

Challenges with assistive technology compatibility in universal design

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Abstract. Compatibility with assistive technology (AT) such as screen readers is a precondition for universal design of ICT. This is also a requirement in the W3C WCAG guidelines. Experience shows that providing compatibility with one screen reader does not necessarily ensure compatibility with other screen readers from different vendors. It is therefore necessary to test an ICT solution with different AT from different vendors to ensure accessibility for all AT users. In this work, we investigate compatibility challenges with AT in depth and explore the potential for an online tool for AT compatibility testing.

Keywords. Universal design, WCAG, assistive technology compatibility, screen reader compatibility, AT, inclusive design, accessibility testing tools, cloud service

Introduction

The concept of universal design (UD) is becoming more known in the ICT industry, but there is still a great need for knowledge and effective tools to support the development of universally designed ICT solutions.

UD is about 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 [1]. UD shall, however, according to the Convention on the Rights of Persons with Disabilities, not exclude assistive devices² for particular groups of persons with disabilities where this is needed [2]. This means that an ICT solution must be compatible with any assistive device or technology that the user is dependent upon. This is also reflected by the de facto standard in web accessibility, namely the WCAG 2.0 guidelines. Guideline 4.1 of WCAG 2.0 requires maximizing compatibility with current and future user agents, including assistive technologies (AT) [3]. This requirement does not only mean technical accessibility, but also that the ICT solution is usable (i.e. perceivable, operable and understandable) with all the different ATs that people are dependent on.

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² Assistive devices or technology (AT) refers to products, devices, and equipment created for personal use, whether acquired commercially, modified or customized, that is used to maintain, increase, or improve the sensory, physical or cognitive capabilities of individuals with disabilities. Examples include screen readers, screen magnifiers, speech recognition, spell checkers, and alternative input devices such as large-key keyboards, trackballs and joysticks.

The new Norwegian Regulations for universal design of ICT solutions, which came into force on 1 July 2013 [4] requires new net based ICT solutions to conform to the WCAG 2.0 guidelines, i.e. ISO/IEC 40500 [5].

During a pilot evaluation of the Norwegian e-vote 2011 solution with people with disabilities, we became particularly aware of challenges with screen reader compatibility [6]. Although the e-vote pilot worked with one screen reader (Jaws), it did not work satisfactorily with two others (Window-Eyes and SuperNova). Others have also pointed out that even if a solution is compatible with one screen reader, there may be compatibility issues with other screen readers [7, 8]. Steve Faulkner [7] has provided a table that compares practical screen reader support in various browsers. While the general advice is to focus on accessibility standards and widely accepted accessibility techniques rather than differences between different brands of screen readers [8], doing so in practice is still a challenge. This challenge is perhaps most prominent when developing rich web applications which is increasingly common.

Because compatibility with AT is a precondition for universal design of ICT, (and required by law in some countries), there is a need for efficient ways to achieve such compatibility. We therefore wanted to further investigate what challenges developers of ICT solutions meet with regard to universal design and AT compatibility. We also wanted to explore the need and desirability of tool support for compatibility testing.

1. Existing approaches to AT compatibility testing

There are a number of tools today that can be used to check whether a web site meets the W3C WCAG guidelines, see e.g. [9]. Passing automatic tests will usually increase the accessibility and the compatibility with AT, but does not guarantee it. To our knowledge, none of these tools can be used to check the actual compatibility with screen readers from particular vendors.

WebAIM has developed a screen reader simulation of a particular web page [10]. This can be used to demonstrate what it is like to use a screen reader, but it does not provide a way to test compatibility.

It is possible to install screen readers to test the actual compatibility. The open source screen reader NVDA can be used for free. Other AT providers may offer free trial licenses for demonstration and testing.

Fangs is a Mozilla Firefox extension to emulate a screen reader. It creates a textual representation of a web page similar to how the page would be read by a screen reader. However, since this is not an actual screen reader, the results may deviate from various real screen readers in various points.

Another recommended method to evaluate screen reader compatibility is to test with the built in screen reader VoiceOver on iOS or TalkBack on Android. Testing with these built in features will not guarantee an accessible solution for users of separately installed screen reader programs though.

Thus, it seems to be necessary to acquire and install several different types of screen readers to be able to guarantee compatibility, i.e. accessibility and usability for most screen reader users. While it may be possible to get some screen readers for free for the purpose of testing, it is also the question of maintenance, keeping track of updates and version, and also knowledge about how to use them.

2. Approach

To investigate what challenges developers meet in relation to AT compatibility, how they deal with it, and potential needs for more tool support, we conducted a focus group and interviews with various stakeholders. The focus group included 10 participants, four from the public sector and six from the private sector. The participants worked as developers and designers in ICT development projects and were interested in accessibility and universal design. Two of the developers were blind and highly experienced screen reader users. We also conducted supplementary interviews with a supplier of assistive technology and with a person in the Norwegian labour and welfare administration (NAV) who was knowledgeable about the welfare system and the provision of assistive technology.

3. Results

The focus group revealed many questions and challenges in this area, and raised the need for more knowledge, guidance and recommendations about AT compatibility and testing. One reason for these challenges is the fact that AT from different vendors simply works differently. It is a main challenge for the AT developers to continually keep up with and adapt their products to the frequent updates in the various web browsers and technologies. Another problem for developers of mainstream technology is that products and tools from different vendors are updated at different rates and at different points in time. Also, for AT users in non-English speaking countries, there is often a delay in updates of the AT because it has to be translated from English to their native language. It is therefore difficult to know what versions of both the AT and the web browser that should be taken into account.

It seems that ICT developers do not customarily ensure compatibility with AT by testing that their solution actually works with various types of AT. ICT developers do seldom have access to several screen readers from different vendors. Traditional special purpose screen readers are often expensive software that needs to be installed at a local computer. To the extent that testing with such screen reader software is done during development, it is usually only done with one specific screen reader from one vendor. It seems that Jaws for Windows is the best known screen reader, and it is thought to be the one most commonly in use. Moreover, it was pointed out that it is not enough to have access to AT, it is also necessary to learn how to use it. Another challenge was that even if errors could be found through testing with a screen reader, it could be difficult to find the reason for the error, because the screen reader did not offer any kind of debugging options.

Because the Norwegian legislation requires compatibility with AT, the participants wanted to know what types of AT that are included in this requirement. They also wanted to know what AT products to choose for testing, and they needed guidance on backwards compatibility, i.e. how many versions of the AT (and browsers) to take into account. Therefore they wanted detailed background information about the proliferation of various types of AT and versions in the population. From the interview and contact with NAV, we managed to get an exhaustive list of what types of AT that have been delivered to users in Norway. However, information about the number, versions and types of AT that are currently in use in the population were not easily

discernable from this list. The developers were also interested in recommendations on efficient testing with regard to compatibility.

The focus group participants were positive towards an online AT lab. Such a tool would be particularly useful for smaller development teams that do not have the means to acquire, install and maintain expensive AT such as screen readers. Equally important as a tool for testing, is the provision of continually up-to-date information, knowledge and recommendations with regard to which types of AT that are covered by the legislation, and how to do the conformance testing as efficient and cost effective as possible. For example, our informants envisioned that a continually updated table on compatibility issues with regard to combinations of various types and versions of AT and various types and versions of browsers could be useful. Some participants also mentioned that a compatibility testing service would be desirable.

4. Conclusions

When aiming at universally designed ICT solutions, it is a challenge to ensure compatibility with all the types of AT that is in use in a population. In practice, it is necessary to test with specific types and versions of AT from different vendors to be able to guarantee actual compatibility with these specific tools. However, most developers do neither have readily access to, nor knowledge about, how to use various types of AT. It is therefore usually not possible or realistic for developers to test the solution against several types of AT within the tight time schedules and cost constraints in ICT development projects. To support universal design of ICT it is therefore an urgent need for more information, advice and effective tools to achieve actual AT compatibility.

The developers in this study were positive towards an online tool to test AT compatibility. However, such a tool should be accompanied with continually updated information on what types of AT that is covered by the legislation and on proliferation of various types and versions of AT in the population. They also wanted descriptions of efficient test procedures and how-to guides, including continually updated information on differences, overlaps and special issues with regard to compatibility between various versions of AT and web browsers.

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