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FEDSTATS' WORK ON ACCESSIBILITY

Supporting Paper

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I. INTRODUCTION

1. Changes to the accessibility laws of the United States in 2001 required the federal government to actively make technology and information accessible to the disabled—including information on Web sites. Making Web tables and charts accessible is complex and difficult. As frequent providers of complex tables and charts, federal statistical agencies faced a significant burden from the new law. Many government agencies and private vendors began to offer technical assistance, training, and software to make content accessible after the announcement of the standards, but those efforts lacked the level of sophistication and automation needed by the agencies.

2. Federal statistical agencies were frustrated by the lack of guidance and faced a tremendous workload in implementing the new standards. In response, the FedStats Task Force—an interagency task force of U.S. federal statistical agencies—sponsored a workshop June 24, 2002, on the new accessibility standards for Web-based information. The workshop provided in-depth coverage of the requirements that applied to tables, charts, and mathematical formulas. The workshop brought together representatives from all of the principal federal statistical agencies as well as other government agencies and members of the disabled, research, and vendor communities. A white paper summarizing the workshop's findings and outlining an agenda for future work was also published by FedStats.² This paper summarizes the work done by FedStats on accessibility, updates some of the workshop's findings, and provides information on accessibility resources.

II. BACKGROUND

3. August 7, 1998, marked the beginning of a significant change in accessibility policy in the United States with the signing of the Workforce Investment Act, which included the Rehabilitation Act Amendments. One of those amendments expanded and strengthened Section 508—changing the focus of accessibility from providing accommodation upon request, to actively making technology and information accessible.³

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² See http://www.fedstats.gov/policy/publications/fedstats_wp1.html.

³ See <http://www.section508.gov/index.cfm?FuseAction=Content&ID=12>.

4. The amendment to Section 508 requires that when federal departments or agencies develop, procure, maintain, or use Electronic and Information Technology (EIT) they must ensure that the EIT is accessible to federal employees with disabilities. It also requires that all members of the public, disabled or not, have comparable access to and use of information and data from federal departments or agencies. The amendment covers six broad areas of information technology—software applications and operating systems; Web-based intranet and internet information and systems; telecommunication products; video and multimedia products; self contained, closed products; and desktop and portable computers.

5. Section 508 directed the Architectural and Transportation Barriers Compliance Board (known as the Access Board) to set standards for the various information technologies. Those standards went into effect June 25, 2001.

III. FEDSTATS AND SECTION 508

6. The Section 508 guidelines include 16 standards for Web information, based on the Web Content Accessibility Guidelines 1.0 developed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C). Most of the standards are focused on making information accessible to those with visual impairments, although some also address hearing and mobility impairments. The standards that pose the greatest challenge to the federal statistical agencies are those dealing with tables and charts.

A. Tables

7. For years, statistical agencies have presented their data in printed tables. With the Internet as a viable means of dissemination, statistical agencies began presenting their tables in a variety of electronic forms, such as ASCII text, Adobe Portable Document Format (PDF), HTML, and various spreadsheet formats. The structure of tables has not significantly changed with the move from print to electronic media.

8. Two of the 16 Section 508 standards apply to tables presented in Web formats and are primarily aimed at making tabular content accessible to the visually impaired. The standards require the following:

(g) Row and column headers shall be identified for data tables.

(h) Markup shall be used to associate data cells and headers cells for data tables that have two or more logical levels of row or column headers.

i. Workshop Findings

9. Of the electronic formats mentioned above, neither ASCII nor PDF (at the time) inherently maintain the structure of a table—presenting data simply as highly formatted lines of text, which makes the association of information with the appropriate labels impossible. Therefore, the workshop focused on the accessibility of tables presented as HTML or spreadsheets.

10. The following issues were identified with respect to tables:

- **There is no agreement on how to mark up tables.** Although the mantra is to “code to the standard,” that standard is rather sketchy. Both the W3C and Access Board offer examples of coding, but those examples are not particularly instructive because they are not of complex statistical tables, are inconsistent both within individual organizations and across organizations, and do not always comply with the HTML 4.01 Specification.
- **Assistive devices interpret various tags inconsistently.** A divide currently exists between what “works” and the standard.
- **Current technology does not allow visually impaired users to use the data as intended.** Statistical tables are generally produced to allow users to make comparisons between numbers, to find logical visual patterns in the data, or to look up a specific piece

of information. The current technology allows visually impaired users to perform only the last task easily.

- **Large, complex tables on the Internet may not be usable to the disabled or other users.** The Internet has expanded the audience for statistical content beyond the agencies' traditional audience of subject-matter experts. Many of the participants at the workshop who were not users of statistical products questioned the need to produce so many large, complex tables. They wished for simpler, easy to understand tables or alternative presentations.
- **Making tables accessible should not make them less usable to sighted users.** The use of white space to visually group similar items in a table poses a problem for some screen readers, which simply stop when they reach a blank cell. Effective techniques for associating metadata, such as footnotes or units of measure, with the respective data do not exist. Also, the extra markup required to make tables accessible results in large files that take a long time to download from the Internet. Lack of speed, including slow download time, is one of the major complaints voiced by Web users.
- **Meeting the 508 standards for large, complex tables poses a resource problem for statistical agencies.** The lack of fully automated, reliable solutions is a significant constraint on the statistical agencies as they try to make the vast number of tables they produce accessible.
- **No methods exist to validate the quality of markup for accessibility.** Although remediation tools are available that can check for the existence of attributes, they are unable to make any qualitative assessment about those attributes.

ii. *Update*

11. Screen-reading software continues to improve with each version released—supporting more features and moving closer to the standards. However, some features require users to change the default settings of their software or access advanced options—something studies have shown few users actually do.

12. More recent versions of Adobe Acrobat now maintain the row and column structure of tables when converting documents to PDF and allow some tagging for accessibility. However, complex tables (for example, those with headers that span multiple columns or rows) require that the resulting tags still be touched up by hand. According to the Adobe Acrobat 7.0 documentation, adding a *ColSpan* or *RowSpan* attribute to a tag is a nine-step process and, because that process is menu driven, it is not open to automation.

B. **Charts**

13. In addition to tables, the federal statistical agencies commonly produce statistical charts and maps—geometric representations of the data that present the big picture, highlight a point, or reveal a relationship not obvious in a table of data. Just as a picture is worth a thousand words, a statistical chart may summarize thousands of data points.

14. Another of the 16 Section 508 standards for Web information concerns making content from non-text elements, including pictures, diagrams, charts, and maps, accessible to the visually impaired:

- (a) A text equivalent for every non-text element shall be provided (e.g., via alt, longdesc, or in element content).

iii. Workshop Findings

15. The following issues were identified with respect to charts:

- **What should the text alternative for a statistical chart include?** Additional guidance is needed on this issue. While tables are often cited as an accessible alternative, providing large amounts of data in a table is not equivalent in purpose to showing the “big picture,” which is the purpose of many graphics.
- **What are acceptable alternatives for content that cannot be made truly accessible, like maps?** While several agencies provide a telephone number for disabled users to call if they need the content explained, that solution does not provide disabled users with the same 24/7 access to information as nondisabled users.
- **Existing assistive technology is not well suited to the presentation of statistical graphics or maps.** The current focus of the standards is to convey meaning through text—either aurally or as Braille. However, other technologies, such as tactile browsers or software that renders curves as varying sound pitches, may be more effective. Also, there may be differences in how people who have never had sight and those who were once sighted perceive graphical information.
- **Current graphic formats do not maintain underlying structural image information.** Although alternative graphics formats that retain structural information, such as SVG, do exist, they are not yet widely supported.

iv. Update

16. Although several agencies have begun offering graphics in SVG format, there is still not widespread support for it among browser and assistive technologies. Users are often required to install plug-ins to view content in this format.

17. Since the meeting, several vendors have developed software to automatically create the text descriptions for charts. Chart Explainer by CoGenTex automatically generates summary text descriptions from the underlying data used in trend charts and bar charts.⁴ PopChart by CODA Technologies generates graphics from dynamic queries and includes the data required to meet the 508 requirement.⁵

C. Mathematical Formulas

18. Statistical agencies, like many agencies involved with scientific endeavors, use mathematical formulas based on notation that is not in the regular ASCII character set. Most agencies present formulas on Web pages as images. Therefore, the same requirements that apply to charts apply to formulas: a text rendering of the formula that can be read by a screen reader must be provided. However, writing complex formulas out in text is not a good way to present this information. In addition, although this method addresses the needs of blind users, it does not address the challenges faced by those with low vision. For example, an older user may need only to enlarge the font size on his or her browser in order to use the Web, but an equation that is inserted as an image will not scale proportionally with the text around it.

19. The workshop’s findings on this topic are very simple: MathML is the standard for the presentation and communication of mathematics. Therefore, it is imperative that the browsers and assistive technologies incorporate this standard as soon as possible. In addition, the statistical agencies should begin to tag their formulas using MathML.

20. Many browsers now support MathML. While some still need a plug-in to render MathML, many browsers natively include this functionality as long as the user has the proper fonts available.⁶ Assistive technologies are also starting to formally include support for MathML; however, there are many reports of issues in the current implementations.

⁴ See <http://www.cogentex.com/products/chartex/index.html>.

⁵ See <http://www.corda.com/products/popchart/>.

⁶ See <http://www.w3.org/Math/XSL/>.

IV. SUMMARY

21. Based on the response to the FedStats workshop and continued correspondence related to the workshop materials, there is great interest in finding ways to meet the Section 508 requirements as they relate to statistical material. First and foremost, agencies are looking for clear guidance in what is needed to meet the requirements. Even though they are very willing to make their content conform, they often face serious resource constraints that could be eased somewhat with fully automated, reliable solutions and better tools for validating the quality of markup. Additionally, the federal statistical agencies recognize that just meeting the minimum requirements falls short of the ultimate goal to make statistical content usable for all.

22. Overall, the workshop was a good first step. It succeeded in drawing attention to the problems the agencies were having. Since the workshop, there has been progress—vendors have responded with improvements in their products and several of the agencies have developed automated solutions.

23. Also, more testing with blind users is starting to be done. For example, between November 2002 and February 2003 the Communication Technologies Branch of the United States National Cancer Institute conducted usability tests with 16 blind users using screen readers as they worked with Web sites.⁷ While that study resulted in 32 guidelines, none of those guidelines addressed the issues of interest to the federal statistical agencies.

24. The Access Board recently announced plans to review and update the standards for EIT covered by Section 508. In addition, the board is now coordinating its work with international organizations to “advance global harmonization and standardization.”⁸ During the public comment period, the federal statistical agencies will have the opportunity to share their experiences and frustrations with the current standards. And, hopefully, some of the needed specificity and guidance will be forthcoming.

25. However, more discussion with the disabled community is still needed to ensure that the implementation methods selected meet the needs of that community. Additional research is needed to make statistical content usable to the disabled, to identify new ways of presenting statistics, to determine how these requirements could be leveraged to help sighted users, and to develop new methods for presenting statistical content to the disabled.

V. RESOURCES

26. Appendix E of the white paper contains an extensive list of accessibility resources, including general resources, vendor resources, and accessibility tools. Below are links to some good starting points for learning about accessibility, in general, and Section 508, in particular.

- Access Board Section 508 Homepage: <http://www.access-board.gov/508.htm>
- FedStats (links to workshop proceedings and white paper): <http://workshops.fedstats.gov/>
- GSA’s Section 508 Web site: <http://www.section508.gov/>
- Information Technology Technical Assistance and Training Center:
<http://www.ittatc.org/>
- *Research-Based Web Design & Usability Guidelines* (Chapter 3 covers accessibility):
<http://usability.gov/pdfs/guidelines.html>
- Usability.gov Accessibility Resources: <http://www.usability.gov/accessibility/>
- Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C):
<http://www.w3.org/WAI/>

⁷ See *Guidelines for Accessible and Usable Web Sites: Observing Users Who Work With Screen Readers* at <http://www.redish.net/content/papers/InteractionsPaperAuthorsVer.pdf>.

⁸ See <http://www.access-board.gov/news/508update.htm>.