Web Accessibility for Visual Impairments

In the early days, computers were limited to text-based interfaces, since graphical user interfaces (GUIs) required more processing power. Ophthalmic researchers, Chiang, Cole, Gupta, Kaiser, and Starren note, "because of increased computer processing power since that time, GUIs with "point-and-click" interactions have largely replaced the old-fashioned text interfaces (p. 394)."

However, with the rise in graphical user interfaces, this leads to problems for visually impaired individuals. For example, Figure 1 depicts tabbed folders, checkboxes, slider bars, buttons, and navigation bars. These GUI features rely heavily on the spatial context and on/off situations. The tools that visually impaired individuals use will have to compensate for all of these features.

Figure 1: Graphical User Interface

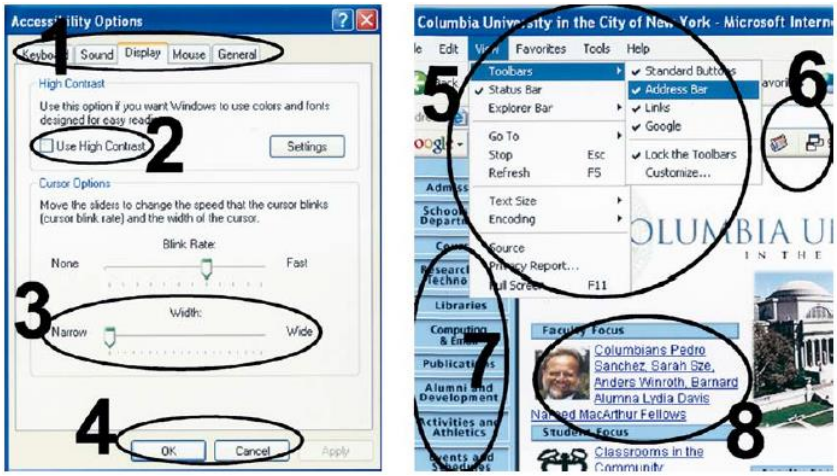

Figure 1 comes from page 396 from Computer and World Wide Web Accessibility by Visually Disabled Patients: Problems and Solutions

Why should I care?

The shortest answer to why you should care is that accessibility is the law. However, depending on who you or your organization is, your compliance with a certain law may not be mandated. One of the laws to enforce accessibility for disabled individuals is the American with Disability Act (ADA) of 1990. This law applies to everyone. The ADA of 1990 requires employers to provide "reasonable accommodations" to workers with disabilities. The Federal Rehabilitation Act of 1973 is another law of interest. Section 508 of the law mandates that electronics and information technology for the federal government must be accessible to people with disabilities. Section 504 of the Federal Rehabilitation Act of 1973 requires that all

educations programs that receive funds from the federal government must be accessible to all students with disabilities.

Tools for visually impaired individuals.

Researchers, Chiang, Cole, Gupta, Kaiser, and Starren explain the traditional components of computer accessibility as, "standard refractive care, specialized care for patients with reduced vision, and specific advice on the use of computers (p. 398)." Standard refractive care is about making sure the retina receives a focused image. Specialized care consists of magnification and lighting. The researchers explain the advice as: positioning the monitor lower, using a page stand that is level with the monitor, positing the head and neck in a comfortable posture, and increasing the font size (p.398). Clinically, a good visual acuity is 20/50 for reading computer screens. Based on this information, users can change lighting condition and distance from the screen to compensate. The current assistive technology available consists of screen magnifiers, braille displays, and screen readers.

Human-computer interaction researchers, Mankoff, Fait, and Tran note, "automated checking tools require a small-time commitment, but do not necessarily result in more accessible sites (p. 42)." They write, "user testing is a common usability method proven effective for finding accessibility problems (p. 42)." However, finding people with disabilities is difficult. If a web developer has accessibility experience, then the web developer will have an easier time understanding an automated checking tool. Markoff, Fait, and Tran explain that no one tool or evaluator can find most of the accessibility problems in websites, but with multiple people working interpedently, it is possible to find more of the accessibility issues (p. 49).

How should I design my website?

In the *interactions* journal, researchers Chisholm, Vanderheiden, and Jacobs published fourteen guidelines for web content accessibility. Although these guidelines should not be the only guidelines to follow for web content accessibility, these guidelines do help web developers think. These guidelines consider disabilities in a broad sense, but they should still apply with vision impairments. The guidelines have been endorsed by the World Wide Web Consortium (W3C) (p. 37).

This means that the guidelines in the *interactions* journal are significantly important. In reference to the Federal Rehabilitation Act of 1973, Section 508, Chiang, Cole, Gupta, Kaiser, and Strarren write, "because this law is based on the U.S. Access Board's Electronic and Information Technology Accessibility Standards, which are in turn based on the [W3C]'s Web Content Accessibility Guidelines …, it has become an important legal reference for Web accessibility (p. 397-398)." Therefore, the guidelines in the *interactions* journal have a potential for legal importance.

Guideline 1: Provide equivalent alternatives to auditory and visual content

Concerning guideline 1, Chisholm, Vanderheiden, and Jacobs wrote, "provide content that, when presented to the user, conveys essentially the same function or purpose as auditory or visual content (p. 39)." Web developers should stay away from using ACII art, use alt tags and longdesc tags to explain content that users with disabilities may have trouble accessing.

Guideline 2: Don't rely on color alone

Concerning guideline 2, Chisholm, Vanderheiden, and Jacobs wrote, "ensure that text and graphics are understandable when viewed without color (p. 40)." Web developers should test to see what happens when they do not have color and ensure that there is contract between the background and text in web pages.

Guideline 3: Use markup and style sheets and do so properly

Concerning guideline 3, Chisholm, Vanderheiden, and Jacobs wrote, "mark-up documents with the proper structural elements (p. 40)." This means that stylesheets should govern the look of the webpage and the code should govern the content of the webpage. Web developers should look to use standard-compliant code. For example, code, rather than a picture of a formula would be more accessible.

Guideline 4: Clarify natural language usage

Concerning guideline 4, Chisholm, Vanderheiden, and Jacobs wrote, "use markup that facilitates pronunciation or interpretation of abbreviated or foreign text (p. 41)." This means that webpage header should specify the language of the web page content.

Guideline 5: Create tables that transform gracefully

Concerning guideline 5, Chisholm, Vanderheiden, and Jacobs wrote, "ensure that tables have necessary markup to be transformed by accessible browsers and other user agents (p. 42)." In other words, tables should be for data and not for layout or design.

Guideline 6: Ensure that pages featuring new technologies transform gracefully

Concerning guideline 6, Chisholm, Vanderheiden, and Jacobs wrote, "ensure that pages are accessible even when newer technologies are not supported or turned off (p. 43)." Web

developers can evaluate their website against this guideline by turning off style sheets and newer technologies,

Guideline 7: Ensure user control of time-sensitive content changes

Concerning guideline 7, Chisholm, Vanderheiden, and Jacobs wrote, "ensure that moving, blinking, scrolling, or auto-updating objects or pages may be paused or stopped (p. 43)." Web developers should aim to have static text or content to address users that can not keep up with moving content or have medical problems.

Guideline 8: Ensure direct accessibility of embedded user interfaces

Concerning guideline 8, Chisholm, Vanderheiden, and Jacobs wrote, "ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc. (p. 44)." This means that when embedding interfaces, such as a YouTube video, web developer should be cautious to make sure that that content is still accessible by other human-computer interactions.

Guideline 9: Design for device independence

Concerning guideline 9, Chisholm, Vanderheiden, and Jacobs wrote, "use features that enable activation of page elements via a variety of input devices." This means that the website should be accessible by multiple devices, such as mouse, keyboard, voice, head wand.

Guideline 10: Use interim solutions

Concerning guideline 10, Chisholm, Vanderheiden, and Jacobs wrote, "use interim accessibility solutions so that assistive technologies and older browsers will operate correctly (p.45)." Web developers should aim to not have pop-ups and to support older browsers and technologies.

Guideline 11: Use W3C technologies and guidelines

Concerning guideline 11, Chisholm, Vanderheiden, and Jacobs wrote, "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 gracefully, provide an alternative version of the content that is accessible. (p.45)." Web developers should use W3C content because it is standardized. However, discursion should be considered. For example, converting a pdf to an html web page file may not be the best conversion for accessibility.

Guideline 12: Provide context and orientation information

Concerning guideline 12, Chisholm, Vanderheiden, and Jacobs wrote, "Provide context and orientation information to help users understand complex pages or elements (p. 46)." This means to user titles, headers, and longdesc tags. By using these tags, accessibility technologies will have an easier time explaining the content.

Guideline 13: Provide clear navigation mechanisms

Concerning guideline 13, Chisholm, Vanderheiden, and Jacobs wrote, "Provide clear and consistent navigation mechanisms—orientation information, navigation bars, a site map, etc.—to increase the likelihood that a person will find what they are looking for at a site (p.47)." This means that the links should be understandable on their own and web developers should use metadata.

Guideline 14: Ensure that documents are clear and simple

Finally, concerning guideline 14, Chisholm, Vanderheiden, and Jacobs wrote, "Ensure that documents are clear and simple, so they may be more easily understood (p.48)." This means that web developers should use language without jargon, cater to different learning styles, and use the contrast, reputation, alignment, and proximity principles.

In summary, web accessibility is not only a legal requirement, but helps you reach more users. While user testing is the best method to strive for web accessibility, it is also expense and hard to conduct. For web developers with web accessibility experience, it may be possible to gain insightful information from an automated tool. Most people will get the greatest benefit by doing user testing with more than one participant, each working independently. Chisholm, Vanderheiden, and Jacobs suggested fourteen guidelines to help strive for web accessibility.

References

Chiang, M. F., Cole, R., Gupta, S., Kaiser, G., & Starren, J. (2005). Computer and World Wide Web Accessibility by Visually Disabled Patients: Problems and Solutions. *Survey of Ophthalmology, 50*(4), 394-405. doi:10.1016/j.survophthal.2005.04.004

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Mankoff, J., Fait, H., & Tran, T. (2005). Is your web page accessible? *Proceedings of the SIGCHI conference on Human factors in computing systems - CHI 05,* 41-50. doi:10.1145/1054972.1054979

Web Accessibility for Visual Impairments

Jacob Bostick

Introduction

- Text-based user interfaces → graphical user interfaces (GUIs)
- Accessibility problems with GUIs:
  - Rely on spatial context and mapping
  - Buttons and states toggle

Why should I care?

- It's the law!
- American with Disability Act (ADA) of 1990
  - Applies to everyone
  - provide "reasonable accommodations" to workers with disabilities
- Federal Rehabilitation Act of 1973
  - Section 508:
    - electronics and IT for the federal government must be accessible to people with disabilities
  - Section 504
    - all educations programs with federal funding must be accessible to all students with disabilities

Accessibility tools

- traditional components of computer accessibility:
  - standard refractive care – retina focused image
  - specialized care – magnification and lighting
  - specific advice on the use of computers – ergonomics and posture
- current assistive technology tools:
  - screen magnifiers
  - braille displays
  - screen readers

Web Developer tools

- automated checking tools
  - Not necessarily effective
  - Useful for experienced developers
- user testing
  - Very effective, but hard to administer
- Need multiple people working individually to be effective

How should I design my website?

1: Provide equivalent alternatives to auditory and visual content
2: Don't rely on color alone
3: Use markup and style sheets and do so properly
4: Clarify natural language usage
5: Create tables that transform gracefully
6: Ensure that pages featuring new technologies transform gracefully
7: Ensure user control of time-sensitive content changes
8: Ensure direct accessibility of embedded user interfaces
9: Design for device independence
10: Use interim solutions
11: Use W3C technologies and guidelines
12: Provide context and orientation information
13: Provide clear navigation mechanisms
14: Ensure that documents are clear and simple

Conclusion

- legal requirement
- Accessibility testing
  - User testing (greatest benefit)
  - Automated tools (for experienced web developers)
- 14 Guidelines for web accessibility

References

Chiang, M. F., Cole, R., Gupta, S., Kaiser, G., & Starren, J. (2005). Computer and World Wide Web Accessibility by Visually Disabled Patients: Problems and Solutions. *Survey of Ophthalmology, 50*(4), 394-405. doi:10.1016/j.survophthal.2005.04.004
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Mankoff, J., Fait, H., & Tran, T. (2005). Is your web page accessible? *Proceedings of the SIGCHI conference on Human factors in computing systems - CHI 05,* 41-50. doi:10.1145/1054972.1054979