

Best Practices for Web Accessibility Design and Implementation

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Our lives are intricately tied to Internet technology. We use it to work. We use it to communicate. We use it to entertain. As the Internet becomes a part of our daily lives, it is important for Web site developers to consider the many obstacles individuals with disabilities face when accessing the Internet.

An essential part of Web design today is designing for people with disabilities. Many U.S. government and educational institutions are required by law to provide accessible Web content that follows accessibility guidelines established by the World Wide Web Consortium (W3C) and standards set forth in Section 508 of the U.S. Federal Rehabilitation Act. With the implementation of new U.S. Federal laws and compelling international standardizations efforts by the W3C, there has been heightened awareness regarding Internet access for people with disabilities across multiple markets, and new governmental policies established across the globe.

This document outlines a process-based approach to implementing accessibility design. This process consists of several steps:

- Identification and adoption of accessibility standards to determine which standards apply to an organization and adopting those standards across the organization
- Validation to evaluate the site with respect to the adopted standards.
- Establishment of an approach to select tools and techniques to meet the needs and experience in the organization.
- Implementation plans to integrate standards, tools and training.

Accessibility: Understanding the Issue

An essential component to an accessibility plan is an understanding of the issues relevant to individuals with disabilities, the benefits of accessible design and the importance of accessibility. This section is intended to provide a brief overview of the challenges faced by

individuals with disabilities using the Web, accesses to Web content and developers striving to create more accessible pages.

What is Accessibility?

According to the World Wide Web Consortium (W3C), content is accessible when it may be used by someone with a disability. In this paper, we define Web accessibility as:

- Access to electronic information
- The nature and scope of disabilities that affect individuals accessing Web content
- A brief description of the assistive technologies used by individuals with disabilities.

Access to Electronic Information

Accessibility simultaneously involves two issues: first, how users with disabilities access electronic information, and second, how developers enable Web content to function with assistive devices commonly utilized by individuals with disabilities.

For the disabled user, the challenge is to identify tools that will provide the most convenient access to Web-based and other electronic information. For the Web content developer, the challenge is to remove the obstacles that prevent accessibility tools from functioning effectively. In many cases, these challenges are relatively simple to overcome; others require a bit more thought and effort.

Defining Disabilities

Disabilities are broad and difficult to categorize, however it is important to provide some sense of the scope of the issue.

A 1997 report by the U.S. Census Bureau categorizes 19.6% of the U.S. population as having some sort of disability. Within that group are individuals with visual impairments, hearing impairments, cognitive impairments and motor impairments. Each category describes a much wider range of conditions. For example, vision impairments include limited vision, color blindness and blindness. Disability categories can also describe temporary disabilities. For example, someone with a broken wrist may have difficulty using a mouse, but still needs access to the Web to meet the day-to-day job requirements.

At the same time, statistics about individuals with disabilities may be misleading. As people get older, most will face a disability of some kind. While nearly 20% of the total U.S. population has a disability, as the population ages the proportion of people with disabilities gets higher (see Table 1). In fact, almost 75% of the population older than 80 has a

disability. Thus, accessibility is not just about opening doors, it is about keeping them open. Accessibility allows people to maintain a level of independence that age would likely otherwise make difficult.

PREVALENCE OF DISABILITY BY AGE: 1997			
	Total	Number w/Disability	Percent w/Disability
All ages	267,665,000	52,596,000	19.7%
Under 15 years	59,606,000	4,661,000	7.8%
15 to 24 years	36,897,000	3,961,000	10.7%
25 to 44 years	83,887,000	11,200,000	13.4%
45 to 54 years	33,620,000	7,585,000	22.6%
55 to 64 years	21,591,000	7,708,000	35.7%
65 years and over	32,064,000	17,480,000	54.5%

Table 1

Resources

U.S. Census Bureau: Americans with Disabilities
<http://www.census.gov/hhes/www/disable/sipp/disab97/ds97t1.html>

Assistive Technologies

Users with disabilities frequently rely on hardware and software to make Web content accessible to them. These tools, known as assistive technologies, range from screen readers to touch screens and head pointers.

Blind users of the Web frequently use software called a screen reader to read the contents of a Web page out loud. Two common screen readers are JAWS® from Freedom Scientific™ and Home Page Reader from IBM®. Screen readers enable users to hear the contents of a Web page rather than read them. However, a screen reader can only read text, not images or animations. Therefore, it is important that images and animations have text descriptions associated with them that the screen reader can read. This text is called alternative text, or “alt” text.

Users with mobility issues may rely on the keyboard instead of the mouse to navigate Web pages. For individuals with nerve damage, arthritis or repetitive motion injuries, use of the mouse may not be comfortable or possible. Using only the tab and enter keys on the keyboard, it is possible for these individuals to negotiate a page with ease. Many users of the Internet have this capability and are simply unaware of it. In Microsoft® Internet Explorer, pressing the Tab key moves the “focus” of the browser between all available links on a page. Pressing the Enter key activates links, much like clicking a mouse.

In some cases, users may employ touch screens, head pointers or other assistive devices as well. A touch screen allows an individual to navigate the page using her or his hands without the fine motor control required by the mouse. A head pointer is simply a stick placed in one's mouth or mounted on a head strap used to interact with a keyboard or a touch screen.

In these cases, it is very important that essential components of the page work without a mouse. Rollovers, dropdown menus and interactive simulations are all examples of elements that are typically dependent on the mouse for user interaction. These elements must ensure that keyboard-defined events are included along with mouse-defined events. A quick test using the keystrokes available in Internet Explorer may provide a valuable glimpse of the issues a page may present users with disabilities.

Accessibility Standards

Accessibility standards help Web content developers identify and address accessibility issues.

The Web Content Accessibility Guidelines (WCAG) from the W3C was the first major effort to establish guidelines for accessible design. This standard consists of fourteen guidelines, each with three checkpoint levels for Web developers to meet. Priority One checkpoints ensure that the page itself is accessible. Priority Two checkpoints ensure that certain groups will be able to access information on the Web page. Priority 3 checkpoints ensure that all content on the page is completely accessible.

In specific countries, national standards emerged later. Section 508 of the Federal Rehabilitation Act in the U.S. is based on WCAG Priority One. Common Look and Feel in Canada and Guidelines for U.K. Government Web sites in the United Kingdom are based on Priority One and Two from WCAG. The W3C provides an extensive listing of country specific standards initiatives. Noted below are a few relevant listings.

Resources

W3C Web Content Accessibility Guidelines
<http://www.w3.org/TR/WCAG10/>

W3C Web Content Accessibility Guidelines Curriculum
<http://www.w3.org/WAI/wcag-curric/>

Adaptive Computer Technology Training Center (Canada)
<http://www.ec.gc.ca/act/>

Guidelines for U.K. Government Web Sites
<http://www.nics.gov.uk/bds/isservices/wads/pubs>

Introduction to Web Accessibility
<http://www.Webaim.org/info/intro>

Why is Accessibility Important?

Accessibility is an immensely important effort.

- First and foremost, accessibility is the right thing to do. It opens doors to information for individuals with disabilities.
- Second, it is the law for many institutions.
- Third, accessibility offers benefits for all users by creating more usable Web sites.
- Fourth, accessible design is based on more contemporary architecture and design that allow for greater flexibility across a site.
- Fifth, accessibility represents a growing market in need of software, hardware and design.

Accessibility Is The Right Thing to Do

Accessibility represents an important step toward independence for individuals with disabilities. Accessible Web pages provide access to fundamental government services and information such as tax forms, social programs and legislative representatives. Accessible Web pages provide access to a broader range of employment and educational opportunities by providing other means of communicating via distance or face-to-face. Accessible Web pages allow users with disabilities to participate in day-to-day activities many of us take for granted, such as reading a newspaper or buying a gift for a loved one.

Legal and policy mandates for accessibility

With new national requirements in the U.S, Canada, the European Union and more to come in the near future, there are numerous legal mandates

for accessibility. These policies will likely expand in scope. In the United States, for example, Section 508 of the Federal Rehabilitation Act sets standards for Web pages designed or maintained by federal agencies. State and local governments as well as educational and non-profit institutions around the U.S. are considering their own accessibility policies. For example, early this year the University of Wisconsin-Madison adopted an Accessibility Policy requiring all pages published or hosted by the University to conform to all WCAG Priority One and Two checkpoints.

Accessibility Benefits All

As with many improvements intended for individuals with disabilities, the enhancements of accessible design offer benefits for all users of the Web. Anyone who has pushed a shopping cart out of a grocery store can attest to the value of automatic doors and ramps cut into curbs. Similarly, accessible Web pages are often easier to read, easier to navigate and faster to download. .

Innovative Technology

Accessible design is based on the premise that pages must work with a broader category of browsers than just Netscape® Navigator or Microsoft® Internet Explorer. A page must be accessible whether using a screen reader, refreshable Braille display or a head pointer. Making pages work in less standard browsers often makes them available to other consumer Internet devices such as WAP-enabled phones or handheld Personal Digital Assistants (PDAs).

The techniques of accessibility are based on more contemporary technologies and design strategies. Older, static HTML designs often intermix the content on pages with the formatting. Accessibility guidelines encourage formatting to be separated from content using Cascading Style Sheets (CSS) to allow more flexible content use and easier implementation of more powerful dynamic models.

Market Opportunity

Accessibility offers potential for organizations and businesses to reach new customers and new markets. As new policies are adopted, there is a growing need among government and educational institutions for goods and services that support accessibility policy. In the U.S. businesses providing goods and services to the Government via the Web or other information technology should understand Section 508. Businesses that understand accessibility and complying with Section 508 will have a strong market advantage. This advantage is multiplied as local governments implement new policies.

Resources

Thirty-Something (Million): Should They Be Exceptions?
Vanderheiden, G.C. (1990). *Human Factors*, 32(4), pp. 383-396.
http://trace.wisc.edu/docs/30_some/30_some.htm

Identification and Adoption

Identification and adoption of a standard is the first step in implementing an accessibility policy. It includes determining what standards and guidelines govern a particular organization, developing local and subjective standards and identifying individuals to coordinate compliance efforts within the organization.

Identify the standard

To begin this process, identify the standards that need to be met. In some cases this standard may be legislative. In other cases the standard may be developed locally in advance of any legislative or organizational mandate.

U.S. Federal Standards - Section 508

The regulations referred to as Section 508 are actually an amendment to the Workforce Rehabilitation Act of 1973. Section 508 is a set of standards requiring electronic and information technology developed or purchased by the U.S. Federal Government to be accessible by people with disabilities.

All federal agencies are required to comply with Section 508, with some exceptions. Exemptions may include small purchases of less than \$3,000, national security systems, and situations where conformance to the law would impose an "undue burden." It should be noted that it is typically very difficult to qualify for exemption.

Section 508 does not directly apply to the private sector. While many private institutions have adopted the standard outlined in Section 508 as part of their accessibility policy, they are not required to do so under the current law. However, there is widespread expectation that similar laws may be passed regarding Web sites for organizations that receive federal funds.

Resources

About Section 508

<http://www.section508.gov/About508.htm>

Exceptions to Section 508

<http://www.section508.gov/508QandA.html#g>

State, Local and Organizational Standards

Increasingly, state, local agencies and educational institutions are developing their own accessibility standards. For example, the University of Wisconsin System recently implemented a policy based on Priority One guidelines from the Web Accessibility Initiative (WAI). Other institutions often adopt standards reflecting Section 508, allowing them to take advantage of training and support resources developed by the U.S. government and its vendors.

Other Standards

The W3C WAI is the basis for Web accessibility standards for governmental agencies in the U.K. and Canada. These standards incorporate all Priority One and Priority Two checkpoints from the WCAG. While these standards raise the bar in terms of design and support, they allow sites to take advantage of the benefits of Cascading Style Sheets (CSS) and the separation of presentation from structure within the HTML code. If an organization can support standards for CSS, XHTML or even XML, they may want to add further standards for formatting of text. Even without implementing dynamic architecture, a site incorporating WCAG Priority Two checkpoints will have greater flexibility in adopting these models in the future.

Adopt Local Standards

After determining which, if any, federal, state or organizational standards apply, one can then develop local standards. These are particularly helpful where standards are more subjective. For example, there is currently no formal accessibility policy in Australia. However, there are court rulings about accessibility that mandate that the government not discriminate on the basis of disability. Here, it would be advisable to set local standards for Web design. Such standards establish some measure of accountability to indicate that the agency made efforts to comply with the court's order. It also provides a concrete target for Web content developers to incorporate into their work.

Identify a local person

It is important to identify a person within the organization to coordinate accessibility efforts. This person is responsible for communicating standards to Web developers, connecting developers to resources for learning standards and standardizing local techniques and interpretations of standards. In addition, this person can work to maintain the organization's focus on accessibility as the initial enthusiasm as momentum begins to fade.

Validation

Once accessibility standards have been identified and adopted, the organization needs to measure its Web site against the standard using automated and application-based tools. This accessibility check will identify the issues to be addressed in the implementation process. One useful application-based tool is the 508 Accessibility Suite, a free extension to Macromedia® Dreamweaver® and Dreamweaver® UltraDev™. The suite is a comprehensive set of tools for evaluating and repairing accessibility issues on Web site pages.

Online Automated Checking Tools

Perhaps the easiest way to begin the process of validation is to use one of the numerous free online validation tools. In most circumstances, these tools will provide a quick, if cursory, glance at the accessibility issues on a page. The oldest and most well known of these tools is Bobby from Center for Applied Special Technology.

Bobby

To use Bobby, the URL of the page to be checked is entered in the form on the Bobby page. Bobby returns the page with a report of obvious issues on the page. Missing alternative text descriptions, missing frame titles or absent CSS style sheets are easy to catch using a tool like Bobby. Bobby does not look at more complex and subjective problems such as tables used for data or the type of alternative Alt text used. However, Bobby was not intended to analyze these complex issues. Bobby's strength is in its ease and simplicity.

LIFT Online

LIFT Online is a much more powerful online tool available from UsableNet™, a company specializing in Web usability technology. LIFT Online evaluates five pages for free then offers a fee-based service that provides a more comprehensive evaluation of subsequent pages or the whole site. This is particularly helpful when attempting to get an overall sense of the issues facing an entire site.

LIFT can detect when specific Alt types of alternative text are required, for objects such as spacer images. LIFT is able to detect when a table is used for data and evaluate the markup appropriately. LIFT is also able to evaluate a page using more general usability rules. These rules are not based on issues specifically for individuals with disabilities, but common usability issues across all segments of Web users.

HTML and CSS Validator

HTML Validator and CSS Validator from the W3C are particularly helpful for advanced users. These free tools do not check for accessibility issues—instead they check for the proper use of HTML and CSS. This is particularly helpful for users who may understand coding in HTML and CSS, but not be familiar with relevant techniques for accessibility. The HTML and CSS validators can identify incorrect coding and point to a solution.

508 Accessibility Suite for Dreamweaver® and Dreamweaver® UltraDev™

Application-based tools generally offer more comprehensive tools for validation. An excellent example is the 508 Accessibility Suite for Macromedia® Dreamweaver and Dreamweaver UltraDev. This free extension was developed by UsableNet™ and offers the ability to check individual pages or even an entire site against a customizable set of accessibility guidelines. The 508 Accessibility Suite offers a comprehensive set of tests similar to LIFT Online. Perhaps most importantly, it takes advantage of the Dreamweaver authoring environment to point the Web content developer to specific places on the page in need of repair.

Checking Dynamic Pages

A common concern during the process of validation and repair is how to validate dynamic pages. Testing a dynamic page is similar to testing a static page. The primary difference is that the test covers the output of the page, not the page itself. In most cases, making the necessary adjustments is comparable to making changes in HTML. While there are tools that do check dynamic code, many developers report being equally comfortable using static checkers such as the 508 Accessibility extensions for Dreamweaver.

Dynamic design techniques for accessibility are more complex. However, these techniques are more often intended to improve the process of accessible design rather than directly affecting the user's experience of a page.

Resources

Bobby

<http://www.cast.org/bobby>

LIFT Online

http://www.UsableNet.com/lift_online/index.htm

HTML Validator

<http://validator.w3.org/>

CSS Validator

<http://jigsaw.w3.org/css-validator/>

508 Accessibility Suite Extension for Dreamweaver

<http://www.macromedia.com/exchange/dreamweaver/>

Establishing an Approach

The next step in implementing an accessibility plan is establishing an approach to accessible design with respect to architecture and techniques. The goal is to standardize site structure and page creation to streamline workflow and limit common development mistakes. Establishing standards for site architecture and design techniques provides Web content developers with a common starting point for their designs as well as a common language to discuss the issues involved.

As an approach is being developed, two groups need to be considered: novice Web content developers, and advanced developers. For the novice it is important that the approach make accessibility easy to achieve. Providing templates, library objects and other shortcuts for creating accessible pages are some effective strategies. For advanced Web content developers, the approach should take advantage of their skill set, but streamline the process of accessible design. Using CSS, XHTML and data-driven models, advanced developers may offer a rich and more customizable feature set to users.

Architecture

Many site architectures can foster accessible design. It is crucial that the architecture reflects the capabilities of the organization. The staff's level of expertise, the availability of hardware and software and the availability of staff for maintenance will all be fundamental variables in this decision.

The following three site design models represent span on a continuum from completely dynamic models to completely static sites. As

organizational expertise and experience with accessibility and data-driven design evolve, each organization can find the model that best fits its needs.

Data-driven Model

Data-driven Web sites are sites in which the site content is stored in a database. Retrieving content from the database dynamically generates each Web page. The data-driven model allows the process of accessible design to be streamlined in two ways. First, a Web content developer can enter content into the database using a form on a Web page. This allows an individual across the organization to add content to a site without learning HTML or an authoring tool. This is an ideal solution when there are numerous content developers with little or no experience of actually building Web pages.

Second, a data-driven model automates the process of page creation and allows site users to select the content format that best serves their needs. Thus, the same page can be delivered dynamically in a text-only format, full-graphics HTML version or in a rich media format like Macromedia® Flash™. When a static HTML site has multiple site versions, the typical problem is that only one version is actively maintained. To maintain multiple versions in a static site results in much more work. In dynamic sites, all versions are dynamically updated to reflect the latest content.

Organizations should choose a data-driven model only if it has the hardware and software infrastructure to support it. This infrastructure would include a server running ColdFusion®, Jrun™ or other dynamic server applications. In addition there should be sufficient resources to adequately maintain the server in addition to developing dynamic pages.

Until a sufficient level of expertise is developed within the organization, it is particularly important for the Webmaster to not only be able to maintain the Web server but also to be support Web content developers.

Static Model

A static model is appropriate when infrastructure or expertise within the organization cannot support a data-driven model. Instead, the site consists of a set of static HTML pages. In these situations, it is helpful to use the template and library objects features in Macromedia® Dreamweaver® to streamline the process of accessible design.

Utilizing templates involves creating a set of pages in Dreamweaver that cover common page types within the site and incorporate accessibility features. Using templates enables the Webmaster or senior designers to adjust a problem or make a design change across an entire site by fixing

just the template. Templates include all the standard elements on a page such as organization logos, navigation bars, copyright notices and such. These elements are locked. Novice Web content developers then add content to the other parts of the page while still maintaining consistent and accessible pages.

It is particularly important to provide accessibility training for the front-end Web content developers who will develop the templates.

Dreamweaver libraries are a way to store page elements like images or text that will be reused or updated frequently throughout a Web site. When you save a page element as a library item, you can place it on multiple Web pages and have the ability to update all copies automatically from the library. You can use libraries to create and edit a full range of accessibility features across multiple pages easily. For example, you can create an accessible navigation bar with all the right Alt text and save it in a library. Then you can drag the navigation library item on to multiple pages or templates while still being able to edit them all at once.

Combined Model

When knowledge or experience with dynamic design is limited but the hardware and software are available, an approach combining data-driven and static elements can be appropriate. In these circumstances, it is a good practice to start with a single instance of dynamic design. For example, a single page that needs frequent updating can be developed by a novice or inexperienced designer. As organizational expertise with data-driven models grows, so would the site's reliance on dynamic pages. Additionally, the sophistication and maturity of the dynamic techniques used in a site may grow as well. Ongoing training for both the Webmaster and Web content developer is essential to the success of these models.

Tools & Techniques

In addition to standardizing architecture, it is also important to standardize techniques. This enables Web content developers to be consistent in their approach. The following list comprises common issues benefiting from standardization.

Tools

As part of instituting an accessibility policy, it is essential to ensure that designers and developers have the appropriate tools to implement the policy. In addition, these tools should support novice content developers in creating accessible pages while also supporting more sophisticated users. Macromedia® Dreamweaver® and Dreamweaver® UltraDev™ are good choices to support broad skill levels. Both products support visual

editing and drag-and-drop creation of accessibility features and still enable developers to use more sophisticated techniques as their expertise grows.

Another important reason for standardizing tools is to simplify training-related to accessibility. Training on accessibility should connect an issue with the related technique with step-by-step instructions employing this technique. Using a single application across an organization limits the explanation allowing the materials to cover a greater number of issues rather than a greater number of applications. Time is a valuable and limited resource when it comes to accessibility, given the range of issues and techniques that merit attention.

Techniques

Standardizing techniques across an organization provides Web content developers with a concrete and consistent approach to some of the more subjective accessibility issues. Some techniques to consider are navigation, images, Cascading Style Sheets, plug-ins and design support mechanisms.

Navigation

Navigation poses a number of issues related to accessibility. Two issues in particular require a consistent approach. The first issue is the use of a skip navigation mechanism. Section 508 states that, “a method shall be provided that permits users to skip repetitive navigation links”. Skip navigation mechanism enables screen reader users to avoid listening to every link in the navigation bar on each page. Typically, designers create skip navigation by linking a small transparent image at the top of a page to an anchor just before the main content. The Alt text description for this image would read, “skips to content” or “skip navigation.”

The second key navigation issue relates to the use of JavaScript™ rollovers. Rollovers that display drop-down menus or disjointed images elsewhere on the page pose particular challenges. While some screen readers are now able to read JavaScript, the majority still cannot. Thus, the links and content from a JavaScript rollover are unavailable to screen reader users. Pull-down menus are possible but require Cascading Style Sheet (CSS) layers with JavaScript rather than JavaScript alone. These techniques are complex and require significant design planning. In addition, these tools may benefit from the use of multiple skip navigation mechanisms. Standardizing the development of accessible JavaScript rollovers in navigation significantly simplifies their consistent implementation.

Images

Images benefit from standardization in at least two areas. First, it is helpful to standardize and centrally store Alt tags for commonly used images across the site. Storing images as library items in Macromedia® Dreamweaver® and Dreamweaver® UltraDev™ enables designers to add the appropriate Alt text just once and use it consistently throughout all pages. Other developers can then place library items on a page knowing the correct Alt text is there.

Second, images requiring Alt text longer than 50 characters should use a long description. There are multiple strategies for adding long description to images. The first is using the LONGDESC attribute. The LONGDESC attribute provides a screen reader user with a link to the long description on a separate page. However, support for the LONGDESC attribute is very limited at this time. A second method for adding long descriptions is using the d-link. A d-link is a hyperlinked letter d (for description) to the right of an image, as shown below:



The letter d is linked to a separate page with a longer description of the image.

A third method, very similar to the use of the d-link, places a caption next to the image and links the caption to the descriptive page. Offering the same functionality as the d-link, using captions is often easier to integrate into a design scheme.

Standardizing the implementation of long descriptions is important to content developers, but also to users, as they will consistently know where to find descriptions.

Cascading Style Sheets (CSS)

The use of Cascading Style Sheets (CSS) offers significant benefits for accessibility. While Section 508 does not mandate CSS, national standards in the U.K. and Canada do require use of CSS.

When site text is formatted with CSS, users can override styles to format text to meet their needs. This allows users with limited vision or colorblindness to change size or color, for example. It is important to note that using HTML to format text overrides all CSS styles, including user-

defined styles. So if you standardize on CSS for formatting text, do it across a site.

Use of Plug-ins

Plug-ins enable browsers to display a particular file format. Each plug-in requires a distinct strategy for accessibility. Under Section 508 the use of plug-ins must comply with standards for software. Similar to standards for Web content, the software standards also require that the plug-in function without a mouse. The following comprises a list of commonly used plug-ins and the commonly related issues.

Macromedia® Flash™ Player poses two accessibility issues. First, there needs to be a text description for the content of the Macromedia Flash movie. Since there is no Alt tag associated with a Macromedia Flash page element, developers need to place an Alt text element elsewhere. One way to create Alt text for Macromedia Flash content is to use CSS layers. A layer is drawn over the Macromedia Flash content on page using Draw Layer object in Macromedia Dreamweaver®. The alternative text is inside of the layer and the visibility property is set to Hidden. Another way to add Alt text is to add a d-link.

A second accessibility issue is device-independence. The Macromedia Flash movie must support keyboard- and mouse-based interaction. This may require guidance for novice Macromedia Flash developers.

Use of video and audio requires a synchronized text alternative, typically in the form of closed-captioning. If an organization frequently uses multimedia on its site, it should invest in hardware and software tools that support closed captioning.

Design Support Mechanisms

Even the best and most thorough accessibility plan may not be able to accommodate all users. As a final measure, add an e-mail link so that users who have difficulty accessing resources may directly request the information they need. The person monitoring the e-mails should be prepared for questions from users with disabilities and be able to direct these individuals to resources within the organization.

Implementation

Two crucial ingredients to a successful accessibility implementation plan are tools and training. Accessibility is an integral aspect of the design process, not an add-on or separate activity. The tools and training for novice and advanced users alike should reflect this. Training for designers and developers should integrate accessibility principles directly into an explanation of the tools and design concepts used site-wide.

The more accessibility is integrated into the design process, the more likely the policy will succeed.

Training for Developers

Training for all Web content developers should cover the general issues and challenges faced by users with disabilities. This may include discussion of assistive devices such as screen readers, individual disabilities and relevant accessibility policy. This will provide developers with a context in which to evaluate their designs

Integrating the techniques of accessible design in use of the appropriate tools will make a significant difference for novice developers. For advanced developers, where training may not be as difficult, seek out other opportunities to discuss advanced accessibility techniques. These opportunities include face-to-face meetings, user groups, e-mail LISTSERV® or bulletin board discussions. Providing the time and the expectation for these discussions is crucial for organizational knowledge of accessibility to expand.

Staged Rollout

It can be quite a challenge to roll out a completely accessible site. Another key to successful implementation of an accessibility policy is a staged rollout. Given the complexity of accessibility issues, spreading training and implementation out over a period of time is wise. Six months to a year is a reasonable scope to consider for implementation.

In that time frame, one strategy is to identify a start date for accessibility. From that point forward, all new pages created within a limited area of the site must adhere to the standard. It is better to limit the scope of the pages rather than the scope of the standard. The W3C standards are created in such a way to serve users with a wide range of disabilities. Choosing some standards from Priority One checkpoints will isolate users with a specific disability. This also allows initial training to be targeted to the group in charge of the affected pages. The scope of the plan can be expanded incrementally to include all areas of a site.

Perhaps the most difficult decision is to set a date that requires existing pages to be accessible. Retrofitting pages for accessibility is more challenging than designing from scratch.

Conclusion

Accessibility is an important and timely issue. Any organization with a Web site, from government agencies to educational institutions to businesses of all kinds should consider adopting some type of accessibility implementation plan or policy. Accessibility opens doors for

individuals with disabilities in ways that were not previously possible. At the same time, it allows others to maintain a degree of independence when the challenges of age make using a mouse or seeing the screen more difficult.

For federal government Web sites, accessibility is the law. Additionally, accessible Web sites offer a range of benefits to the organization and users alike by:

- Improving usability for all users
- Applying more contemporary technology
- Expanding the reach of the site to more individuals and more markets.

This paper has outlined the accessibility policy implementation in five steps:

- Understanding the issue
- Identification and adoption
- Validation
- Adopting an approach
- Implementation.

There are no quick fixes for accessibility, but careful and thoughtful planning can minimize many of the challenges of accessible design.