

Access to the Internet for Persons with Disabilities and Specific Needs



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Background

“The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect,” said the inventor of the World Wide Web, Tim Berners-Lee [1]. The increasingly large number of people worldwide who have access use and contribute to this vast resource to the benefit of everyone. From education and freedom of expression to leisure and commerce, the Web continues play an important role in everyday life.

Member states that have ratified the Convention on the Rights of Persons with Disabilities (CRPD) are committed, according to Article 9, to uphold access to communications technology such as the Web as a fundamental right [2]. This ensures that those with disabilities are not disadvantaged by a lack of reasonable access to the Web and its benefits comparable to others without a disability. Therefore, the Web is expected to accommodate everyone despite the considerable diversity in experiences and resulting needs.

The World Wide Web Consortium (W3C) through its Web Accessibility Initiative (WAI) works to ensure the right to have access to information and communications technologies is preserved for people with disabilities on the Web [3]. The WAI has produced several international standards designed to improve the accessibility of content on the Web and applications involved in its design and use.

The Web Content Accessibility Guidelines (WCAG) 2.0 is one of the WAI’s most successful standards. It has gained approval from the International Organization for Standardization (ISO) (i.e., ISO/IEC 40500:2012) [4], which has a membership of standard organisations based in over 162 countries [5]. Additionally, many countries have seen merit in instituting WCAG 2.0 compliance as a requirement for government and in some cases (e.g., Australia) non-governmental websites as well [6, 7].

However, despite all efforts some challenges and gaps remain for governments and other major stakeholders to address to advance the implementation of Article 9 of the CRPD for the Web.

Challenges facing persons with disabilities and specific needs on the Web

Lack of Web skills and informed use

Facilitating access to the Web is not limited to providing the necessary technological infrastructure. It is also ensuring no access barriers exist that makes it difficult to perceive, understand, navigate, and competently interact with Websites. Lack of Web skills, informed use, and accommodation on the Web are major hindrances to achieving this goal.

There are some indications that persons with disabilities may not be equally benefiting from some of the most lucrative opportunities made available on the Web as others do. Research has revealed that they use the Web in less personally beneficial ways when compared to others without disabilities [8]. Persons with disabilities in this study typically engaged in gaming and information seeking relating to health and government services. They were less likely to engage in social interaction, shopping, reading news, banking and job searching on the Web.

Some Web accessibility professionals are also concerned about the awareness level surrounding the use of adaptive strategies to address encountered barriers [9, 10]. For example, they believe that users are often not informed about Web browser accessibility preferences (e.g., adjust font sizes and page zoom) and other accessibility solutions, and how to use them.

Lack of accommodation on the Web

Over the last 18 years Web accessibility has concentrated on people with sensory and mobility disabilities, and on the major barriers faced by this population. Work on accessibility for persons with visual impairment aims to provide information via alternative sensory channels: auditory (e.g., screen readers); tactile means (e.g., refreshable Braille displays); sight (e.g., virtual retinal displays, customised pre-compensation of images to match the visual characteristics of individual users and produce undistorted retinal images) [11]. Alternative input mechanisms were developed for those with physical disabilities to access systems used to navigate the Web [12]. These include many special keyboards and novel pointing-based input methods operated by eye gaze tracking and other body parts (i.e., tongue, feet, elbows and head), and speech input devices. Guidelines have been good at integrating this knowledge and accommodating assistive technologies.

However, there is still considerable room for the improvement of access to assistive technologies, a wider range of websites and mobile. Purchasing assistive technologies represent an additional cost

to access the Web that erects an even larger barrier to Web access by these individuals who already tend to have less wherewithal than those without disabilities [13]. A 2016 study revealed that even when they gain access, blind users for instance, encounter great difficulty with taking and posting images and interpreting poorly described photos on social networking sites [14]. Much attention has not been directed at such sites despite their popularity.

Mobile access for persons with disabilities raises many currently unanswered questions as well. Mobile devices provide essential benefits for people with disabilities, especially relating to real-time informed-decision making. Search data underscores its importance as it suggests that a much greater number of users access the Web from mobile devices compared to alternative avenues for several countries around the globe [15]. Current work has seen the publication of an editor's draft document from the WAI on how its guidelines apply to mobile [16]. However, much research is needed to resolve the uncertainty surrounding the tolerance of mobile platforms to provide traditional support for accessibility features and how to effectively exploit this new interaction paradigm presented by these devices [17].

There is a dearth of Web accessibility work targeting persons whose experience of disability is not as apparent as the aforementioned — persons affected by mental disorders, sleep disorders and chronic fatigue syndrome — despite research showing a dire need. A keyword search of several relevant research databases revealed that some accessibility related research has been conducted for persons with sensory (156) and physical (64) disabilities. However, very little research has been conducted for those with less apparent disabilities (i.e., mental disorders and other cognitive impairments) (44) during the last five years.

Researchers have reported several website elements that persons affected by conditions that are associated with cognitive impairment such as depression and anxiety identified as being accessibility issues [18]. These include distracting design, confusing menu options, time limited response forms, information overload, poor content organisation, complicated language, excessive advertisements, and complex purchasing processes. Moreover, there are difficulties that this group experience offline that may be present on the Web as well but have not been researched in this context as yet. For example, it is sometimes difficult for people with depression to accurately interpret information exchanged during social interaction [19].

Promising approaches and good practice

WAI guidance

WAI relies on broad voluntary and non-structured community involvement to highlight difficulties that people with disabilities might experience when using the Web [3]. The process is often open to the public and employs research and stakeholder expertise. Volunteers are predominantly Web accessibility and development professionals followed by persons with disabilities. WAI aims for consensus among volunteers involved concerning the final inventory of barriers and corresponding recommendations to remove or reduce them. Some recommendations may appear more applicable to specific groups than others but the guidelines generally aim to ensure accessibility for all.

However, there are difficulties associated with a high rate of non-compliance to guidelines and evaluating compliance that are a major concern. For example, a 2015 study investigating WCAG 2.0 compliance found that 30.6% (15/49) of government websites of states in the United States of America (excluding Texas and Oregon) and the District of Columbia failed basic accessibility requirements (i.e., did not meet all WCAG 2.0 Priority 1 guidelines) [20]. Also, an earlier study found that though almost 70% of the 160 Australian websites in the study claimed at least WCAG 2.0 A compliance, only 2% of those actually met their claimed level of compliance [21]. Additionally, according to the WAI comprehensive and effective Web accessibility evaluations require human evaluators with expertise in a wide range of related areas [22]. A study involving a sample of such experts reported that they failed to reach the W3C recommended 80% level of agreement [23] for 50% of the 61 WCAG 2.0 success criteria when evaluating sites in the study [24]. Another study supports these findings revealing an average agreement among experts between 70 and 75%, with an error rate around 29% [25].

Other areas for improvement include participation by persons with disabilities and the linking of barriers with recommendations. More involvement from persons with a wider range of disabilities will ensure proper representation of everyone's interests during the guideline development process. Additionally, it is difficult to adopt new insight from research to increase the effectiveness of a particular recommendation, as guidelines are not explicitly linked to well-stated barriers and associated conditions. Though helpful information is given under the "Understanding Success Criterion" sections, there is no consistent information about the particular user categories affected, related disability types, hindered activities or tasks, level of restriction (inclusive of frequency) or supporting evidence. This is crucial information for the future validation and improvement of Web accessibility recommendations for a wide range of disabilities.

Research-based guidelines

There are several additional guidelines in existence that aim to improve accessibility, especially for older people. Many of these research-based guidelines are derived from observation studies of user evaluations and literature reviews of findings validated with participants who were Web users.

The research-based approach is relatively prompt, responsive and very helpful for providing evidence-based guidance about how to accommodate those with disabilities (i.e., generally or by specific group) who are not currently addressed by more established guidelines and standards. For instance, project entitled BETTER (weB accEssibiliTY for people wiTh mEntal disoRders) in collaboration with the World Health Organisation (WHO) has been investigating Web accessibility for depression and anxiety. It employs three-phases to examine this issue for people with these conditions: (1) identification of possible Web accessibility barriers using three data sources — a systematic review of literature, focus-group interviews with people affected by depression and or anxiety, and an expert survey using personas; (2) validation of Web accessibility facilitation measures for this population using experimental user-testing; (3) provision of recommendations for later validation using a delphi method.

However, a study a survey of 57 Web developers and accessibility advocates showed that except for the 'Beyond ALT Text: Usability for Disabled Users' guidelines (26%), at least 61% of participants had no knowledge of other guidelines included in the study. These guidelines include Making your Website senior-friendly-a-checklist (91%), Research Derived Web-Design guidelines for older people (87%), Research-based Web Design and Usability Guidelines (78%), Guidelines for Accessible and Usable Web Sites: Observing Users Who Work With Screen Readers (71%) and Web Usability for Senior Citizens (61%).

Filling the gaps

Research gaps

Researchers should closely coordinate their work with major initiatives within the accessibility community to increase their credibility and visibility within the community. They must also demonstrate how research-based recommendations could be coalesced with Web standards and implemented. These actions are very important for increasing the awareness and use of research-based guidelines.

Researchers should also pursue investigations into a wider coverage of disabilities in a more systematic way. Involving clearly defined and culturally diverse populations to obtain conclusive evidence about what barriers exist and how they can be removed or reduced will also be immensely helpful. Closer attention to contextual factors will also shed light on other important issues. For example, reasons why persons with disabilities are not taking advantage of the seemingly most valuable opportunities the Web provides to this group. These activities will entail ensuring each barrier is well-stated along with an indication of the level of restriction it causes and frequency of occurrence. This will help with informing the prioritisation of individual access issues for people with disabilities in guidelines. Strategies targeting the removal of barriers must also be validated before they are recommended as a solution.

Gaps in practice

An aggressive Web accessibility training program that not only focuses on established standards and guidelines but also on-going research insight must be pursued. It is also vital that persons with disabilities are involved throughout the development process to ensure that expended efforts on their behalf are effective. A renewed effort by the organisations to guarantee Web accessibility compliance to standards must be priority as this provides a good starting point.

Systematically involving persons with disabilities

Efforts must be made to develop capability within the community of persons with disabilities to effectively guide and ensure their best interests are being considered in Web accessibility research and practice. This must also involve an initiative to increase awareness of existing features designed for persons with disabilities to personalise Web-browsing. Bespoke training targeting persons with a specific category of disabilities and the tools available to them will also be useful. Developing tools for persons with disability to provide meaningful and transparent feedback about their needs when using the Web will also be instrumental for the improvement of Web accessibility.

The role of governments

Governments have the responsibility to facilitate access to the Web. It is understood that their execution of this role is dependent on available resources, which might be scarce, but more needs to be done. The notion of progressive realisation provides a realistic framework for governments with any level of resource availability to develop bespoke strategies that are progressive. It directs governments to assess their current state of affairs, devise meaningful and feasible steps, no matter

how small, towards the goal of making the Web accessible for all nature [26, 27]. Steps devised by governments should incorporate several key elements.

Strengthening links between key stakeholders

Governments should play a stronger role in unifying efforts by stakeholders — persons with disabilities, researchers and Web professionals — to ensure Web access to persons with disabilities. This will involve: identifying stakeholder needs and how to satisfy them; determining their interdependence; defining their individual contributions towards achieving success; offering transparent support (e.g., training, funding, monitoring and guidance) to each stakeholder. Fostering a good working relationship between stakeholders will be instrumental to this process.

Ensuring standards compliance

Governments must acknowledge the importance of Web accessibility by taking the lead. They should ensure that all government websites are standards compliant. Those in the private sector, especially those offering essential services, should be required to do the same. Support must be offered to those with less resources to implement this mandate. Monitoring mechanisms must also be established and firmer penalties for non-compliance should be issued as well.

Funding research to accommodate a wider range of disabilities

Adopting existing standards and guidelines is not sufficient to ensure Web access to all. Larger and more sustained research funding must be provided to investigate the needs of persons with a much wider range of disabilities on the Web and how to meet them. This should be done in a manner that offers the same opportunities for all groups with disabilities. For example, funding areas neglected by research in the past should be considered as a matter of urgency.

Meeting the needs of persons with disabilities on the Web go beyond the provision of recommendations and adopting standards. Governments should take a bigger responsibility in enlisting the help of the private sector to participate in joint funding in support of mutually beneficial research. For instance, investigating how to institutionalise the underlying principles advocated by the CRPD within organisations will be crucial for a more effective and proactive response to ensuring access to the Web for persons with disabilities.

Empowering persons with disabilities

Policies should consider the high economic burden on persons with disabilities to obtain expensive accessible solutions in addition to standard equipment required to access the Web. Special measures must be taken to reduce the associated costs of accessing the Web for this group. For example, priority must be placed on sourcing and or developing accessible solutions that are more resistant to obsolescence due to rapid technological development, which characterises the Web and its access points.

Modules focusing on accessible solutions need to be integrated into digital literacy programs. These modules will provide a general overview of available solutions, their use and ways to obtain them. This training should also be included in existing online resources.

References

1. World Wide Web Consortium. World Wide Web Consortium Launches International Program Office for Web Accessibility Initiative. 1997; Available from: <http://www.webcitation.org/6eVABj5b7>.
2. United Nations General Assembly. Convention on the Rights of Persons with Disabilities. 2006; Available from: <http://www.webcitation.org/6eTo8arue>.
3. World Wide Web Consortium, WAI Mission and Organization. 2005.
4. International Organization for Standardization, ISO/IEC 40500:2012 - Information technology - W3C Web Content Accessibility Guidelines (WCAG) 2.0. 2012.
5. International Organization for Standardization. ISO Members. 2016; Available from: <http://www.webcitation.org/6eVFJ8Po1>.
6. World Wide Web Consortium. W3C Web Content Accessibility Guidelines 2.0 Approved as ISO/IEC International Standard. 2012; Available from: <http://www.webcitation.org/6eVHjqInF>.
7. Australian Human Rights Commission. World Wide Web Access: Disability Discrimination Act Advisory Notes ver 4.0 (2010). 2014; Available from: <http://www.webcitation.org/6eVHZ5N9o>.
8. Dobransky, K. and E. Hargittai, The disability divide in Internet access and use. *Information, Communication & Society*, 2006. 9(3): p. 313-334.
9. Sloan, D., Two cultures? The disconnect between the web standards movement and research-based web design guidelines for older people. *Gerontechnology*, 2006. 5(2): p. 106-112.
10. Meyer, E.A. Is accessible design a myth? in *Proceedings of the 2005 International Cross-Disciplinary Workshop on Web Accessibility (W4A)*. 2005. ACM.
11. Barreto, A., Visual Impairments, in *Web accessibility: a foundation for research*. 2008.
12. Trewin, S., Physical Impairments, in *Web accessibility: a foundation for research*. 2008.
13. Lee, R., et al., The ever-shifting internet population: A new look at access and the digital divide. 2003: Pew Internet & American Life Project.
14. Voykinska, V., et al., How Blind People Interact with Visual Content on Social Networking Services. 2016.
15. Google. Building for the next moment. 2015; Available from: <http://www.webcitation.org/6ed4GxLiu>.
16. World Wide Web Consortium. Mobile Accessibility: How WCAG 2.0 and Other W3C/WAI Guidelines Apply to Mobile. 2016; Available from: <http://www.webcitation.org/6ebeQ2pAY>.
17. Abou-Zahra, S., J. Brewer, and S.L. Henry. Essential components of mobile web accessibility. in *Proceedings of the 10th International Cross-Disciplinary Conference on Web Accessibility*. 2013. ACM.
18. Good, A. and A. Sambhanthan, Accessing Web Based Health Care and Resources for Mental Health: Interface Design Considerations for People Experiencing Mental Illness, in *Design, User Experience, and Usability: User Experience Design for Everyday Life Applications and Services*, Pt Iii, A. Marcus, Editor. 2014, Springer-Verlag Berlin: Berlin. p. 25-33.
19. Rottenberg, J. and I.H. Gotlib, Socioemotional functioning in depression. *Mood disorders: A handbook of science and practice*, 2004: p. 61-77.
20. White, J.D., T. Goette, and D. Young, Measuring the Accessibility of the US State Government Web Sites. *Communications of the IIMA*, 2015. 5(1): p. 4.
21. Brown, J. and V. Conway, Web accessibility in corporate Australia: perceptions versus reality. 2012.
22. World Wide Web Consortium, Using Combined Expertise to Evaluate Web Accessibility. 2002.
23. World Wide Web Consortium, Requirements for WCAG 2.0 Checklists, Techniques, and Test Files. 2005.

24. Brajnik, G., Y. Yesilada, and S. Harper. Testability and validity of WCAG 2.0: the expertise effect. in Proceedings of the 12th international ACM SIGACCESS conference on Computers and accessibility. 2010. ACM.
25. Brajnik, G., Y. Yesilada, and S. Harper, Is accessibility conformance an elusive property? A study of validity and reliability of WCAG 2.0. ACM Transactions on Accessible Computing (TACCESS), 2012. 4(2): p. 8.
26. No, G.C., 3: The nature of States parties obligations (Art. 2, par. 1). Fifth Session, UN Doc. e/1991/23, Annex III. United Nations Economic and Social Council, Geneva. OpenURL, 1990.
27. Limburg Principles, The Limburg Principles on the Implementation of the International Covenant on Economic, Social and Cultural Rights. 2004, Retrieved.