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Accessible Solutions: The Value of Accessible Web Design

Edwin L N Thoms

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Rochester Institute of Technology

A Thesis Submitted to the Faculty of The College of Imaging Arts and Sciences in candidacy for the degree of Master of Fine Arts.

Accessible Solutions: The Value of Accessible Web Design
by Edwin L.N. Thoms
April 30, 2004
Thesis Documentation for the Master of Fine Arts Degree

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ABSTRACT

An exploration of techniques and theories that will help Web and Multimedia designers understand and implement design solutions for accessible web content is the basis of this thesis report. A rich online environment for all people (disabled and non-disabled) will emerge once strategies are in place for designers to research, test, and implement standards of accessible design. The concept of accessibility is explored, and misconceptions regarding accessible standards and practices are dispelled. The research report covers the laws and standards set by the World Wide Web Consortium (W3C), Section 508 of the Rehabilitation Act, and Americans with Disabilities Act (ADA).

The objectives are three fold:

1. To define accessibility and how it impacts upon the web design industry;
2. To illustrate techniques a designer can use to incorporate accessibility into online web design;
3. To use the thesis web site as a springboard of information in understanding accessibility, and how it can help with normal design solutions such as project management and site control.

Often, designers misunderstand the meaning of accessible standards and find that it is difficult to place into practical use. With strategies in place, designers can develop a rich online environment for everyone.

LOCATION OF THESIS PROJECT

The CD-ROM files that accompany this research report.
WHY CHANGE RESEARCH PATH?

The original concept for the thesis project was to answer the question of how E-Learning Solutions can affect the education of those with a hearing impairment. An underlying query emerged before an understanding of people with hearing impairments and classroom solutions could be solved. However starting with E-Learning Solutions was a good beginning, which in turn led to understanding accessible design solutions. I soon realized that I was not researching E-Learning at all, but rather searching for the answers and procedures that directly related to accessibility and the web designer. As a result of the different research path, I began to develop a new topic, which consisted of the words accessibility, web design, and disabilities. Because of this new path direction, a clearer understanding emerged that helped create a web site that is more accessible to every user.

KEYWORDS (see Glossary for definitions)


GOALS

The goal of this thesis research report and project is to follow a line of investigation on how accessible web site design can be accomplished with ease if guidelines are followed to ensure the user’s experience is one of quality navigation and enjoyment. This can mean anything from allowing the user to set the preferences for a site to utilizing assistive HTML tags correctly. In their book, Maximum Accessibility: Making Your Web Site More Usable for Everyone, John M. Slatin and Sharron Rush state that “An important thing to
THESIS REPORT

Accessible Solutions is an in-depth look at the need for accessible design clarification, as well as, establishing a value to the terminology, laws, and practices associated with web accessibility and design. If web designers take into consideration that over 600 million people worldwide have a disability of some type, then web designers soon realize why and how this topic is becoming an important issue to the web design industry. These numbers would also include the 54 million Americans and 37 million Europeans who want to surf the information highway while avoiding, metaphorically speaking, the information collisions that designers create through control over the final output of the web site [Bureau of the Census 1997; United Nations 2000]. No one can blame a designer for wanting control over the look and feel of his or her creation, especially considering that many come from a background in print and other design areas where control is key to the look and feel of the final piece, but many of these same designers are moving into web and multimedia which are not as exact as print and other design forms. Michael G. Paciello, author of Web Accessibility for People with Disabilities, comments on the “... increased availability of information, the publishing (industry) has wrongly assumed that ‘one size fits all.’ The sad truth is that the proliferation of information does not guarantee its accessibility. Availability does not equal accessibility.” (p.70 Paciello)

Print and other areas of design lend themselves to control, but this is not the case when it comes to web design. The individual user is the person responsible for the way in which content is delivered, which means the individual user has the final say as to the distribution of a designer’s site. In their book, Maximum Accessibility: Making Your Web Site More Usable for Everyone, John M. Slatin, Ph.D. and Sharron Rush state, “Accessibility is defined in terms of the user’s experience, - that is, his or her ability to access and use the site and its resources as effectively as someone without a disability.”
(p.10 Slatin) With that in mind, an accessible designer needs to understand that there is a distinction between form and function; in other words, he or she needs to understand the difference between the look of the web site and the way in which people use the web site. The World Wide Web Consortium’s (W3C) recommendation is to use Cascading Style Sheets (CSS) for layout and look, while using tables for tabular data to accomplish the goal of balancing form and function.

The use of accessible design techniques can help web designers incorporate a broad range of styles to help in the design of the web site. This in turn puts control over the design of a site back into the designer’s hands. The end user can still change the presentation of information; however, the accessible designer is in control of the look and feel of information at the start of the presentation, which can create a nice balance between form and function. What questions then can the accessible designer create as he or she determines the approach used for the design of the web site? A perfectly good starting point is to determine what the true definition of ACCESSIBILITY is? Amazingly enough, a topic that is so integral to the design industry is getting very little notice by mainstream design groups. It is still considered a niche market. So, in order to find the answer to what exactly is meant by accessible design, we have to turn to the United States laws on accessibility found in the Rehabilitation Act of 1973, which leads to the Americans with Disabilities Act. Amendment Section 508, which was passed by the United States Congress in 1998 to include the Internet and other digital media, defines “Web sites are accessible when individuals with disabilities can access and use them as effectively as people who don't have disabilities.” (p.3 Slatin) Furthermore, Section 508 mandates that “Federal departments or agencies develop, procure, maintain, or use
Electronic and Information Technology (EIT), they shall ensure that the EIT allows Federal employees with disabilities to have access to and use of information and data that is comparable to the access to and use of information and data by other Federal employees.” (http://www.usdoj.gov/crt/508/508law.html)

Simply stated, all government-run programs must be user friendly to all people. These programs range from counterterrorism programs, i.e. Regional Defense Counterterrorism Fellowship Program, to back school programs for adults in which the government contributes money to the development of information technology. Other examples are school sites, government sites, and many non-profit organizational sites that take contributed money from the government. Unfortunately, this definition does not explain how to accomplish the goal of creating an accessible web site. And, of course, too many are thinking, do people with disabilities REALLY surf the World Wide Web? Of course, they search for information like anyone else.

Since the inception of the Internet in the 1990’s, it has become the optimum source for information that ALL people use to access daily information. Unfortunately, some still don’t understand accessibility even when defined so simply, but if examples are used from existing accessible design, then a person can begin to understand the need for user friendliness on the web.

Ask yourself what most people think when asked about accessible design? Many refer to architecture with wheelchair ramps, room numbers made with Braille, or even the larger restroom stalls. Some think of closed captioning, interpreters, and/or automatic door openers. These are all true examples of accessible design, but this design did not just appear suddenly, it started because someone had the foresight to see the need for
accessible design. Someone saw a need for creating access ramps, Braille information, and add other features to make building construction more accessible.

A good case study is the evolution of accessible design in architecture from the 1970’s to today. Prior to the 1970’s, sidewalk curbs and/or government buildings did not have access ramps; Braille information or larger bathroom stalls for that matter. Imagine yourself in a wheelchair trying to navigate a sidewalk without accessible curbs or a wheelchair ramp to access the building. Attending a meeting without assistance would be virtually impossible. Or being blind and lost in a building because the room information was not raised or put into Braille. It could have been next to impossible to get anywhere without the aid of some third party. It was not unheard of to see someone in a wheelchair strolling in the road because he or she could not find a sidewalk-cut curb to gain access to something as safe as . . . a sidewalk. Through the evolution of architecture, sidewalk curbs, Braille and other accessible designs were implemented. Today, we can find examples of this everywhere; look at the local bathroom, classroom numbering schemes or access ramps if you don’t believe.

Let’s look at another case study of a person who is trying to access the County-Clerks office to pay a ticket and they are missing a leg? Before access ramps were mandated, this person again had to struggle up the steps, or rely on someone else to help him or her into the building. Where is the freedom? Is it not his or her right to have a free lifestyle without having to wait on a third party for help? Of course it is his or her right, but many do not think of accessibility in this light. Now, let’s change the situation a bit and not think of the person in the wheelchair, but let’s think of the mother with a baby stroller, baby bag, B-A-B-Y and then on top of all of that, her own belongings. She would also struggle to walk down the road or enter a building, but since the introduction of the Rehabilitation Act of 1973 and later the Americans with Disabilities Act of 1990,
mothers, deliverymen and people in wheelchairs have enjoyed an easier walk or stroll in the city.

Well, let's take a deeper look into the Americans with Disabilities Act, Section 508. Let's even simplify both definitions to say the ability to obtain information without difficulty. This can include people with disabilities, but it can also include people who do not have disabilities. Looking at it this way, it becomes a usability issue rather than a disability issue. In the forward to John M. Slatin, Ph.D., and Sharron Rush's book, Jakob Nielson, Ph.D. writes, “Accessibility and usability are two tightly intertwined concepts. The first important relationship is that increased accessibility for users with disabilities almost always leads to improved usability for all users.” (p. XIX Slatin)

Many architects thought that mandating accessible architecture would limit them in their creation of modern design, but in fact, it has created better architecture that is more efficient to the user. Interior and information designers had the same wrong idea when asked to incorporate Braille into the design of door numbers, mapping, and other information that makes it easier for the blind to find a location. Yet again, information was streamlined in a way that became efficient for all users, not just those who were blind. The point here is accessible design can help everyone once standards are put in place to help guide designers to embrace accessibility into his or her design.

Now, many are wondering how this can relate to web design. It is simple; through better structural web design many designers can create a better Internet experience. The important thing for creating accessible web content is to have a total commitment to user-friendly design and a complete understanding of how to develop accessible content. Too often we are taught that design is absolute in terms of the layout; but mentally when it
comes to web design is obsolete. An accessible designer must realize that information is more important than the look of the site. The accessible designer will always remember "When planning a new Web page . . . (not to) think about what it will look like (first) . . . (although) visual presentation is important, to the accessible designer that's putting the cart before the horse, so to speak." (p. 96 Paciello) Designers are still encouraged to create good presentation through good solid design, but the accessible designer is constantly thinking of the information and how it can logically be displayed. Logically, information should be presented in a format that a screen reader, re-usable Braille board, or other assistive technology devices can translate.

**LAWS AND GUIDELINES**

The W3C wants designers to understand that "... The best experiences will happen as developers . . . share (the) . . . belief that good design is accessible design (and) make . . . accessibility a design goal from the beginning of every project." (p.11 Slatin) From its web site, the W3C states that a designer should "... Consider that many users may be operating in contexts very different from your own. They may not be able to see, hear, move, or may not be able to process some types of information easily if 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." In the development of accessible web design, the accessible designer must consider many different scenarios for his or her web site. This will ensure that the broadest range of viewers is taken into consideration.
TABLE vs. Cascading Style Sheets (CSS)

Many web designers construct web sites using tables, but do not understand that the blind user can easily become disoriented. Screen readers and other assistive technologies do not allow the blind user to distinguish when a sentence ends. This is due to the fact that screen readers and other assistive technologies read lines of information from left to right and top to bottom. (p.78 Paciello) Unfortunately, in the World Wide Web, the most abused tag is the table tag. Too often designers feel they must control the layout of a site and resort to using a table for this. But this is a common misconception. Through the creation of CSS, CSS1 and CSS2 layout is now achieved through style sheets. Anyone familiar with layout programs such as Adobe In-Design or QuarkXPress understand what a style sheet can represent to the web designer in the use of control. In their book, *Cascading Style Sheets: Design for the Web*, Hakon Wium Lie and Bert Bos feel “Tables have severe accessibility problems . . . Tables used for layout pose problems to programs that try and read pages without displaying them visually.” (p.8 Lie) This poses a specific problem for Braille browsers, large font browsers, and cellular phone browsers.

The content organized in a table is not accessible to people who use re-usable Braille boards, screen readers, and other assistive technology, which are unavailable to millions of users. An inaccessible web site is not good use of the original dream for the World Wide Web, which is to pass on information to as many users as possible. There is hope for the table-using designer, “the key to creating accessible tables (and design) . . . is to think about the order in which information will be (orally) . . . presented to the user.” (p.307 Slatin) Screen readers and other assistive technologies speak the information to
The user; therefore the user cannot take visual cues from the layout of the design. An accessible designer has to mentally visualize the web page as having millions of metaphoric layers that can best be compared to the layers found in software packages like Adobe’s Photoshop or Macromedia’s Flash. These mental layers will help in deciding the order of images and help in considering which images should be in the background. Also, when in the planning stages of a web site, begin to consider how each page relates to the next page and how a user will navigate between them, “having a clear and effective navigation system is a cornerstone of good accessible design.” (p.95 Paciello) In this way, an accessible designer can begin to relegate how information will be displayed while using Style Sheets.

The W3C recommends that style sheets be used for layout, rather than tables. Through style sheets, the designer can control the way in which information is displayed, remembering that assistive technologies read left to right, top to bottom. The accessible designer then needs to understand the broadest audience in order to logically order information. As stated earlier, the end user is the person responsible for the final output of a site; therefore, style sheets allow the end user to customize the creator’s design. “... (The designer) can offer users a choice of styles without having to modify the source document. And (the designer) can easily verify that the source document works effectively with assistive technologies before applying any style at all.” (p.487 Slatin)

With that in mind, the accessible designer of information needs to provide style sheets that allow for modifications without losing the initial information and/or design. “In theory, the designer of the information should not have to worry about producing several versions of specialized Web pages or sites. Rather the focus should be on designing the source page with a rich set of characteristics that can subsequently be rendered or viewed
by a wider audience . . .” (p.74 Paciello) Unfortunately, this is not accomplished with table layout and thus provides the designer with at least one reason to learn and use CSS.

IMPLEMENTATION AND LAYOUT

The first step to implementation and layout is to outline what the goals of the web site are. Again, “Creating an accessible multimedia product (web site) requires full commitment to accessibility – and a shared understanding among the team members of what . . . (accessibility) means – before a single line of code is written.” (p.365-366 Slatin) This will help the accessible designer to keep his or her mind constantly on track for what is to be accomplished through the web site. Now, do not misunderstand the meaning here, any web site design should have a good set of goals to follow, which ensures that the client is satisfied and understands the procedures involved. Also, this forces the accessible designer to think of what accessible issues he or she may confront through the design of the web site. For example, in working on this thesis site for example, the first goal was to create a web site using accessible standardization. These standards can be found in the Web Content Accessibility Guidelines 1.0 from the W3C, Section 508 and the Americans with Disabilities Act.

The second major step to overcome in working towards implementation of an accessible web site is to find the appropriate software that can make the job easier. In the case of this thesis web site, Macromedia Dreamweaver MX was used to help write code with the style sheets were written externally and in a separate document. Although Dreamweaver MX has the capabilities to create Style Sheets, CSS was easier to create using external Style Sheets and a text editor.
Dreamweaver MX has features that allow an accessible designer to set preferences that check for accessibility tags and validate the web site as it is designed. These tags are ALT tags and LONGDESC tags that pop up whenever an image is inserted into the design and allows for a more accessible site. Other tags can relate to Tables and Forms; but since this site uses very little of each, they are not relevant. This *What You See Is What You Get* or WYSIWYG program also is a good way to make sure that your site map is correct, that is just an added advantage to using it. Also, if a designer likes to write code by hand, it is easily accomplished by switching to the code view. Dreamweaver MX is a tool proven to be an asset to the accessible designer.

The third implementation concept that an accessible designer should understand is that he or she must visualize how the site will layout. This means that mentally, the web site should be separated into pieces that can be put on top of each other seamlessly. As an accessible designer learns Cascading Style Sheets, he or she will find that the background image and the rest of the initial design do not have to be one image but can be multiple images that make the screen look like a unified body. This can mean taking your initial design concept and breaking it into pieces. For example, with this thesis web site, the background image is a set of scan lines that are repeated along the X-axis. The BODY tag in the Style Sheet is set to a width of 1000 pixels to keep the images that make up the banner from floating across the screen. In order to force information to layout the way a design should look; the Style Sheet must force the margin. What this means is that the designer has to manipulate HTML to do
things it is not naturally capable of. For instance, formatting images left to right; HTML naturally formats images top to bottom.

The last technique that an accessible designer has to incorporate is probably the simplest implementation technique. The accessible designer NEEDS to be creative with the use of tags in order to design a site the way in which they want it to look. An example can be seen with the use of columns to simulate a printed page. The use of Style Sheets can create this, but the accessible designer must realize how to implement it.

FIVE STEPS TO START ACCESSIBLE WEB DESIGN

1. Write the goals of the web site out: First, create a list of what the web site should accomplish in terms of how the content will be displayed. Try hard to think of as many users as possible. This is important to the accessible designer because the user has control. Once that understanding is firmly established, then solutions will develop on how to implement proper design solutions.

Secondly, decide what types of design elements the site should have. An example of this is using Flash. The accessible design must consider how to make these types of file formats accessible to the end user. Luckily, Macromedia has completely engaged this new trend in design and allows Flash to incorporate accessible design solutions.

Finally, when setting the goals of the web site, the team must map out how accessible solutions will be determined by the user. This is accomplished by knowing the target audience. Get familiar with the people that will use the site the
most. No one site can please everyone, but if a designer works hard at finding solutions, the site then incorporates a broad range of users.

2. Always use HTML tags that create an accessible environment. An example of this is applying ALT tags to images. Now, not all images will be important to the end user, determine in advance what data is important and what is not. This will save design time and help the workflow of the project. Once an image is decided unimportant, then the accessible designer can make the ALT tag null (ALT=""). This will make the image invisible to the screen reader, but still visually pleasing to the rest of the audience.

3. Determine early the site structure of the web site. This means that the client and the designer must go over a good site map of the web site. When doing this, the accessible designer can go over the areas that accessibility will benefit the operation of the web site. The designer can begin the process of conceptual artwork. Accessible designers create visually pleasing web sites as well as navigational and informational comprehension by the end user.

Following the meeting with the client, begin measuring the size of the site. This seems confusing at first, but it is good to know if the site will be 800X600 or 1024X600. Adobe’s Photoshop is a great tool for this process because of the information that can be gathered from images in the design process. In many sites, it is normal to design flush left in reference to the margin. Also, in your images, begin to write out the measurements for placement. It is a good habit to develop because it will reduce the development time down the road.

4. At this point, the design of the web site should be underway. This is the period of the design phase when implementation should take place for including accessible elements. These elements include ALT tags, Table Header tags and hidden tags
for screen readers to come across for easier navigation for the user. This is the time for testing and implementation to ensure that the end user will be able to access the information.

5. The final step to creating an accessible site is to have fun with the new design standards. Many of the changes as the accessible designer gets use to them will help in ordinary site design and allow for fast development. Also, use a validation program that is industry standard such as BOBBY, JAWS, or the program found within Dreamweaver MX. Many are in the marketplace, but like anything, the accessible design has to choose the right software package for his or her needs.

CONCEPTUALIZATION

The initial concept for the thesis project was to produce a web site that was accessible, but also still visually appealing. Future designers must see that a more complicated web site can be designed using CSS, at least something comparable to a site laid-out with tables. This will fuel the need to learn CSS and help them see how it can be applied to web design.

In the design phase of this project, I had to decide how to design a more complex web site. This took some time because I needed to contemplate how I wanted to represent Accessible Solutions. The title was the only constant in my work, and I really did not know where to go with it. One major problem was how to represent a comfortable feeling. The blue is too overpowering of a color and makes a person feel down. That is definitely a feeling I did not want to convey through Accessible Solutions web site. The use of white as a predominant color helped lighten the feel of the web site. Then to highlight the white, the decision was made to use the original blue from the first web site. That way, there was some carry over from the initial design to the next.
Once the new design was finalized, the need for the correct CSS was clearly apparent. At this point, I already understood how to line images up, but I had not attempted using CSS to overlap text or force images and text to line up horizontally. This was a challenge because HTML instinctively aligns images and text top to bottom. But, people feel more comfortable visualizing a web site left to right. The manipulation of Style Sheets helps layout the web site the way that second design called for. In the BODY tag of the HTML, I specified a CLASS selector in order to use a Style Sheet to lock the background into the 1000 pixel dimension. What this does is keep the images from moving around the screen as a user stretches the window. Through the use of external Style Sheets, the site is then laid-out the way the design called for and at a simpler degree than if using a table.

**FIVE KEY STEPS TO THIS PROJECT**

1. Read the current accessible standards that the W3C produced. It is constantly changing because of new technologies within the web industry. See Appendix A and Appendix B for W3C Accessibility Guidelines.

2. Map out the structure of the web site to ensure that the content has a continuous flow. This is a process that is used for any good web design project, but it especially becomes important with accessibility issues.

3. Know the anticipated width and height that the site should be. These factors change with time and the design process, but it is good to start with. Also, start to
design a good template that can be repeated throughout each page of the website. It saves production time.

4. Never assume everyone understands accessibility. Most think of it has some foreign language that no one can understand, but the essence of accessible design is preplanning with as many possible scenarios in mind. For instance, with this current website, a main goal was to make it eye catching as well as informative. This site is strictly information in nature and therefore has little extra visuals.

5. The final essential step to this project is to know your audience. In the case of this website, it was presented to my peers. Many of the elements in the website are overly used to illustrate how an accessible design should be redundant in the structure of the site. Never assume that your method of conveying information is the only way people will understand or navigate to and/or through it.

CONCLUSION:

Accessible design solutions will aid in the development of web solutions for the masses. These solutions will include people with disabilities, and include people who do not have disabilities. The first of the many design solutions that develop through accessible design is user friendly navigation. User friendly website navigation helps disabled and non-disabled users understand the flow of content. It also leads to a better understanding of information that should be presented in screen reader formats, re-usable Braille board formats, or other assistive technology devices for the translation of online content. Having this kind of understanding will create a situation of ease within the use of the website. The accessible designer puts the user in control. Through a combination of good design principles and being able to relinquish control, the accessible designer will have a better understanding of people’s needs.
Viewing the laws and practices as an asset will aid in the development of a better online community. Using tools like Macromedia Dreamweaver MX and validation software will ease the transition from old web standards to new standards (see W3C WCAG 1.0). The simple truth of accessible design and the essence of accessible design is dependant almost entirely on the preplanning with a conscience consideration for as many possible scenarios. Finding the answer to each problem will help those who view the accessible designer’s web site.

Many designers use tables to control the layout of web sites because the need for control is embedded within them. But this concept for an accessible web designer is not true; there must be some balance between the initial control and look of a web site and understanding that the end user will be the person who determines the final distribution of the content. With that in mind, an accessible designer will understand that there is a distinction between form and function. He or she will understand the difference between the look of the web site and the way in which people will use the web site. Accessible Solutions was an in-depth look at the terminology, laws, and practices associated with web accessibility and design.
Appendix A: Web Content Accessibility Guidelines 1.0, or WCAG 1.0 Guidelines

1. Provide content that, when presented to the user, conveys essentially the same function or purpose as auditory or visual content: Supply equivalent alternatives to auditory and visual content so that images and area attributes within images, images maps and flash files provide alternative text information through the ALT attribute.

2. Ensure that text and graphics are understandable when viewed without color: Do not allow your site to rely on color to convey a message alone. Information should not rely on color to set its importance or context. There should be a secondary means of displaying importance.

3. Mark up documents with the proper structural elements. Control presentation with styles sheets rather than with presentation elements and attributes: Use mark up and style sheets properly by appropriately structuring mark up language to be able to display on different devices. Avoid using structural mark up for visual results.

4. Use markup that facilitates pronunciation or interpretation of abbreviated or foreign text: Make it clear what language the code is written in. There are abbreviations for national code of language, English is set to en and should be in your HTML file. This will help expand text that may be new to your audience.

5. Ensure that tables have necessary markup to be transformed by accessible browsers and other user agents: Tables should be reserved for tabular data, not visual layout such as columns for text. “One metric is to read the information in your table horizontally, without regard to column borders. If it makes sense, (it is) . . . tabular data” (p.91 Paciello). Or else, tables have been used for layout.

6. Supply pages that are accessible even when newer technologies are turned off or not supported: Ensure that pages that feature the newest in technology convert over to older browsers. It is nice to be cutting edge, but “. . . be aware that many . . . users may not
have a user agent capable of rendering new content formats.” This would include incorporating Macromedia Flash into your site design, remember that Flash enhances a site; it should not be completely designed using this tool.

7. Ensure that moving, blinking, scrolling, or auto-updating objects or pages may be paused or stopped: Make sure that any information on a site that is time-sensitive can be controlled. This would include video, multimedia and scrolling information. Remember, many viewers may not read at the same pace, for information to be used by the person, they would need some control over delivery of content. Also, screen reader technology cannot keep up with fast past information.

8. Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, and self-voicing: Make sure that accessibility is incorporated into embedded objects such as applets or interactive media pieces.

9. Use features that enable activation of page elements via a variety of input devices: Design for device independence because not everyone will use a mouse and keyboard. Use keyboard shortcuts, tabbing order, and event handlers that help increase the accessibility of forms and other elements.

10. Apply temporary accessibility solutions so that assistive technologies and older browsers will operate correctly: Use interim solutions until better ones present themselves. This means that accessibility can be achieved through implementation of design elements and making allowances for browsers that do not have the capabilities to implement many of your solutions for accessibility.

11. Use the World Wide Web Consortium technologies and guidelines: Use W3C technologies (according to specification) and follow accessibility guidelines. Where it is not possible to use a W3C technology, or doing so results in material that does not transform correctly, provide an alternative version of the content that is accessible.
12. Provide context and orientation information because complex web sites can confuse the average person. If a person has a cognitive learning disability, the stress of losing his or her way is twice that of everyone else. Information that is grouped into sections should relate to one another and easy to interpret by someone with a cognitive learning disability.

13. Provide clear and consistent navigational systems. There should be orientation information, navigational bars, and a site map to increase the likelihood that a viewer will be able to find his or her way through the site.

14. Make sure documents are clear and simple for easy understandability. Use consistent page layout, recognizable icons and graphics, and easy language in order to benefit the viewer. This, in particular, helps people with cognitive learning disabilities.

**Appendix B: Section 508 of the Rehabilitation Act**

Section 508 mandates that Federal entities that develop, procure, maintain, or use electronic and information technology take it upon themselves to ensure accessibility. It is recommended that all freelancers for government jobs develop standards to follow to ensure accessibility. This leads to understanding how the W3C is going to implement changes in the way design is handled.

- Requirements for Federal Department and Agencies:
  
  (1) Accessibility:
  
  (A) When developing, procurement, maintaining, or using electronic and information technology, each Federal department or agency, including the United States Postal Service, shall ensure, unless an undue burden would be imposed on the department or agency, that the electronic and information technology allows, regardless of the type of medium of the technology –
(i) Individuals with disabilities who are Federal employees to have access to and use of information and data that is comparable to the access to and use of the information and data by Federal employees who are not individuals with disabilities; and

(ii) Individuals with disabilities who are members of the public seeking information or services from a Federal department or agency to have access to and use of information and data that is comparable to the access to and use of the information and data by such members of the public who are not individuals with disabilities.

(B) Alternative means effort: When developers, procurement, maintenance, or use of electronic and information technology that meets the standards published by the Access Board under paragraph (2) would impose an undue burden, the Federal department or agency shall provide individuals with disabilities covered by paragraph (1) with the information and data involved by an alternative means of access that allows the individual to use the information and data.
GLOSSARY

Accessible, Accessibility:
- Easy to enter or reach physically; easy use of web applications by users who use assistive devices.
- Able to be appreciated or understood without specialist knowledge
- Able to be obtained, used, or experienced without difficulty
- Not aloof and not difficult to talk to or meet with
- Susceptible to or likely to be influenced by something
- Able to be referred to from another possible world, so that the truth value of statements about it can be given

Adaptive Technology:
- Able to be adjusted for use in different conditions

Adaptive Computing:
- Computing systems adjusting to individual user inputs.

Assistive Technology:
- To help somebody to do or accomplish something
- To attend something or be present
- An act or series of actions helping another
- The study, development, and application of devices, machines, and techniques for manufacturing and productive processes
- A method or methodology that applies technical knowledge or tools
- The sum of a society’s or cultures practical knowledge, especially with reference to its material culture
Internet:
- A network that links computer networks all over the world by satellite and telephone, connecting users with service networks such as e-mail and World Wide Web

Section 508:
- Section 508 was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals. *see page 23 for header of Appendix B*

Thesis Project:
- A proposition advanced as an argument
- A subject for an essay
- A dissertation based on original research, especially as work toward an academic degree
- An unproved statement, especially one serving as a premise in an argument
- The downbeat of a bar of music
- A long syllable, on which the stress naturally falls, in classical Greek and Latin poetry

Thesis Research:
- *see Thesis Project*

User Interface Design:
- The part of the design of a computer or other device or program that accepts commands from and returns information to the user
Web Content Accessibility Guidelines 1.0 or WCAG 1.0:

- These guidelines explain how to make *Web content* accessible to people with disabilities. The guidelines are intended for all *Web content developers* (page authors and site designers) and for developers of *authoring tools*. 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.). Following these guidelines will also help people find information on the Web more quickly. These guidelines do not discourage content developers from using images, video, etc., but rather explain how to make multimedia content more accessible to a wide audience. *See page 21 for header of Appendix A*

Web, Web design:

- A group of related Web Pages
BIBLIOGRAPHY


Web Content Accessibility Guidelines 1.0, WCAG 1.0 Guidelines (See page 21 heading for Appendix A) http://www.w3.org/TR/WAI-WEBCONTENT/