Eskil Hognestad

Norwegian Software Developers and Web Accessibility

Master's thesis in Informatics
Supervisor: Trond Aalberg
June 2021

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NTNU

Norwegian University of
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Abstract

There are 80 million people across the European Union (EU) living with a form of disability. Daily, several of these humans get excluded from the usage of information technology (IT) solutions. For ensuring the inclusion of all, several large-scale accessibility efforts have been implemented in the EU over the last years. One of these efforts was affirmed in December 2016, namely The Web Accessibility Directive (WAD) (Lewis, 2019). The EU directive regarding universal design (UD) in information technology systems shall secure more reliable access to websites and mobile applications in the public sector for persons with disabilities. In February 2021, the directive was also included in the EEA agreement and will become part of Norwegian law concerning universal design and web accessibility. The bill was sent to Stortinget for final consideration in May 2021 (UU-Tilsynet, 2021a). Fundamentally, the directive sets the same requirements that already apply to IT solutions and applications and introduces new stricter requirements, including an accessibility statement and a feedback function. The introduction of WAD will also lead to an update of The Web Content Accessibility Guidelines (WCAG). The directive will mainly apply to public organizations in the EU, but private actors will also be affected in Norway.

The goal of this master's thesis is to gain insight into how web accessibility is prioritized in Norwegian IT companies and what the current standing of accessibility competence is among their software developers. In addition, there has been researched on existing process change models to investigate whether these models can contribute to Norwegian companies' implementation of WAD and the forthcoming requirements more efficiently.

The findings and results presented in this thesis are based on a comprehensive background study, survey data, and insight gained through several interviews with software developers.

From the results, it is clear that software developers have a good understanding and knowledge of why web accessibility is necessary. Regardless, it gets deprioritized in work. Several reasons cause the deprioritization, among them are the companies' resource allocation and time distribution. The results also show that the interviewed junior developers have insufficient knowledge of how to solve accessibility requirements. This may be caused by low accessibility-prioritization in the university.

The data collection has contributed to numerous methods for increasing and securing the focus on technical accessibility. One of the central solutions recommended by several interviewed developers is to create internal expert groups responsible for universal design in ICT systems.

Conclusively, a new process change model has been created, summarizing the software developer's wishes and suggested solutions to increase the engagement for web accessibility. This model is based on existing change models and has been developed through exciting conversations with system developers where WAD has been the central topic of discussion.

Sammendrag

Det er over 80 millioner mennesker med nedsatt funksjonsevne i Europa som daglig ekskluderes innenfor informasjonsteknologi. For å sikre at flest mulig blir inkludert, er det gjort flere tilgjengelighetsrelaterte endringer innenfor den Europeiske Union (EU), hvor medlemsland også må implementere disse endringene (Lewis, 2019). En av disse endringene ble vedtatt i desember 2016 i form av et nytt direktiv kalt The Web Accessibility Directive (WAD). EUs webdirektiv om universell utforming av nettsteder og mobilapplikasjoner skal sørge for at personer med nedsatt funksjonsevne har bedre tilgang til nettsteder og mobile applikasjoner i offentlig sektor. I februar 2021 ble direktivet også inkludert i EØS-avtalen og vil dermed bli en del av norsk lov innen universell utforming og teknisk tilgjengelighet. Gjennomføringen av direktivet har enda ikke blitt vedtatt, men i mai 2021 ble lovforslaget sendt til endelig behandling i Stortinget (UU-Tilsynet, 2021a). WAD stiller i utgangspunktet de samme krav som allerede gjelder for IT-løsninger og applikasjoner, men introduserer også nye skjerpede krav, inkludert krav om tilgjengelighetserklæring og en feedback-funksjon. Innføringen av WAD vil også medføre en oppdatering av The Web Content Accessibility Guidelines (WCAG-standarden), som er veilederen for IT-bedrifter når det kommer til teknisk tilgjengelighet i Norge. Som tidligere nevnt, vil WAD hovedsakelig gjelde offentlige organisasjoner i EU, men i Norge har det blitt bestemt at direktivet også vil gjelde for private aktører.

Målet med denne masteroppgaven er å samle innsikt i hvordan teknisk tilgjengelighet blir prioritert i norske IT-bedrifter og hvordan tilgjengelighetskompetansen til deres systemutviklere er i dag. I tillegg har det blitt forsket på eksisterende endringsprosessmodeller for å undersøke om disse modellene kan bidra til at norske bedrifter enklere kan implementere WAD og de kommende kravene.

Resultatet av oppgaven viser til et sett med funn som er opparbeidet gjennom en grundig bakgrunnsstudie, en spørreundersøkelse og ved hjelp av flere intervjuer med systemutviklere. Resultatene sier at systemutviklere har god forståelse og kunnskap om hvorfor teknisk tilgjengelighet er viktig, men at det likevel blir nedprioritert i arbeidet. Det er flere grunner til dette, blant annet bedriftens ressursprioriteringer og tidsbruk. I tillegg viser resultatene til at flere av de intervjuede juniorutviklerne har svært lite kunnskap om hvordan løse tilgjengelighetskrav grunnet lav prioritering fra universitetet. Datainnsamlingen har bidratt til at flere metoder for å øke fokuset på og sikre teknisk tilgjengelighet har kommet frem. Et av de sentrale ønskene var å danne interne ekspertgrupper med ansvar for universell utforming i IKT-systemer.

Avslutningsvis har det blitt laget en ny endringsprosessmodell som summerer opp systemutviklernes ønsker og foreslåtte løsninger for å øke engasjementet rundt teknisk tilgjengelighet. Denne modellen tar utgangspunkt i eksisterende endringsmodeller og har blitt utviklet gjennom interessante samtaler med systemutviklere hvor WAD har har stått sentralt.

Preface

This thesis was written during the fall of 2020 and spring of 2021 at the Norwegian University of Science and Technology (NTNU), Faculty of Information Technology and Electrical Engineering, Department of Computer Science.

I would like to thank the seven software developers that allowed themselves to be interviewed regarding my thesis. Also, my deepest gratitude to Miriam Eileen Nes Begnum for helping me at the beginning of this project; our discussions really helped me reflect on my problem description. Lastly, I want to acknowledge my supervisor, Trond Aalberg, for his support and valuable guidance along the way. Without him, this thesis would not be possible.

Supervisor: Trond Aalberg

Trondheim, 29th of May, 2021
Eskil Hognestad

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Abbreviations

NTNU	=	Norwegian University of Science and Technology
DevOps	=	Development and Operations
EU	=	The European Union
GCP	=	Google Cloud Platform
GDPR	=	General Data Protection Regulation
ICT	=	Information and Communication Technology
IDI	=	Department of Computer Science
IT	=	Information Technology
NAV	=	The Norwegian Labour and Welfare Administration
SRS	=	Software Requirement Specification
TA	=	Technical Accessibility
UD	=	Universal Design
UD in ICT	=	Universal Design in Information and Communication Technology
UN	=	United Nations
WA	=	Web Accessibility
WAD	=	Web Accessibility Directive
WCAG	=	Web Content Accessibility Guidelines

Chapter 1

Introduction

This chapter describes the importance of accessibility, including a description of the motivation behind the choice of research and the related research questions. Also, the research scope and research process are explained in detail. The chapter concludes with main contributions and a thesis outline.

1.1 Motivation

According to the United Nations (UN), Norway has been in the top ten best countries to live in for the last ten to fifteen years. The country scores high on GNP per capita (Bank, 2020), the happiness index (Helliwell et al., 2020), and is one of the top countries in ensuring equality. Nevertheless, from a study conducted by Oslo Economics in 2016 on behalf of UU-Tilsynet, we know that over 290,000 Norwegians suffer from a kind of disability (UU-Tilsynet, 2016) and can feel a form of discrimination in the world of IT. The number of Norwegians with disabilities is presumably higher by now. Persons with disabilities are argued to be the collectively largest group experiencing discrimination in society (WHO, 2020). In addition to these people, other groups risk being excluded, such as the elderly over 80 years of age, first-generation immigrants, and persons with low digital competence. By Norwegian law, discriminating *any* person is forbidden, which means that all citizens should have equal rights and opportunities to use all services, including digital solutions. If systems are created in a faulty fashion, making some users strive to share information, interact or communicate, they are, by definition, discriminating.

Over the last couple of decades, there has been a rapid increase of digital solutions created in the public and private sectors. Usage of ICT systems has become a prevalent and natural part of Norwegian life. Most services are handled digitally, meaning the need for digital competence is more significant than ever. People need to be able to use the created systems. To avoid creating digital barriers, IT companies and their software developers must know how to achieve universal design in ICT.

The meaning of universal design is to develop products, environments, and services that make usage possible for all intended users, to the largest extent possible (Digdir,

2015). In other words, UD covers all disabilities, from physical to psychological, in addition to language and communication barriers.

For a user without any form of disabilities, it can be challenging to remember that digital problems and barriers related to universal design exist. Once you step outside of the web, one gets daily reminders of it. Ramps, signs, elevators, the beeping sound when you are crossing the road, are all examples of universally designed solutions. In digital systems, it can be difficult to notice or even imagine what problems may occur. Some of the more significant issues that seem to be forgotten are missing to include alternate text, support of keyboard accessibility, color contrast, flashing content, or the absence of naming or labeling different parts. These things are not hard to implement, but unfortunately, easy to forget.

The current Norwegian laws regarding UD of ICT are minimalistic. Instead of making laws that secure full accessibility, the laws currently focus on minimum criteria for the resulting end-solutions, such as compliance to the Web Content Accessibility Guidelines (WCAG) (Lovdata, 2013). This legislation does not cover the entire aspect of UD in ICT and is somewhat limiting only to cover *technical* accessibility instead of ensuring *usable* accessibility. Also, quoted directly from the law: "as many as possible" (Lovdata, 2013), is vague, giving enterprises the possibility to interpret the policies and, in the worst case, neglect the importance - resulting in inaccessible solutions. The focus on accessibility may be increased when the Web Accessibility Directive (WAD) is approved, resulting in stricter requirements for Norwegian companies and operations.

This thesis aims to investigate the current knowledge of universal design in ICT, or web accessibility (WA), among Norwegian developers and how their companies are planning to implement WAD. In addition, the developer's thoughts and meanings on how this directive will affect their work are explored. In order to understand how businesses deal with internal change, we also investigate different process change models and try to map out which model(s) can be used for implementing WAD.

1.2 Research Questions

During the planning of this research, several articles regarding WAD appeared, where questions like "Where are the businesses?" emerged (Øyvann, 2018)(Gerhardsen, 2020). One could read about the big governments like the European Union (EU), the UN, and the Norwegian state and their plans for the coming change. However, the engagement from the Norwegian corporations has been distant, leading to a series of questions. These amazements are the basis of this thesis, resulting in four research questions.

1. What is the current knowledge regarding universal design in ICT among Norwegian developers?

2. How did the developers acquire their knowledge?

3. How do Norwegian developer teams solve today's WCAG-standards?

4. How will Norwegian developer teams solve the future requirements regulated by the Web Accessibility Directive and the upgrade of WCAG?

The first two research questions aim to examine the current knowledge of developers regarding universal design in ICT and investigates their backgrounds, interests, and engagement. The third and the fourth RQ intend to look at today's UD practice, how the different teams are build up, and how they operate.

1.3   Research Scope

This thesis's main themes are current knowledge regarding web accessibility and the preparedness for the Web Accessibility Directive. Also, the thesis explores the possibility of utilizing existing process change models for a more straightforward implementation of the directive. The original scope was to base this research solely on developers from The Norwegian Labour and Welfare Administration (NAV). However, after a minor pivot, developers from two other companies, Kantega and TietoEVRY, were included. Each company is based in Norway and is both in-house and consultant companies in the private and public sectors. In addition, this thesis investigates how teams operate in their companies, how they are structured, and which roles exist. Through seven intriguing interviews and discussions, valuable insights have been acquired. Both informant's WA thoughts and meanings, and how different teams are operating. The subject selection process is explained in Section 3.3 and key information about the companies and informants is described in Section 4.1.

This thesis has studied Norwegian IT firms and software developers, and the results may not be transferable to outside this country. However, a summary in a form of a change model has been created, meaning companies needing a suggestion to implement WAD can make use of the findings.

1.4   Research Process

Semi-structured interviews were considered the most suitable research method for this thesis. The method allows for open-ended questions and enables new talking points and reflection from the informant. The subject selection occurred through direct contact with the organizations, and the informants were asked to read and approve a consent form before each interview. All of the interviews took place virtually by using video-chat solutions like Zoom. The selected developers' roles ranged from Front-enders to Project Managers, and the experience level differed between juniors and seniors. The data collected was primarily from interviews, where the data was coded and categorized using a thematic analysis process. These categories were used as a baseline for structuring the findings and answering the research questions. In addition, a survey was sent to collect initial data and for constructing the interview guide. The whole research process is described in detail in Chapter 3.

1.5   Contributions

This thesis contributes with insight into Norwegian developers' knowledge regarding universal design in ICT. With a deep dive into current practices, team collaboration, and personal thoughts concerning accessibility, this thesis explores the future upgrade of WCAG due to WAD. The Web Accessibility Directive is bringing along several new requirements that will, to some degree, affect developers. The focus on accessibility in Europe is increasing and it is the IT companies' responsibility to respond accordingly.

This thesis bases upon existing literature on universal design in ICT, process change models, and Norwegian and European universal design legislation. The data collection comes from a survey and several interviews conducted on Norwegian developers from different companies in Norway. In addition, a new process change model has been developed, named The Accessibility Change Model. The model is produced as a proposal to companies on how they can implement WAD and also increase the accessibility competence and attention in their companies.

1.6   Thesis Outline

The rest of this thesis has the following outline:

Chapter 2 investigates existing literature concerning WCAG, WAD, and national/international legislation. Also, it explains three different models of process change; ADKAR, Kurt Lewin Change Model, and Kotter's Change Model. This sets the stage for further investigation regarding accessibility in Norwegian companies and how changes are made in chapter 4.

Chapter 3 explains the chosen methodology, including the research questions, subject selections, data collection, and analysis. By setting the research in well-known practices and methods this thesis aims to contribute to the existing research body of UD in ICT and process change models.

Chapter 4 discusses the findings and results from the data collection. Also, the chapter introduces a new process change model called the accessibility change model. The chapter concludes with a further general discussion about the subjects found.

Chapter 5 concludes the thesis by summarizing the chosen research areas, future work, key findings of the study, and research process experiences during the study.

Appendices include:

      A The consent form sent to the informants

      B Interview guide in Norwegian

      C Survey from Nettskjema in Norwegian

Chapter 2

Background

This chapter provides the reader with the necessary information that has been extracted from a thorough background study. Section 2.1 introduces web accessibility and universal design with national and international legislation. In the same section, a guide of WAD is provided with some examples. Section 2.2 explores the modern software development process and gives information on how software development teams are constructed, emphasizing different accessibility-related roles. The last part of the background chapter is the research of process change models. WAD will provide some changes in how IT teams create front-end solutions in the future. Therefore, this thesis also examines existing process change models and change management, described in Section 2.4.

2.1 Web Accessibility and Universal Design

Due to human diversity, society necessitates creating solutions that "stretch to the edges in the scatterplot of human needs" (Begnum, 2019). Therefore it is essential to develop solutions and products that can be used for all people, to the greatest extent possible, without specialized design.

For the last ten years, the term universal design has been used. Before that, "barrier-free design" was the correct choice (Persson et al., 2015). *Universal Design* is defined as *"The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design"* (Connell et al., 1997), while in Norway, UD is interpreted as *"as inclusive as possible within reason"*. An essential part of universal design is on the web, called web accessibility.

With the rapid development of information systems, everyone must have access to information and have the possibility to make use of it. Therefore, web tools and websites must be properly designed and coded to ensure no exclusion of humans. Making the web accessible benefits individuals, businesses, and society (Carter and Markel, 2001). Below, a description of the historic events regarding universal design in ICT is presented, in addition to elaboration of Norwegian legislation regarding the theme.

2.1.1 Universal Design legislation for ICT-solutions

As a response to the 20th century social changes, in the form of respect to civil and human rights, medical advances emerged. The likelihood of surviving injuries or illness was greater, meaning people lived longer and the life expectancy of people with severe disabilities increased. Partly driven by many returning soldiers from WW2, the governments responded with equal rights and anti-discrimination legislation (Story, 2001). A new term, "design for all" (Stephanidis, 2001), was introduced, and the EU and the UN sought ways for making a more user-friendly society in Europe. Creating solutions that were easy-to-use, accessible, and affordable became a focus area to improve the quality of life for all citizens. As of 1991, when the internet became public, ICT slowly but steadily became a significant part of human's day-to-day life. In 2006, during an EU-ministerial meeting called "ICT for an inclusive society," the EU created a declaration named eInclusion (EU, 2006), focusing on web accessibility more comprehensively. "The European Commission - Communication" was given the responsibility for following up accessibility in ICT. This commission is working to develop suggestions for improving e-accessibility and is, among other things deciding legislations for which WCAG-standards EU countries must follow (EU, 2021). The commission also formed the European Accessibility Act to improve the functioning of the market for accessible products and services for all member states.

2.1.2 Norwegian Universal Design in ICT legislation

In 2001 during the Bondevik-government, a representative called the "Manneråk-committee" created a report named "From user to citizen - A strategy for dismantling of disabling barriers" (Manneråk et al., 2001) which included a chapter about accessibility on the internet. In the report, technological barriers in the electronic society of Norway are discussed, highlighting and addressing future problems and challenges. In 2008, Stoltenberg's government followed up the promises of universal design and created an action plan for offensive ICT-politics in the public sector. Here it was decided all technological development within ICT and media had to be universally designed (Stoltenberg et al., 2005). In 2009, the Discrimination and Accessibility Act was created and required all new ICT systems from 2011 to be technically accessible. Additionally, due to a standard ten-year period (Huitfeldt et al., 2009), all existing Norwegian public-facing ICT systems need to be technically accessible from 2021. As a response to the lack of routines for measuring and ensuring universally designed ICT solutions, success criteria from WCAG were included in the regulations on UD in ICT (Lovdata, 2013). However, the regulations were limited to only include web solutions and vending machines. The principles for web solutions were set to the minimum standards of the Web Accessibility Initiative (WAI) WCAG 2.0 AA-level with a few exceptions. The Directorate for digitization (Digdir) controls compliance with the law. The regulation applied to all solutions directed to the public of Norway, defined as a large, unspecified group, including distinct target groups (Digdir, 2015). In 2014 Digdir also included mobile web-based applications to fall within the same law. As of 2016, the Solberg government revealed an action plan that referred to accessibility in information and communication technologies. The project included UD practices inside the education sector because the usage of ICT tools increased within the schools (Horne et al., 2016). During the summer of 2019, an update of the Norwegian legislative was ex-

pected, namely the Web Accessibility Directive, that would update WCAG 2.0 to 2.1. This directive was taken into effect in September 2018 in the EU but is yet to be approved in Norway. However, in May 2021, the proposed bill regarding WAD was sent to Stortinget for consideration (UU-Tilsynet, 2021a).

2.1.3 Web Content Accessibility Guidelines

The Web Content Accessibility Guidelines, or WCAG, is a set of standards to ensure and help developers to create access-friendly mobile- and web applications. W3C creates the guidelines in cooperation with individuals, organizations, and governments worldwide. By following the guidelines, developers secure creating and operating applications that provide alternate ways for users to perceive, understand, navigate and interact with the web content (Caldwell et al., 2008). WCAG includes guidelines, success criteria, and four design principles called POUR:

- **P**erceivable: Information and UI components must be presentable to users in ways they can be perceived.

- **O**perable: UI components and navigation must be operable.

- **U**nderstandable: Information and operation must be understandable for the users.

- **R**obust: Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.
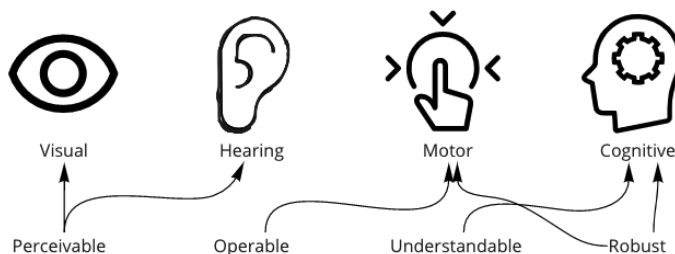
Figure 2.1: POUR

The guidelines are the chosen standard for several western countries to follow, including the United States, the European Union, UK, Canada, and Australia. The current active version of the guidelines that are being used in Norway is WCAG 2.0. By Norwegian law (Lovdata, 2013) 36 of 61 success criteria must be met in all areas of society. This includes web solutions, digital learning tools, public systems, e.g., ticket machines. The success criteria are divided into three categories; A, AA, and AAA, where the AAA criteria are the strictest of the standards.

In several cases, the standards overlap. For example, the requirements for contrast are in the categories AA and AAA, giving some differences. It is the discipline level and the country's law that decide which one is to be used. The Norwegian law regarding

accessibility was announced the 25th of June 2013 and has been the applicable regulation since.

2.1.4 The Web Accessibility Directive

As mentioned in Section 2.1.2, an upgrade of WCAG was taken into effect by the EU in September 2018. The Norwegian guidelines will also be updated which will regulate the current law regarding universal design in information technology. The directive causing this upgrade is called the Web Accessibility Directive and will give developers increased and stricter standards to follow when developing new web solutions and applications. Furthermore, existing solutions must also be compliant with the new criteria. The upgrade of WCAG, from 2.0 to 2.1, gives a total of 17 new success criteria, where the Norwegian guidelines will include 12 of them. However, standards with category AAA will not be covered. Table 2.2 shows an overview of the standards included in the Norwegian guidelines.

As an example of how this works, we will look at one success criteria, 1.4.4 (AA), from WCAG 2.0. and 1.4.10 (AA) from the new standard 2.1. Criteria 1.4.4 states that font-size of text must be changeable up to 200% without losing content or information. As we can see in table 2.2, criteria 1.4.10 *Reflow*, states that content shall be mutable up to 400% without loss of information or functionality.

Criteria	Level	Change	Target group
1.4.4 Resize text	AA	Text can be resized without assistive technology up to 200 % without loss of content or functionality	70%

Table 2.1: WCAG 2.0 1.4.4 Resize text Standard

In practice, both criteria would apply even though criteria 1.4.10 sort of overlap criteria 1.4.4. The meaning of criteria 1.4.10 is how dynamically adaptive the information is for usage from various users and the allowance of giving the user a more accessible way for perceiving the information. Figure 2.2 shows an example of what criteria 1.4.10 in practice means (top right corner shows how much zoomed). Additionally, WCAG includes requirements for usage of mobile systems, which applies to touch screens, gestures, and prevention of activation of content unintentionally, e.g., shaking the phone to regret, which is a default feature for all iPhones.

Another example is WCAG 2.1 criteria 4.1.3 called Status Messages (AA). The upgrade intends to support visually impaired persons who may use screen readers for navigation when visual automatic content is displayed. As a blind or low-visioned person, these messages may be hidden for perception. For example, if a user searches for something on a website, the update "87 results found" would be read to the user if this criterion is implemented. Figure 2.3 shows an visual example. The user has searched for "Universal design in ICT," and the search engine has found over 13 million hits. As an alert, and if the implementation is correct, the screen reader will notify the user by reading the message, providing the user this particular information.

Criteria	Level	Change	Target group
1.3.4 Orientation	AA	Users can decide to view content in a vertical or horizontal orientation.	Impaired hand functionality, vision.
1.3.5 Identify Input Purpose	AA	Schemas are coded with input purpose	Impaired cognition, impaired motor skills.
1.4.10 Reflow	AA	Content should be mutable to 400% size without loss of information or functionality.	Impaired vision.
1.4.11 Non-Text Contrast	AA	Non-text content should have a contrast ratio to at least 1:3 for colors beside each other.	Impaired vision.
1.4.12 Text Spacing	AA	Text spacing should be mutable for easier readability.	Impaired vision, impaired dyslectics.
1.4.13 Content on Hover or Focus	AA	Users should have more control over content that are in focus or hovered.	Impaired vision, cognition, hand functionality.
2.1.4 Character Key Shortcuts	A	Users should easily disable one-key-shortcuts.	Impaired hand functionality.
2.5.1 Pointer Gestures	A	Content shall be usable with simple pointer-inputs.	Impaired hand functionality, motor skills, cognition.
2.5.2 Pointer Cancellation	A	Easier prevention of unintentionally pointer clicks.	Impaired hand functionality, cognition, vision.
2.5.3 Label in Name	A	Users using visual lead texts shall also be able to use coded lead texts.	Impaired motor skills, cognition.
4.1.3 Status Messages	AA	Users shall get messages regarding important changes on web site without changing the context.	Blind people, impaired vision, cognition

Table 2.2: Changes included in WAD
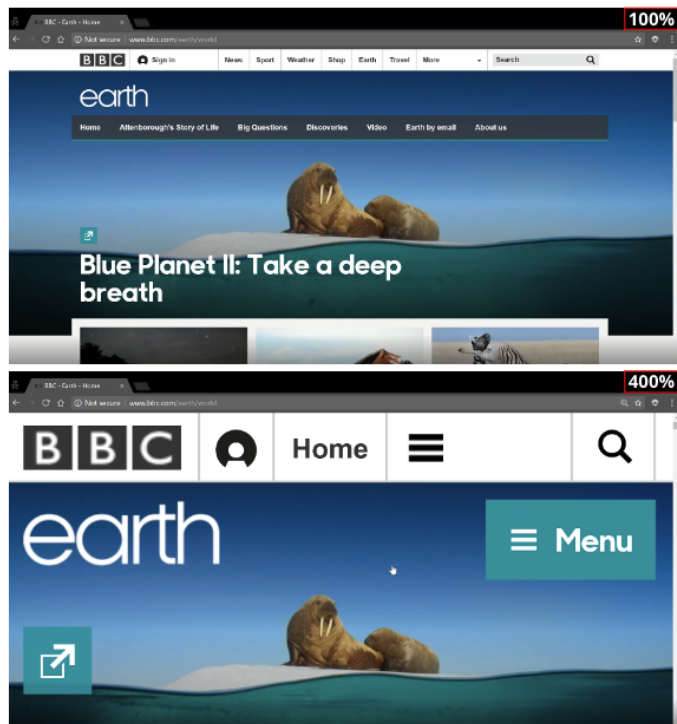
Figure 2.2: Criteria 4.1.10 Example
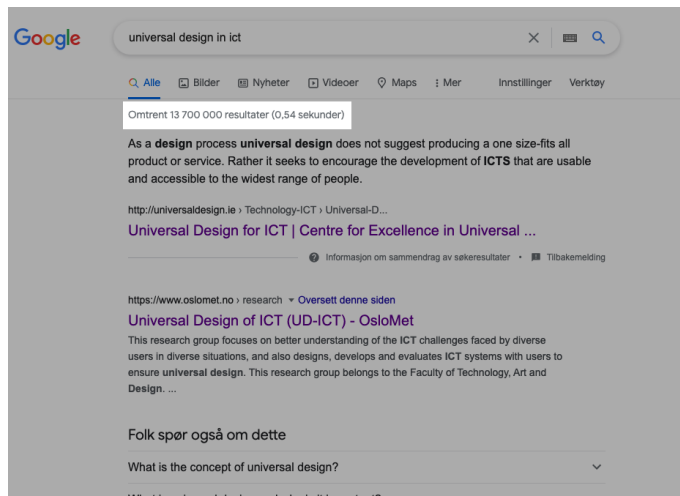
Figure 2.3: Criteria 4.1.3 Example

The directive also includes requirements for companies to have an accessibility statement. The statement holds an overview of new requirements, how they were tested, which conditions are still in development and, an overview of not-finished success criteria. The meaning behind the accessibility statement is for companies to be aware of pages and systems that are not following the standards and has to be improved. Furthermore, it will perform as guidance for users questioning how to get information accessible (UU-Tilsynet, 2021b). Digdir is currently working on a national solution that companies can use if desirable (UU-Tilsynet, 2021c). Such a solution will be free of charge. In addition to the accessibility statement, users of the potential solution must have the opportunity to give feedback. If this feedback is regarding accessibility, the company shall answer feedback "within a reasonable time", possibly 3-6 weeks (UU-Tilsynet, 2021c). Moreover, internal systems must be UD-friendly in the public sector. In other words, WAD will impact both public and private sectors, resulting in an increasing focus on UD and technical accessibility.

The Web Accessibility Directive was decided incorporated into the EEA agreement on February 5th 2021, which means it will sooner than later be affecting Norwegian firms.

2.2   The Software development process

Throughout history, the software development process has rapidly improved with several different conventional methodologies. Numerous methods have been introduced where the most known are methods for securing satisfactory work progress e.i. agile or the water-fall model. However, management procedures also ensure a positive work environment, e.i. the PDCA (Plan, Do, Check, Act) method (McComb, 2008). These methods are often called management methods. Here, we primarily focus on the methodologies in the software development process.

Software methodologies have often separated into two categories; traditional and agile. In the traditional category, the most known model is perhaps the waterfall model constructed in 1970. The model emphasizes a structured progression between defined phases. Each phase consists of activities, where each step must be finished before the next phase can begin. The first step defines what the system will do, the next describes the design. Then the third stage starts the actual coding, while the second last step is meant for testing. The last part is the actual implementation of the system (Awad, 2005). Waterfall allows for feedback loops and iterations but is today regarded as antiquated because it offers low compliance in the project cycle. Traditional methodologies have existed for a long time and hold disciplined processes for trying to create effective and predictable development. They are regarded as unsuccessful and are more challenging to use than not. There are several reasons for these methodologies not to be successful; they have a predictive approach, meaning the first part of planning the work is often redundant due to new and coming requirements. Also, they need comprehensive documentation, meaning all of the client's requirements must be documented before the system's actual creation (Awad, 2005). In reality, this is not easy to achieve. Information technology system has rapidly changing requirements, and it is relatively rare the clients or the systems are having a fully finished and defined requirement specification.

More modern methodologies exist in the agile category. The agile methodology came as a reaction to the traditional software development strategy, such as waterfall. Instead of developing in a linear sequence, the agile way encourages developers to work in iterations and increments. This way, the software development process is more adaptive to new requirements, and the finished result is often more robust and extensive. Each iteration involves cross-functional teams working simultaneously on planning, requirements analysis, design, coding, and unit/acceptance testing. Since the agile manifesto is somewhat transparent, there have been a lot of different agile styles that have occurred, where the most known are Scrum (Schwaber and Beedle, 2002), Kanban, and Extreme Programming (XP) (Lindstrom and Jeffries, 2004).

Today, most development teams are using a form of agile methodology, where they have included different working activities in their workflow. Activities like daily stand-up meetings, sprint reviews, and planning games are often being practiced. For using software development methodologies, it is advantageous to work in an established enterprise. Startups tend to struggle to follow a defined methodology. Rejecting the notion of controlled and relatable processes, startups prominently take advantage of relative and low-precision engineering practices (Tanabian and ZahirAzami, 2005). Teams from established companies that work for designated clients are often given a software requirement specification (SRS) for controlling and knowing the different assignments and responsibilities. There is
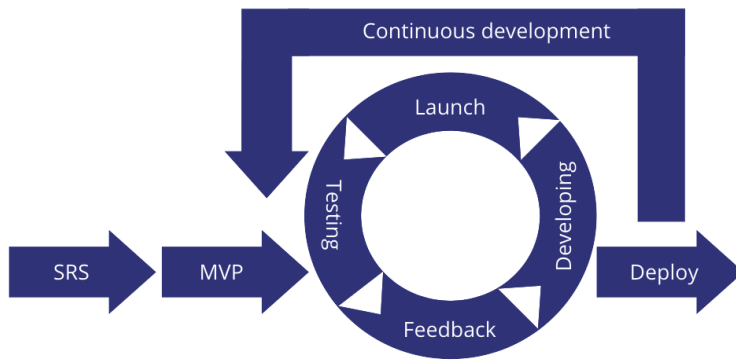
Figure 2.4: Agile software development process example

no specific way to create the SRS, but it must be pragmatic and straightforward (Greenspan et al., 1982). Directives from organizations like the EU or the Norwegian government can be viewed as an SRS. Therefore, WAD can be considered a national SRS, giving the different enterprises structured guidelines and rules. Figure 2.4 shows an example of an agile development process. The team receives an SRS, creates a minimum viable product (MVP), and delivers continuous improvements and add-ons.

2.3 Modern Software Development

Several specialists create modern-day software development teams with different expertise. For learning about these individuals, we take a look at the different roles and how the team members have gained their education.

2.3.1 The Education

When working in a software development team, several roles exist. From the educational point of view, we separate the studies into two categories; traditional and modern. In the traditional category, we mean engineering backgrounds from universities with three or five years of education. NTNU Trondheim is an example of a university giving this type of education. These educations rely on heavy theoretical practices but are also having some subjects that are work-oriented. There are few hands-on tasks for learning techniques and principles or problem-solving. Students are expected to learn these things by themselves (Leikanger, 2016). Graduates from the traditional category often have broad knowledge regarding several fields of IT, but not specialized expertise. Examples of finished degrees are MCs in Informatics, Computer Science, or Industrial Design Engineering.

In the modern category, we find more specialized and practically oriented educations. Schools like Oslo Met and Fagskolene are in this category and are offering work-oriented studies, preparing students for jobs in real life. Students get hands-on examples on how to

solve real problems, and the educations give the graduates specific titles like app-developer or UX-designer (OsloMet, 2021).

All of the educations results in the different roles needed for modern software development teams. The main difference is the traditional educations have a more theoretical approach while modern educations provide an in-use method for the students. According to a study done by Støren et al. (2019), Norwegian companies do not favor either of the educational directions.

2.3.2 The Roles

Several specialists create modern-day software development teams with different expertise. Below, the thesis explores these roles and their responsibilities. Front-end developers, UI/UX Designers and Testers are elaborated since they are most relevant for web accessibility.

Front-End Developer

The front-end developer is the point of contact between the end-user and the delivered business solution. The role's most significant responsibility is to ensure the best possible application reception by the user. The front-end is the selling side of the systems, meaning it is the part of the system that the users explore and get to see (Lindley, 2017). Important factors of a front-end developer are to have good communication with the UI and UX designer and be open to finding solutions when problem-solving. Concerning accessibility, the front-end developer has to ensure the solutions are user-friendly and follow standards like e.i. WCAG. Besides, the front-end developer is the creator behind the visual and interactional parts of a website. Therefore it is essentially the frontender's responsibility to ensure accessibility and universal design.

UI and UX Designer

The UI (User Interface) and UX (User Experience) designer's job is to prepare and design the user interface and ensure the user experience. It means transferring content, style, and graphics connected with a client or product to lay the best presentation for the end-user (Stevens, 2020). Traditionally, the UI and UX designers have automatically worked with accessibility requirements in the viewable parts, including color choice, contrasts, and size regulation. UI and UX Designers can contribute to the accessibility solutions by improving or assisting the developers in finding more innovative solutions by being creative (Da Silva et al., 2013). For example, including animations of content being resized when moved or changing the shade of color when onClick-actions are registered. These minor alterations can be helpful and combine artistic value with accessibility. They can also support by deciding what styles the different solutions should have. For example, making sure the font style is separating the letters that look similar: 'i' & 'l', 'g' & 'q' or 'b' & 'd', for mentioning some (Gkogka, 2020). Overall, the UI designer decides the structure of how web pages and other front-ends should look, while the UX designer research and ensures the experience of the user is excellent.

Tester

Some teams operate with designated testers. Software testers need to be capable of designing test suits and have the ability to understand usability issues. In addition, the tester must know accessibility issues, making sure the tests also check errors regarding UD in ICT. Important factors of a tester are to have good communication skills for effective interaction with the development team (Pikkarainen et al., 2008). Testers in software development teams are also having the responsibility of testing the solutions on user groups. Here, several testing techniques can be used. The testers are traditionally included at the end of the iteration, giving feedback to the development team for further improvements. Now, they are often working alongside the developer and continuously testing the solutions developed (Auerbach, 2015). Continuous testing is being performed for giving rapid feedbacks and constant improvements.

Other key roles in software development teams are:

Project manager - Higher level operations like budgets, risk analysis and contracts.

Product owner - Business value maximization and focused on constant changes because they are using agile methodology.

Team lead - Often, a developer's role and has leadership qualities.

Tech lead - Often a developer's role. In charge of technology decisions.

Full-stack developer - Developer with no necessary tremendous skillset on either side of the stack. Overall knowledgeful.

Back-end developer - Expert in back-end development.

For the last couple of years, it has been popular to call complete teams with expertise in all fields for interdisciplinary development teams. These teams are often only created by the traditional roles, but in some cases, they also include employees with no technical background. These members handle the "big picture" things like the legal department, economics, user groups that will use the systems and perform user testing. The main idea is to assemble all interests in one area for quicker responses and testing. Structuring teams like this gives a more effective team collaboration, saving resources and time in the long term (Flowers et al., 2000).

2.3.3 Software Requirement Specifications

As already discussed, WAD is a directive giving developers new requirements for creating solutions. Following demands is nothing new inside the world of IT and is being done regularly. The last significant directive influencing all IT companies was the general data protection regulation (GDPR) (Lovdata, 2018). Other than these directives and national/European decisions are development teams following other specifications given by their clients. These requirements are on a more modest measure, seen in the grand scheme. However, the developers must follow these requirements to create the correct solution. The software requirement specification (SRS) describes a software system to be developed and lays out the functional and non-functional requirements. In some cases, it also includes user stories describing the user interactions. The SRS sets the framework that every team involved in the development process must follow, and the creation of the SRS is the client or the owner of the project's responsibility. It takes form by collecting inputs from selected target groups and setting a scope where the solution will give value (Doe, 2011). The use of SRS has become a daily part of software development teams creating systems for clients.

2.3.4 The Accessibility Responsibility

Early controlling the necessity for accessibility can help teams to be more effective when developing software solutions. If acknowledging the need for WA at the end of the project chain, the results can lead to unnecessary issues late in the project. Understanding how vital accessibility is from the beginning would save the software development team an amount of time and resources which can be used on other system parts. The goal is to plan the proper intervention of accessibility, by the right person, at the right time within the web development lifecycle. When following the W3's accessibility responsibility breakdown (WAI-Engage, 2012), it is clear that front-end developers are having the most significant part of the responsibility. Here, W3 categorizes the front-enders to include graphic and interaction designers, HTML/CSS prototypes, and content strategists.

Their responsibilities involve creating the correct schematics of a web page, ensuring the system is POUR-friendly and has the power of making equal approachability a reality. Several frameworks and tools exist for securing accessibility. For example, Accessible Rich Internet Applications, or ARIA, is a framework for helping front-enders develop web-accessible applications and present content for people with disabilities (Taylar, 2018). ARIA can be used as an indicator of the current state of a web component to a screen reader or an input device. Front-enders should make use of existing tools and frameworks, helping them to create WA-friendly solutions.

2.4 Processes of Change

The introduction of WAD will force enterprises to make some internal changes. Accessibility should become a focus area, and therefore Norwegian businesses must create an inner management change for achieving it. Change is inevitable; it happens all the time, all around, also in software development. The rest of this chapter will be focusing on change management, different change models, and existing theories linked to the topic. There are many exciting topics regarding change, but we will focus on change in teams and management in ICT.

2.4.1 Change management

When discussing change management, we include processes a company or an organization uses when implementing changes in their operating methods, technological and organizational models, structure, or strategies, in addition to the different outcomes these changes are applying. Reasons for change management are often a response to new demands or internal or external pressure of change. For leaders, three dimensions need to be balanced when introducing changes (Cameron and Green, 2019);

- Outcomes: developing and delivering clear outcomes;

- Interests: mobilizing influence, authority, and power;

- Emotions: enabling people and culture to adapt.

The leaders are in the center for making sure to shape and direct these dimensions. It is easy to only focus on one of them, but as a leader, there is essential to juggle the dimensions successfully to ensure each one is in view. Implementing changes can be a difficult job because there are often many stakeholders, as said by Lewin (1951):

> "Changes involves a condition of stable quasi-stationary equilibrium."

In other words, Lewin is saying that changes are a force, much like a river, and it is the manager's responsibility to influence the velocity and direction it will take (Hayes, 2018). Change is happening, but the tempo can be affected and tamed.

One of the significant impacts of being successful in implementing changes is organizational culture. A strong culture promotes motivation and innovation and the creation of affiliation (Cummings and Worley, 2014). The culture within an organization is affected by three conditions, management, national culture, and the market. Management can influence communication, socialization, rituals, ceremonies, storytelling, and language (Hennestad, 2012). The nation's culture influences through current norms for distribution of power (how tolerant employees are to the distance of authority), individualism, and gender roles (Hennestad, 2012). Market influences how the business is willing to take risks and how quickly the company receives feedback regarding its strategies and decisions. If the culture becomes problematic, meaning the thoughts, values, or opinions, a culture change is necessary to function optimally. Therefore, upper management must have a clear vision the employees can relate to and be motivated by. In some cases, it is practical to have a visual front person responsible for the incoming changes, hiring new employees viewed

as experts, or taking other similar actions. Also, the leaders must handle opponents, adapt the business model and keep the sensitivity regarding ethics and politics (Cummings and Worley, 2014). In the process of change, the expectations of the management are often high. Employees expect the necessary and correct steps are taken to ensure the changes are included as planned. Likewise, strategies and methods should be made to make the change's execution as effectually and time-saving as possible. Further, the management is expected to include employees during the process and minimize harmful effects and nurse the organizational culture, making sure all involved are focusing on their tasks (Øyum, 2006). John Kotter's 8-step model is a recognized model regarding processes of change. Kotter and two other process change models will be further explored later in this chapter.

2.4.2 Change in Teams

A *work team* is defined as *"A small group of individuals who share responsibility for outcomes for their organizations"* (Sundstrom et al., 1990). The teams can be structured in several ways, but we mainly focus on product teams (or self-managed teams) and project teams in this thesis. The main difference is that project teams are formed to complete a project and answer to a supervisor, while product teams are not directly managed by one leader but are collaboratively in charge of decision-making and team performance.

Project teams are often time-limited and are focused on an external client or an internal one-off. There are frequently designated roles inside a project team where a project manager is usually included. Working as a project manager, you are responsible for leading the team and report to the project sponsor (or client). The measure of success is on-time delivery, quality, and how much resources were spent. These teams are often associated with implementing change, which does not necessarily mean that each team member separately is. One of the problems that can occur when the need for change comes is that the importance of the change task triumphs, resulting in reduced team maintenance. In the worst case, effective teams can be turned ineffective. Also, the dynamics between the team and the organization can be tested where the change will take place (Cameron and Green, 2019).

Product teams are often focusing on products inside their frame of expertise. These teams are build up by different proficient roles that cover all possible problems that may occur. The development and operation of existing solutions are generally more emphasized than delivering and implementing change. (Lucas, 2018). Before conducting a change inside a company, it is essential to know how to structure the teams and then implement changes.

2.5 Process change models

Facilitating effective and successful change can be difficult. The secret often lies beyond the visible and busy activities that surround the changes. In this section, the thesis investigates the most popular and recognized process change models.

2.5.1 ADKAR

The ADKAR model is a popular framework for understanding change at an individual level. The founder of Prosci, Jeff Hiat, created the model in 2003 and is considered a helpful model that supports employees to more easily go through change (Jouany and Martic, 2020). Figure 2.5 shows the five elements included in the ADKAR model. In some cases, it is helpful to look at these elements as building blocks, meaning each phase builds the possibility to realize the changes.
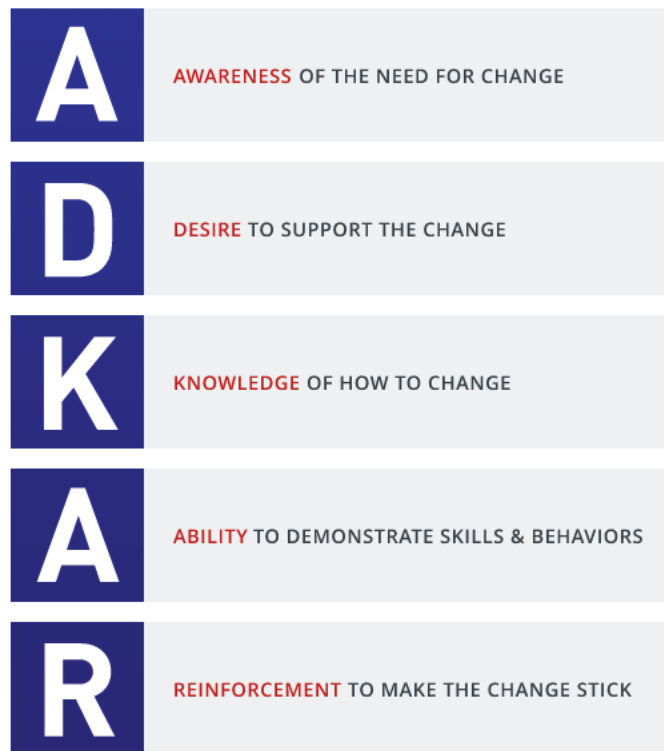
Figure 2.5: The ADKAR model

1. Awareness

It is important to announce that changes are coming in the awareness stage, why they are necessary and possible outcomes. It is always essential to have open communication,

creating a possibility for the employees to ask questions and make suggestions.

2. Desire

Desire is about to measure the employees' reactions and identify champions or wizards that can help administer the changes painlessly.

3. Knowledge

Knowledge is about providing training and coaching to show what employees need to do after the change occurs. This stage is suitable for addressing skill gaps and offering resources to reduce these gaps.

4. Ability

The ability stage is about doing practice runs *before* the change is fully implemented. Here it is essential to set reasonable goals and metrics.

5. Reinforcement

The last stage is reinforcement, and it is about monitoring the changes over time, ensuring the desired outcome is achieved. The elements of this model fall into the natural order of how changes are experienced. *Desire* cannot come before *awareness* because the desire would not exist without the awareness of needing to attend the change. Same for *knowledge* and *desire*. For getting the knowledge needed to create changes, one must first have a desire to be willingly absorbing new knowledge (Hiatt, 2006). The ADKAR model is placing the individual in the center. As a manager, it is vital to motivate and create an urge for change within the individual's mindset.

2.5.2 Kurt Lewin Change Model

When researching for change models, there is impossible not to come across the name of Kurt Lewin. Lewin has been a pioneer in the field of process change. Although his models are first and foremost meant for the managers of organizations, it is adequate to include his thoughts in this thesis. Figure 2.6 visualize Lewin's change model. Imagine an ice block. We heat it until it becomes water, reshape the ice to look like something new, and then refreeze it. Now, we have something new molded by the same original material. The model is divided into three parts:

1. Unfreeze

Unfreezing is the first step of Lewin's change model. Lewin looked at the stability of change to be a continuous river. For making changes, one needs to destabilize (unfreeze) it. Only then is it manageable to discard old, outdated practices and successfully adopt new behavior (Burnes, 2004). Much like the *awareness* and *desire* in the ADKAR model, the first stage is about preparing the organization to accept that the change is necessary. The ideal strategy is to motivate and focus on the upcoming benefits and values that the

Figure 2.6: Kurt Lewin change model

change will provide. In addition, it is important to emphasize the *why* and create a need for change (MindTools, 2020). The unfreezing phase is about ceasing old habits and creating a climate receptive to change.

2. Change

This step is also called *moving* or *transition*, and is about executing the planned change. This phase is a process to learn new methods and systems that are meant to be adapted in the organization or workflow. The general idea is that people and routines are now "unfrozen" and ready to move towards the desired state. One of the challenges related to this phase is to attempt to predict or identify a specific outcome from the planned change, so there is often better to identify and evaluate, on a trial and error basis, all available options (Burnes, 2004). Steps that are important for successfully managing this phase are constantly communicating, answering questions, and engaging people to commit to the changes.

3. Refreeze

By refreezing, Kurt Lewin means reinforcing and institutionalize the desired changes. This is done by ensuring the changes are widely accepted, utilized always, and incorporated into the business structure. Stability and confidence among employees are key factors in this phase, securing them to be confident in what to do and how to do it. Lewin saw successful change as a group activity, meaning that unless group norms and routines also are transformed, the changes may be short-lived (Burnes, 2004). The goal of the refreezing phase is to reinforce changes to make the new process accepted.

2.5.3 Kotter Change Model

John Kotter's 8-step process for leading is built up of eight phases that can be used as a guide for successfully performing change management. For succeeding, management should follow the eight steps in a specific order, from 1 to 8 (Kotter, 2021). Kotter has been

1.	Establishing a sense of urgency
2.	Forming a powerful guiding coalition
3.	Creating a vision
4.	Communication the vision
5.	Empowering others to act on the vision
6.	Planning for and creating short-term wins
7.	Consolidating improvements and producing still more change
8.	Institutionalizing new approaches

Table 2.3: Kotter's 8 steps

a significant figure regarding organizational change since his paper "Leading Change" was published in 1995 and his book, with the same name, in 1996. Kotter meant that by following the eight steps, the outcome would be a success. The essence of each step is to change human behavior by influencing them intellectually (Nguyen, 2014). Below, a summary of each step is provided, including the most critical factors of each phase.

1. Establishing a sense of urgency

To implement changes, most employees must want it. It must be shown, and a sense of urgency should be developed. Otherwise, the effort may be too low. In the article from 1995, Kotter claims that the "urgency-level" needs to be at 75% for enabling leaders and employees, meaning 75% of the staff must be wanting to perform some change and share a form for urgency.

2. Forming a powerful guiding coalition

This step is about creating a task force to be "in front" of the change, meaning that this group is being used as leading stars to help navigate co-workers during the change period. This coalition can be a conglomerate of senior management and key influences within the organization. There are four key factors essential for the individuals guiding the coalition; power, expertise, respect, and leadership (Cunningham and Kempling, 2009).

3. Creating a vision

For having an effective change process, Kotter means that creating a vision is very important. This vision can be used as a road map for the change effort, where strategies can be developed for handling the different phases of change in a genuine manner. As written in Kotter: *"[...] the guiding coalition develops a picture of the future that is relatively easy to communicate and appeals to customers, stakeholders and employees* (Kotter et al.,

1995). The vision phase goes beyond marketing and budgeting and gives the organization a direction in which it needs to move.

4. Communicating the vision

The fourth step is about communicating the change and visualize it to all employees. This can be done by involving key influencers and facilitating various talks for the employees. The important part is to engage the employees, keep up the momentum, and reduce uncertainty and confusion.

5. Empowering others to act on the vision

To only communicate the vision is rarely enough. The employee may understand *why* and wants to contribute, but sometimes something or somebody is blocking the path (Kotter et al., 1995). Therefore, this phase includes removing barriers and obstacles. Kotter addresses four significant barriers: structures, skills, systems, and supervisors. The goal is to remove these barriers and nourish a culture of new approaches and ideas, making an innovative organization.

6. Planning for and creating short-term wins

Planning for short-term wins means creating milestones for ensuring the motivation of the employees and not losing momentum. Making and achieving short-term wins concerning the change also gives certainty for the organization that they are heading in the correct direction, reassuring both employees and management.

7. Consolidating improvements and producing still more change

One of the significant pitfalls, according to Kotter, is declaring victory too early. Managers tend to prematurely announce change initiatives as successful and completed at first sight of performance improvements and after the first project has been completed (Kotter et al., 1995). This can risk employees going back to old habits and forgetting the changes that have been implemented. Change processes are often time-consuming and are only completed when the change has sunk deeply into the organization's culture.

8. Institutionalizing new approaches

Change is only successful when the change has been a part of the organization's culture, becoming a *"this is the way we do things around here"*-thing (Kotter et al., 1995). When this is achieved, it is essential to underline the positive effects of the change. Kotter exclaims that two factors are essential here: demonstration and assurance. The first is to demonstrate or show the employees that the new way works and it has helped the organization's performance. Let the employees see the bigger picture and connections to improvements connected to the change. Also, the assurance part of this phase is to ensure the employees that future management will continue using the new changes and make sure that everyone knows this change has come to stay.

Chapter 3

Methodology

This chapter describes the methodology used in this research, including an illustration of the research process. In this chapter, we revisit the research questions and explain how the data collection was conducted. The chapter ends with information regarding the data analysis and describes the analysis process.

3.1 Research Method

This study seeks to generate knowledge by investigating the events and actions of those who experience them and are therefore, in an exploratory nature (Oates, 2005). At the beginning of writing this thesis, several data generation methods were considered. A quantitative research method could give interesting conclusions and connections and provide a handful of straightforward analysis methods. However, a quantitative research method requires several participants for the collection of data, which can be a limitation to the research process (Queirós et al., 2017). Instead, a qualitative approach was considered the most suitable option for generating the most valuable data when exploring developers' views and knowledge regarding web accessibility. A qualitative research study allows for finding and examining large amounts of unique data (Sutton and Austin, 2015). In addition, several study methodologies are available, making the qualitative strategy a fitting option for writing this thesis. Observations were considered too time-consuming and challenging to implement due to Covid-19 restrictions, making it hard to attend and plan physical meetings. Field research would be an appropriate strategy for giving an in-depth analysis of a real work team. However, the research would only appeal to the actual team, and it would be impossible to implement during these restricted times.

For ensuring reliable data, semi-structured interviews were contemplated as the most viable research method, allowing openness and empowerment of the informant for free thoughts and discussions while creating new topics and talking points. Semi-structured interviews give flexibility in designing and refining the interview guide and conducting the interviews, which is probably the primary key to success when using this technique (Horton et al., 2004). The interviews occurred over video chat to avoid possible infection.

Several themes were included in the discussions, resulting in a multiple case study approach. The overall study is regarded as more unyielding when conducting multiple case research (Herriott and Firestone, 1983).

For creating a good interview guide and starting the data collection, a survey was formed. Using surveys is usually considered a quantitative research method (Queirós et al., 2017). However, in this case, its primary objective was to help to create questions and topics to be used in the semi-structured interviews. It also contained questions, where the answers gave valuable input to the overall data collection. Figure 3.1 illustrates the steps in the research process.
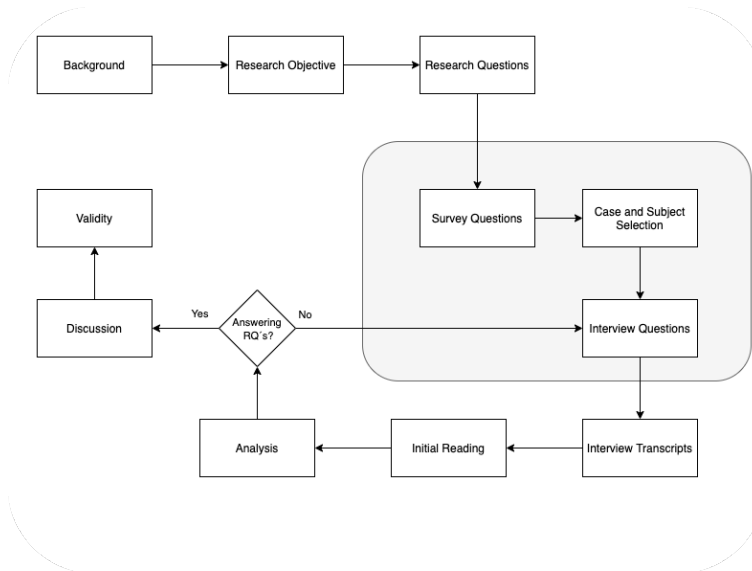
Figure 3.1: Research Process

3.2 Research Questions

The background study revealed there existed little to no knowledge regarding Norwegian software developers and their knowledge in web accessibility. Knowing the coming changes followed by WAD and the update of WCAG, an opportunity to research this theme appeared. In addition, the operation of modern software development teams is compelling, working with designated roles and making use of methodologies, which motivated the following research questions:

1. What is the current knowledge regarding universal design in ICT among Norwegian developers?

2. How did the developers acquire their knowledge?

3. How do Norwegian developer teams solve today's WCAG-standards?

4. How will Norwegian developer teams solve the future requirements regulated by the Web Accessibility Directive and the upgrade of WCAG?

By performing a qualitative study, this thesis aims to answer these research questions. The conclusion can be read in Chapter 5.

3.3 Subject Selections

When a case study is selected, several aspects need to be taking into account for basing the selection on (Oates, 2005). From the beginning, Norwegian IT companies were selected intentionally for the research with the main focus on NAV. NAV has many target groups and users who should have equal opportunities to use services and get information on their websites, regardless of the users' ability to function (NAV, 2020). Web accessibility is essential for NAV, and the company was considered the perfect participant for this thesis. Also, two other Norwegian IT companies were included in the process; Kantega and TietoEVRY. In order to locate developers that willingly wanted to contribute, direct contact with NAV was established, with helpful management giving access through the company's internal communication service. For contacting Kantega and TietoEVRY, NTNU's KID network was used. The selection of informants was based on three factors: experience level, involvement, and availability. They needed to be available for conducting the interviews, they needed to be full-stack or front-end developers, and they had to be willing to participate. To receive the most various and solid data, the researcher reached out to talk to senior and junior developers to map the current state of web accessibility competence for developers in Norway. There was no requirement for the developers to have earlier experience regarding accessibility considering this is one reason this thesis exists. All of the interviewed developers showed great interest in IT and had many interesting thoughts and meanings about accessibility. Also, two managers were interviewed to acquire knowledge regarding management processes and process change in their respective companies. One of them was part manager, part developer, while the other was sole in a manager role.

3.3.1 Interview process

Before each interview, a consent agreement was sent to the respondents. The consent agreement informed them about the interview's overall topic, the purpose, and information on how it would be saved and deleted. An audio recorder provided by Nettskjema recorded the interviews, and the respondents gave their approval for the recordings in advance. All interviewees were well informed that the recordings would not be published and deleted after transcription. An interview guide was constructed, holding fascinating talking points for the interviewer.

During the interviews, the informants received questions about their workplace, business conduct, and web accessibility. All of the informants were encouraged to answer according to their personal opinions and thoughts. They were also free to decline specific questions or cancel the interview if they wanted. The interviews transpired in a semi-structured manner, allowing flexibility and exploration (Doody and Noonan, 2013).

The interview consisted of four parts with a range of questions. Initially, the idea was to interview developers at NAV, but other companies were included after a minor pivot. The

first interview also worked as a piloting interview to see which questions worked and which needed reformulation. Lessons learned were asking more open-ended questions and letting the interviewee reflect more. Questions asked were mainly about web accessibility, and due to the developers' different experience levels, some questions were experienced as a bit complicated. The nature of the semi-structured interview model allows for discussing the questions, explaining the essence and the meaning behind it (Louise Barriball and While, 1994). The respondents answered their best of knowledge and gave their suggestions and meanings, which led to valuable input to the talking points.

The interviews were conveyed through video chat, which gave a face-to-face approach, telling when and if the interviewees did not understand the questions or had disagreements during the discussions. It would have been more beneficial to complete the interviews while sitting in the same room, giving even more opportunity to create spontaneous conversations (Dialsingh, 2011), but this was impossible to achieve during the pandemic period with Covid-19. Seven interviews were completed, whereas five of the informants came from NAV, one from Kantega, and one from TietoEVRY. Each interview was conducted in a relatively small time window, and the average interview lasted around 46 minutes per respondent. An overview of the interviews can be viewed in table 3.1.

3.3.2 Survey

Before any interviews were conducted or even created, a survey for collecting initial data was published. A survey is a helpful tool for getting a picture of the current state of an organization (Janes, 1999). The respondents were developers in NAV, and the survey was published on their internal communication service, Slack, to reach as many developers as possible. The survey was divided into three parts. The first part was to get an overview of the different backgrounds of the participants. The second part consisted of a series of claims about web accessibility where the respondents had to show how much they agreed or disagreed with the various statements. Also, two open-ended questions were included, where the respondents could themselves write their thoughts and reflections. The last part of the survey was about the upcoming upgrade of WCAG, WAD, and a set of claims and statements. The survey concluded with an extra field for the informants to provide their contact information if they wanted to participate in the interviews and contribute more.

By having various question types, the survey ensures to collect the best information (Janes, 1999). In this case, the survey included multiple-choice, open-ended, and agree/disagree statements. For creating the survey, Nettskjema was used. A total of 25 developers answered the survey, giving a great starting point for further investigation and the construction of the interview guide, which can be viewed in appenix B. Also, the result of the survey gave valuable information regarding web accessibility inside NAV.

From the survey, five developers from NAV volunteered to participate in an interview. The remaining two developers were directly contacted through email.

3.4   Data Collection

When selecting a method for data collection, it is essential to choose the appropriate way that ensures credibility for the content analysis (Elo et al., 2014). For this thesis, the

Company	Place of Interview	Role	Duration
NAV	Zoom	Junior developer	40 min
NAV	Zoom	Senior Developer	45 min
NAV	Google Meet	Senior Developer	52 min
NAV	Zoom	Senior Developer	47 min
TietoEVRY	Zoom	Junior Developer	42 min
Kantega	Whereby.com	Senior Developer	65 min
NAV	In Person	Manager	35 min

Table 3.1: Interviews

method for data collection was primarily through conducting interviews. Interviews are identified as an efficient method for answering research questions in case studies (Oates, 2005). A challenge that may occur when leading qualitative interviews is the overload of comprehensive data that could be less precise. However, this data can nourish reflection and discussions.

The language spoken during the interviews was Norwegian due to convenience and ease. Then, the interviews were transcripted and translated with insurance to "express all aspects of the meaning in an understandable manner" (Larson, 1991). In other words, the interviews were not translated word for word but in a direction for perceiving the context and meanings. As earlier stated, a quantitative method was also applied. Surveys are an effective way to collect amounts of data quickly, but it was primarily used to create the interview guide and find talking points.

3.5 Data Analysis

For data analysis, a thematic approach was used as it produces a more comprehensive analysis. The thematic analysis allows for insight in a more profound form and helps to analyze it fluently as the data and analysis are being done continuously (Clarke et al., 2015). After the interviews were complete, the transcription was conducted and then analyzed by creating "open codes" and key categories (Charmaz and Mitchell, 2001). Creating categories helps to identify themes and patterns that occur cross-interviews. The categories show which topics being attractive, and it is easier to compare the answers. It is also the most effective and straightforward way to interpret and go through qualitative data (Jenner et al., 2004).

The method makes things less cumbersome by collecting each theme together and compare the different thoughts and answers. Several codes were generated through the coding process, and as expected, many of the answers had similar meanings. Thereby, these answers ended up in the same code or category. Figure 3.2 shows an example of this analysis technique.

● WAD
● Management and process change
● Accessibility Statement and Feedback function
● Competence and Competence increase

I think one of the positive outcomes from this directive, is that the demands will in a way be forcing higher level managers, it will become a more administrative task to make sure it is taken care of. Earlier it has been more like a developer that remembers focusing on it. And if there is no focus it will take some time before it gets noticed - maybe users that complain or something. The prioritization is often the key here. The moneymen have often other "more" important tasks for us. Securing revenue before WA.
I hope the directive forces WA into the routine. force management to take more responsibility.
I think the declarience will become an external global implementation, and each team or work area needs to implement this solution in their own solutions.
There are a lot of old customers, with their own graphic profile, which they don't want to change and are well incorporated inside the company. And sometimes we get assignments to improve or create solutions, we must point out that their graphic profile isn't good enough for universal design. Then it is very varying how well these customers take this critique. A scale between cool design and accessibility. Often they just say: No, just use our profile, regardless of the illegality.
Maybe the directive will be a driving force for them to actually change.
It is always a need for competence development. We do not at this date know how the directive will actually end up, but when it is finished we will "take some rounds on it". Usually we create a task force that tries to drill down into the subject and then we presentate the findings for the rest of the internal environment. Findings like, "what do we need to do", "what do we have to notify the customers on" and so on.

Figure 3.2: Key categories and coding example

Chapter 4

Findings

In this chapter, the findings from the case study are presented. It begins with displaying each company participating in this thesis and some non-personal information regarding the informants. From the seven interviews, the most compelling data is analyzed and discussed. The findings are exhibited with direct quotes from informants and interpretations around their opinions and thoughts. The chapter concludes by discussing the significant results and a summary constructed like a new process change model proposition.

4.1 The respondents

The initial data collection was done through a survey. Of the 25 recipients, 40% were seniors, meaning they had eight years or more of experience in IT. 35% of them had three years of experience or less, while the rest of the participants worked professionally for between four and seven years. From the interviews, seven developers from three different Norwegian companies contributed to the data collection. Each informant had different background and expertise. The companies' structure was both in-house and consultants. A short overview of each company can be seen in table 4.1. The developers interviewed came from NAV, TietoEVRY, and Kantega, and essential information about the respondents can be viewed in table 4.2. A presentation of the companies will follow.

4.1.1 NAV

The Norwegian Labour and Welfare Administration (NAV) was established 1st of July 2006. In this thesis, only the IT department of NAV is considered. The IT department controls payments, applications, and the streamlining of welfare. NAV is an in-house establishment, meaning they are developing systems used for and by NAV. However, they also create solutions for their users, which is the entire population of Norway. This means they have a variety of different user types. The company consists of 790 in-house developers and is also hiring consultants from other IT establishments.

Over the last couple of years, one of NAV's changes is introducing interdisciplinary product teams with end-to-end responsibility for the digital solutions. These teams are having the entire responsibility for developing and operating (DevOps) the systems. They are working agile and are immediately launching when they have produced a minimum viable product (MVP). This makes the application architecture more adaptable for quick changes. Recently, they started moving their infrastructure into the cloud by using Google Cloud Platform (GCP).

The administration of teams is quite interesting. Because of the interdisciplinary team model, there are no "direct" leaders to guide them. NAV's management has adapted another style of leadership.

> K5 - "It is like in the military. A general may tell a platoon to secure "that" hill, but how they should do it is the platoon's responsibility. We are telling the teams what the problem is. Not how they are going to solve it. Choice of technology, how they want to work, is completely up to them. This ensures everyone has ownership of their solutions and thereby making them want to deliver their best. If something doesn't work, we are here to help them in the right direction."

The political climate in Norway significantly impacts NAV's focus areas because NAV is under the direct control of the Norwegian government and works as a prominent political influence. As the main contributor for assuring welfare in the country, NAV manages a considerable part of Norway's state budget. Therefore they need to comply with the government's wishes and promises to the best of their capability. To have that ability, NAV has introduced internal product teams where software developers, designers, and other employees are working. The meaning of product teams is to collect persons working in the same area locally, which gives the teams the possibility to help each other across different projects within the same product. Besides, teams inside a product team will automatically become experts in the area.

> N5 - "By creating interdisciplinary product teams we are reducing the need for coordination and increasing productivity rapidly."

Each team has different experts, and the management believes that collecting innovative heads and giving them tasks nourishes creative problem-solving. Since NAV must obey the government's wishes, they believe that this team model can help the company become even more efficient in the future.

4.1.2 TietoEVRY

TietoEVRY is a Scandinavian consultant company. Earlier, this organization was two separate companies, but as of December 5th 2019, EVRY merged into Tieto. The company has 24 000 employees globally and serves thousands of private and public customers. Thus TietoEVRY is the most prominent consultant company in Scandinavia. The firm's main clients are from banking and finance, but they also work in other fields. The informant interviewed in this thesis worked in an "external consultant" branch, meaning the developer was hired out for outside customers. Usually, TietoEVRY sells their customers' whole

teams, including developers, UI/UX designers, and product owners. However, in some cases, they also hire out single developers, depending on the customer's requirements. Although the company size is already significant, they are still expanding and growing.

4.1.3 Kantega

Kantega is a Norwegian *employee-owned* consultant company with a wide range of customers in several domains. Kantega helps to solve problems for their customers in both the public and private sectors. The company has existed since 2003 and has around 180 employees. The client's Kantega is prioritizing is customers that they consider exciting. Today, Kantega's client list is from various industry fields: finance, transport, logistics, and the fish industry. Their focus areas are AI, machine learning, and sustainable software development. Being an employee-owned company, the employees decide which fields they want to explore and prioritize. The company sells interdisciplinary teams and single consultants to their customers, depending on their needs and wishes.

Company	NAV	Kantega	TietoEVRY
Private/Public	Public	Private	Private
In-house Consultants Start-up	In-house	Consultants	Consultants
Employees	790	180	24 000 (in total)
Location	Norway	Norway	Scandinavia

Table 4.1: Information about the interviewed companies

4.1.4 The informants

During the interviews, the informants were asked questions primarily about web accessibility and universal design. The discussions also included some aspects of process change. In order to provide the most relevant and varied data, it was desired to talk to developers with different levels of experience. Every software developer interviewed was currently working for their company and was on different projects and teams. Front-enders, fullstackers, and team leaders were talked to, in addition to two managers that had a background as developers. Every informant had a technical background with either a bachelor's or a master's degree, and the experience level ranged from graduates with one year of practice to seniors with over 15 years of experience in IT. The informants also had varying degrees of interest and expertise in web accessibility. During the interviews, several topics were discussed, not only web accessibility - themes like team development, methodologies, and growth were explored. A brief overview of the informants can be viewed in table 4.2.

Informant	Company	Years of experience	Degree	Role
N1	NAV	2	Bachelor's	Junior developer Frontend
N2	NAV	3	Master's	Mid-level developer Fullstack
N3	NAV	15+	Master's	Senior developer Product owner Fullstack
N4	NAV	15+	Master's	Senior developer Techlead Fullstack
N5	NAV	15+	Master's	Senior developer Manager
T1	TietoEVRY	2	Master's	Junior developer Frontend
K1	Kantega	15+	Master's	Senior developer Manager Fullstack

Table 4.2: Information about the informants

4.2 Findings from the Data Collection

The following sections describe what the developers answered during the interviews, including some information from the survey. The findings from the data collection are divided into two subcategories; *"WCAG and Accessibility in Norwegian companies today"* and *"WAD and the upgrade of WCAG"*. The first subcategory explores how WCAG-standards are solved today, giving an AS-IS overview of accessibility in Norway. Here, the thesis investigates the informants' thoughts and engagement regarding WA, their competence, and how they have achieved their skill. Also, this subcategory examines the teamwork of the different teams with a focus on accessibility and WCAG.

The following subcategory, WAD and the upgrade of WCAG, explores the current knowledge of the developers regarding these themes. The informants describe their concerns on how they think this will affect their work and give possible solutions to solve new requirements followed by the Web Accessibility Directive. This section also explains the informants' general thoughts regarding directives and updates. Please be noted, this section is not giving a TO-BE view of the situation but is describing the different teams' preparedness to implement the updates.

4.2.1 WCAG and Accessibility in Norwegian companies today

Thoughts and engagement

The developers that were interviewed had some different views on web accessibility and what it means. One of them was unsure of the term but understood it was about universal design. Another developer thought immediately about the diversity of users and making robust solutions that everyone can use.

> N3 - *"Web accessibility is about creating solutions that are available for an 18 year old person that has lost his or her job, and to a 90-year-old person that wants to check the pension."*

One developer got right into what he thought WA means for NAV and their users:

> N4 - *"Web accessibility, in practice, means to secure the rule of law for the users. Everybody in Norway has a right to use our systems, and we can't exclude anybody just because it is "boring" to do that job."*

The same informant also claimed that a well accessible system is better for every user group, not only the disabled persons. He stated that the flow and the feeling of the site are much better for everyone and underline the fact that accessibility is not only about optional navigation, screen readers for the visually impaired or for deaf persons.

> T1 - *"Just having a correct and understandable language is very important. So for me, it is about the rights everybody has to use technical solutions."*

One word all the respondents mentioned was the word *competence*. They emphasized the significance of having the correct competence in immediate reach for questioning or help.

> N3 - *"In my earlier jobs they had their own web accessibility team, that were experts and really knew the subject. These developers had very good knowledge and were used as "sit-ins" in other teams. A lot like NAV's security champions. For now, here in NAV, it is up to each individual team. They need to prioritize it themselves.."*

This developer had talked to the management in NAV about creating accessibility champions, but it has not happened yet.

During the informants' careers, they had experienced several different WA-related problems that had left their mark. Several informants have had the opportunity to work with visually impaired persons, which has given intrinsic value to the developers.

> N4 - *"One time I was on a project working alongside a blind person. First of all, it was rewarding for my thoughts on how to develop and design websites. For instance, the team had created a component styled as a collapsible, but it was a button in reality. When the blind person tested the site, he got a surprise when he came to the mentioned collapsible using a screen reader. Since it was, in reality, a button, the screen reader was reading all the information inside the "collapsible" - making it very hard to navigate and use the site. Minor issues like this are challenging for "normal" persons to catch."*

> K1 - *"I have invited blind web users on several occasions to hold presentations and show how they navigate and use the web. Here we discussed problem areas and possible solutions."*

Problems like remembering to add on accessible solutions after a product was launched were recurring. Here it is tempting to claim that the problem lies on the product owners or those who create the requirement specifications, but in the end, as N3 states, it is the developers' responsibility to include this from the start.

> N3 - *"I think parts of the problem are that the developers, on several occasions, forget to have an accessible mindset from the start. If we could change the way developers think, several more websites and web solutions would have been universally designed when they are being programmed. Furthermore, it is tempting to say "it was not described in the SRS", but I mean it is the developers' responsibility in the end."*

This description can also be observed from the survey. One of the statements was, "I think about accessibility while I am developing or coding", 40% of the respondents answered, "quite disagree". Hence, it is fair to say that some change, or at least an alteration of their mindset, must be conducted before WAD is taken into force.

The developer's Web Accessibility-competence

One of the things this thesis wants to map out is the accessibility competence of the developers and how they got it. The informants' competence level was varied, which, naturally, are connected to the experience-level and personal interests. However, another reason was brought up by the junior developers.

> T1 - *"Actually, when I started working, I never had any experience or ideas about web accessibility. Or maybe it was introduced in one subject in school. I think it was called MMI..* (TDT4180 - Human-Computer Interaction) *But now I know that this is an essential part of developing front-end solutions."*

The informant later stated that the competence had been growing relating to the project he was assigned. However, he did not feel like an expert, and the competence came mainly from cooperating with UX designers working on the same project. The other junior developer interviewed also addressed the lack of WA-related topics during the time at the university.

> N1 - *"My competence is low. Lately, I have started getting interested in the theme, so I know a lot more now than before. I feel like I know about the problems, but not necessarily how they should be solved. My competence is mainly from a course at the university, MMI, and from a growing interest the past six months."*

During a three-year-long bachelor's degree in Informatics at NTNU, only one compulsory course is in some degree related to web accessibility. This is also the case for the five-year-long master's degree in computer science at the same school, which is thought-provoking, knowing there have existed Norwegian laws regarding the field since the 2000s.

The senior developers interviewed said almost the same things. They had achieved their competence through self-studies, talking to coworkers, and attending and working on various projects. Stating, "it is part of my job". Two of them said they had close friends or relatives with disabilities, giving them an extra reason to learn about the topic.

> N3 - *"The mindset of mine is automatically pretty different from others. I, for example, always think about the placement of people when we are having gatherings. I also like to observe and learn how they* [People with disabilities] *solve day-to-day difficulties - thinking solutions instead of problems. If you create reasonable solutions for everybody, everyone will have a sounder life."*

Inner motivation often comes from having personal relations to the problem (Reeve, 2006). In this case, N3 automatically thinks of accessibility because of his relation, which helps him create WA-friendly solutions. From the survey sent to developers in NAV at the beginning of the project period, there were some varied answers regarding themselves and WA competence. One of the statements was "I have good knowledge of web accessibility", where 31.6% of the respondents categorized themselves as "neither agree nor disagree" while 26% said "quite agree" or "totally agree".

To summarize, the accessibility competence appeared varied but overall satisfactory. Unfortunately, the informants' knowledge was never tested, so one is left with the impressions. The senior developers showed knowledge and passion about the subject, and they appeared genuinely qualified to work with accessibility. The information provided by the junior developers was also intriguing and showed a lack of focus on web accessibility in educational institutions even though several web development courses are held during the semester. They also claimed their companies were good at engaging graduates and young software developers to be interested in numerous IT fields, including universal design.

Team work and current WCAG-standards

One of the topics included in the interviews was how teams resolved current laws and requirements regarding online accessibility and how the different groups operated. Initially, the answers were expected to be diverse since the informants were both in-house developers and consultants. In addition, due to the different requirements regarding the public/private sector and internal/public systems, there were several answers concerning how the various teams solved present WCAG-standards.

One of the positive revelations was how Kantega structurally ensured and prioritized accessibility and how much the developers in NAV knew of its importance. However, several developers from NAV claimed that they did not have any form for structural guidelines from the management, and therefore it was easy to forget about while coding.

> N3 - *"[...] when I think about it, there are no persons outside the team that is demanding it... Which is kind of strange. Because I know it is possible to receive fines. Luckily, we have people on our team that are very engaged in WCAG and accessibility, and they are often reminding us about it, especially at the beginning of projects."*

Further on, the developer talks about improving the attention on accessibility and quickly draw parallels to 2018 and the General Data Protection Regulation (GDPR). He claims that the focus area can be associated with media coverage. As earlier mentioned, NAV has its group of experts called *security-champions* formed to ensure their users' privacy. This action was a direct response to the GDPR-focus. When GDPR covered all media, the focus on creating solutions that ensured user privacy increased. Before this, the emphasis on privacy was somewhat mediocre.

> N3 - *"Everybody was talking about it, and everyone was engaged. Maybe a "big" accessibility-related scandal is the solution for increasing accessibility-focus..."*

In the survey, one of the solutions that often came up was to create an expert group, which seemed like a clever way to make NAV even better on accessibility. When they were asked: "How can NAV support teams to ensure web accessibility?" over 53% of the respondents wanted to create a group of subject matter experts (SMEs) for accessibility. Also, there were wishes for more focus on it from the upper management.

At this time, N1 worked on an internal system where it is not required to make the user interface accessible. Regardless, N1's team tried to be ready for the future requirements, although they did not prioritize it highly.

N2's team was also deprioritizing accessibility and the current WCAG-guidelines.

> N2 - *"We are not solving the requirements especially, I don't think we are considering it that much. For us, it is not that important to focus on. Nobody has complained, so I guess our sites have pretty good accessibility already."*

N2 also says that their solutions have made users save much time looking for information. The team has simplified navigation to the users that look for something particular, which also appeals to user experience and accessibility. In other words, N2 and his team are not

explicitly trying to solve or follow WCAG-requirements, but since they have not received any complaints, they assume they are following the standards.

Another developer in NAV said that his team was heavily relying on the company's design system. The systems' purpose is to have a set of React components that should be accessible and make sure the different NAV systems have the same layout.

> N4 - *"It* [the system] *includes many components that should be supporting the WCAG-requirements. We are blindly trusting them and thinking: "Ok, this is covering universal design standards" and then never check it up..."*

He and his team were also often "doing rounds" with a blind colleague for testing new features in addition to using the pre-defined components from the design system. As for improvements, the developer says that he wished they often, or more routinely, used automatic testing tools like Google Lighthouse or Tenon.io for ensuring the accessibility of their systems.

> N4 - *"It should be a part of our daily routine. We are not good enough in this area. We should be better at it testing our solutions ourselves and not only relying on the designers."*

From the survey, we can see the same tendencies of accessibility and teamwork. One statement was "There is a great focus on web accessibility within my team", where 64% answered "neither agree nor disagree" nor "quite disagree". Having a design system is maybe the reason, giving the developers a boilerplate for ensuring WA-friendly solutions or, at least, the illusion of it.

Kantega, on the other hand, was already having professional groups with a focus on accessibility and front-end solutions and was claiming that every front-ender in Kantega had, to some degree, an honest and positive relationship to accessibility.

> K1 - *"We are discussing it evenly, and we are focusing on it. Every front-ender in Kantega has a relation to accessibility. Of course, with varying degrees of competence, but it is generally well taken care of."*

For being a consultant house, it is positive to see the attention to details regarding accessibility. In fact, during his career, on several projects, he and other consultants were the ones to remind the clients to not forget about making WA-friendly solutions. According to the respondent, Kantega always focuses on raising competence and implementing appropriate and effective changes inside teams.

> K1 - *"It is always a need for competence development. We do not know where the directive will end up, but we will take some rounds. Usually, we create a task force that tries to drill down into the subject and then present the necessary findings for the rest of the internal environment. Findings like: "what do we need to change", "what does this mean for our customers" and so on."*

The developer also draws a parallel to GDPR. At that time, Kantega was a much smaller company than it currently is, and they did not have routines on how to conduct competence development.

> K1 - *"Each developer sat down and drilled into the subject, then we met and discussed possible problems and solutions. It was like the time stopped, and all the focus was on getting ahead of future privacy problems."*

As the developer further described the change process, it is intriguing to draw parallels to Lewin's change model. As he says, the requirements changed when GDPR and privacy laws launched. GDPR broke up the routines (*unfreeze*), and the routines got changed (*change*). Then the workdays began again with the change implemented in the business strategy (*refreeze*). Further, he says that if the "GDPR-crisis" happened now, they would apply a different strategy.

> K1 - *"Today, we would have used a different tactic. Since every developer is very passionate about IT and the different branches inside the field, I am sure a group or a task force would automatically be formed, finding solutions and creating paths or guidelines on how to process and implement the changes."*

He claims that the implementation of WAD would not cause any problems as he is confident in Kantega's competence-building system.

4.2.2 WAD and the upgrade of WCAG

Several questions were asked regarding WAD in the initial survey, giving a quick overview of the respondents thoughts about this topic. Most of the respondents (70%) said that they disagree with the statement "I have control over the new requirements included in WAD", while 50% of the respondents agreed that WAD would help increase focus regarding UD in ICT. Few of the survey respondents thought WAD would influence productivity in any form. An overview of the questions and the respondents' answers can be seen in the table 4.3.

The interviewees had several ideas, concerns, and suggestions on what the Web Accessibility Directive would mean for the work process. The central part of the respondents did not show any form of concerns but was rather eager to make sure innovative solutions were created. In this part of the interviews, the respondents were told what WAD meant, including the accessibility statement, the feedback function, and the new requirements. The respondents were asked to tell what they thought about the coming changes and how they would have wanted to resolve these challenges. Also, they were asked to talk about how they imagined this change would affect their work. Firstly, one of the juniors had no idea of the upcoming changes but took it very sincerely:

> N1 - *"WAD sounds like a significant upgrade, especially with the new accessibility statement and feedback function. I think it will cause a re-prioritization, at least inside my team. I think we should stop all work and only focus on this problem and find solutions to how we can implement both the accessibility statement and the feedback function and make UD-coding a part of our mindset when we are developing."*

It was her first time hearing about the upgrade, and she found it thought-provoking how others might know about this, while she did not. The other junior developer initially seemed very relaxed and stated this upgrade would be well cared for by the UX designers. After discussing where the responsibility should be, he shifted and said:

Question	Agree	Neither agree nor Disagree	Disagree	Don't know
I have control over the new requirements included in WAD	10%	15%	70%	5%
My team are prepared for writing a accessibility statement	15%	15%	50%	20%
My team are prepared for answering user feedbacks about universal design errors	70%	10%	10%	10%
WAD is going to influence the productivity	26.3%	31.6%	5.3%	36.8%
The new requirements included in WAD will improve our awareness of universal design and online accessibility	45%	25%	5%	25%
The team has everything needed to ensure new requirements for technical accessibility and user feedback	21.1%	31.6%	15.8%	31.6%

Table 4.3: WAD questions and answers from survey

> T1 - *"If the UX designers took care of this, which does not necessarily have any coding background, it could be cumbersome. Maybe it is a more excellent idea to include it in the developers' responsibility. After all, we are the craftsmen."*

It is interesting to see how different the junior developers thought about this future upgrade. Knowing they are the two least experienced informants, they are maybe also the most qualified for accepting change and new requirements (Dunican, 2015).

None of the seniors seemed worried about the new directive and were sure that at least the technical aspect of it would be solved quickly. However, they were curious about how the management would tackle this difficulty, ensuring every solution is accessible and how the workflow would be affected.

> N3 - *"I am not worried about the technical aspect, but the focus of each developer must be more comprehensive. Furthermore, that is more a management problem."*

One of the senior developers also expressed his feelings regarding directives in general, which was not too optimistic:

> N4 - *"The thing about directives is that you never know how strict it will be before it has gone through some cases in the juridical system. Back to GDPR, I think when the everyday developer watched the trial* [Mark Zuckerberg and Facebook], *they first then, for real, understood the severity and how important privacy actually is."*

The developer meant that there had been earlier tendencies to create directives for "forcing" developers to listen because it has not been done voluntarily. He also expressed insecure feelings regarding how time-consuming the implementation would become and how ineffective it would be to always "follow up" developers as they produced solutions.

>   N4 - *"I am worried it would become a bureaucratic obstacle in some way."*

He showed doubt and concern for creating a "supervised workflow" and thereby risking choking the team's effectiveness. To this day, he and the team had worked agile and, every team member contributed in their best way for making sturdy solutions. Something that he did not want to lose.

K1 shared some concerns about the time aspect of implementing the directive, stating it would become a key factor when working with some of their clients. As a consultant-house, the developers are often hired out as "experts", but the clients usually handle the responsibility for following demands and directives.

>   K1 - *"Universal design is often an extra area of responsibility that the customer does not necessarily envision, which is a problem that is more than often easy to oversee. In several cases, we as "outsiders" have reminded our clients not to forget to focus on it. I hope this directive can help everyone to embrace achieving WA-friendly solutions."*

He also addresses another concern. As of the "GDPR-revolution", most pages on the internet ask the user to collect cookies, a thing that many people (in his words) feel annoyed by and "clicks away". He states that the directive, or at least the accessibility statement, would become "another thing just to hook off".

>   K1 - *"The implementation of the accessibility statement must be clever, or else it will not have any effect."*

Other concrete suggestions for solving the statement where:

- Include it in the ReadMe for each system on Github. This depends on the system being open source or not.

- To create a button placed in the footer, redirecting to an informative article with the current "todo's" structured like a backlog.

- To make a general solution for NAV, like a backlog with channels to the responsible teams, each team needs to operate its accessibility statement.

As for the feedback function, the developers at NAV were currently implementing a service for receiving feedback from users where the question: "did you find what you were looking for" was asked. A possible solution for the feedback function could be to create a component as an add-on to the existing solution. The challenge would be how to channelize the feedback to the responsible team. One of the developers had some thoughts regarding this:

>   N3 - *"I think it would be possible to create a ticket system. If the user needed to register an accessibility problem triggered by hooking off a checkbox, or something, the component could read the ticketID or pageID and thereby transfer the information to the correct team."*

The developers from Kantega and TietoEVERY did not have any concrete solutions for this requirement, stating it would depend on the client's systems. Other concrete suggestions to the feedback function where:

- Have a sticky feedback button, which is currently only included when launching new functionality (at least in one of the NAV teams). After a click, a modal could appear and give the users the possibility of complaining.

- Better use of monitoring systems. Identify users using e.i. Screen readers and see where the flow plugs or stops - a fly on the wall approach.

All of the developers agree that the web accessibility directive would help to achieve more focus on universal design in ICT. With new requirements and higher standards, developers will be "forced" to take a stand and thereby start to prioritize UD in their work routines. However, the problem is still to change the developers' mindset, making them automatically create accessible systems without having an external push. As an unknown NAV developer from the survey said: *"Web Accessibility should be integrated into the agile process, giving it routines and structured ways of checking it up"*.

To summarize, let us say as Bailey (2005) states in the title of his research paper:

Think twice, code once!

Think about the solution, include accessible measurements, and create robust, inclusive systems that everybody can enjoy.

4.3 Discussion

From the interviews with the informants from the different companies, several challenges and ideas were deemed relevant to mention in a more general discussion. Naturally, the informants tend to touch upon the same topics and were having some similar ideas. These themes are discussed in the following section and are categorized into three different parts.

4.3.1 Universal Design in ICT does not get enough attention in IT-Norway

Most of the developers interviewed expressed that the attention to universal design in ICT is overall pretty solid. However, the execution of implementing universally designed solutions is more than often being deprioritized. They said that they, in some cases, got reminded to include accessibility during the software development period and often in the final stages of a finished project. The accessibility implementation thereby got less reliable than it could have been if it had been included from the origin.

Naturally, there were some differences between in-house developers and consultants. Consultants listen to their tasks received from the client, which is not very strange knowing clients hire them to do a job. Here, the problem was more about where the border goes for notifying the clients to follow up on accessibility requirements, something that was also depending on the customer.

> T1 - *"If the mission is to create a web page for, e.g., a car dealership, it is our responsibility. However, if we are hired out to an existing IT company, it should be closer to 50/50. It is not black and white. It depends on the client."*

In-house developers from NAV generally had more various experiences regarding how vital accessibility is and how it was practiced in their teams. Most of the informants said they often used persons with disabilities for testing purposes and were doing iterations with the rest of the team. The attention to UD in ICT was profoundly dependent on the personal interests of the different developers in the teams. Others heavily relied on the internal design system. Some of them also exclaimed that it was a bothersome theme to include in their services, stating they already had *more important* requirements to finish. This is where the most significant part of the challenge lies, wrong attitudes to web accessibility. It is here that a transition must take place, changing developers' perspectives while coding, making them think accessibility from the start of the project cycle.

4.3.2   Not a focus area in the university

To create more attention and urgency to learn more about accessibility, the universities, or at least NTNU, need to prioritize WA more. It is almost impossible to grow accessibility-strong graduates if the theme is almost unknown to them. If the goal is to ensure the competence of WA increases, schools and universities must include more accessibility-related projects in the teaching process.

Students are tasked with several different team-related projects during a bachelor's degree study in informatics at NTNU. Moreover, numerous of them are front-end related. By raising the requirements to incorporate accessibility-related tasks, the students will automatically become more attended to the importance of accessibility. As a result, students or graduated developers will have a more substantial fortitude concerning WA-related tasks in the future of their careers.

> K1 - *"I only had one subject during my studies that were related to web accessibility, and the subject was, for the most part, only focused on the "why" and not concrete how's for solving different problems."*

It would be positive if universities like NTNU focused more on showing real examples of how to implement accessible solutions and systems. Much of the wisdom behind WA is front-end related. In this area, there already exist many useful tools. Tools like Figma could be used for contrasts and color examination, in addition to user testing before implementation. Miro could be practiced to visually show navigation flow and how users tend to interact with web pages. Google Lighthouse shows the overall statistics for an up and running solution. All these tools are accommodating when students learn about universal design in ICT. Therefore, it could be an idea to use them in different front-end projects at NTNU or let the students know these instruments exist.

Please notice, the junior developers interviewed in this thesis were both earlier students at NTNU. This thesis has not investigated other schools and their practices when it comes to accessibility.

4.3.3   Internal expert groups

One of the positive findings from the study was the companies' already existing groups where developers can share and cultivate frontend knowledge. Both NAV and Kantega had a similar arrangement. These groups were created for enhancing competence and for sharing findings different developers come across. These findings were shared with others to grow the developers' competence. One possible solution for achieving more attention to accessibility could have been making designated web accessibility groups that operate similarly. However, since these groups operate on interests and voluntariness, the companies first have to identify WA-passionate developers. Another way for securing accessibility competence is to create "accessibility champions" - experts in the field. As several informants from NAV mentioned, the company operates with designated GDPR champions that ensure privacy for their users. They could have been an independent group with UD experts that could assist demanding teams and help the company secure coming demands followed by WAD.

4.4   A possible solution

All of the models presented in Section 2.4 tries to answer the same question; "How do we perform change most effectively?". Fascinated by this question, this thesis introduces a new process change model based on existing models and findings from the data collection. *The Accessibility Change Model* tries to answer this question concerning web accessibility and WCAG. Below, the model is described, and it is created for being a solution companies can use to implement WAD and other accessibility-related changes successfully.

Identification   Create   Maintainance

Figure 4.1: The Accessibility Change Model

4.4.1   Identification

Knowing the agile way of thinking is the new standard, it is intriguing to use this methodology to implement new changes. As learned in Section 4.2.1, developers tend to deprioritize accessibility, remembering it late during the software development process either by external reminders or by someone inside the team. Also, the introduction of new requirements was sometimes poorly received.

The first phase of the Accessibility Change Model is entitled "Identification", where the essence is to eliminate old habits and prejudices. This phase inherits parts of the earlier introduced change models; creating a vision (Kotter), creating awareness (ADKAR), and

try to create a state of urgency (Kotter). The goal of this phase is for the management to suffocate negative influence regarding accessibility, but not in a conceptual way, meaning to talk about the importance of accessibility must be increased. However, negative attitudes like developers thinking "I have to do this" must be taken away and converted into an "It is part of my job, and I want to do this"-mentality. For accomplishing this, the management must identify things that need to get improved, identify processes that already work, and keep supporting and nourishing them. Also, it is essential to identify passionate developers.

Providing a specific method for succeeding is almost impossible, but several tricks already exist;

Posting a mandatory survey:

Pros:

– The management receives many data points, identifying the real meanings regarding accessibility inside the organization and the overall motivation.

– Swift data collection.

Cons:

– The data can be deceptive.

– The survey participants are probably anonymous, making it difficult to identify passionate developers.

– Respondents may skip answering or quit in the middle of the survey.

– Possibility for receiving zero responses.

Interviews with each team:

Pros:

– Forcing developers to talk about the theme.

– Easy to identify passionate developers.

– Side effect: The teams understand the severity of the issue.

Cons:

– Time consuming.

Inquire internal contacts about possible candidates:

Pros:

- Little work for the management.

- Easy to identify passionate developers.

Cons:

- Depended by interest inside the organization.

- Possibility for receiving zero responses.

These employees, or passionate developers, are the key to successfully implementing WAD and new accessibility processes and enhancing accessibility competence. The goal is to end up with developers that can be future accessibility guiding stars, helping their teams to follow the accessibility standards, and help them nudge into a more accessible state of coding mind. Every informant from the interviews claims that their team is working agile. An essential part of the agile methodology is to have continuous communication between the team members. Therefore listening to their "accessibility-expert" should not be a problem. The examples above help the organization to establish a sense of urgency, showing the management takes this seriously, at the same time creating awareness between the developers and shares a vision meant to be followed by the future organization.

4.4.2 Create

Phase two of The Accessibility Model is called *Create* and is about creating a well-functioning task force responsible for their team's inner WA practices. One of the things most often mentioned during the data collection was creating accessibility champions, something that the interviewed developers really believed in. If organizations are to be successful in creating this sort of task force, they need to invest time in raising the competence of these individuals. First of all, the management must have sufficient communication with the developers, finding out what tactics can be applied to raise competence. Also, the management must keep in mind that focusing on the *how* is more critical than the *why*. All of the informants showed compassion and understanding of why accessibility is essential. The majority of the obstacles laid on how to solve specific problems. Most likely, there exist a collection of solutions, and here we examine a few.

One solution can be to have a course for a week for the task force, only focusing on solving accessibility challenges. This can be advantageous and will kickstart the rise of competence. This week, the organization can hire expert talkers to help educate the accessibility gurus about the theme. In addition, there may be beneficial to create internal competitions between the course participants. Humans' competitive instinct applies in all forms for competitions, not only in the sports arena, and can help productivity inside the company (Rynne, 2016). It can also create an inner desire to become the best in the field regarding accessibility.

After the "kickstarting-week", the developers go back to their original teams with new responsibilities concerning accessibility. Exactly how the organizations can use a accessibility team is not defined, but for other developers, knowing such a team exists may help

them earlier think about accessibility while developing because they now have a task force to contact if and when problems occur. Also, as one of the informants stated, using automatic testing tools in day-to-day development may be advantageous; tools like Google Lighthouse. These mechanisms contribute to catching easy user problems, such as contrast and color choice, in addition to page performance. The key is just remembering they exists. Another essential step of this phase is to ensure the information sharing inside the team is sufficient.

4.4.3 Maintainance

From the last step, the management has created a capable task force with accessibility knowledge. Also, hopefully, the organization strive to be the best in the field. A sense of coherence is established, and an increased focus on accessibility. It is vital to keep the momentum, making the changes a part of the business culture. The traction of change can easily be lost. Therefore it must constantly be overseen (Burnes, 2004). Here, the focus is only on accessibility. Regardless it is equally important to prevent going back to the old ways. The Maintenance phase is about preserving the change, making the teams think about accessibility before, during, and after a project. As earlier said, accessibility should be in the agile way of thinking. This means accessibility must have attention during the whole project cycle, from the beginning of creating an SRS, during the sprints of coding, and in the testing periods. Also, after launch, monitoring bottlenecks and answering feedback problems from users. It can be fortunate for the accessibility task force to have monthly meetings, ensuring competence is raised. These meetings can be used for learning from each other and information sharing, looking at new technologies or practices. As an example, these meetings can be facilitated like lightning talks that shift the talkers from time to time, challenging the developers, giving them motives to improve themselves, and expanding their horizons. The essence of the Maintenance phase is much like step eight in Kotter's change model, to "Anchor the changes in corporate culture". If the organizations manage that, many of the problems will disappear, making the new way "our way" and installing a "this is how we do it"-mentality.

4.4.4 Limitations

The model is constructed from knowledge of existing processes and information retrieved from the data collected through the interviews and survey. The primary purpose of this model is to give a possible solution to the challenge of including WAD and raising awareness of accessibility inside companies. The model summarizes the wishes and thoughts provided by the informants in addition to recognizing the parts of the process change models from chapter 2 that actually works. It is hard to assume the effects of using this model. Therefore it is not meant for testing, although it would be interesting to see it in practice.

Chapter 5

Conclusion

This chapter summarizes the research process and answers the research questions based on the new knowledge produced from the background study and findings. In addition, limitations to the thesis and thoughts on future work regarding accessibility are covered. Finally, a description of experiences gathered from writing this master's thesis is addressed.

5.1   Summary

The importance of accessibility is almost a paradigm in the IT world of Norway. Developers are aware of the consequences of weakly created solutions, meaning bad experiences for disabled persons, and in some cases, they know about possible fines. They have control over the *why* and understand the severity, but not necessarily the *how*. This may be caused by lacking attention from upper management. Another problem discovered through this research was the absence of accessibility-related subjects in the university. Graduates may be unsure and uneducated on creating front-end solutions that are accessible and user-friendly for all. Regarding the upgrade of WCAG and the implementation of the web accessibility directive, some of the informants were very positive, expecting the awareness of universal design to increase to a more suitable level. They wished web accessibility would become an automatic thing to consider while developing, without an external or internal push reminding them to include it. However, one of the developers saw the directive as a nuisance and often got discouraged over directives in general. Naturally, this is a thing to reason around, the negative aspects of directives and orders. In some cases, it can be deterring to follow orders, especially if the employee has a different mindset than the one giving the orders and is not believing the same things. The clue would be to make these orders motivating, making the employees accept the directives and procedures.

The objective of this thesis was to *gain insight into how web accessibility is prioritized in Norwegian IT companies and what the current standing of accessibility competence is among their software developers*. For achieving this, a qualitative research study was conducted through semi-structured interviews and a comprehensive background study. Seven developers/managers were interviewed from three different Norwegian IT compa-

nies. These interviews were then transcribed and categorized for contributing to answering the research questions.

5.2   Research Questions

A collection of information was received from the findings chapter. Here, we extract the concrete remarks answering the research questions presented in Section 1.2.

RQ 1: What is the current knowledge regarding universal design in ICT among Norwegian developers?

This question is pretty vague to answer due to the abstract nature of the query, meaning there is no right or wrong answer. However, as an outsider to these companies, the developers seemed qualified in web accessibility. Most of them showed genuine interest in the field, which is essential for further increasing competence. During the interviews, concrete questions like "how do you solve this" was never asked. Therefore we are only left with impressions, and most developers gave the impression to have control over creating accessible solutions. Naturally, impressions can be deceiving, but through a 45-minute interview, one gets to grasp a person to some level.

RQ 2: How did the developers acquire their knowledge?

As it turned out, few businesses focused on raising accurate accessibility competence inside their house through organized courses or similar. The interviewed developers had different experience levels, and naturally, this reflects the answer to this question. The junior developers had acquired their initial knowledge through one subject from the university, but their principal knowledge came from different projects through work. As for the seniors, the same applied. Most experiences were through different projects. Several interviewees have had the privilege of working side-by-side with a user with a disability, something that had given valuable knowledge and explicit directions of how-to's. In addition, self-studies were often mentioned, where reading different articles and discussions with colleagues were the primary resource. Attending courses or demonstrations was not specified by any of the developers.

RQ 3: How do Norwegian developer teams solve today's WCAG-standards?

All of the teams and developers interviewed had implemented the lean, agile work method, and their teams consisted of several modern roles. Regarding how teams solved the current WCAG-standards, several explanations were told. Some of the development teams in NAV were heavily relying on their design system. Also, the follow-through of completing WA-related tasks often depended on internal team members that were reminding or alerting the rest of the team about the importance. Since teams in NAV did not have any structural guidelines or emphasis on its significance from the upper management, they sometimes forgot or deprioritized to implement it.

As for Kantega, the employees had facilitated professional groups to talk about accessibility. A positive side-effect was that they simultaneously reminded each other to think about accessibility while developing front-end solutions for their clients.

RQ 4: How will Norwegian developer teams solve the future requirements regulated by the Web Accessibility Directive and the upgrade of WCAG?

There are many answers to this question. First of all, as several of the developers mentioned, the focus of raising competence must be increased. Especially in NAV, the management must facilitate enthusiastic developers to expand their accessibility skills and give teams directed guidelines and constant reminders to take accessibility actions. With stricter requirements, a lower threshold for imposing fines can follow, and the vigilance of UU-Tilsynet (The Norwegian Universal Design in ICT supervision) can strike the company, which can be expensive. Another solution that has already been discussed several times is to create an accessibility expert team or a task force of sort. An accessibility task force created to solve accessibility-related problems and finding solutions may be a great way to include WAD in the day-to-day software development process. Having a team reachable for the other developers in need of help would help productivity, as long as the need for help is moderate.

A significant part of the web accessibility directive is the incorporation of an accessibility statement and a feedback function for users to use when complaining about accessibility problems. During the conversations, the informants suggested several solutions to these new demands.

– Usage of already existing solutions by appending add-ons.

– General new open solutions implemented by all teams.

– Take use of the coming solution created by UUTilsynet.

There are no correct answers to this question, but several sample solutions have been formed through the interviews and discussions.

5.3 Future Work

The overall accessibility-knowledge of Norwegian developers is not covered in this thesis. Of all Norwegian IT companies, only three organizations have been considered through seven interviews. This thesis is meant for creating an initial understanding of how the current situation is and what various developers think about the upgrade of WCAG and WAD. For future works, it would be interesting to investigate how start-ups prioritize accessibility and how they are planning to solve future requirements. Also, because most of the interviewees in this thesis were developers from NAV, working in the public sector, it could be interesting to examine more in the private sector and talk to numerous developers from consulting firms. In addition, it would be exciting to investigate the same topics, but from a management perspective.

Conclusively, using the accessibility change model in practice and see how it would perform would be fascinating and rewarding.

5.4 Research Process Experiences

Writing a master's thesis is much like running a marathon. The path is long-drawn and challenging, but the reward at the finish line is invaluable. Initially, the plan was to investigate NAV and their accessibility knowledge and how the different teams planned to solve upcoming changes, followed by WAD and WCAG 2.1. Therefore, the majority of the informants are developers from NAV. By pivoting, more interesting reflections were uncovered, especially from the Kantega informant. In addition, the pivoting involved a transformation in the research area. The developers were now interviewed about accessibility but also with a process-change perspective in mind. The change of focus or the choice of including process-change was decided from discussions with the thesis supervisor.

The implementation of the web accessibility directive and the update of WCAG will demand more attention and structured practices regarding creating accessible solutions. Consequently, this may lead to changes inside IT companies. Seven interview informants and twenty-five survey respondents are somewhat limiting when writing a qualitative research study. It would have been proportionate to interview several more developers to get even more data. However, this was not easy to accomplish due to the short project period and few voluntary interview objects, making this a limitation for the study. This thesis covers an in-depth analysis inside a relatively narrow impact field. Although accessibility is an area every developer and IT company should have a relationship to, it is related chiefly to front-end developers and UI/UX designers.

Bibliography

Auerbach, A., 2015. Part of the pipeline: Why continuous testing is essential. TechWell Insights .

Awad, M., 2005. A comparison between agile and traditional software development methodologies. University of Western Australia 30.

Bailey, M.W., 2005. Ironcode: think-twice, code-once programming, in: Proceedings of the 36th SIGCSE technical symposium on Computer science education, pp. 181–185.

Bank, T.W., 2020. Gdp per capita (current us$). URL: `https://data.worldbank.org/indicator/NY.GDP.PCAP.CD`.

Begnum, M.E.N., 2019. Facilitating and advancing universal design of ict. NTNU .

Burnes, B., 2004. Kurt lewin and the planned approach to change: a re-appraisal. Journal of Management studies 41, 977–1002.

Caldwell, B., Cooper, M., Reid, L.G., Vanderheiden, G., Chisholm, W., Slatin, J., White, J., 2008. Web content accessibility guidelines (wcag) 2.0. WWW Consortium (W3C) 290.

Cameron, E., Green, M., 2019. Making sense of change management: A complete guide to the models, tools and techniques of organizational change. Kogan Page Publishers.

Carter, J., Markel, M., 2001. Web accessibility for people with disabilities: An introduction for web developers. IEEE transactions on professional communication 44, 225–233.

Charmaz, K., Mitchell, R.G., 2001. Grounded theory in ethnography. na.

Clarke, V., Braun, V., Hayfield, N., 2015. Thematic analysis. Qualitative psychology: A practical guide to research methods , 222–248.

Connell, B.R., Jones, M., Mace, R., Mueller, J., Mullick, A., Ostroff, E., Sanford, J., Steinfeld, E., Story, M., Vanderheiden, G., 1997. The principles of universal design. Retrieved January 11, 2005.

Cummings, T.G., Worley, C.G., 2014. Organization development and change. Cengage learning.

Cunningham, J.B., Kempling, J.S., 2009. Implementing change in public sector organizations. Management Decision .

Da Silva, T.S., Silveira, M.S., Melo, C.d.O., Parzianello, L.C., 2013. Understanding the ux designer's role within agile teams, in: International Conference of Design, User Experience, and Usability, Springer. pp. 599–609.

Dialsingh, I., 2011. Face-to-face interviewing. Encyclopedia of Survey Research Methods , 1–6doi:`https://dx.doi.org/10.4135/9781412963947`.

Digdir, 2015. Kva betyr omgrepa? uu - universell utforming av ikt. Digitaliseringsdirektoratet .

Doe, J., 2011. Recommended practice for software requirements specifications (ieee). IEEE, New York .

Doody, O., Noonan, M., 2013. Preparing and conducting interviews to collect data. Nurse researcher 20.

Dunican, B., 2015. Acceptance of change: Exploring the relationship among psychometric constructs and employee resistance. TopScholar .

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., Kyngäs, H., 2014. Qualitative content analysis: A focus on trustworthiness. SAGE open 4, 2158244014522633.

EU, E., 2006. Riga ministerial declaration on e-inclusion. OJ .

EU, E.C.C., 2021. European commission communication. URL: `https://ec.europa.eu/info/departments/communication_en`.

Flowers, N., Mertens, S.B., Mulhall, P.F., 2000. What makes interdisciplinary teams effective? Middle School Journal 31, 53–56.

Gerhardsen, S.M., 2020. Snart må nettsider og apper ha en tilgjengelighetserklæring. Digi.no URL: `https://www.digi.no/artikler/snart-ma-nettsider-og-apper-ha-en-tilgjengelighetserklaering/497594`.

Gkogka, E., 2020. Accessibility is our responsibility. URL: `https://medium.muz.li/accessibility-is-our-responsibility-5f9627a89177`.

Greenspan, S.J., Mylopoulos, J., Borgida, A., 1982. Capturing more world knowledge in the requirements specification, in: Proceedings of the 6th international conference on Software engineering, pp. 225–234.

Hayes, J., 2018. The theory and practice of change management. Palgrave.

Helliwell, J., Richard, L., Sachs, J.D., De Neve, J.E., 2020. URL: `https://worldhappiness.report/ed/2020/#read`.

Hennestad, B., 2012. Endringsledelse og sticky culture: Å lede endring med kulturell bevissthet. Fagbokforlaget i samarbeid med Econa .

Herriott, R.E., Firestone, W.A., 1983. Multisite qualitative policy research: Optimizing description and generalizability. Educational researcher 12, 14–19.

Hiatt, J., 2006. ADKAR: a model for change in business, government, and our community. Prosci.

Horne, Sanner, Høie, 2016. Regjeringens handlingsplan for universell utforming. 1. URL: `https://www.regjeringen.no/contentassets/48ed7783842b410881a7da36ab530c72/no/pdfs/regjeringens-handlingsplan-uu.pdf`.

Horton, J., Macve, R., Struyven, G., 2004. Qualitative research: experiences in using semi-structured interviews, in: The real life guide to accounting research. Elsevier, pp. 339–357.

Huitfeldt, A., Kleppa, M.M., Navarsete, L.S., Solheim, E., Røys, H.G., 2009. Norge universelt utformet 2025. Handlingsplan , 24–25URL: `https://www.regjeringen.no/globalassets/upload/bld/planer/2009/norge-universelt-utformet-2025-web-endelig.pdf`.

Janes, J., 1999. Survey construction. Library hi tech .

Jenner, B., Flick, U., von Kardoff, E., Steinke, I., 2004. A companion to qualitative research. Sage.

Jouany, V., Martic, K., 2020. 5 change management models to take a look at. URL: `https://blog.smarp.com/5-change-management-models-to-take-a-look-at`. accessed on 17.02.2021.

Kotter, J., 2021. The 8-step process for leading change: Dr. john kotter. URL: `https://www.kotterinc.com/8-steps-process-for-leading-change/`.

Kotter, J.P., et al., 1995. Leading change: Why transformation efforts fail. Harvard Business Review .

Larson, M.L., 1991. Translation: theory and practice, tension and interdependence. John Benjamins Publishing.

Leikanger, K., 2016. The clash between traditional academic values and strategic management:-a case study of the merged NTNU in the context of structural change in higher education. Master's thesis. NTNU Handelshøyskolen.

Lewin, K., 1951. Field theory in social science: selected theoretical papers (edited by dorwin cartwright.). Harpers .

Lewis, E., 2019. The european web accessibility direvctive. URL: https://www.3playmedia.com/blog/the-european-web-accessibility-directive/.

Lindley, C., 2017. Frontend developer handbook 2017. Frontend masters .

Lindstrom, L., Jeffries, R., 2004. Extreme programming and agile software development methodologies. Information systems management 21, 41–52.

Louise Barriball, K., While, A., 1994. Collecting data using a semi-structured interview: a discussion paper. Journal of advanced nursing 19, 328–335.

Lovdata, 2013. For-2013-06-21-732, forskrift om universell utforming av informasjons- og kommunikasjonsteknologiske (ikt)-løsninger. Lovdata.no .

Lovdata, 2018. Lov om behandling av personopplysninger (personopplysningsloven). Lovdata.no .

Lucas, D., 2018. Self-directed teams: An organizational change. doi:10.13140/RG.2.2.18211.71203.

Manneråk, Brandsnes, Brattstrøm, Buvik, Grasli, Kjellevold, Schwartz, 2001. Nou 2001:22, fra bruker til borger — en strategi for nedbygging av funksjonshemmende barrierer (committee report, "from user to citizen - a strategy for dismantling of disabling barriers"). Regjeringen.no .

McComb, M.A., 2008. The quality toolbox. Technometrics 50, 408.

MindTools, 2020. Lewin's change management model: Understanding the three stages of change. URL: https://www.mindtools.com/pages/article/newPPM_94.htm.

NAV, 2020. Tilgjengelighet i nav. https://www.nav.no/no/nav-og-samfunn/kontakt-nav/teknisk-brukerstotte/nyttig-a-vite/tilgjengelighet#chapter-1.

Nguyen, T., 2014. Kotters 8-Steg & Barack Obama. Master's thesis. Norwegian University of Life Sciences, Ås.

Oates, B.J., 2005. Researching information systems and computing. Sage.

OsloMet, 2021. Ta en master i anvendt data- og informasjonsteknologi ved oslomet! URL: https://www.oslomet.no/studier/tkd/anvend-data-informasjonsteknologi-master. example of hands-on student experiences.

Øyum, L., 2006. God ledelsespraksis i endringsprosesser: eksempler på hvordan ledere har gjort endringsprosessen til en positiv erfaring for de ansatte. Nordic Council of Ministers.

Persson, H., Åhman, H., Yngling, A.A., Gulliksen, J., 2015. Universal design, inclusive design, accessible design, design for all: different concepts—one goal? on the concept of accessibility—historical, methodological and philosophical aspects. Universal Access in the Information Society 14, 505–526.

Pikkarainen, M., Haikara, J., Salo, O., Abrahamsson, P., Still, J., 2008. The impact of agile practices on communication in software development. Empirical Software Engineering 13, 303–337.

Queirós, A., Faria, D., Almeida, F., 2017. Strengths and limitations of qualitative and quantitative research methods. European Journal of Education Studies .

Reeve, J., 2006. Extrinsic rewards and inner motivation. Handbook of classroom management: Research, practice, and contemporary issues .

Rynne, B., 2016. Honing our competitive instinct. KPMG Articles .

Schwaber, K., Beedle, M., 2002. Agile software development with Scrum. volume 1. Prentice Hall Upper Saddle River.

Stephanidis, C., 2001. User interfaces for all: New perspectives into human-computer interaction. User Interfaces for All-Concepts, Methods, and Tools 1, 3–17.

Stevens, E., 2020. What does a ui designer actually do? URL: `https://careerfoundry.com/en/blog/ui-design/what-does-a-ui-designer-actually-do/`.

Stoltenberg, Halvorsen, Haga, Solberg, Djupedal, Arnstad, Kolberg, Westhrin, Kleppa, 2005. Plattform for regjeringssamarbeidet mellom Arbeiderpartiet, Sosialistisk Venstreparti og Senterpartiet 2005-09. 1. URL: `https://www.funka.com/contentassets/1818d8865e4d4fc7b6a2826d83c68996/regjeringsplatform_soriamoria-2005-2009.pdf`.

Støren, L.A., Reiling, R.B., Skjelbred, S.E., Ulvestad, M.E., Carlsten, T.C., Olsen, D.S., 2019. Utdanning for arbeidslivet: Arbeidsgivers forventninger til og erfaringer med nyutdannede fra universiteter, høgskoler og fagskoler. NIFU .

Story, M.F., 2001. Principles of universal design. Universal design handbook .

Sundstrom, E., De Meuse, K.P., Futrell, D., 1990. Work teams: Applications and effectiveness. American psychologist 45, 120.

Sutton, J., Austin, Z., 2015. Qualitative research: Data collection, analysis, and management. The Canadian journal of hospital pharmacy 68, 226.

Tanabian, M., ZahirAzami, B., 2005. Building high-performance team through effective job design for an early stage software start-up, in: Proceedings. 2005 IEEE International Engineering Management Conference, 2005., IEEE. pp. 789–792.

Taylar, G., 2018. A guide to web accessibility for frontend developers. URL: `https://www.itproportal.com/features/a-guide-to-web-accessibility-for-frontend-developers/`.

UU-Tilsynet, 2016. Kartlegging av antall personer med ulike typer nedsatt funksjonsevne i norge. `https://www.uutilsynet.no/statistikk-og-analyse/kartlegging-av-antall-personer-med-ulike-typer-nedsatt-funksjonsevne-`818. Accessed: 2021-09-02.

UU-Tilsynet, 2021a. Eus webdirektiv (wad). `https://www.uutilsynet.no/webdirektivet-wad/eus-webdirektiv-wad/265`. Accessed: 2021-09-02.

UU-Tilsynet, 2021b. Tilgjengelighetserklæring. `https://www.uutilsynet.no/webdirektivet-wad/tilgjengelegheitserklaering/260`. Accessed: 2021-09-02.

UU-Tilsynet, 2021c. Tilgjengelighetserklæring. `https://www.uutilsynet.no/webdirektivet-wad/tilgjengelegheitserklaering/267`. Accessed: 2021-09-02.

WAI-Engage, 2012. Accessibility responsibility breakdown. URL: `https://www.w3.org/community/wai-engage/wiki/Accessibility_Responsibility_Breakdown`. accessed on 21.04.2021.

WHO, 2020. Disability and health. URL: `https://www.who.int/en/news-room/fact-sheets/detail/disability-and-health`.

Øyvann, S., 2018. Difi etterlyser næringslivet. Computerworld URL: `https://www.cw.no/artikkel/siste-nyheter/difi-etterlyser-naeringslivet`.

Appendix

A   Consent Form

Informasjonsskriv

Forskningsprosjekt: Teknisk Tilgjengelighet og endringsprosesser

NTNU - Norges teknisk-naturvitenskapelige universitet er ansvarlig for prosjektet.

Forskrift om universell utforming av IKT-løsninger kom i 2013, og pålegger utviklere å sikre teknisk tilgjengelighet i det som blir utviklet. Snart vil noe som heter WAD - Web Accessibility Directive - tre i kraft, og med det kommer en skjerping av krav til teknisk tilgjengelighet. En oppgradering av WCAG 2.0 til WCAG 2.1.

NTNU lurer på hvordan utviklere i Norge vil påvirkes av kommende lovkrav. Vi vil forske på hvordan du som utvikler opplever dagens krav til teknisk tilgjengelighet, og hva du tenker om nye lovkrav. I tillegg hvilke endringer man må innføre for å kunne oppnå kommende krav.

Prosjektet gjøres av NTNU (Norges Teknisk- Naturvitenskapelige Universitet), ved Trond Aalberg (veileder) og Eskil Hognestad (student), som er ansvarlige for prosjektet.

NTNU ønsker intervjuer med utviklere.

Hva innebærer det for deg å delta?
All informasjon samles inn og anonymiseres av NTNU, og behandles etter GDPR og personopplysningsloven. Vi knytter aldri kontaktopplysninger/navn til det som sies i intervjuene, og det vil ikke spørres om informasjon som kan gjøre deg direkte eller indirekte identifiserbar.

Dersom du samtykker til at vi tar lydopptak, vil intervjuet bli spilt inn og det vil bli tatt notater underveis. Lydopptak vil slettes når intervjuet er ferdig transkribert (skrevet ut). I anonymiseringsprosessen gir vi deg typisk et pseudonym. Kun anonymisert data vil bli publisert, derfor vil ikke deltakerne kunne bli gjenkjent i publikasjonen.

Om det er ønskelig vil transkribering av intervjuet ditt sendes til deg som deltaker, slik at du kan lese over. Skulle vi ha tolket deg feil, eller om du føler det kan være indirekte identifiserbar informasjon som har blitt sagt, setter vi pris på korrigering.

Kontaktinformasjon til alle deltakere slettes ved prosjektslutt, 01.12.2021. Hvis du vil at dine personopplysninger skal slettes før, er det bare å kontakte Eskil Hognestad (eskilhog@stud.ntnu.no / 97682185). Da vil Eskil bekrefte forespørsel før vi sletter deg som deltaker i studien.

Ditt personvern - hvordan vil vi oppbevare og bruke dine personopplysninger?
Vi vil kun bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi
behandler opplysningene konfidensielt og i samsvar med personvernregelverket.
- Kun veileder Trond Aalberg ved institutt for datateknologi og informatikk ved NTNU
  og masterstudent Eskil Hognestad, vil ha tilgang til opplysningene dine. Ingen
  uvedkommende vil få tilgang til opplysningene.
- Data som samles inn vil så fort som mulig bli anonymisert.
- All eventuell papirarbeid vil bli skannet og makulert slik at ingen skal ha tilgang til
  dine personopplysninger. Skannede dokumenter vil bli kryptert.

Dine rettigheter:
Så lenge du kan identifiseres i datamaterialet, har du rett til:
- Innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi
  av opplysningene.
- Få korrigert personopplysninger om deg.
- Få slettet personopplysninger om deg.
- Sende klage til Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke, muntlig eller skriftlig.

Hvordan kan jeg få mer informasjon?
Hvis du har flere spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta
kontakt med:
- Institutt for datateknologi og informatikk ved NTNU
  - Trond Aalberg, tlf: 73597952,
    e-post: trond.aalberg@ntnu.no (Veileder)
  - Eskil Hognestad, tlf: 97682185,
    e-post: eskilhog@stud.ntnu.no (Masterstudent)
- NTNUs personvernombud: Thomas Helgesen, tlf: 93079038 ,
  e-post: thomas.helgesen@ntnu.no

Hvis du har spørsmål knyttet til NSD sin vurdering av prosjektet, kan du ta kontakt med:
- NSD - Norsk senter for forskningsdata AS
  e-post: personverntjenester@nsd.no
  tlf: 55582117

B   Interview Guide

Intro: Litt om meg og studien:

Jeg heter Eskil Hognestad og går i 5. klasse informatikk ved NTNU Trondheim.

Jeg har lyst til å forske på hvordan krav til teknisk tilgjengelighet i Norge påvirker utviklerne i NAV - og hva utviklere i NAV trenger for å lykkes med å møte nye krav som kommer i 2020/2021. Har du hørt om WCAG?
(HVIS IKKE)

I dag finnes det en forskrift om universell utforming av IKT-løsninger som stiller krav til at nettsider må oppfylle 35 av 61 suksesskriterier i standarden "Retningslinjer for tilgjengelig webinnhold - også kalt WCAG.
I løpet av 2020/2021 skal noe som heter WAD tre i kraft, en oppgradering av WCAG.
Endringer vil inkludere synstolkning av video.
12 nye WCAG krav som tar bedre høyde for mobile enheter.
En ny tilgjengelighetserklæring og tilbakemeldingsfunksjon med bruker-feedback for tiljgengelgihetsfeil.
Og at intranett-systemer skal omfattes de nye retningslinjene.

Har du lest informasjonsskrivet?
https://docs.google.com/document/d/1nOF3dkl6miWppPD324n3rOwX0WTW4tE4PDY5bkpr BQ0/edit#
Jeg kommer til å bruke diktafon fra nettskjema, den er anbefalt å bruke ved forskning. Går det greit?
Jeg er interessert i dine tanker, refleksjoner og erfaringer. Du kan når som helst avbryte eller velge å ikke svare på spørsmål hvis du synes de er ubehagelige.
Da setter vi i gang.

Del 1: Intervjuobjektet og TT/UU

Hvem er du? Års erfaring som utvikler og hvor lenge har du jobbet i NAV?
Hva var grunnen til at du valgte å bli utvikler? og hvorfor i NAV?
Din rolle i NAV? Team?

Hvor mange? Hvordan strukturert?

Hvordan jobber dere? Si fra start på et prosjekt til levering…

- Agile?
- DevOps?

Teknisk tilgjengelighet og deg:

Hva betyr teknisk tilgjengelighet for deg?

Hvordan er ditt engasjement for Teknisk tilgjengelighet eller Universell Utforming?

Relasjon til en med nedsatt funksjonsevne?

Hvordan vil du beskrive din kompetanse på teknisk tilgjengelighet eller UU?

- Hvordan har du fått bygget opp denne?
- Var NAV involvert?

Hvilke brukertyper eller brukergrupper synes du NAV skal prioritere?

NAV og teknisk tilgjengelighet i dag:

Hvordan løser ditt arbeidsområde lovkravene til teknisk tilgjengelighet?

Har dere noe forbedringspotensiale?

- Hvordan kan dere oppnå disse forbedringene?

Er det noe du vil anbefale at NAV-ledelsen prioriterer for ditt arbeidsområde?

- Kan det være noe konsekvenser av en slik prioritering?

NAV og teknisk tilgjengelighet i framtiden:

EU lagde i 2016 et nytt direktiv som omhandler teknisk tilgjengelighet. Dette kalles WAD -

Web Accessibility Directive.

Har du hørt om dette direktivet?

Ja? HVA DA????

HVIS NEI

WAD blir selve fundamentet til oppgraderingen av WCAG 2.1. og inneholder nye skjerpede

krav til gjeldene retningslinjer. Forskriften vil peke på 47 WCAG kriterier, hvor 12 av dem er

nye. Den vil også kreve at hver løsning har en tilgjengelighet erklæring og at brukere kan

melde inn tilgjengelighets feil og få svar innen 14 dager på denne klagen.

Har du noen umiddelbare tanker hvordan dette vil påvirke ditt arbeidsområde?

- Hvis du trenger kompetanseoppdatering her, hvordan vil du gå frem for å sørge for at du får det?

Hva kan NAV gjøre for å øke kompetansen til utviklere når det gjelder Tek Tilgjengelighet?

- Kurs?
- 1-1?
- Champion?
- Testing?

Som sagt må hver løsning ha en tilgjengelighet erklæring, den skal inneholde:

- Informasjon om innhold som ikke er UU vennlig og begrunnelse hvorfor
- Informasjon om universelt utformede alternativer, dersom det finnes

Hvordan vil denne erklæringen påvirke ditt arbeidsområde?

- Ser du for deg en konkret måte å løse dette på?

I tillegg så skal brukerne kunne melde inn tilgjengelighets feil og få svar på dette innen 14 dager. Tror du dette vil påvirke ditt arbeidsområde? Hvordan?

- Ser du for deg en konkret løsning på dette problemet?

Er det noe NAV kan gjøre for å bedre fremme kompetanse på teknisk tilgjengelighet og UU? Både nå og i tilknytning til de nye kommende kravene?

Endringsprosesser

Til slutt ønsker jeg å høre om du i løpet av din karriere har opplevd noe form for endringer.
Nye krav eller lignende?
Sikkerhet?
Hvis JA: Hvordan løste du/dere dette?

Avslutning:

Har du noen kommentarer eller tanker du vil dele angående temaet?
Er det noe jeg ikke har spurt om som er relevant å spørre om?
Kan noe forbedres med intervjuet?

C Survey

Forskningsprosjekt: Teknisk tilgjengelighet i NAV

Hvordan vil oppdateringen av WCAG fra 2.0 til 2.1 påvirke utviklerne i NAV? Og hva med den nye til-gjengelighetserklæringen og tilbakemeldingene på universell utforming fra brukere? Dette undersøkes i regi av NTNU, og vi håper du som utvikler i NAV har 5 minutter til å bidra.

Prosjektet er godkjent av NSD. All informasjon blir anonymisert av NTNU, og behandles etter GDPR og personopplysningsloven. Svar på de spørsmålene du selv ønsker.

Har du spørsmål til studien? Kontakt Institutt for datateknologi og informatikk, NTNU ved:
- Trond Aalberg, tlf: 73597952, e-post: trond.aalberg@ntnu.no (veileder)
- Eskil Hognestad, tlf: 97682185, e-post: eskilhog@stud.ntnu.no, Slack: @eskil.hognestad (masterstudent)

1. Først ønsker vi å bli litt kjent med deg.

Hvor mange års erfaring har du som utvikler?

Velg …

Hva er din stilling og rolle i dag?

Velg så mange du vil

- ☐ Utvikler
- ☐ Full-stack
- ☐ Front-end
- ☐ Back-end
- ☐ Data/statestikk
- ☐ UI design
- ☐ Teamledelse
- ☐ Produktledelse
- ☐ Kontor/Seksjon/Avdelingssjef
- ☐ Annet

Har du en nær relasjon til personer med nedsatt funksjonsevne eller utviklingshemmede (in-kludert deg selv)?

- ○ Ja
- ○ Nei

2. Hva tenker du om teknisk tilgjengelighet (Web Accessibility)?

Med teknisk tilgjengelighet menes den delen av universell utforming som kodes inn i løsningene. Forskrift om universell utforming av IKT-løsninger peker i dag på 35 WCAG 2.0 kriterier for webinnhold, i tillegg til tilgjengelighet på mobile flater.

Hvor enig eller uenig er du i påstandene nedenfor?

	Helt enig	Ganske enig	Verken enig eller uenig	Ganske uenig	Helt uenig	Vet ikke
Jeg har god kjennskap til teknisk tilgjengelighet.	O	O	O	O	O	O
Alle på mitt team/arbeidsområde har god kjennskap til teknisk tilgjengelighet.	O	O	O	O	O	O
Jeg tenker alltid på teknisk tilgjengelighet når jeg utvikler.	O	O	O	O	O	O
Det er stort fokus på teknisk tilgjengelighet innad i mitt team/arbeidsområde.	O	O	O	O	O	O
Å sikre god teknisk tilgjengelighet er viktigere enn å sikre et visuelt pent design.	O	O	O	O	O	O
NAV prioriterer teknisk tilgjengelighet i sine løsninger.	O	O	O	O	O	O
Alle team burde ha på plass rutiner for å sjekke teknisk tilgjengelighet før lansering.	O	O	O	O	O	O
NAV legger til rette for kompetanseheving innenfor teknisk tilgjengelighet.	O	O	O	O	O	O
Jeg vet hvor jeg skal henvende meg for å øke min kompetanse innenfor teknisk tilgjengelighet.	O	O	O	O	O	O
Teamet/arbeidsområdet har alt som trengs for å sikre teknisk tilgjengelighet og universell utforming.	O	O	O	O	O	O

Kan du kortfattet beskrive hvordan ditt team/arbeidsområde arbeider?

Hva er størrelse på team/arbeidsområde? Er det en spesiell arbeidsmodell dere bruker? Jobber dere smidig? Er det delte ansvarsområder, eller tar alle ansvar til alt?

Hvordan kan NAV bedre støtte team/arbeidsområder i å sikre teknisk tilgjengelighet?

Her har du mulighet til å fritt dele forbedringsforslag eller forventninger.

3. Hva vet du om ny lovgivning på teknisk tilgjengelighet som kommer i 2020/2021?

EU har innført et nytt direktiv, Web Accessibility Directive (WAD), som vil legge til flere krav på gjeldende WCAG. Forskrift om universell utforming av IKT-løsninger vil peke på 47 WCAG 2.1 kriterier. Den vil også kreve at hver løsning har en tilgjengelighetserklæring. Den vil også kreve at brukere kan melde inn tilgjengelighetsfeil og få svar innen 14 dager. Her finner du en oversikt over de nye reglene.

Hvor enig eller uenig er du i påstandene nedenfor?

	Helt enig	Ganske enig	Verken enig eller uenig	Ganske uenig	Helt uenig	Vet ikke
Jeg har god kontroll på de nye kravene som kommer med WAD.	O	O	O	O	O	O
Teamet/arbeidsområdet mitt er forberedt på å skulle skrive en tilgjengelighetserklæring.	O	O	O	O	O	O
Teamet/arbeidsområdet mitt er forberedt på å skulle svare på brukermeldinger om UU-feil.	O	O	O	O	O	O
De nye kravene som kommer med WAD vil påvirke produktiviteten.	O	O	O	O	O	O
De nye kravene som kommer med WAD vil påvirke bevisstheten vår rundt UU og teknisk tilgjengelighet.	O	O	O	O	O	O

Teamet/arbeidsområdet har alt som
trengs for å sikre nye krav til teknisk
tilgjengelighet og brukerfeedback.

   ○   ○   ○   ○   ○   ○

Har du andre tanker knyttet til teknisk tilgjengelighet i NAV?

Her har du mulighet til å fritt dele tanker, drømmer og bekymringer.

4. Intervju

Vi ønsker å utføre dybdeintervjuer via Zoom for å få mer innsikt i hvordan utviklere i NAV IT jobber med teknisk tilgjengelighet. Intervjuene vil ta mellom 30-45 minutter og gjennomføres av en masterstudent ved NTNU i oktober, november og desember.

Ingen som jobber i NAV vil ha tilgang til intervjuene og navnet vil ikke kunne kobles til svarene du har gitt.

Hvis du synes dette høres greit ut kan du fylle ut kontaktinformasjon under. For å lese mer om hvordan vi vil behandle dataen som blir innsamlet kan du lese vårt informasjonsskriv ved å <u>trykke her.</u>

Hva heter du (fornavn og etternavn)?

Hva er din e-postadresse?

Andre kommentarer

Dersom du ønsker å legge til en foretrukket uke, dato eller tid, kan du skrive det her.

Tusen takk for at du tok deg tid til å besvare denne undersøkelsen.