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Closing the Disability Divide: Making Web Sites Accessible

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I. INTRODUCTION

Computers can be a tool for everyone. In recent years, computers have become more affordable and easy to use. In addition, use of the Internet is expanding at an unprecedented rate. It is easy to imagine that some day, relatively soon, computers will be common in every household in America. Therefore, it is very important that computer technology and software be accessible to all individuals including those with disabilities.

People with disabilities are in all occupations. As computers become more critical to all professions, increasing numbers of individuals with disabilities will need to use computers in their work, education, and personal lives. It is imperative that, during this period of rapid technological development, we ensure that the rights of people with disabilities are addressed. The impact of accessibility reaches all sectors of our economy, whether or not the participant is a consumer, employee, educator, student, parent, or child.

The very features that make the WWW useful and exciting for some individuals (e.g., graphics and sound) create barriers for others. For example, some people cannot see graphics due to visual impairments. Others cannot hear audio. Some people have difficulty navigating sites because of limited mobility. And still another limitation to many users is that they have slow connections, modems, and computers and cannot download large files. By properly designing web pages, you can choose to include design techniques that allow all individuals, whether disabled or not, access to your site.

People with disabilities who need to use adapted computers have issues with access to the Internet and WWW on three levels: (1) access to the computer (e.g., screen readers, alternative keyboards, mouse emulation); (2) access to the software on the computer that is being used to "surf" the Internet (e.g., web browsers); and (3) access to the documents being presented by that software (e.g., web pages). This paper focuses on the third issue and identifies some of the emerging digital barriers to accessibility, current efforts to address these barriers, and guidelines for WWW page development. These guidelines do not discourage content developers from using, for example, images and video, but rather explain how to make multimedia and other content more accessible to a wider audience.

Currently, there are around 54 million people with disabilities in America. That number is ever changing since many individuals have moments of disabilities, or become disabled as they get older. It is so important that the needs of these people be addressed during this boom in technology. It is very important

that web designers be educated on how to make a web site accessible since anyone creating a web page has complete control over the degree of accessibility that a web page possesses.

II. PROBLEM DEFINITION

Cynthia Waddell, in her paper titled "The Growing Digital Divide in Access for People with Disabilities: Overcoming Barriers to Participation," states:

According to the National Council on Disability, computers and the Internet are used by a significant number of people with disabilities in America. But because the Internet environment is inaccessible, it is difficult to count the number of people with disabilities who would like to participate but cannot because of the barriers to access. Counting users on the Internet is like counting the number of people using wheelchairs who are inside an inaccessible building. It was once thought that since no wheelchair users were in the building, ramps were not needed.

Since the Internet has grown from a text-based system to a world of multimedia and graphics, access for people with disabilities is becoming a much greater problem. For example, in the past, people with visual disabilities could access the Internet with their screen readers that read aloud the text on a web page. With the graphical nature of the web today, many web developers have not incorporated accessible web design into their web pages. HTML is structured and provides a great deal of flexibility in displaying information. Therefore, it is really not as difficult as many people would believe to incorporate accessible information in addition to using items such as audio, video and graphics.

Some of the specific problems are as follows. Many graphics provide power, ease of use, and marketing appeal for many users, but graphical images and video restrict access for users with visual impairment. Additionally, use of audio and non-captioned video restricts access to those with hearing problems. We do not advocate that these things are taken away from web pages – but rather text information needs to be added to web pages. Another common file format on the Web currently is PDF from Adobe Systems. In the past, this type of format was not accessible. However, Adobe now has tools that convert PDF documents in HTML or ASCII text, which can be read by many screen-reading programs that synthesize text as audible speech. Information for PDF conversion can be found at <http://access.adobe.com>. The primary

way to assure the accessibility of a WWW document is to provide all graphic, audio, and information stored in PDF format in alternate formats. A list of problems faced by those with disabilities in accessing information via the WWW is detailed in Table 1.

Another issue is that current web authoring tools make is very difficult to design an accessible web page. Many users create web pages in their free time and it is not their primary job. Therefore, web-authoring software is very popular and used by many people who are not "web masters" for a profession. Unlike almost anything else in history, the Internet allows any person to post information to it, which can be accessed and read by millions of people.

Table 1 – WWW Problems Faced by those with Disabilities

- Can't see graphics due to visual impairments. This can create problems when the web pages are no longer accessible audibly with screen readers.
- Can't hear audio. This has become a problem because audio streaming and videoclips posted on the Internet do not have captioning.
- Have difficulty navigating sites because of limited mobility.
- Have slow connections, modems, and computers and can't download large files.

III. BENEFITS — WHY MAKE YOUR SITE ACCESSIBLE?

There are millions of people with disabilities. So from a business standpoint, you would be limiting your potential market by limiting access to those with disabilities. The Microsoft Site gives the following statistics: "According to government figures, one person in five has some functional limitation, and 8 percent of all users on the Web have disabilities. In the U.S. alone there are more than 30 million people with disabilities who can be affected by the design of computer software, and worldwide the number is much higher."

Making systems accessible to people with disabilities will benefit all of society. This statement is true for many reasons. First, without giving access to people with disabilities, society will not benefit from their input. In addition, anyone can become permanently or temporarily disabled through injury, illness, or aging. According to Microsoft, "Most people experience a period of disability if they live long enough: 25 percent by the age of 55, increasing quickly thereafter."

In addition, certain circumstances can create problems, which are similar to those faced by people with disabilities. Take into consideration the following examples: "If you are working somewhere noisy such as a plane or a workshop, you're temporarily hard of hearing. If you have a broken mouse, you rely on the keyboard just as someone who's blind or quadriplegic might. Anyone can experience conditions that impose limitations that mimic a disability, and be forced to rely on the same sorts of solutions."

In a paper titled "People With Disabilities and NII: Breaking Down Barriers, Building Choice" (1994), the following statistics were given.

According to the U.S. Bureau of the Census, by the year 2000, the U.S. population of those over 65 years will be greater than 34 million, this figure worldwide will be over 419 million. The Bureau projects that in the next 50 years, the U.S. population will increase overall by 19.8 percent; however, the population of those 65 years or older will increase by 117 percent, more than doubling from 31.6 million to 68.5 million.

When most people think about how the WWW impacts disabled individuals, we believe that most people focus on those that are handicapped, blind, or deaf. But, this problem is far more reaching than that. By designing WWW pages to meet the needs of people with varying disabilities, web pages will have more flexibility, which will benefit everyone, without segregating out a large proportion of users. Another portion of the population that can benefit from efforts to make WWW sites accessible is those individuals who are illiterate. Illiterate people can also benefit from screen-readers audibly reading the web.

IV. Guidelines and Implementation details

The World Wide Web Consortium (W3C) has the official Web Accessibility Initiative Standard (WAI), which is published at <http://www.w3.org/WAI/>. At this site, a web designer can find a list of design guidelines (<http://www.w3.org/TR/ATAG10/>). W3C's WAI, in partnership with organizations around the world, are pursuing accessibility of the Web through five activities:

- ensuring that core technologies of the Web support accessibility;
- developing guidelines for Web content, user agents, and authoring tools;
- developing evaluation and repair tools for accessibility;
- conducting education and outreach;
- coordinating with research and development that can affect future accessibility of the Web.

After you follow the guidelines that dictate the level of accessibility, you can check a web page for accessibility using *Bobby Analysis*. Bobby is one of several free on-line HTML validation services that verify a web page against HTML standards. Bobby also provides advice on how to change your HTML to make your web pages more accessible. Bobby can be found on the CAST (Center for Applied Special Technology) web site (<http://www.cast.org/bobby>). Bobby is becoming a well-known tool. Table 2 lists the information that is required to become "Bobby approved." When your site is Bobby approved, you can list it in the "Bobby Approved Database" which shows that you believe accessibility is important. There is also a graphic that you can put on your web page showing that your site has been "approved" by the Bobby Analysis.

Table 2. How to Become Bobby Approved

- To Become Bobby approved, a Web site must:
- Provide text equivalents for all non-text elements (i.e., images, animations, audio, video)
 - Provide summaries of graphs and charts
 - Ensure that all information conveyed with color is also available without color
 - Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions) of non-text content
 - Organize content logically and clearly
 - Provide alternative content for features (e.g., applets or plugins) that may not be supported

Although automated tools are fast and convenient, they do not identify all accessibility issues. Therefore, human review is also needed to verify accessibility.

When developing web pages, verification methods should be used at the earliest stages of web design, so that the issues are corrected early on and avoided when the development becomes complex and harder to change. In addition, it is important to look

at your pages on different computers, different platforms, and different speed computers and modems if you have access to them. This will give the web developer a better idea of the overall usability of his or her site. Also, a good way to view information that shows just the text available from your site is to use Lynx. Lynx can be accessed via a Telnet connection to a server that offers public access to Lynx to anonymous users. There is a Lynx Telnet site page that lists servers with this type of access (http://www.crl.com/~subir/lynx/public_lynx.html).

From a user or developer's standpoint, there are many icons that display whether or not the site is considered accessible. Some of these icons include:

- The world with a keyhole in it.



- A wheelchair icon.



- A Bobby Approved icon.



Web developers are just realizing how important it is that they can proudly say that their site is accessible.

V. PROBLEMS

We believe that few web developers actively discriminate against individuals with disabilities. At this point, the major "problem" associated with making web pages more accessible stems from time involved. To run through an analysis of a basic web page and make changes to it for accessibility will take additional hours after the creation of the web page. However, as history has shown in other areas, when you design your pages with people with disabilities in mind, your site will become easier to use by everyone.

VII. AN EXAMPLE OF HOW A STATE IS DEALING WITH ACCESSIBILITY ISSUES: NEW YORK STATE

Many states are creating their own initiatives to enable access. This section provides an example of what New York State is requiring.

Understanding that the World Wide Web (WWW) is a valuable resource for information exchange and communication, New York State's Office of Technology (through Technology Policy 99-3 - <http://www.irm.state.ny.us/policy/99-3.htm>) requires that all New York State agencies' web sites provide universal accessibility to persons with disabilities.

In New York State in 1998, a group was formed (called the NYS Accessibility to Information Technology Work Group) to recommend improvements to accessing information via the WWW. These recommendations were given to the NYS Office for Technology. This work group was co-chaired by the NYS Office for Technology and the NYS Advocate's Office for Persons with Disabilities, and consists of agency technical and policy staff as well as consumers.

Policy:

It is the policy of the State that persons with disabilities have access to information - via the World Wide Web - which is equivalent to that available to persons without disabilities. Page two of this document contains references to Federal and State legislation and regulations governing an agency's responsibility to provide access to technology for persons with disabilities. The technologies that allow us to design, create and access the WWW are constantly evolving. The World Wide Web Consortium (W3C), an international industry consortium of over 300 organizations, was created to exploit the Web to its full potential by developing common protocols to promote its evolution and ensure its interoperability. The State of New York has adopted the W3C Web Content Accessibility Guidelines (<http://www.w3.org/TR/WAI-WEBCONTENT/>) as a means to provide optimal access to State agency web sites and the content therein. As a matter of policy, each agency is responsible for applying the most current version of these guidelines in the design, creation and maintenance of any official New York State agency web site. It is expected that the guidelines will be applied to all newly developed content/pages effective immediately. Existing content/pages should be prioritized and modified over time (but no later than one year from the date of the technology policy). Web content shall conform to level "A," satisfying all priority one checkpoints. In addition, each site must have a contact mechanism so individuals who might have trouble accessing any portion of the site can report the problem.

Agency Heads and Commissioners are required to designate a staff person to be responsible for implementing this policy. This responsibility includes dissemination of the W3C Guidelines and subsequent updates to appropriate persons. Appropriate persons include, but are not limited to, all New York State agency staff who are responsible for Web site and/or Web content development and any consultant or vendors who develop Web sites and/or content for a New York State agency web site.

New York State is not alone in its concern about making government information accessible to all of its citizens.

VIII. CONCLUSIONS

The only drawback to making a web site more accessible is the time involved. The authors hope that as software evolves for creating web pages, that accessibility design techniques will be built into the software. This way, even web pages novices will display pages that are accessible to everyone which will make the Internet even more valuable.