Web accessibility: what we have achieved and challenges ahead

Jenny Craven
Research Associate, CERLIM, Manchester Metropolitan University, Manchester, UK.
Email: j.craven@mmu.ac.uk

Abstract

The development of the web since the 1990s has come a long way, but not without some major challenges relating to the design of websites to allow access for all. This is a particular issue for people with print impairments who use a variety of ways to access online information, including (such as adjustments to the desktop or browser view, and the use of assistive technologies such as screen magnification, screen readers, or braille output) and which require accessibility features (such as text descriptions for images) to be included in the design of websites. Web accessibility is being addressed through the abundance of advice and guidance on creating, developing and/or commissioning accessible websites as well as relevant disability legislation. This has resulted in great improvements to the accessibility and usability of websites and many examples of good practice can be found of work that is being undertaken to ensure the accessibility of websites and web-based resources. However, evidence shows that websites are still not as accessible as they could be and this, coupled with the new and emerging technologies available (often referred to as Web 2.0), presents challenges for print impaired people, particularly those using assistive technologies. Suggestions to help address both old and new accessibility challenges include improvements of available advice and guidance, a more holistic approach to web accessibility, continued

development of assistive technologies, increased accessibility of authoring tools, and the importance of education and training in web accessibility and accessible web design.

Introduction

The internet and the world wide web (the web) are now familiar terms to most people. Those born after 1993, often referred to as the 'Google generation', will not remember the time when the web did not exist! For them, the web (in the developed world, at least) is just another medium from which to access, interact with, store and share information and data. Predictions are that by 2017 the internet will have come of age for all ages and be completely integrated into most homes (Ciber, 2008).

People with print impairments (e.g. blind, visually impaired, dyslexic, learning difficulties) use a variety of ways to access online information, ranging from adjustments to the desktop or browser view (enlarged font size, colour contrasts and inversions), to the use of assistive technologies such as screen magnification, screen readers, or braille output. These can be applied to whichever device they are using, such as desktop computer, laptop, or mobile device. Whereas the issue of accessibility was less of a problem in the early years of the web (as the design of websites was mainly text based, which enabled fairly successful access and interaction using assistive technology software), a number of web design developments have taken place which have presented challenges for people with print disabilities. The main developments include the following:

- Increased use of images and graphics (the graphical user interface).
- The arrival of web content creation software (authoring tools such as Front Page and Dreamweaver), which allow unstructured use of HTML.
- Web browsers move away from web standards.

(Howell, 2008 p58-59)

The above developments can have had a negative impact on the accessibility of websites, particularly for people with print impairments and who are using assistive technology software. For example:

- Failure to provide a text alternative for images and graphics will be a problem for people who use screen reading software because it cannot interpret images or graphics (it will simply read out 'image' 'image' 'image' etc).
- Unstructured use of HTML may look quite acceptable on screen (for example, a mis-use of heading levels) but makes navigation difficult for people using screen reading software.
- Web browsers which allow non-standard web coding will display websites even if the coding is poor, and this can be a problem for assistive technology compatibility.

In 1999 the World Wide Web Consortium (W3C) set up the Web Accessibility Initiative (WAI) (www.w3.org/WAI/) to raise awareness of web accessibility and to provide guidelines for creating accessible websites (WCAG) as well as for creating accessible authoring tools (UTAG) and browsers (UAAG). Some countries and organisations have also developed their own guidelines (usually based on WAI principles). For example, the British Standards Institute produced guidelines called the Publicly Available Specification 78: *guide to good practice in commissioning accessible websites* (PAS 78) (BSI, 2006), which includes advice on steps that should be taken to commission accessible websites; how the W3C guidelines and specifications to be adopted; the role of the guidelines and specifications, software tools and user testing within the development life cycle.

Accessibility statements and policies have also been developed by organisations to inform visitors to their website of how accessibility has (or has not) been addressed. For example, the Office for Information Technology Policy (OITP) of the American Library Association (ALA) has published advice on how to develop an accessibility policy, with advice such as "Listen to the community so as to establish its needs and any perceived barriers", "Examine other organization's policies in this area to see if they contain good ideas that could be adapted and adopted", "Write an overarching statement of intent that sets out what the library is committing itself to", "State who is responsible", "State how information on accessibility will be disseminated" (Brophy, 2008 pp100-102).

Other activities which have helped to improve accessibility include the e-Europe accessibility action plan to address the i2010 strategy for creating a "European society for growth and employment" (European Commission, 2005) by 2010, which places a

particular emphasis on accessibility requirements for public procurement of ICT, accessibility certification, and web accessibility assessment methods and tools.

Recommendations have also been provided for the digitization of information using accessibility standards and specifications such as those created by the Centre for Educational Technology and Interoperability Standards (CETIS) and the IMS specification for e-learning technology standards.

Examples of good practice

The abundance of advice and guidance on creating, developing and/or commissioning accessible websites (such as those described above), coupled with relevant disability legislation (for example the UK Disability Discrimination Act and the Special Educational Needs Disability Act, the Americans with Disabilities Act (ADA) and the Australian Disability Discrimination Act) has resulted in great improvements to the accessibility and usability of websites.

Many examples of good practice can be found. The following are just a handful of the good work that is being undertaken to ensure the accessibility of websites and web-based resources:

The Earth Sciences Library at the University of Cambridge, UK (http://rock.esc.cam.ac.uk/new/v10/new_library/August/index/home.html), have demonstrated how it is possible to redesign a website on a very restricted budget. Their aim was to make the site more widely accessible to users. Following user surveys and staff training, the new website was designed. Accessibility was built into the design using web standards to ensure accessibility and platform conformity so that the website could be accessed via a variety of different browsers, including the Lynx text browser. Language was also seen as an important issue and therefore technical terms and 'librarian jargon' were kept to a minimum. Cascading Style Sheets (CSS) were also used to provide users with the ability to change the display according to their requirements, for example the pages can be accessed using high or low contrast.

The J. Murrey Atkins library at UNC Charlotte, USA (http://library.uncc.edu/), implemented changes for accessibility into their latest website redesign. The biggest

change was an increased use of CSS to enable users to personalise font styles and colours. Users are now offered a range of font sizes and colours which can be saved in a cookie and activated when they return to the page. Language is another area which is being addressed to make the website more inclusive. A project is currently underway to translate the home page into multiple languages to "get people started on the right foot". This may then be extended to other parts of the website. The website has been tested using JAWS assistive technology. This provided the web designers with a better understanding of how a screen reader will read out a page to a user, and this highlighted a problem with title tags. Each title page started with J. Murray Atkins, for example "J. Murray Atkins Library – title of page". Listening to JAWS revealed that it was more helpful to first read out the title of page you were visiting and then the name of the library, so, for example "Home Page – J. Murray Atkins..", thus, users could quickly establish which part of the J. Murray Atkins website they were visiting.

The College DuPage library, USA (www.cod.edu/library/), has undertaken user testing and testing with assistive technologies to help make pages more accessible, not just for people using assistive technologies, but also more accessible for people using devices such as handhelds – so truly widening access for all. In the future, the college will be working with information systems vendors to encourage them to make their interfaces more accessible. This will help to ensure external resources provided by the college will be just as accessible as the pages generated by the college. The college plans to create more content that raises accessibility awareness. For example, by creating tutorials which point people to appropriate accessibility tools and techniques. Being involved in accessibility working groups and consortia is also seen as a useful way to work collectively on accessibility issues and to get more people involved in accessibility practices.

Deakin University in Australia has an accessibility section on its website (www.deakin.edu.au/dwm/accessibility/index.php) which provides links to accessibility guidelines, evaluation methods, and Deakin's top 12 issues to fix. Deakin University staff are also involved in an accessibility working group. The Electronic Accessibility working group meets every 2 months to highlight, discuss and "hopefully solve" accessibility issues on websites. The aim of the working group is to provide support to academics who assist students with disabilities and encounter issues in interactive with course

materials. This will enhance the universities online teaching and learning environment, both on and off-campus.

Finally, and of direct relevance to this IFLA conference, IFLA has launched a project to redesign its website to better promote its activities and services. As the project gets underway, a working group of IFLA members has been established, who will be involved throughout this whole process. The working group will provide input and feedback about their particular section/discussion group/core activity needs for the website to help ensure design for accessibility and usability is adhered to, and the IFLA website is designed according to different needs and requirements of both member and non-member visitors to the site.

Challenges ahead

Whilst the above examples are very encouraging, there are still challenges ahead. Web accessibility has received a great deal of attention since the late 1990s, especially with the work of the W3C/WAI which has helped to raise awareness of the problems faced by people with disabilities and to provide guidance on how to make websites more accessible. However, reports and studies continue to demonstrate that websites in general are still not as accessible as they could (or should) be. For example, a study in the UK found that "75 percent of businesses in the FTSE 100 list of companies fail to meet the minimum requirements for website accessibility" (Nomensa, 2006), and the 2007 MEAC report *Assessment of the Progress of eAccessibility Europe* (European Commission, 2007) raise concerns that even when significant improvements in web accessibility have not yet been fully achieved, new and emerging technologies present new challenges for people with disabilities.

The new and emerging technologies include further development to mobile phone technologies, increased choice in devices to access the web (for example PDAs, smart phones, games, music players, digital TV), and the use of social networking sites such as Facebook and MySpace, and online virtual reality environments such as Second Life. These technologies (often referred to as Web 2.0) present new challenges. A recent study of social networking tools revealed a number of accessibility problems (AbilityNet, 2008). For example, the use of CAPTCHA (a type of security question or test used to determine that the 'person' is not a computer; usually asks for a word or a line of

distorted text to be deciphered) at login will lock out anyone with a visual impairment, as well as people with dyslexia and learning difficulties. Many social networking tools allow interactions such as providing reviews, adding friends, watching videos and sharing photos, but which present problems for people using assistive technologies such as screen reading software.

So, why is accessibility still so much of a challenge? And what can be done to help improve the situation? There are a number of suggestions for meeting the challenges which will be explored further in the remainder of this paper.

Meeting the challenges

Improved advice and guidance

The WAI Web Content Accessibility Guidelines (WCAG) are currently being updated from version 1.0 (which has been available since 1999) to version 2.0. The aim of this revised version is not to change the thinking about web accessibility drastically, but to provide guidelines which are more easily understood and that provide more flexibility than the prescriptive list of checkpoints offered by version 1.0.

WCAG 2.0 will cover issues relating to web accessibility and, where they have an impact on accessibility, usability issues will be addressed. Four principles of web accessibility are proposed, which are referred to as the POUR principles:

- Perceivable: content must be perceivable to each user.
- Operable: user interface components in the content must be operable by each user.
- Understandable: content and controls must be understandable to each user.
- Robust: content must be robust enough to work with current and future technologies.

The W3C and WAI provide an important framework for ensuring accessible web design, development and assessment, accessible authoring tools, and guidance for creating accessible web browsers.

In the UK, the British Standards Institution is in the process of establishing a standard which organisations will be able to follow in procuring or developing an accessible

website. A technical standards committee will oversee the development of the standard, which will be based on the PAS78 *guide to good practice in commissioning accessible websites* (mentioned earlier in the paper). The aim is to also take into account some of the new types of web service that were not available when the PAS 78 was first developed. IT is hoped that the new standard will be published in 2009.

Holistic approach to accessibility

Kelly et all (2004) suggest that a heavy reliance *solely* on guidelines is not enough, and that the Design for All approach cannot be fully achieved because of the diverse nature of users and their needs. Instead, a more holistic approach is needed which takes into consideration a number of issues to help create websites that are accessible to as many people as possible. The approach draws on guidelines and best practice (such as the WCAG), as well as usability guidelines, interoperability standards, and engagement with users though feedback, focus groups and accessibility working groups. The aim of this approach is to provide "a solution which maximises the usefulness to the end user, as opposed to the current WAI approach which encourages mandatory application of a limited set of guidelines." (Kelly et al, 2007)

Assistive technology developments

Assistive technology developers need to take into account the new and emerging technologies, and to develop assistive technology (AT) software that can better handle the new features, interactions, and opportunities offered by Web 2.0. After all, it wasn't so long ago that screen readers were unable to logically read through tables or move between frames, whereas great improvements to AT navigation have now taken place. Therefore, with a combination of good design principles and added navigational features, together with appropriate training, AT software should be able to offer users a more efficient and flexible way to access and interact with websites, and for creating and sharing web content. Issues of affordability of AT are of course another issue, although there are a number of free assistive technology applications available (for example Thunder screen reader (www.screenreader.net) and Natural Reader speech output (www.naturalreaders.com/download.htm) (see also Draffan, 2008 pp7-23).

Accessible authoring tools

Authoring tools need to be provided that will create accessible code as standard – not as an optional extra, and should also be usable by people with disabilities. Guidelines for accessible authoring tools (such as the WAI Authoring Tool Accessibility Guidelines: http://www.w3.org/TR/WAI-AUTOOLS/) are becoming just as important as the Web Content Accessibility Guidelines, and should be developed accordingly. This is because web developers now tend to rely much more on authoring tools rather than hand coding of content, plus, the huge increase in 'user generated content' with the creation of Blogs, Wikis, photo sharing sites such as Flickr, and social networking sites such as MySpace has allowed web users to "be web developers without any understanding of web code" (Howell, 2008 p64). A working group at the W3C are currently working on version 2.0 of the ATAG guidelines and the latest working draft was published in March 2008 (http://www.w3.org/TR/ATAG20/)

Education and training

Education and training can help create a culture where accessibility is the norm rather than an add-on or after thought. Until this happens it will be necessary to keep reminding developers of websites, authoring tools and assistive technologies of the importance of accessibility. Education and training in the field of web accessibility can influence the current and future generation of web managers, designers and developers, and policy makers. The UK Cabinet Office 2005 study looked at web accessibility training initiatives in the European public sector and made the following recommendations:

- For web managers and developers in all public sector organisations:
  - o Make sure that all content commissioners and authors are fully trained in the importance of accessible content, and in the means that are made available for them to achieve this.
- For web designers in the software industry:
  - o Train all web designers in both the requirement for, and the techniques to achieve fully accessible websites.
  - o Develop a competence framework for web designers that includes web accessibility and use it for personal development schemes and recruitment campaigns.

- For public policy-makers at EU level:
  - Carry out a feasibility study … into the development of an appropriate qualification in accessible websites for developers, managers and content providers (perhaps aligned with the European Computer Driving License).

(Cabinet Office, 2005).

The MeAC study identified ICTs in education as a policy option: "eAccessibility in the educational context needs a high visibility and attention in future EU-level policy on eAccessibility" (European Commission, 2007).

Evidence can be found of web accessibility issues and design being taught to students in various disciplines. Taking library and information science (LIS) as an example, a short review by Eskins (2008) found that web accessibility is taught within modules and courses such as basic web design (Manchester Metropolitan University, UK), designing usable websites (Sheffield University, UK), electronic publishing (University of Wales, Aberystwyth), and multimedia (Ionian University, Greece).

An online course in barrier free web design developed and provided by the Johannes Kepler University in Linz, Austria is now in the process of being developed into an international online joint study programme through the web_access project (www.bfwd.at/webaccess). This project is funded by the European Commission Lifelong Learning Programme and involves 6 partner institutions: Johannes Kepler University, Linz (Austria - the lead partner), Manchester Metropolitan University (UK), Dublin City University (Ireland), University of Pannonia (Hungary), Karlsruhe University (Germany), and the Baobab Association (Spain). The project is developing new modules and re-purposing existing materials offered by the partner organisations (and beyond) to deliver the international online joint study programme in accessible web design. It is being designed in an accessible way to enable access to as many people as possible – through formal education, continuing professional development (CPD) activities, and return to work initiatives. The overall aim is to provide an accredited programme which will lead to a recognised academic award, giving recognition to and enhancing the status of anyone involved in the field of accessible web design.

Conclusion

In conclusion, the development of the web since the 1990s has come a long way, and not without some major challenges, particularly for people with print impairments who use a variety of ways to access online information and need websites to be designed in a way that will allow them to access and interact using on-screen adjustments and assistive technologies. The achievements, such as those described in this paper, show an encouraging commitment to providing websites that are as accessible to as many people as possible. Suggestions to help address both old and new accessibility challenges include improvements of available advice and guidance, a more holistic approach to web accessibility, continued development of assistive technologies, increased accessibility of authoring tools, and the importance of education and training in web accessibility and accessible web design. Engagement with user feedback, focus groups and accessibility working groups are an important way of keeping accessibility issues on the agenda, rather that just a one-off exercise. As one university library webmaster put it:

"Websites are never 'done', they are an evolution, a revision, not set in stone."

It is hoped that the commitment to creating accessible websites continues to evolve alongside current and emerging web 2.0 technologies, on to web 3.0 … and beyond.

Acknowledgements

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