

This article is downloaded from



CHARLES STURT
UNIVERSITY

CRO

CSU Research Output
Showcasing CSU Research

<http://researchoutput.csu.edu.au>

It is the paper published as:

Author: S. Anderson, P. Bohman, O. Burmeister and G. Sampson-Wild

Title: User needs and e-Government accessibility: The future impact of WCAG 2.0

Journal: Lecture Notes in Computer Science ISSN: 0302-9743 1611-3349

Year: 2004

Volume: 3196

Issue: 2004

Pages: 289-304

Author Address: oburmeister@csu.edu.au

URL: <http://dx.doi.org/10.1007/b95185>

<http://www.springerlink.com/content/ycqn3ehru332gjlq/>

http://researchoutput.csu.edu.au/R/-?func=dbin-jump-full&object_id=10064&local_base=GEN01-CSU01

CRO Number: 10064

User Needs and eGovernment Accessibility: The Future Impact of WCAG 2.0

*Shane Anderson
Programmer Analyst
WebAIM (Web Accessibility in Mind)
Center for Persons with Disabilities
Utah State University
Shane@cpd2.usu.edu*

*Paul R. Bohman
Project Coordinator
WebAIM (Web Accessibility in Mind)
Center for Persons with Disabilities
Utah State University
paulb@cc.usu.edu*

*Oliver K. Burmeister
Swinburne Computer-Human Interaction
Laboratory
School of Information Technology
Swinburne University of Technology
oburmeister@it.swin.edu.au*

*Gian Sampson-Wild
Member of the W3C Web Content
Accessibility Guidelines Working Group, &
Accessibility Consultant/Managing Director
PurpleTop
gian@purpletop.com.au*

ABSTRACT

Governments in many countries require that government Web content adhere to international accessibility standards, in addition to specific national standards. The Web Content Accessibility Guidelines (WCAG) version 2.0 will set a new standard for Web accessibility. The implications of WCAG 2.0 for eGovernment sites in two nations, the United States of America and Australia, are considered. While the needs of all users are important when determining accessibility and usability requirements of sites, the particular needs of people with cognitive impairments are considered in greater detail, as an example to designers that people with disabilities are a heterogeneous group, where one solution does not fit all.

KEYWORDS

Accessibility, W3C, Web, disability, guidelines.

1. INTRODUCTION

Universal usability recognizes that people with disabilities account for a significant proportion of the general population. In Australia 19% of the population have some form of disability (Smith and Brien, 2000). Kaye (2000) reported on longitudinal research following the Web practices of people in 48,070 US *households*. Of these 21.8% (10,480) households had at least one member of the household who was “work disabled.” He says that the most common reasons cited by people with disabilities for using the Internet were virtually identical to the reasons given by people without disabilities.

Governments around the world have created legislation to ensure equity of access to participation in the information society. In many countries the legislation is limited in terms of the types of organizations that are required to comply. Most countries with Web accessibility laws require that government Web sites be made accessible, but compliance requirements vary from one country to another and even within some countries. The level of enforcement of standards also varies.

Designing for inclusion requires a commitment to involve users from the intended audience. In the case of eGovernment Web, rather than alienate people with disabilities, various co-operative design methodologies have been proposed, for example Buhler (2001). However, the focus of this paper is not on the design aspects per se, but rather on compliance issues and changes to those with the introduction of the soon to be released WCAG 2.0. Using these, Web developers can better work towards ensuring an inclusive design process.

Yet there is more to accessibility of government than just complying with legislation. Sites need to incorporate into issues of usability with those of accessibility; referred to as *universal usability* by the Human-Computer Interaction (HCI) community to (Schneiderman, 2001). Developing for accessibility means ensuring that the information or functionality present is available to all user groups, regardless of how the information is accessed. Often people with disabilities access information via different methods, for example, by overriding style sheets, enlarging text, changing font, and/or by using a screen-reader, on-screen keyboard, a pointer, a magnifier, or other assistive technologies. Accessibility for the different user groups of a particular Web site should be ensured through the design process. However it is important to remember that designing for accessibility does not mean sacrificing dynamic sites in favor of text only sites. Instead it involves the creation of accessible dynamic Web sites.

This paper begins with a review of the needs of people with various types of disabilities, and cognitive disabilities in particular. This focus on cognitive disabilities was chosen partly because it is so often neglected in Web accessibility literature, and partly because of an increased focus on cognitive disabilities in the forthcoming Web Content Accessibility Guidelines (WCAG) 2.0. This second generation of Web accessibility guidelines is discussed in detail, in terms of philosophical and practical differences compared to WCAG 1.0. The paper finishes with an examination of the legal situation in Australia and the United States, including case studies of selected eGovernment sites in Australia and the United States. The implications for Web site design are then drawn together.

2. USER NEEDS

The authors of WCAG 1.0 state that: “The primary goal of these guidelines is to promote accessibility. However, following them will also make Web content more available to *all* users, whatever user agent they are using (e.g., desktop browser, voice browser, mobile phone, automobile-based personal computer, etc.) or constraints they may be operating under (e.g., noisy surroundings, under- or over-illuminated rooms, in a hands-free environment, etc.).” (W3C, 1999, 1)

The aim is to promote inclusivity. Inherent in these guidelines is the fact that not all people with disabilities are the same. They are a diverse, heterogeneous group. For example, the W3C defines users with access difficulties as follows (W3C, 1999, p 4):

- “They may not be able to see, hear, move, or may not be able to process some types of information easily or at all.
- They may have difficulty reading or comprehending text.

- They may not have or be able to use a keyboard or mouse.
- They may have a text-only screen, a small screen, or a slow Internet connection.
- They may not speak or understand fluently the language in which the document is written.
- They may be in a situation where their eyes, ears, or hands are busy or interfered with (e.g., driving to work, working in a loud environment, etc.).
- They may have an early version of a browser, a different browser entirely, a voice browser, or a different operating system.”

Similarly, in describing the needs of users for WCAG 2.0, the W3C have used the following scenarios to show access difficulties experienced by different users (W3C, 2004, p 9):

- “Someone who cannot hear will want to see the information normally presented via sound.
- Someone who cannot see will want to hear or read through Braille information that is usually presented visually.
- Someone who does not have the strength to move quickly or easily will want to use as little movement as possible and have as much time as they need when operating Web interfaces.
- Someone who does not read well may want to hear the information read aloud.”

The above lists show the heterogeneity of the population of people with access difficulties. As Powlik and Karshmer (2002) put it, there is not one accessibility audience, but rather there are multiple audiences. However, it is also inadequate to simply group disabilities into categories and then to treat people within such a category as belonging to a homogeneous group. Thus categories like hearing impaired, visually impaired, and cognitively impaired are inadequate. For a start, many older adults experience functional disabilities that arise with aging. They might suffer hearing loss, as well as a physical impairment, such as arthritis in the hand, making mouse usage difficult. But aside from combinations of functional disabilities, there is also the problem of sub-groups within a category. For example, in visual impairment, that could be total blindness, color blindness or any of a great number of partial vision problems.

2.1 Cognitive Disabilities

Though all types of disabilities are considered in this paper, special attention is given to the oft-neglected category of cognitive disabilities (also described as intellectual impairment in the literature; see for example Williamson and Stillman, 2000). Doing so illustrates that, even within a disability category, the people involved can be very different in terms of their functional capabilities.

The IMS guidelines (2001) say that the category of cognitive disability is one of the most diverse. “It includes individuals with general processing difficulties (mental retardation,

brain injury, etc), people with specific types of deficits (short term memory, inability to remember proper names, etc.) learning disabilities, language delays, and more” (IMS, 2001, p 11). In addition, as with other disabilities, severity differs amongst people.

Cognitive disabilities can stem from a variety of causes, such as Down’s syndrome or cerebral palsy, which means it is at times also accompanied by physical impairments. One advantage for designers is that because cognitive disabilities frequently involve print disabilities, accessibility increases where screen reading software functions well. So design for visual impairment can also assist with cognitive disabilities.

To some the diversity of access difficulties amongst users with various types of cognitive disabilities may appear daunting. But it is worth remembering that “A degree in cognitive psychology is not required to be effective; rather, the process begins with attentive understanding” (Powluk and Karshmer, 2002, p 219).

3. IMPLICATIONS OF ADOPTING WCAG 2.0 FOR eGOVERNMENT

With WCAG 1.0 the goal was to create content accessible to people with disabilities. The creation of this document by an international committee in 1999 was a significant step toward making the Internet more accessible to people with disabilities. However, there are significant weaknesses in WCAG 1.0 that are in the process of being addressed by the WCAG Working Group (WCAG, 2004). These weaknesses necessitated fundamental changes in the document. For the purposes of this paper, these changes have been categorized as conceptual differences, the requirement that conformance be verifiable, differences in conformance criteria, an increased focus on usability, and an increased recognition of non-(X)HTML technologies.

Although WCAG 1.0 is still the current official document of the WAI, designers should be aware of the changes that WCAG 2.0 will bring in the future. WCAG 2.0 is still a document under development, so it is still subject to future revisions, but it has remained steady in the major areas, despite changes that have been introduced since the work began. The comments in this paper reflect the status of the latest internal draft of WCAG 2.0 at the time of this writing, dated February 14, 2004.

3.1 Conceptual Differences

On a practical level, some of the changes in WCAG 2.0 are subtle. For example, images will still require alternative text. Web developers who currently design accessible Web sites will not have to change their habits much. On the other hand, WCAG 2.0 represents a substantial shift in philosophy. Rather than focus exclusively on the specific do’s and don’ts of (X)HTML techniques, as WCAG 1.0 does, WCAG 2.0 is written on the conceptual level, so that it can be applied to multiple technologies, and not just to (X)HTML. This makes WCAG 2.0 more relevant to developers who create content in PDF format, Flash, Java, Video, and other forms of non-(X)HTML media. Whereas WCAG 1.0 implores developers to avoid non-(X)HTML technologies, WCAG 2.0 allows the use of any technology, as long as developers can make the content accessible to people with disabilities.

The shift from technique-driven guidelines to concept-driven guidelines resulted in a reduced number of top level ideas. WCAG 1.0 had fourteen ideas at the top level. WCAG 2.0 places only four ideas at the top level—called “principles”—under which more specific guidelines are organized. These four principles can each be referred to by a single keyword:

- Perceivable,
- Operable,
- Understandable, and
- Robust.

Content must be made available to users in a format that they can *perceive* with at least one of their senses (i.e. sight, hearing, touch). It must be presented in a way that they can interact with or *operate* it with either standard or adaptive devices. It must be presented in a way that the user can *understand* or comprehend. Finally, content must be presented using technologies and interfaces that are *robust* enough to allow for disability access, whether natively or in alternative technologies and interfaces. Together these principles address all areas of accessibility, at least in broad conceptual strokes.

3.2 The Requirement that Conformance be Verifiable

One of the key areas of weakness in WCAG 1.0 is that some of the requirements are somewhat ambiguous, leaving them open to interpretation. In terms of implementing WCAG 1.0, this means that one developer's method of complying with a particular checkpoint could be quite different from that of another developer. WCAG 2.0 does much to fix this problem, by requiring that all minimum checkpoints be *normative*. The Working Group defines normative as meaning that compliance with a checkpoint can be unambiguously verified. This verification can be performed either through an automated, algorithm-based process or through human testing. Automated processes can verify the existence or absence of certain required elements, such as the "alt" attribute for images. Human testing requires a process that can be performed with high inter-rater reliability, for example by having 9 out of 10 trained individuals reaching the same conclusion about the element in question.

WCAG 2.0 contains paradigm shift that relates to the underlying philosophy of minimum compliance. In WCAG 1.0, minimum compliance is on what is required by the user in order to access the information in the site. WCAG 1.0 defines minimum compliance (Level A) by saying: "A Web content developer must satisfy this checkpoint. Otherwise, one or more groups will find it impossible to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents" (W3C, 1999).

In contrast, WCAG 2.0 (W3C, 2004) requires that checkpoints in the minimum compliance area:

- Do not specify how information is presented.
- Are reasonably applicable to all Web sites.
- Are testable (machine or reliably human).

The WCAG Working Group decided upon this change in philosophy hoping that it would ensure more sites would attempt accessibility compliance by overcoming the myths of "accessible sites must be text only," which is narrowly applicable and subjective.

3.3 Difference in Conformance Criteria

One of the most obvious differences between WCAG 1.0 and WCAG 2.0 is the method of claiming conformance. One problem with WCAG 1.0 has been that if a site was unable to

comply to a particular checkpoint, there was no incentive to attempt other checkpoints in the same conformance level. WCAG 2.0 allows for sites to specify the exact criteria they have met in a particular priority level, however exactly how this will be achieved is still to be decided.

Every checkpoint in WCAG 2.0 has a *minimum* requirement, without which it is impossible to claim conformance to the guidelines. This minimum requirement is equivalent to the definition of WCAG 1.0 Level A; implementing this checkpoint will offer substantial benefit to people with disabilities by removing barriers that would otherwise make it difficult or impossible to access the content.

In WCAG 1.0, conformance was broken into three levels: A, AA and AAA. In WCAG 2.0, conformance had been broken down differently in recent drafts, but there is disagreement as to what the new breakdown ought to be. This is reflected in the current internal draft: “As we publish this Working Draft of WCAG 2.0, the WCAG WG is in the midst of significantly changing the conformance scheme from previous drafts.” (W3C, 2004, p 6)

It is anticipated that changing conformance criteria will encourage sites to comply with more checkpoints. Current discussion in the Working Group has focused on how a site can identify exactly which checkpoints it has complied with. One suggestion has been to provide this information in the metadata of each page. This would allow a specific search engine to search for sites that conform to particular accessibility criteria and this may also encourage sites to increase the number of checkpoints they comply with.

3.4 An Increased Focus on Usability

Another major difference is that WCAG 2.0 focuses more on the usability aspects of Web accessibility. All users, with or without disabilities, benefit from this increased focus on usability. Perhaps those that will benefit most are users with cognitive disabilities. One of the major criticisms of WCAG 1.0 is that it did not include many guidelines that specifically benefited users with cognitive disabilities, and those guidelines that were specific to cognitive disabilities were relegated to Level Triple-A. Some may still argue that WCAG 2.0 does not focus sufficiently on this group, but it does represent a step forward in that direction. One of the guidelines under the keyword “operable,” for example, instructs developers to “Make it easy for users to browse the resource, to know their place in it, and to find information they need.” This guideline is solidly aligned with general usability principles that cut across all abilities. As another example, the principle about understandability explains that “content and controls should be understandable to as many users as possible.” This means that it is not sufficient to make sure that the site is merely available, or that the controls are merely functional. Users must be able to understand both the content and the controls that are necessary to interact with that content. In other words, the site must be intuitive.

3.5 Increased Recognition of Non-(X)HTML Technologies

Due to the evolving nature of the WCAG 2.0 document, it is difficult at this point to identify a list of all of the specific techniques that Web developers will have to follow in order to comply with the WCAG 2.0 recommendations. Nevertheless, it is possible to look forward and anticipate the general nature of these techniques.

First of all, developers will not be limited to (X)HTML alone when writing Web content. The wording of WCAG 2.0 allows them to use any technology that satisfies the criteria set

forth in the document. Of course, this does not imply that (X)HTML should be abandoned or that developers should seek out new and untested technologies. On the contrary, WCAG 2.0 requires that developers be very selective in terms of the technologies used and the way in which they are used. Since the list of accessible Web technologies is currently a short list, (X)HTML will still figure prominently in future accessible Web development.

Lastly, developers will need to pay closer attention to the human-computer interaction implications of their Web content. They will need to test their site for usability and understandability. They will need to consider the ways in which people with various types of disabilities interact with the computer. Users with cognitive disabilities, visual disabilities, hearing loss, and motor disabilities all have specific needs and methods of interacting with Web content. Some of these needs and methods are common among all of these groups. Others are specific to certain types of disabilities. It will no longer be enough to follow checklists. Rather, developers will need to consider the human side of disability access to the Web. Thinking optimistically, this focus gives users with disabilities reason to hope that developers will include users with disabilities in their planning process, thus leading to a more universal user-centered design paradigm.

4. ACCESSIBILITY IN eGOVERNMENT

eGovernment Accessibility in Australia

Thirty-two Commonwealth departments and agencies have created Disability Actions Plans (DAPs) with the Human Rights and Equal Opportunity Commission; thirty-seven state government agencies and one hundred and three local governments have also created DAPs. All Commonwealth Government agencies are also required to address accessibility in their online action plans developed to meet the Commonwealth Government's commitment to eGovernment. These online action plans can usually be located on the individual Commonwealth agency's Web site.

Senior Ministers from State, Territory and local governments meet twice a year to discuss policy issues related to the information economy. In June 2000 they adopted the W3C Web Content Accessibility Guidelines as the common best practice standard for Australian government Web sites to "promote the confidence of users in online services, and the accessibility of online government information and services" (Online Council, 2000).

The Victorian state government was the first to produce best practice guidelines in 1999 to mandating the use of the W3C Web Content Accessibility Guidelines 1.0 when developing Victorian Government sites (Vic eGov, 2003). The Victorian state Government also has extensive information on accessibility, including an accessibility toolkit and FAQs. However, other states have their own state level guidelines.

In Australia the legislation says government sites must comply with world best practice (Sampson-Wild and Burmeister, 2001), which for several years has been interpreted as compliance with the Web Content Accessibility Guidelines (WCAG) of the World Wide Web Consortium (W3C). That means that eGovernment practice will soon undergo changes in regards to accessibility, as the W3C move their draft second version (WCAG 2.0) to the status of stable reference document, as is the case with their first version (WCAG 1.0).

eGovernment Accessibility in the United States

The United States federal government is required to make Web content accessible to people with disabilities by virtue of Section 508 of the Rehabilitation Act (Access Board 2001). Though there are other laws regarding disability rights, Section 508 is the only place anywhere in US law that provides a checklist of accessibility requirements for Web accessibility. The scope of Section 508 is actually broad enough to encompass all of electronic information technologies, such as telephones, fax machines, copiers, etc. All federal government entities are required to abide by the guidelines in Section 508. Interestingly, though Section 508 technically only applies to the federal government, some states have chosen to adopt Section 508 guidelines as their standard for Web accessibility. Even states that have not adopted the Section 508 are required to provide equal access to individuals with disabilities, though, without the Section 508 guidelines as a standard, the actual definition of accessibility is a bit vaguer in these states.

Section 508 itself was patterned after WCAG 1.0. The main difference is that Section 508 is much more limited in scope. It does not contain any guidelines that specifically benefit people with disabilities, for example, and the amount of support for all other types of disabilities is more limited than in WCAG 1.0. Another difference is that Section 508 was written to more easily testable than WCAG 1.0. The testability of this law makes compliance easier to verify and easier to codify into law. The testability of Section 508 will provide a relatively smooth transition into the guidelines of WCAG 2.0, except for the fact that Section 508 is a small subset of the WCAG guidelines.

Other laws play an important role in the United States are the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act. Both of these are anti-discrimination laws. Among other things, the ADA requires that public buildings and other public spaces be made accessible to people with disabilities, with elevators, access ramps, and so on. It can be argued that the Web is a public place as well, even if it is in a virtual space rather than a physical space. Still, neither the ADA nor Section 504 provides developers with a specific set of checklist items as does Section 508.

It will be interesting to see how the US Access Board—the organization that created the Section 508—guidelines reacts to WCAG 2.0 when it is released. Since the Web requirements of Section 508 were so heavily based on WCAG 1.0, the Section 508 guidelines will need to adapt to the changes in WCAG 2.0 in order to not fall badly behind. If the Access Board does not respond to the changes in the field of Web accessibility, the end result may be that Web developers continue to abide by out-of-date standards even as the Web continues to evolve. People with disabilities will be the ones to suffer as a result.

5. CASES

These cases have been chosen because they represent current practice in regards to accessibility compliance. They also serve to illustrate the similarities and differences between Australia and the US in regards to accessibility. In these cases the needs of users with disabilities have been considered and provided for. However, as the above discussion on WCAG 2.0 illustrates, the needs of users with disabilities can be more comprehensively met. World's best practice needs to change. The implications of those changes for eGovernment generally are explored in these cases.

5.1 Australian cases

www.gov.au

The www.gov.au Web site is a small site that provides summary information on the state and territory Governments in Australia. It has been ‘developed with usability and accessibility principles as the main drivers for design’ (Gov, 2004), although the site does not claim any particular accessibility conformance. The site boasts a text-only version, however this appears where the accessibility of the site begins and ends, which is unfortunate as people with cognitive disabilities often have greatest difficulties with reams of text. On first glance, the site appears to be consistent with a number of visual cues that could assist people with disabilities, especially cognitive disabilities. However, noting that some people with cognitive disabilities use screen readers to assist in reading a site, the inappropriate use of alt tags is problematic. There are a number of images in the site without alt tags, however there are eleven instances on the homepage alone where the alt tag is “spacer”, and a further eight instances where the alt tag is “#”. All these images are spacer images which of course could all be removed if the site were designed with style sheets instead of images.

Another concerning aspect of the site is the provision of information available only via mouseover. When hovering over a state or territory in the left hand menu, the southern cross image in the top left hand corner changes to an image of that state or territory’s official emblem. This information is not provided elsewhere on the site.

Each state and territory page is set out in a similar fashion – including a map of Australia indicating the position of the state or territory and a screenshot of the appropriate site. Unfortunately, the location of the state or territory is indicated by a change in color (the state or territory is colored magenta whereas all other areas are blue), and this information is not indicated in the alt tags or elsewhere. This is a clear violation of WCAG 1.0 Checkpoint 2.1 – ensure that all information is provided without reliance on color. Interestingly this would be a violation of the WCAG 2.0 Checkpoint 1.3: “any emphasis can be derived programmatically from the content without requiring interpretation of presentation” (W3C, 2004). Thus, providing an indicative alt tag would mean compliance with the WCAG 2.0 Checkpoint 1.3, but not with WCAG 1.0 Checkpoint 2.1.

www.companioncard.org.au

The Companion Card (2004) site is a Disability Services Division initiative aimed at people with significant disabilities and their companions to provide information on the ‘Companion Card’ initiative, which allows people who require a companion to accompany them, to have this companion admitted without charge to a range of venues and events in Victoria. The site is run and funded by the Victorian State Department of Human Services.

The site complies with WCAG 1.0 Level Triple-A, although full testing will not be completed until mid-May. The site offers a number of features specific to people with cognitive disabilities, such as visual cues, anchor links and nested headings.

Companion Card uses icons in conjunction with style sheet manipulated text to identify major navigational items. These icons are specific to a particular navigational section, for example, the Home section icon is a house, and the icon for Sitemap is a flowchart. When in a particular section of the site the relevant navigation section is colored orange (instead of blue) and sub-navigation items are provided directly underneath the relevant item. Further use of icons in the site includes downward arrows next to anchors, indicating links that link further down the same page, and double browser windows to indicate links which open in a new window.

Another feature of the Companion Card is the range of documents available for download. Taking into account that tagged PDFs are often larger than their non-tagged counterparts, Companion Card provides two versions of each PDF: an untagged version purely for printing purposes, and a tagged version for people using screen readers or requiring additional accessibility features. Documents are also available as Word and RTF documents for people that do not have access to Adobe Acrobat or would prefer these versions. The Companion Card documents are also available in Easy English and a variety of languages and formats can be sent out at no charge by contacting the Companion Card Information Line. Recorded information is also available in a variety of languages.

The Companion Card Web site is a best-practice example of how a site can be visually attractive and comply with highest accessibility requirements. The site complies with Triple-A checkpoints of WCAG 1.0 but has also included a variety of other accessibility features.

5.2 US cases

www.firstgov.gov

Firstgov.gov (Firstgov, 2004) is the US government's main portal for all information within the US government. As such, it has been highly publicized and marketed to US citizens as the place to go for government information. The high profile of this site underscores the importance of making it accessible to all US citizens, including to those with disabilities.

An initial analysis of the page reveals that the developers of this site have paid attention to issues of Web accessibility. All of the images have alt text, for example, and there are links at the top of the page which allow users to skip to the main content or to other important areas of the page.

Upon closer examination, however, it is apparent that the developers are not Web accessibility experts, though they may have had good intentions. For example, the form elements have labels, as they should, but none of the labels are coded correctly. The developers clearly did not understand the basic technique, and have applied it in a way that is useless to users with disabilities. Similarly, the "skip to content" link is completely non-functional. When users select the link, nothing happens. This is an error that is easy to correct, but which has been left neglected, probably due to a lack of careful coding and quality control. In fact, the site's (X)HTML is woefully out of compliance with standardized (X)HTML markup protocols.

The designers of the firstgov.gov site face a daunting task in terms of usability. They must organize hundreds, if not thousands, of different government agencies, offices, and Web sites into understandable categories that are easy to navigate. Considering the enormity of the task, the designers are to be commended for the way in which they have organized all of the content. They provide four top level categories based on user characteristics: "for citizens," "for businesses and nonprofits," "for federal employees," and "government-to-government." In addition to these main tabs, other lists offer "information by topic," "by audience," "consumer help," "contact your government," and others. This scheme for organizing information seem intuitive enough, though some users will undoubtedly still have to search through these categories in order to find the specific information that they are searching for.

One limitation to their overall organization scheme is that it is geared mostly toward visual users. The bold colors of the main tabs in the design suggest to users that these are the principle divisions of the site. Users who cannot see the colors are not given any indication

that these are the main tabs. The links are there, and the links are accessible, but the links are stripped of their context, and are likely to blend in with all of the other 70+ links on the page. In order to provide more of an understandable interface to people using screen readers—in the spirit of WCAG 2.0—the developers would need to provide textual cues that convey the importance of the links in the main tabs. The text could say “start main site navigation” before the tabs begin, and then “end main site navigation” after the last tab. Another technique that could benefit firstgov.gov would be to use headings and other semantic markup. These are simple techniques, but they would position the site more in line with the recommendations in WCAG 2.0.

www.irs.gov

Like firstgov.gov (IRS, 2004), the irs.gov Web site is another huge undertaking that demands a high level of user-centered design and information categorization. This is the Web site of the Internal Revenue Service, which is the office in charge of collecting taxes from US citizens. With such a distasteful topic, it is apparent that the irs.gov designers attempted to make the site as friendly and non-threatening as possible.

The site features a clean design, with photographs of people smiling as if they actually enjoyed paying taxes. The home page features links that are focused on user wants and needs, rather than those of the government agency. For example, the most prominent link tells users to “start here for free online filing [of taxes].” Other links include “find what you need, fast,” and “where’s my refund?” All of these links are intuitive from the perspective of the American tax payer, and seem to follow the philosophy of putting the customer first, even if it is a bit of a stretch to call taxpayers “customers.” Though outside of the scope of disability access, another evidence of the focus on user needs is the existence of a Spanish version of the site.

In contrast to the firstgov.gov site, the main navigation of the irs.gov site is easily interpreted by screen reader users as the main navigation. The number of links on the home page is much fewer, and the main navigation appears right after the government agency’s title and logo, which is a logical place for the main navigation to appear. One criticism is that the main navigation text is small and the contrast with the background is not as good as it could be.

The irs.gov Web site features hundreds of forms. Nearly all of these forms are in PDF format, which is usually problematic for screen reader users. However, the designers of irs.gov have gone to great lengths to provide many ways of accessing these forms. The forms are available in tagged PDF format (which is compatible with some screen readers), in PDF forms that can be filled out directly using a screen reader, and in alternative text versions. In light of WCAG 2.0, the use of accessible PDF files would not be a problem, as long as they truly are accessible. Still, even WCAG 2.0 advocates for the robustness of Web content, which often means providing a text alternative to non-(X)HTML technologies. The designers of irs.gov have done well in this regard.

There is still room for improvement on the site. For example, the developers could validate their (X)HTML markup against the accepted standard. Like firstgov.gov, the code behind irs.gov is sloppy and haphazard. The site could also benefit from more semantic markup, such as the use of headings.

In terms of cognitive disabilities, the site could use more graphics and illustrations. The site may be a clean design, but it is definitely text-centric, and could be intimidating to some users.

www.mbda.gov

The mbda.gov Web site (MBDA, 2004) is where US citizens can find information about the Minority Business Development Agency, though it's hard to tell what the acronym stands for, because the expanded version is not featured prominently on the site. A graphic at the top of the page simply says "MBDA," without offering any kind of explanation. In this regard, screen reader users actually have a slight advantage over visual users, because they can hear the screen reader read the title of the page to them, which says "Minority Business Development." However, that is where the screen reader advantages end. In all other ways, this site is an accessibility nightmare to screen reader users.

The main navigation of the site is a group of five tabs, none of which have alternative text. In an ironic twist, the site is overrun by alt text for unimportant images, which serve only to confuse screen reader users. Image after image has such meaningless alt text as "spacer," "space," "clear space," and "arrow." The lists on this site are all pseudo lists. None of them were created using the standard (X)HTML tags for bulleted or numbered lists. These lists are not recognized as such by screen readers, leaving users to guess as to the semantic structure of the content.

Users with cognitive disabilities do not fare much better on this site. Upon clicking on the "who we are" link, for example, it appears that nothing at all has changed on the page. All of the content that was on the home page is still there. The one difference is that a new submenu option has appeared under the "who we are" link, but users may not notice this change at all. It is a subtle change, and the text is small, with poor contrast against the background. Users with or without cognitive disabilities are likely to feel disoriented on this site.

One further consideration is the lack of usability for people with access difficulties, cognitive and other. Powlik and Karshmer (2002, p 218) ask "does simply getting one inside the door really make the resource usable?" They argue that simply complying with accessibility guidelines does not make a site usable. The designers of sites such as the mbda.gov site need to consider not only meeting the minimal accessibility standards, but also how well it works for those needing to use it.

Perhaps the most serious and cruel form of irony is that people with disabilities are part of the target audience of the site: minorities. From a political perspective in the United States, people with disabilities are often a forgotten minority. Much emphasis has been placed on minority races, and on gender disparities, but a proportionally small amount of emphasis has been placed on people with disabilities. That people with disabilities would be unable to access a Web site intended to serve minorities is a travesty, and makes a mockery of the reason for the Web site's very existence.

<http://nihseniorhealth.gov>.

The Senior Health Web site of the US National Institutes of Health is one of the few US government Web sites designed specifically to accommodate people with disabilities. The main reason for this focus is that the target audience is senior citizens, many of whom have one or more disabilities due to age-related processes.

The disability features on this site are prominent and intuitive. In fact, the first four links are disability-related. These are “skip navigation,” “enlarge text,” “high contrast,” and “turn speech on.” The “skip navigation” link takes the user to the beginning of the main content. The “Enlarge text” link increases the font size substantially for the benefit of people with low vision. The “high contrast” option turns the background black and the text white, also for the benefit of people with low vision. The “turn speech on” button provides an uncommon, but useful, feature that can benefit users with cognitive disabilities as well as those with low vision. When this button is activated, a java applet is activated in a popup window in the background which begins to read the Web page out loud. The Web site designers use this applet to stream the sound of a voice synthesizer reading the page’s contents. Users are able to control what is read by clicking on the content they want to hear. The reader reads one paragraph at a time.

The use of a site-specific synthesized reader is not a technique that should be applied across all Web sites, because most users who need voiced output will need this output for their entire computer, not just for certain Web sites. They need full-featured screen readers. The NIH Senior Health Web site is a bit different though. Most elderly individuals do not have extensive experience on the computer, and most feel at least somewhat intimidated by the prospect of using a computer at all. Chances are low that these individuals would have full-featured screen readers at their disposal, even if they would find this functionality useful. It makes sense then to include this functionality in the Web site itself for this specific audience and on this specific site. The designers have made a special effort to accommodate their target audience.

The designers have also made a concerted effort to construct a site that is very simple and well-organized for the benefit of those with cognitive disabilities or memory loss. The amount of text on each page is minimal, with plenty of white space, resulting in content that is easy to read. Longer passages of text are split up across multiple pages, and the “next page” buttons are clearly marked, in both text and graphic format, with a large arrow pointing to the right. All of these techniques facilitate navigation and increase comprehension for people with cognitive disabilities and reduce cognitive load for all users.

The site also features several video clips, used to explain concepts. This is also in line with the idea of providing assistance to users with cognitive disabilities. In order to accommodate users with hearing loss, the videos are captioned and text transcripts are provided.

In many ways, this is a model site in terms of accessibility. Not only have the designers made sure to “obey the rules” of Web accessibility by conforming to the existing standards, but they have extended the accessibility of the site by catering specifically to those with disabilities. The site is not only *accessible* to people with disabilities, but *usable* to them as well. This site is well positioned for the changes that WCAG 2.0 will bring.

6. CONCLUSION

All people, with or without disabilities, have a right to access government information on the Web. In many countries, such as in Australia and in the United States, this right is written into law. Though the specifics of these laws differ, they all have the same goal in mind: to make government information accessible to all citizens.

Though separate national standards exist in the US and although there are some additional requirements in Australia in the form of commonwealth and state based guidelines, the

dominant standards in the area of eGovernment accessibility for people with disabilities has been and continues to be set by the W3C. In Australia, additional commonwealth and state-based guidelines are effectively attempts to deal with these standards within the confines of the Australian legal system. Similarly Section 508 in the US is in large part a reinterpretation of WCAG 1.0, in terms of legislative requirements in that country.

As WCAG 2.0 moves closer to being the official document of the W3C on Web content accessibility, governments should take the opportunity to anticipate the changes that this document will bring. With a greater focus on usability for people with disabilities, WCAG 2.0 can serve as a catalyst to cause developers to consider the user's perspective more seriously. It is not enough to merely provide access. The information must also be useful and usable. With WCAG 2.0 allowing the use of accessible non-(X)HTML technologies, this opens up a realm of possibilities that many in the Web accessibility community previously shunned. This is an exciting development in terms of the possibilities for multi-modal engagement that can benefit all users, especially those with cognitive disabilities. The caveat, of course, is that these non-(X)HTML technologies must be accessible to a broad range of users, and not just to those with specific abilities or disabilities, unless equivalent alternatives are provided. Also, with impending changes in the verifiability of conformance WCAG guidelines and changes in conformance criteria, Web developers will need to adapt their processes for testing the accessibility of their creations. This requires new protocols in the quality control process.

The review of the six sites above reveals some common areas that designers need to address. There is the general principle of user-centered design that the users need to be considered. Not all people with disabilities have the same needs. Even within a disability sub-group, such as cognitive disabilities, the type and severity of disability can vary and the functional capabilities of users can therefore vary. The best approach then is to include representatives from the target user populations in the design process. Where this has been done from the start, the additional cost of accessibility considerations in site designs has been shown to be minimal (Pedlow, Mirabella, and Chow, 2001).

All these sites have some implementation of accessibility guidelines, with the better ones showing that, in many areas, a great deal of effort was made to conform to the guidelines. Nonetheless, those better sites are still inconsistent in the way in which they implement the guidelines. Aside from implementing the guidelines per se, there is also the inconsistent use of standard (X)HTML. These types of inconsistencies should be picked up through a quality control process. One form such a quality control process could take is that of an accessibility audit. The W3C provides extensive instructions on how to evaluate a site for accessibility compliance (W3C 2002). It is important to consider universal usability throughout the Web development life cycle. Leaving such considerations until the last phase of development can result in the need for significant redesign and a much greater increase in cost than if universal usability had been considered from the concept phase.

When all things are considered, making Web content—especially government Web content—accessible to people with disabilities is a matter of basic human rights. This is the answer to the question of *why* this important. It is not enough to merely be aware of *what* to do or *how* to do it. With this in mind, the most important thing for developers to remember when designing accessible Web content is that they are designing it for real people with real needs, and not just to satisfy of checklist of guidelines.

7. REFERENCES

Access Board (2001). Section 508 of the Rehabilitation Act, www.section508.gov, accessed February 28, 2004.

Buhler, C. (2001), Empowered participation of users with disabilities in universal design, *Universal Access in the Information Society*, Vol 1. No 2. Oct, 85-90.

Companion Card (2004) www.companioncard.org.au, accessed 1 March 2004.

Firstgov (2004) US government portal for all information within the US government, www.firstgov.gov, accessed 1 March 2004.

Gov (2004) Australian whole-of-government single point of access (portal), www.gov.au, accessed 28th February 2004.

IMS (2001) IMS Guidelines for Developing Accessible Learning Applications, Version 0.6 White Paper, IMS Global Learning Consortium, Inc., 19 October.

IRS (2004) Internal Revenue Service, www.irs.gov, accessed 1 March 2004.

Kaye, H.S. (2000) Computer and Internet Use Among People with Disabilities, Disability Statistics Report (13), Washington DC: U.S. Department of Education, National Institute on Disability and Rehabilitation Research.

MBDA (2004) Minority Business Development Agency, www.mbda.gov, accessed 1 March 2004.

Online Council (2000) Joint Media Statement, www.dcita.gov.au/Article/0,,0_1-2_1-4_15092,00.html, accessed 1 March 2004.

Pedlow, R., Mirabella, M, and Chow, C. (2001) Universal access in HCI: Towards an information society for all, *Proceedings of HCI International 2001*, Ed. C. Stephanidis, New Jersey, Aug, Vol 3, 714-718.

Powlik, J.J. and Karshmer, A.J. (2002) When accessibility meets usability, *Universal Access in the Information Society*, Vol 1, No 3, 217-222.

Sampson-Wild, G. and Burmeister, O. K. (2001) The Continuing Evolution Of Best Practice Principles In Designing For Web Accessibility, *Proceedings of OZCHI2001 Usability and usefulness for knowledge economics*, Nov, 122-127.

Smith, P.D. and Brien, A.O. 2000. Universal Design from Policy to Practice - The Western Australian Experience. *Proceedings, Designing for the 21st Century II: An International Conference on Universal Design*. <http://www.adaptenv.org/21century/proceedings.asp>, accessed 28 February 2004.

Schneiderman, B. (2001) CUU: bridging the digital divide with universal usability, *ACM Interactions*, Vol 8(2), 11-15.

Vic eGov (2003) IT&T 39 – Accessibility Policy, <http://www.mmv.vic.gov.au/accessibility>, accessed 28th February 2004.

WCAG (2004) Web Content Accessibility Guidelines 2.0, <http://www.w3.org/WAI/GL/>, Web Content Accessibility Guidelines Working Group, accessed 28 February 2004.

Williamson, K. and Stillman, L. (2000) Online services for people with disabilities in Australian public libraries, Final report for the @ccessAbility Program, DoCITA, Monash University: Melbourne, Sep.

W3C (1999) Web Content Accessibility Guidelines 1.0, <http://www.w3.org/TR/WAI-WEBCONTENT/>, accessed 28 February 2004.

W3C (2004) Web Content Accessibility Guidelines 2.0, <http://www.w3.org/WAI/GL/WCAG20/>, W3C internal Working Draft, 14 February 2004, accessed 28 February 2004.