of tutorials and guidance throughout the experience. In the VR section, like Steven Vi (2020), Heilemann, Zimmermann and Münster talk about reducing or disabling motion sickness-inducing properties. The application should also support multiple ways of movement and the selection of a dominant hand. Other guidelines include making sure people who require accessible services are participating in user testing because their feedback is essential for accessible design.

The notable difference between Vi's (2020) guidelines and the guidelines of Heilemann, Zimmermann and Münster (2021) is that Heilemann et al. are

specifically focused on XR accessibility, whereas Vi is trying to compile a set of guidelines for usable XR from a more general user experience perspective. A significant difference between these two studies is that Vi tested their proposed guidelines in practice, whereas Heilemann et al.'s guidelines are theoretical. However, the guidelines by Heilemann et al. are similar to the guidelines by Vi's guidelines in the sense that they both are synthesised from existing guidelines and selected based on extensive research. Both sets of guidelines also emphasise the importance of allowing the user to customise their experience, utilising multiple senses to convey information, and keeping the application simple.

4.2 Case Study: Analysis of Research Findings

Half-Life: Alyx (Valve, 2020) features a relatively extensive list of accessibility settings, which makes it a forerunner in the field of VR games. However, according to Nicholas Sutrich (2020), in a web article for Windows Central, it is not the only or the first VR game to consider accessibility. For example, *Beat Saber* (Beat Games, 2018) includes some accessibility features that *Half-Life: Alyx* does as well, such as single controller support. What makes *Half-Life: Alyx* unique is the extent of the accessibility features as well as their incorporation into the game. In addition to the accessibility settings, Lonnie Rad (2020) writes in an article for GameSpot that the developers of the game wanted to make the gameplay itself as inclusive as possible by considering the physical requirements each level and action has.

The accessibility settings, and settings that help improve the user experience for different kinds of gamers, in *Half-Life: Alyx* are adjustable difficulty, different movement types, adjustable player height, as well as seated mode, controller settings, such as left- and right-handed modes, as well as single controller support, and alternative UI navigation methods. The settings also include motion-sickness reducing functions, light-sensitivity settings, as well as subtitles and closed captions. In this chapter, I examine how *Half-Life: Alyx* succeeds in implementing accessibility features.

Half-Life: Alyx has received praise from gamers for the extent of the list as well as the overall incorporation of the accessibility features. Pyry Hakala (2021) refers to the game as “one of the best VR experiences available” in an article on PlayLab!, which is an online game magazine managed by the game research students at Tampere University. Hakala (2021) especially highlights the motion sickness-reducing features:

“However, I did not experience heavy motion sickness, thanks to the great selection of accessibility options. I feel that the game does a great job of alleviating common problems related to VR with its settings and design.” (Hakala, 2021)

Some of the features which help to reduce motion sickness include the option to turn off game mechanics which involuntarily move the player, such as the Barnacle Lift, where hostile mobs, the Barnacles, can lift the player off the ground and throw them (Rad, 2020). Other features that may help to reduce motion sickness are the interchangeable movement types and controller turning options, which determine how the player moves around and turns in the game environment. The blink movement type means teleporting in *Half-Life: Alyx*. It allows the player to move to any point that the player chooses with a fade-out and fade-in without the simulation of motion. This movement type is recommended for people who experience motion sickness (Rad, 2020). The snap turn option turns the player in set angles, which can be adjusted from 15 to 90 degrees. This is a recommended controller turning option for players who experience motion sickness (Matthews, 2020).

Among all the things *Half-Life: Alyx* should be praised for, accommodating the awkward limitations imposed by motion sickness sufferers should definitely be one. (Matthews, 2020)

Half-Life: Alyx also features some settings which are intended to make the game more accessible for players with physical disabilities, such as reduced mobility. Firstly, the game can be played entirely seated (Rad, 2020), which is an important feature for gamers who are, for example, wheelchair users. There are also adjustable height settings, which allow the player to use the controller to toggle their position from standing to crouching without having to physically crouch. The game also supports single-controller play, meaning that the game

can be played using only one hand and all the functions are mapped to a single controller. The controls can also be adjusted according to the player's dominant hand. The in-game user interface navigation is also customizable. The player can select the weapons they use by either pointing with their controller or their head or both (Rad, 2020).

In a video review of *Half-Life: Alyx*, Derrick Haas (2022) describes the game as "almost perfect". In the video, Haas states that they require the left-handed options and lists some of the adjustable moving types, describing the controls themselves as "super easy to use". While having an overall positive experience with the game, Haas, who played the game using the single controller mode, points out that crouching in the game is almost impossible to play with only one hand. In the video, Haas reflects that the issue might be hardware-related and might not be an issue for people using a different VR headset. In an attached spreadsheet documenting 126 games, 126 sets of notes and 90 videos, Haas (2024) presents a few workarounds to this issue while stating that the single controller mode works well otherwise. In the spreadsheet, Haas points out a few other accessibility issues with the game. Firstly, the game does not have colour blind modes. Additionally, the game requires, by Haas's definition, moderate or almost full upper body and arm mobility because the player must be able to press buttons and reach to grab objects. Haas defines moderate upper body and arm mobility in VR gaming as the player needing to be able to lean to either side, as well as lifting and moving their arms, even a little. By full mobility, Haas means that the player must be able to lean from side to side, have a full range of movement for their arms, and be able to grab things (Haas, 2024).

Some additional accessibility settings include the light sensitivity mode as well as subtitles and closed captions. The light sensitivity mode dims the lights and reduces the flickering in the game (Rad, 2020). The subtitles are important for people with hearing impairments to be able to understand what is going on in the game. Michael Anthony (2020) states in a review of *Half-Life: Alyx* on Can I Play That?, an online forum which provides accessibility game reviews by gamers with disabilities, that "the subtitles are hands down the best VR

representation of subtitles” they have encountered. Anthony (2020) reviews the game from the deaf/HoH perspective. HoH stands for heard of hearing. Overall, Anthony (2020) gives the game a positive review and reflects that the execution of the subtitles snapping to the player’s view close enough to be readable and moves away only when forced out. Anthony (2020) also appreciates that the characters' lines are colour-coded, even though there is no clear indication to which characters the colours belong, which means that it takes a while to learn the pattern. Anthony (2020) points out that there are no subtitles for the sound effects, which makes it more difficult to follow the gameplay.

Gabe Mukobi (2020), in a video essay on *Half-Life: Alyx* and universal design, discusses what VR developers and designers can learn from the game. Mukobi starts by praising the amount of accessibility options available in the game, and states that this is an indication of how Valve employed universal design in the development process. The Center for Universal Design at North Carolina State University defines universal design as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design” (NC State University, The Center for Universal Design, 1997).

Mukobi (2020) also talks about the importance of mechanical responsibility in VR development. Mechanical responsibility means that the mechanics and functions in a VR application work as the user expects them to. For example, suppose there is an interactable door in the virtual space. In that case, it should open by turning the handle, rather than a controller input like in traditional user interfaces, such as a PC. This ensures that the experience is as intuitive to the user as possible. Mukobi also highlights the importance of user testing in VR development and claims that the best way to make a VR experience enjoyable for the users is to design it around what the users enjoy. In conclusion, Mukobi (2020) suggests that the combination of universal design, mechanical responsibility and user testing is a solid base for VR developers and may improve VR accessibility in the future.

4.3 Interviews

4.3.1 Interview with Selko Digital

According to an accessibility specialist at Selko Digital, accessibility is currently reviewed with the help of WCAG. Many countries, such as Finland, have placed laws that require products and services to follow these regulations. This is very important, and it ensures equal opportunities for users and customers from different backgrounds to be able to use a product/service. However, WCAG is targeted at web content and not necessarily directly applicable to XR products and services. The WCAG criteria are a good base for XR-accessibility guidelines, but it may be difficult to translate them directly, especially if the product includes a more complex user interface. Additionally, a product that meets the WCAG standards isn't necessarily fully accessible and may still have some accessibility limitations. Commonly, different products/services have unique problems that hinder the usability of said products, which don't fall directly under any WCAG criteria. Accessibility standards are constantly changing and being developed, which is a good thing, but requires developers to stay up to date and to be agile.

An interesting thing to note when talking about the current state of accessibility is the available technologies. Figuring out whether a product/service is accessible or not requires thorough inspection and testing. Currently, there are tools that accessibility specialists use to test products and services for accessibility issues. Depending on the product/service, testing can be done effectively and quickly using automatic accessibility tools. However, much of the testing is done manually by specialists, which is labour-intensive, though important. Depending on the scale of the tested subject, manual testing requires either enough specialists allocated to the project or enough time for a single specialist to complete the testing. Ultimately, automatic accessibility tools as well as AI-assisted testing can reduce the workload of accessibility specialists, but a product or service needs to be reviewed manually to check for errors.

Some tools find the most common accessibility problems, such as missing alternative texts of images, on websites and applications. Additionally, some tools aim to solve specific accessibility problems, such as contrast meters. However, these tools are targeted at web content and traditional user interfaces. Technology is evolving rapidly, and according to Selko Digital, it is important to determine what accessibility means in the context of each new technology development.

It is important to know what the most common factors are that may affect a person's ability to use a product/service. Since visual impairments are among the most common disabilities, many accessibility tools are programmed to find issues that affect the user experience of visually impaired people. Common accessibility problems that impact visually impaired people include missing alternative texts of images, unclear link texts, and too small contrast between assets on the user interface. Sometimes a product is designed in a way that makes it difficult or impossible to use it with a keyboard or a screen reader. All in all, the lack of accessibility varies between products, and therefore, it is difficult to give a straightforward answer to what the most common accessibility problems are.

A theme that came up in the interview, which I found particularly interesting for my thesis, was the social impact of accessibility. According to Selko Digital, making products that are accessible benefits all users. Taking accessibility into account guides developers to create products that are intuitive and clear, which makes it easier for everyone to use said products. Taking accessibility into account increases the overall user experience of a product, regardless of whether a person has a disability or not. A good example of this is having subtitles in a video. Even though a person wouldn't have a hearing impairment and wouldn't usually need subtitles, they might be in a noisy environment where they cannot hear the video clearly and therefore need the subtitles to understand what is being said. Additionally, the need for accessible services is increasing as the population ages.

To summarise, accessibility has taken leaps forward due to legislation. The topic has also taken the interest of many companies and operators. Awareness around accessibility is also increasing, and people are considering it more. AI is also developing and will most likely play a part in recognising and fixing accessibility issues. There is still a lot to do, and as technology advances, accessibility guidelines should too. The development is also slower among those operators and companies that are not required by law to meet the accessibility standard set by the EU or the government.

4.3.2 Interview with Metropolia University of Applied Sciences Lecturer

I found many similarities between the interview answers of both interviewees. According to the Metropolia lecturer, there are guidelines such as the WCAG and the EU Accessibility Regulations that are followed.

The lecturer also talked about testing methods to check a product for accessibility issues. Some issues are technical, meaning they are flaws in the actual product: functionality or UI-related. Some are tested by utilising qualitative evaluation methods. These could be issues regarding cognitive accessibility. Figma also has a variety of tools and add-ons that designers can use to test a prototype for accessibility. As mentioned earlier, these testing tools are used primarily for web development and traditional UIs.

According to the lecturer, many accessibility issues stem from a lack of resources and money, as well as a lack of information or interest. Operators who are not bound by law to make their products and services accessible are not always inclined to do so if they don't have the resources available.

However, designers are trained to take accessibility into account, and it is a foundation of all design. Reasons for this may be that accessibility usually goes hand in hand with usability, and therefore, benefits everyone. Accessibility might also occasionally impact us all temporarily: we might be stressed or tired, or

there might be poor visibility, which affects our ability to use a service. The EU is also promoting accessibility through new legislation.

The future of accessibility is looking brighter due to EU legislation forcing big operators and companies to follow accessibility guidelines and improve their products. New designers are also trained to take accessibility into account in their designs, which is changing the mindset of future designers. Knowing accessibility is currently a standard, without which it can be difficult to be a convincing designer.

5 Discussion

5.1 Findings

The research for this thesis shows that there is insufficient research on XR accessibility and a lack of standardised guidelines. However, the guidelines by Steven Vi (2020) and Heilemann, Zimmermann, and Münster (2021) aim to address this issue. They suggest solutions on how to increase accessibility based on existing guidelines and existing similarities between XR applications. They point out that it requires responsibility, research and motivation by the developers.

Accessibility for XR Design follows many of the principles of accessible traditional user interface design. This is reasonable because these traditional accessibility guidelines have been researched and proven to improve accessibility. Head-mounted XR often relies on visuals and mobility, which present challenges for accessible design, and due to every user being unique, and the wide range of characteristics that cause an individual to require accessible services, it may be impossible to reach absolute accessibility. It is important to note that generalisation of accessibility needs can cause problems and lead to poor design. However, as the research shows, there are ways to make head-mounted XR applications more accessible to a wider audience.

Mukobi (2020) suggests that a combination of universal design, mechanical responsibility and user testing provides a solid foundation for accessible XR design, using *Half-Life: Alyx* (Valve, 2020) as an example. Universal design means that a product or a service is designed to be accessible to all users. According to the accessibility specialist at Selko Digital (2024), taking accessibility into account increases the overall user experience of a product. Both Vi (2020) and Mukobi (2020) talk about mechanical responsibility, which means that the mechanics and functions in a VR application should work as the user expects them to. Vi does not use this exact terminology, but the guideline 8b: Build upon Real World Knowledge – Pair actions with outcomes that users expect serves the same purpose. Many of the sources, including the master's thesis by Steven Vi (2020), the study by Heilemann, Zimmermann and Münster (2021) and the video essay by Gabe Mukobi (2020), underline the importance of user testing because that is the most reliable way to learn what the users consider to be a good user experience.

5.2 Conclusion

In conclusion, XR accessibility is still a work in progress. The guideline documents and case study researched in this thesis provide insight into the current state of XR accessibility and relevant suggestions on how to improve XR accessibility in the future.

For further research, it would be beneficial to develop an XR application following the suggested guidelines by Steven Vi and Heilemann et al. and compare the outcomes. User testing and user research should be conducted in the development process, and the collected feedback should be analysed. The user testing group should include people who require accessible services. Following this method, a synthesis of the guidelines could be formed, which could be compiled into a new XR accessibility design guidelines document. This would add relevant data to the XR accessibility research. Further research should also include more comparative case studies and expert interviews. Mills, Durepos and Wiebe, E. (2010) state that “the goal of comparative case studies

is to discover contrasts, similarities, or patterns across the cases". This approach would help identify the features that make an XR application accessible and what designers should avoid.

The future of XR accessibility also depends on the aspiring industry professionals. Including accessibility studies in the curriculum for XR design students, as it is for digital design students, could have a significant impact on the development of XR accessibility.

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Appendices

Appendix 1 – The Products and Services Covered by the European Accessibility Act

These are the products and services covered by the European accessibility act, listed on the website of the European Commission:

- computers and operating systems
- ATMs, ticketing and check-in machines
- smartphones
- TV equipment related to digital television services
- telephony services and related equipment
- access to audio-visual media services such as television broadcast and related consumer equipment
- services related to air, bus, rail and waterborne passenger transport
- banking services
- e-books
- e-commerce (European Commission, 2025)

Appendix 2 – Interview Transcripts

The interview transcripts of the two interviews are provided here. They are both presented in the original language of the interview (Finnish). The abbreviation Q stands for question, and the abbreviation A stands for answer.

Interview 1 – Accessibility Specialist at Selko Digital

Q1: Mitkä ovat saavutettavuuden tärkeimmät periaatteet, joita pyritte seuraamaan? Onko olemassa listaa kriteereistä, jota yleisesti noudatetaan? Mitä tältä listalta mielestänne vielä puuttuu?

A1: Saavutettavuutta arvioidaan yleensä kansainvälisesti käytetyn Verkkosisällön saavutettavuusohjeiden (Web Content Accessibility Guidelines, WCAG) perusteella. Monien maiden, esimerkiksi Suomen, saavutettavuuslaeissa viitataan WCAG:n A- ja AA-tason kriteereihin. WCAG on yleinen lähtökohta saavutettavuusauditoinneissa.

WCAG tarjoaa hyvän pohjan saavutettavuudelle. Tämä ei kuitenkaan tarkoita, että kaikki WCAG-kriteerit täyttävässä palvelussa ei voisi olla saavutettavuuspuutteita. On tyypillistä, että eri palveluissa on uniikkeja käyttöä haittaavia puutteita, jotka eivät suoraan sovi minkään WCAG-kriteerin alle.

Lisäksi, vaikka WCAG:ta hyödynnetään esimerkiksi myös mobiilisovellusten saavutettavuusauditointien tarkastelussa, on se lähtökohtaisesti tarkoitettu verkkosisällölle. WCAG:n periaatteita on hankalampi soveltaa suoraan monimutkaisempiin toteutuksiin, kuten vaikka VR-tekniikkaan tai peleihin.

Q2: Miten voi varmistaa, että nämä periaatteet toteutuvat käytännössä?

A2: Periaatteiden toteutumisen varmistaminen vaatii palvelun laaja-alaista tarkastelua ja testaamista. Palvelusta riippuen sen saavutettavuutta voidaan tarkastella nopeasti erilaisia automaattisia saavutettavuustyökaluja käyttämällä. Automaattityökalut havaitsevat kuitenkin vain murto-osan saavutettavuuspuutteista. Hyvä tapa periaatteiden toteutumisen varmistamiseen on asiantuntijatestaus, jossa saavutettavuuteen perehtynyt asiantuntija käy palvelun läpi sekä manuaalisesti että automaattityökaluja hyödyntäen.

Q3: Miten lähette tutkimaan, täyttääkö tuote/palvelu saavutettavuuskriteerit? Millaisia työkaluja käytätte/suunnittelijat käyttävät?

A3: Jotta pystymme selvittämään palvelun saavutettavuuden tason, käymme sen syvällisesti läpi manuaalisesti erilaisia teknologioita hyödyntäen. Esimerkiksi verkkosivustojen kohdalla testaamme saavutettavuuskriteereiden toteutumista sekä tietokoneella että mobiililaitteilla, ja käytämme palvelua näppäimistöllä sekä erilaisilla apuvälineteknologioilla, kuten ruudunlukijoilla.

Saavutettavuuden tarkasteluun on kehitetty erilaisia työkaluja. Markkinoilla on useita automaattisia saavutettavuustestaustyökaluja, jotka tarkistavat verkkosivustoista tai sovelluksista yleiset saavutettavuusongelmat, kuten kuvien puuttuvat tekstivastineet. On myös työkaluja, jotka keskittyvät johonkin tiettyyn saavutettavuuspuutteeseen, kuten kontrastimittarit. Hyödynnämme testauksen yhteydessä automaattisia saavutettavuustestaustyökaluja, mutta suurimman osan puutteista löydämme manuaalisella testauksella.

Q4: Mitkä ovat yleisimmät haasteet, jotka tekevät tuotteesta/palvelusta ei-saavutettavan?

A4: Usein esiintyviä saavutettavuuspuutteita ovat esimerkiksi puuttuvat kuvien tekstivastineet, epäselvät linkkitekstit ja liian pienet kontrastisuhteet. Lisäksi on

myös tyypillistä, että palvelun toteutuksessa on puutteita, jotka tekevät sen käytöstä haastavaa tai mahdotonta näppäimistöllä tai ruudunlukijalla. Osa käyttäjistä käyttää palveluita pelkkää näppäimistöä hyödyntäen. Jos jokin toiminto ei toimi näppäimistöllä, voi käyttäjältä jäädä sisältöä hyödyntämättä. Ruudunlukijakäyttö vaatii, että eri elementtien kohdalla välittyy selvästi niiden käyttötarkoitus. Jos elementin ohjelmallisessa toteutuksessa on puutteita, ei ruudunlukija välitä sen kohdalla käyttöön tarvittavaa tietoa.

Saavutettavuuspuutteet vaihtelevat palveluiden välillä, joten on vaikea antaa yksiselitteistä vastausta yleisimmistä saavutettavuushaasteista, jotka estävät palvelun käytön tai haittaavat sitä merkittävästi.

Q5: Miten vastaatte näihin haasteisiin?

A5: Saavutettavuusauditointien parissa työskentelevinä asiantuntijoina emme itse suoraan korjaa eri saavutettavuuspuutteita vaan keskitymme raportoimaan ne asiakkaillemme. Autamme vastaamaan haasteisiin tarjoamalla havaittuihin puutteisiin käytännönläheiset korjausehdotukset.

Q6: Onko saavutettavuudesta mielestänne hyötyä myös ihmisille, joilla ei ole tuotteen/palvelun käyttöä häiritseviä/vaikeuttavia ominaisuuksia? Voisitteko kuvailla tarkemmin?

A6: Saavutettavuus hyödyttää kaikkia, sillä se vaikuttaa myös laaja-alaisemmin käytettävyyteen, palvelun ymmärrettävyyteen sekä yleiseen käyttäjäkokemukseen. Saavutettavuusperiaatteet johdattavat suunnittelemaan palveluita, jotka ovat selkeitä ja joita on intuitiivista käyttää, mikä tekee palvelun navigoimisesta helpompaa kaikille. Monet saavutettavuusominaisuudet auttavat myös tietyissä tilanteissa. Vaikka henkilö ei esimerkiksi normaalisti tarvitsisi tekstityksiä videoissa, voi hän hyötyä niistä meluisassa ympäristössä, jossa ääntä ei pysty kuulemaan hyvin.

Q7: Mitä lähteitä suosittelisitte UX/UI-suunnittelijoille, joista oppia lisää saavutettavuudesta?

A7: Saavutettavuusvaatimukset-sivustolta löytyy kootusti hyviä perusohjeita suunnitteluun.

Selkeästi Meille -hankkeen Kognitiivisen saavutettavuuden ohjeet

Lähtökohtaisesti netistä löytyy hyvin sekä ilmaisia että maksullisia saavutettavuutta käsitteleviä sisältöjä.

Q8: Miltä saavutettavuuden tulevaisuus mielestänne näyttää?

A8: Saavutettavuus on mennyt harppauksittain eteenpäin siihen velvoittavien lainsäädäntöjen myötä. Aihe myös kiinnostaa yhä useampia tekijöitä, toimijoita ja yrityksiä. Tekemistä on silti paljon, jotta saavutettavuus toteutuisi eri palveluissa hyvällä tasolla. Kehitys on hitaampaa niiden toimijoiden ja yritysten keskuudessa, joita lainsäädäntö ei velvoita saavutettavuutta toteuttamaan.

Saavutettavien palveluiden tarve kuitenkin lisääntyy koko ajan väestön ikääntyessä. Onneksi myös aiheen tietoisuus lisääntyy ja siihen kiinnitetään entistä enemmän huomioita.

Uusien teknologioiden tullessa markkinoille on syytä tarkastella, mitä saavutettavuus tarkoittaa niiden kohdalla. Saavutettavuuskriteereiden kehitys jatkuu, ja uusia kriteereitä tullaan lisäämään ja vanhoja poistamaan. Tekoäly kehittyy jatkuvasti, ja se tulee hyvin todennäköisesti olemaan suuremmissa roolissa saavutettavuushaasteiden havaitsemisessa ja korjaamisessa.

Interview 2 – Lecturer at Metropolia University of Applied Sciences

Q1: Mitkä ovat saavutettavuuden tärkeimmät periaatteet, joita pyritte seuraamaan? Onko olemassa listaa kriteereistä, jota yleisesti noudatetaan? Mitä tältä listalta mielestänne vielä puuttuu?

A1: EU:n WCAG ja sen ohjeistukset designereille, muut ohjeistukset esim. Papunet, Selkeästi meille

Q2: Miten voi varmistaa, että nämä periaatteet toteutuvat käytännössä?

A2: Osa on teknisiä ja siten teknisesti testattavissa, osan arviointi perustuu laadulliseen arviointiin (esim. kognitiivinen saavutettavuus).

Q3: Miten lähdette tutkimaan, täyttääkö tuote/palvelu saavutettavuuskriteerit? Millaisia työkaluja käytätte/suunnittelijat käyttävät?

A3: On erilaisia teknisiä saavutettavuustestauspalveluja ja erilaisia kriteristöjä/listauksia, joita vasten voi palvelua peilata. Myös Figmassa on lisäosia, joilla voi testata saavutettavuutta suunnitteluvaiheessa.

Q4: Mitkä ovat yleisimmät haasteet, jotka tekevät tuotteesta/palvelusta ei-saavutettavan?

A4: Tiedon tai kiinnostuksen puute. Saavutettavuuden huomiointi tuottaa pääsääntöisesti laadukkaampia palveluita, joten suurin haaste on raha/resurssit eli se, ettei joku tahoa halua panostaa asiaan joko tietämättömyyttään tai säästääkseen resursseja.

Q5: Miten näihin haasteisiin vastataan?

A5: EU vaikuttaa tähän lakiteitse, joten asia korjautuu pikkuhiljaa. Digitaaliset muotoilijat myös koulutetaan ottamaan saavutettavuus huomioon, se on kaiken suunnittelun lähtökohta nykyään.

Q6: Onko saavutettavuudesta mielestänne hyötyä myös ihmisille, joilla ei ole tuotteen/palvelun käyttöä häiritseviä/vaikeuttavia ominaisuuksia? Voisitko kuvailla tarkemmin?

A6: Saavutettavuus kulkee usein käsi kädessä käytettävyyden kanssa, joten saavutettavuus on kaikkien etu. Saavutettavuus saattaa myös koskettaa meistä jokaista hetkellisesti koska tahansa (esim. kirkas auringonpaiste, meluisa ympäristö, hetkellinen stressipiikki), joten ei ole olemassa ihmistä, joka ei jollain hetkellä tarvitsisi saavutettavuutta.

Q7: Mitä lähteitä suosittelisitte UX/UI-suunnittelijoille, joista oppia lisää saavutettavuudesta?

A7: <https://www.wcag.com/designers/>, <https://www.saavutettavasti.fi>,
<https://papunet.net/saavutettavuus/>, <https://www.selkeastimeille.fi>

Q8: Miltä saavutettavuuden tulevaisuus mielestänne näyttää?

A8: Paremmalta, koska EU pakottaa suuret toimijat kohti parempaa saavutettavuutta. Myös tietoisuus suunnittelijoiden parissa on huomattavasti parempaa nykyään: saavutettavuusosaaminen on standardi, jota ilman on vaikea olla vakuuttava suunnittelija.