

# Making Web Sites More Accessible for Users Who Are Older and/or Have a Disability

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## I. INTRODUCTION

Aging and Disability Resource Center (ADRC) grants are important systems change projects aimed at providing information on, streamlining access to, and assistance with long-term supports and services and related benefits. ADRCs serve both older adults and individuals with disabilities. While there are many methods for communicating with these consumers, Web sites serve as cost-effective means of information diffusion and are especially helpful to consumers looking for information.

The populations targeted by the ADRCs likely require some adaptation of standard Web site construction techniques. This brief shares specific ideas and strategies for making their Web site experience informative and useful. This document is not designed to serve as a comprehensive set of accessibility guidelines. Instead, it is intended as an introduction to the issues relating to accessibility of Web sites; a listing of specific, concrete steps detailing some of the most critical accessibility considerations; strategies for testing the accessibility of Web sites; and a collection of further resources.

## II. BACKGROUND

Today, a majority of working adults with disabilities use the Internet.<sup>1</sup> Fewer seniors use the Internet, but as the more technology-savvy baby boomers age, the online senior population will increase. Only 26 percent of Americans aged 65 and older go online at least once a week, compared to 61 percent of 50-64-year-olds.<sup>2</sup>

However, for older adults and individuals with disabilities, some Web site designs can pose access problems. Older users and those with disabilities may be unable to use a Web site's navigational menu, fill out online forms, or even access Web site content. Addressing accessibility issues for these users is important for every Web site designer, but especially for ADRC grantees.

Much of the recent impetus toward accessible Web sites originates from federal legislation -- Section 508 of the federal Rehabilitation Act amended in 1998 includes enforceable requirements for technology accessibility. However, Section 508 does not explicitly apply to federal grantees like the ADRCs and the only federal enforcement mechanism is for the Department of Education to withhold its limited Assistive Technology Act of 1998 (AT Act) funds from states.<sup>3</sup>

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<sup>1</sup> U.S. Department of Commerce. *A Nation Online: Entering the Broadband Age*. September 2004. Available at <http://www.ntia.doc.gov/reports/anol/>

<sup>2</sup> Kaiser Family Foundation. *e-Health and the Elderly: How Seniors Use the Internet for Health Information*. January 2005. Available at <http://www.kff.org/entmedia/7223.cfm>

<sup>3</sup> Assistive Technology Act Programs. *Section 508 Information Technology Access: Questions, Answers, and Unknowns for State and Local Entities*. Available at <http://www.ataporg.org/itqa.asp>

In the absence of enforceable federal requirements applicable to state agencies, many states have established their own accessibility standards or have required that state governmental entities follow Section 508. The development of many ADRC grantee Web sites may be bound by state accessibility regulations.

- The Information Technology Technical Assistance and Training Center ([http://www.ittatc.org/laws/state\\_intro.cfm](http://www.ittatc.org/laws/state_intro.cfm)) tracks specific state laws, policies, and standards.

Despite the lack of **enforceable** universal accessibility standards, Web designers should still seek to comply with the available universal accessibility guidelines. The two most authoritative sets of guidelines are included below. Many of the most critical considerations in these guidelines have been incorporated into this brief's section on "Building Accessible Web Sites."

- The Section 508 standards (<http://www.section508.gov/index.cfm?FuseAction=Content&ID=3>) list specific accessibility Web site requirements of federal agencies.
- The World Wide Web consortium (W3C), a member organization that develops Web standards, maintains well-respected Accessibility Guidelines as part of the Web Accessibility Initiative (<http://www.w3.org/WAI/>). These guidelines are much more comprehensive than the Section 508 standards, and they are paired with corresponding coding techniques.

### III. ACCESSIBILITY CHALLENGES

Inaccessible Web sites affect four major categories of disabilities: visual disabilities, auditory disabilities, motor disabilities, and cognitive disabilities. Seniors often develop disabilities as they age. Barriers to Internet access vary widely by disability. This section explores the prevalence of each disability category and the effects of poor Web site design on people with those disabilities.

#### A. Visual disabilities

One of the most important challenges for Web designers to consider is ensuring that users with visual disabilities are able to access the full range of resources on a Web site. About ten million Americans are visually-impaired.<sup>4</sup> Despite access problems, over 60 percent of severely visually-impaired, working Americans are Internet users.<sup>5</sup>

The Internet is primarily a visual medium, meaning that visually-disabled or color-blind users face access problems on many Web sites. Though blind users may use software called "screen readers" that read a page's text out loud, poorly structured pages and non-text information, such as pictures or graphs, can cause problems with the software.

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<sup>4</sup> American Foundation for the Blind. *Statistics and Sources for Professionals*. Available at <http://www.afb.org/section.asp?Documentid=1367>

<sup>5</sup> U.S. Department of Commerce. *A Nation Online: Entering the Broadband Age*. September 2004. Available at <http://www.ntia.doc.gov/reports/anol/>

In addition, many users with visual disabilities cannot navigate Web sites with a mouse. These users, who typically use keyboard commands to navigate through a page, can be frustrated when links and functions on a Web site are inaccessible without a mouse.

Another factor to consider is the use of color. Some people are color-blind from birth, while many others lose some color sensitivity as they age. Reduced sensitivity to colors can make it more difficult to understand information that is conveyed entirely by color, such as a color-coded map.

Finally, nearly all aging users begin to experience some vision changes as they grow older, such as reduced color sensitivity and a reduced ability to read close-up, small print.

## **B. Auditory disabilities**

Twenty million Americans are deaf or hard-of-hearing.<sup>6</sup> Fewer barriers are posed for people with auditory disabilities because many Web sites contain no auditory information. Consequently, three-quarters of severely-hearing impaired Americans in the labor force use the Internet.<sup>7</sup> However, as designers increasingly incorporate multi-media presentations into Web pages, accessibility for Deaf users and those with other auditory disabilities is a growing concern.

## **C. Motor disabilities**

Motor disabilities may originate from multiple sclerosis, severe rheumatoid arthritis, Parkinson's disease, and many other conditions. In addition, conditions like carpal tunnel syndrome can make typing painful and difficult. Of working American adults with difficulty typing, almost 65 percent are Internet users.<sup>8</sup>

Like blind Web site users, people with motor disabilities may use the keyboard rather than a mouse to navigate a Web site. Web sites designed without thought to alternative navigation may include keyboard-inaccessible menus or jumbled tab order on forms.

Other people with less severe motor disabilities may use the mouse, but they may not be able to point and click with a great deal of precision. For these users, small links and menus pose a challenge.

## **D. Cognitive disabilities and unfamiliarity with the Internet**

Cognitive disabilities may be caused by developmental disabilities, Alzheimer's disease, and other conditions. In addition, many people, especially older seniors, are unfamiliar with computers and with the Internet.

People with learning or cognitive disabilities as well as people who are unfamiliar with the Internet may find Web sites confusing. While poorly-structured sites and unclear navigation

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<sup>6</sup> Holt, Judith, Sue Hotto, and Kevin Cole. *Demographic Aspects of Hearing Impairment: Questions and Answers*. Center for Assessment and Demographic Studies, Gallaudet University. 1994. Available at <http://gri.gallaudet.edu/Demographics/factsheet.html#Q1>

<sup>7</sup> U.S. Department of Commerce. *A Nation Online: Entering the Broadband Age*. September 2004. Available at <http://www.ntia.doc.gov/reports/anol/>

<sup>8</sup> U.S. Department of Commerce. *A Nation Online: Entering the Broadband Age*. September 2004. Available at <http://www.ntia.doc.gov/reports/anol/>

undermine the efforts of all users to understand the information on a Web site, users with cognitive disabilities or who are unfamiliar with the Internet are disproportionately affected by poorly-designed sites.

#### **IV. BUILDING ACCESSIBLE WEB SITES**

The Section 508 standards and the W3C Accessibility Guidelines are the two most authoritative sets of accessibility guidelines available. Although ADRC grantees are not explicitly required to follow either, grantees should make every effort to make Web sites available to all users. Grantees should also research state-level regulations in order to ensure that their Web sites follow any applicable policies.<sup>9</sup>

Many of the most critical considerations in building accessible Web sites are included below, organized by disability category. Since Web designers may program or create Web sites in a variety of different computer languages, this brief lists specific, concrete steps, but few references to actual code. Following these steps will help ensure a more informative, effortless Web experience for all users.

##### **Visual disabilities**

- Many people with visual disabilities use software called “screen readers” to read aloud the contents of Web sites. Some screen readers can be quite sophisticated (and expensive), but others cannot interpret all code. In addition, no software can describe what a picture or video shows without help from the Web designer. Below are some tips to ensure that people using screen readers will be able to hear a Web page as the designer intended.
  - Provide alternate text descriptions for pictures and transcripts for videos. If coding in HTML, consider the “longdesc” attribute when necessary to convey more information. Use alt="" if an image was used for layout and contains no information.
  - In general, Web designers should separate content from presentation. Make use of semantic elements like headers, strong or emphasized text, and lists in HTML. Use cascading style sheets (CSS) to create a more pleasing presentation, but ensure that the page is still readable with style sheets disabled.
  - While PDF (Adobe Acrobat) files improve file-sharing across different operating systems, many PDF files cannot be read by screen readers. Make files available in alternative formats like HTML or plain text for these users. In addition, recent versions of Adobe Acrobat offer accessibility features that authors may integrate into documents.
- for more information on how to create or read accessible pdf files, go to <http://www.adobe.com/enterprise/accessibility/>.

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<sup>9</sup> The Information Technology Technical Assistance and Training Center tracks specific state laws, policies, and standards found at [http://www.ittatc.org/laws/state\\_intro.cfm](http://www.ittatc.org/laws/state_intro.cfm).

- Similarly, less sophisticated screen readers may not read HTML tables in the order that they appear visually. They “linearize” the text of a Web page by reading the text in the order that it appears. It is recommended that Web designers use CSS rather than HTML tables for layout, but still ensure that the “linearized” page reads in the correct order. When using data tables, label row and column headers and describe the purpose of the table using the “summary” attribute. With large tables, associate cells with their headers.
  - Provide full descriptions for abbreviations and acronyms. Screen readers tend to attempt to read acronyms as words, so “ADRC” would sound garbled. The Web designer should indicate the long form of the abbreviation or acronym either through the text or through attributes in HTML code.
  - If frames are used, they should be assigned appropriate titles and names to improve navigation.
  - Provide a means to skip past navigation bars. Each time a new page is loaded, the screen reader will re-read the contents of the navigational menu. Providing a way to skip the menu allows visually-impaired readers to skip the menu once they are familiar with it, just as other users do. The preferred method in HTML is to denote content using with HTML headings, which are easily navigable with most screen readers.
  - HTML forms can cause problems with screen readers as well. Use drop-down menus rather than radio buttons if possible, as radio buttons can be especially problematic. Be sure to explicitly associate fields with the correct question by using the “label for” tag.
  - Do not use server-side image maps. Use client-side image maps instead and assign alternate text to each region of the map. Provide redundant text links as well.
  - Be cautious in the use of JavaScript, Java applets, and other applications. Be aware that scripts and applets are often inaccessible, though many include accessibility features. When using JavaScript, make sure that you test thoroughly with assistive technologies. If possible, limit usage of these applications, and provide alternate descriptions of their content.
  - A “text-only” version of the Web site should only be considered as a last resort and should not be necessary for a well-designed site.
- As previously mentioned, careless use of color can also render a Web site inaccessible to some of its intended users.
    - Ensure that whenever color conveys information, there is a way to perceive the information without color. For example, when using color-coded charts or maps, use text or symbols as well to code the information. In addition, if required fields in a form are indicated by color or bolding, they should also be indicated by text or symbols, like an asterisk.
    - Use a high-contrast color scheme to help aging users with reduced color sensitivity.

- Designers should also address low vision by assuring that the text is easily read. For the most part, this means keeping the look of the text as standard as possible. (Sutton, SPRY)
  - Use simple, legible fonts. Some experts recommend using only sans-serif fonts like Helvetica and Arial.
  - Double-space text and align left. Keep font size around 12 – 14 point, and use relative rather than fixed font sizes to preserve users' ability to change font size. Consider adding a feature to allow users to increase font size.
  - Avoid formatting text in a distracting way. For example, use italics sparingly for emphasis. Other examples of practices to avoid include writing in all caps or placing text over ghosted images. These practices can slow reading speed.
  - Ensure that the text on navigational menus and buttons is easy to read.
  - Avoid unnecessary graphics and animation, especially anything that flashes.

## **B. Auditory disabilities**

- People who are deaf or hard-of-hearing may not be able to access audio information contained in auditory recordings, videos, and multi-media presentations.
  - Provide alternative means of communicating audio information. For example, audio information in a video may be captured in a written transcript, captions, or even a video of a person signing.
    - The National Center for Accessible Media website (<http://ncam.wgbh.org/richmedia/>) includes many resources on making rich media accessible to people with disabilities. NCAM's tool MAGpie facilitates the process of creating captions.

## **C. Motor disabilities**

- People with motor disabilities may find it difficult or even painful to use precise mouse movements or to type.
  - Make navigational menus and buttons large and easy to use.
  - Ensure that tabs are ordered in a logical way.
  - Access keys are not recommended because conflicts between Web site access keys and software shortcuts can create problems for users.
  - Be cautious in the use of pull-down navigational menus. If they are used, provide an alternative means of navigating to links.

## **D. Cognitive disabilities and unfamiliarity with the Internet**

- People with learning disabilities and people who are unfamiliar with the Internet may find many Web sites confusing or overwhelming. To address this issue, Web designers should present information as clearly and straightforwardly as possible. Below are some important areas of consideration.

- Inform Web site users if they must complete a form within a limited amount of time. Allow them to extend the time period.
- Format pages consistently across the site.
- Make navigation as clear as possible, using the same buttons throughout the site. Use unambiguous icons with text for buttons (e.g. an arrow with the words “next page” inside).
- Provide a simple site map showing a clear structure to the site. Show "breadcrumbs" at the top of pages, displaying where the page exists in the Web site's structure.
- Avoid lengthy pages by using more succinct text. People unfamiliar with computers or the Internet may not be comfortable with scrolling down Web pages, so try to keep text to one page. Where more explanation is necessary, split text into separate pages, and provide links. However, try to balance succinct pages with the “3 click rule” – if users must click more than 3 times to find the information they want, they may give up.
- Surround text with lots of white space. A busy design distracts readers.
- Provide a search function. Older users prefer searching over browsing.
- Address users’ fears about the security of their personal information. This is particularly relevant for sites that record health information.
- Offer a non-Web-based way to contact your organization with questions or concerns.

## V. TESTING THE WEB SITE

After creating any Web page, a designer will test the page using different browsers such as Internet Explorer, Netscape, and Safari. However, the process of creating an accessible Web site demands a more comprehensive testing process.

For example, some screen readers “linearize” the text of a Web page by reading the text in the order that it appears. Features like tables can complicate this linearization process. To ensure that the Web site is read in the correct order, a Web designer can access the site using a text-based browser or a similar tool

- The beta version of the Wave tool (<http://dev.wave.webaim.org/index.jsp>) allows a text-only view of a Web page. To use this feature, select “Change Preferences,” then check “linearized reading order.” Select “Set Preferences” and enter the URL of the Web site.

More sophisticated screen readers render tables correctly, but other problems may arise. A Web designer may wish to access a Web site using a popular screen reader to find these potential problems. Unfortunately, the most widely-used and sophisticated screen readers can be prohibitively expensive. However, many of these same screen readers are often available as free demos for a limited amount of time, including three of the most popular U.S. screen readers.

- JAWS ([http://www.freedomscientific.com/fs\\_downloads/jaws.asp](http://www.freedomscientific.com/fs_downloads/jaws.asp))
- Window-Eyes (<http://www.gwmicro.com/demo/>)
- IBM Home Page Reader ([http://www-306.ibm.com/able/solution\\_offerings/hpr.html](http://www-306.ibm.com/able/solution_offerings/hpr.html))

Web designers may test their site's ease of alternative navigation by simply unplugging the mouse. Verify that tabs are ordered correctly by attempting to navigate to all pages and fill out all forms.

In addition, designers should make use of the array of free tools available to test Web site accessibility. Please note that these tools should not be used as a substitute for comprehensive testing. Many decisions are subjective, and some functions can only be found through manual testing.

- Bobby Online (<http://bobby.watchfire.com/bobby/html/en/index.jsp>): Bobby is the most commonly used accessibility tool. Type in the URL of the Web page, and Bobby will test compliance with either Section 508 standards or the W3C Accessibility Guidelines.
- Wave (<http://www.wave.webaim.org/index.jsp>): The non-beta version of Wave is another common accessibility tester which can test for Section 508 standards and W3C Accessibility Guidelines. One benefit of this tool is that it shows "alt" text next to the image the text describes, thus facilitating the subjective decision of whether "alt" text adequately describes an image.
- Vischeck (<http://www.vischeck.com/vischeck/vischeckURL.php>): Vischeck will display a Web page as it would appear to a color-blind person. It checks for three types of color-blindness.
- Web designers using Bobby, Lift, or Webking as accessibility validation tools can use STEP 508 to help sort through and prioritize the errors/issues that these and other software might identify. STEP508, the Simple Tool for Error Prioritization for Section 508 compliance, is an electronic tool available free at <http://www.section508.gov/index.cfm?FuseAction=Content&ID=155>.

To increase the utility of a Web site to its users, designers should involve those same users in the review process.

- Before you make the Web site public, test it out with some members of your target group. They can help troubleshoot areas that other testing methods do not catch.
  - Usability authority Jakob Nielsen's 2001 column on user testing (<http://www.useit.com/alertbox/20010805.html>) includes helpful considerations in observing usability tests.
- Provide a means for evaluation by the users of your Web page. Some grantees have found mail surveys to be helpful. Whatever method is used, be sure to incorporate new suggestions into the Web page.

## VI. CONCLUSION

Web sites can efficiently serve marketing and informational goals of grantees, but they should not replace traditional marketing and informational activities. Many consumers, especially in the aging population, do not use the Internet. For other users, however, such as those with visual impairments, your accessible Web site may be the only readable version of your information.

To reach online aging and disabled target populations, ADRC Web sites should be designed for accessibility. In addition, Web designers should test the Web site using tools and target users, both before the Web site is launched and on a continuing basis as changes are made to the design.

## VII. FURTHER RESOURCES

This listing of further resources includes a few of the most useful resources from the text of this document as well as additional resources. Resources are organized into three categories:

- General Information on Accessibility Guidelines and Standards
- Tutorials and Resources for Developing Accessible Web Sites
- Tools for Checking Web Site Accessibility

General Information on Accessibility Guidelines and Standards	
Description of resource	Website URL
Section 508 standards	<a href="http://www.section508.gov/index.cfm?FuseAction=Content&amp;ID=3">http://www.section508.gov/index.cfm?FuseAction=Content&amp;ID=3</a>
The W3C Web Accessibility Initiative Web site contains guidelines, checklists, techniques, and links to accessibility tools and alternative browsers.	<a href="http://www.w3.org/WAI/">http://www.w3.org/WAI/</a>

Tutorials and Resources for Developing Accessible Web Sites	
Description of resource	Website URL
WebAIM, or Web Accessibility in Mind, is a non-profit organization within the Center for Persons with Disabilities at Utah State University. The WebAIM Web site contains information on concepts, techniques, and accessibility tools.	<a href="http://www.webaim.org">www.webaim.org</a>
Jim Thatcher wrote this tutorial on Section 508 Accessibility for the Information Technology Technical Assistance and Training Center.	<a href="http://www.jimthatcher.com/webcourse1.htm">http://www.jimthatcher.com/webcourse1.htm</a>
Adobe maintains this Web site with information on how to create or read accessible PDF files.	<a href="http://www.adobe.com/enterprise/accessibility/">http://www.adobe.com/enterprise/accessibility/</a>
The National Center for Accessible Media website includes many resources on making rich media accessible to people with disabilities. NCAM's tool MAGpie facilitates the process of creating captions.	<a href="http://ncam.wgbh.org/richmedia/">http://ncam.wgbh.org/richmedia/</a>
Web designers using Dreamweaver may download this extension geared toward developing accessible pages with Dreamweaver.	<a href="http://dynamic.macromedia.com/bin/MM/exchange/extension_detail.jsp?product=dreamweaver&amp;extOid=195842">http://dynamic.macromedia.com/bin/MM/exchange/extension_detail.jsp?product=dreamweaver&amp;extOid=195842</a>

Tools for Checking Web Site Accessibility	
Description of resource	Website URL
JAWS (screen reader)	<a href="http://www.freedomscientific.com/fs_downloads/jaws.asp">http://www.freedomscientific.com/fs_downloads/jaws.asp</a>
55Window-Eyes (screen reader)	<a href="http://www.gwmicro.com/demo/">http://www.gwmicro.com/demo/</a>
IBM Home Page Reader (screen reader)	<a href="http://www-306.ibm.com/able/solution_offerings/hpr.html">http://www-306.ibm.com/able/solution_offerings/hpr.html</a>
Bobby Online is the most commonly used accessibility tool. Type in the URL of the Web page, and Bobby will test compliance with either Section 508 standards or the W3C Accessibility Guidelines.	<a href="http://bobby.watchfire.com/bobby/html/en/index.jsp">http://bobby.watchfire.com/bobby/html/en/index.jsp</a>
Wave is another common accessibility tester which can test for Section 508 standards and W3C Accessibility Guidelines. One benefit of this tool is that it shows "alt" text next to the image the text describes, thus facilitating the subjective decision of whether "alt" text adequately describes an image.	<a href="http://www.wave.webaim.org/index.jsp">http://www.wave.webaim.org/index.jsp</a>
Vischeck is a tool that will display a Web page as it would appear to a color-blind person.	<a href="http://www.vischeck.com/vischeck/vischeckURL.php">http://www.vischeck.com/vischeck/vischeckURL.php</a>