

Chapter 8

An AAC-Enabled Internet: From User Requirements to Guidelines

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8.1 Introduction

Ensuring that WWW pages are accessible and usable for people with complex communication needs provides a particular challenge for WWW page designers. Despite advances in commercially available assistive technologies, people using augmentative and alternative communication (AAC) comment on continuing difficulty and frustration in physical access to technology and subsequent reliance on non-disabled partners (Clarke *et al.*, 2001 and 2002). The EU WWAAC (World Wide Augmentative and Alternative Communication) project, which began in January 2001, has been engaged in a number of research and development activities in order to overcome some of these problems, including the:

- Development of Internet applications, including an adapted Web browser, tailored to the needs of people who use AAC
- Contribution to the development of Web accessibility guidelines
- Development of a communication infrastructure and protocol to support symbol-based communication on the Web, based upon open-sourced concept coding
- Development of a Dreamweaver extension to enable Web developers to symbol embellish their Web pages via the on-line concept coding database.

This paper will concentrate on the first 2 activities to demonstrate how the design, development and evaluation of an adapted Web browser with people who use AAC will lead to more accessible and usable software. This work is also contributing to the development of WWW accessibility guidelines, which will feed into the work of the World Wide Web Consortium–Web Accessibility Initiative (W3C–WAI). It is important, however, to consider these activities in light of the concept coding stream of the work, which is briefly described below.

Concept coding will facilitate the sharing of symbol-based content between different symbol users using different symbol language systems. It will also enable symbols to be converted into text and vice versa. This might mean, for example,

that a person who uses AAC could open an Internet bank account by completing an on-line form using their own symbol system. The vision of concept coding is that instead of images and symbols having to be transferred from one computer to another, it is possible to share a unique code designating the meaning of the symbol needing to be transferred. In addition to efficiency in handling images used for communication purposes, this concept would also allow personalised or idiosyncratic symbols specific to one person to be used by them in Internet-based communication. An open source concept coding, in combination with more accessible and usable software, is the driving force behind the WWAAC project.

8.2 Survey of User Requirements

The primary target population of end users defined by the project are people between the ages of 12 and 25 years who use graphic symbol-based AAC in face-to-face interaction, and who are professionally supported in their use of AAC and the Internet within school/college or receiving non-professional support at home. However, the developments may well be applicable to people of all ages who use graphic symbol-based AAC, and to those who use text-based AAC. They may also be applicable to a broader range of groups such as people with learning disabilities who use symbols as aids to literacy, people with aphasia, and the elderly. This is something that will be explored during a later stage in the project.

During the survey of user requirements, interviews were held with 51 service providers (e.g., Speech and Language Therapists and teachers) and 10 software manufacturers/distributors. In addition, individual interviews were held with a sample of 28 people, with relatively high receptive abilities, who use AAC from England, Sweden, Finland and Spain. Details of this investigation are reported in Clarke *et al.* (2001 and 2002). The interviews were designed to gain a better understanding of the use of Web browsing and email by people who use AAC, their particular problems, and what their needs and preferences might be, both with regard to the technology itself and future services.

The survey testified that access to the Internet is problematic for people who use AAC, and an analysis of the user requirements provides some insights into the likely needs not only for the users but also for the designers and developers of Web pages. These needs include:

8.2.1 Integrated Speech Output

The most common need identified was for good text to speech systems that would read email and WWW pages to those with complex communication needs, and for the speech output to be integrated into such applications.

8.2.2 Simplified Content

Recommendations were needed to ensure that short and simple text was used on WWW sites and that keywords were clearly identified. The issue of layout and use of graphics was seen as being important to address, particularly in relation to the size of images and the use of animation.

8.2.3 Improved Accessibility for Switch Users

Advice on making the Internet accessible to switch users was also seen as being needed. In addition to the issues of physical and sensory access, cognitive issues also need to be considered, e.g., simplifying materials and providing cues to users to assist them in navigating a site.

8.2.4 Improved Access for People who Use Symbols

A significant number of comments related to the development of WWW services for people who use symbols, as well as the need to both improve access to general Web sites for these end users and to develop a greater number of symbol-based sites.

8.3 The Simulator Studies

A simulated off-line Web browser was developed to test out design ideas, first with experts internally within the project and then with professional experts outside the project (see Figure 8.1). Preliminary impressions of the software by experts were very favourable and it was perceived to be much better than other Web browsers for the primary target population due to its flexibility. Specific concerns were addressed, and the robustness of the software was improved before the trials with people who use AAC could begin.

The simulator was then evaluated with end users during 3 main phases: Preliminary evaluations with 9 people who use AAC in the United Kingdom, the Netherlands and Sweden; a workshop with 8 people who use AAC, held at the ISAAC 2002 Conference in Odense, Denmark (August 2002); and a workshop with 4 people who use AAC at the Communication Matters Conference at Lancaster University in the UK (September 2002). The workshops followed the same general procedure, starting with a demonstration of the software to the users and their facilitators, either individually or in small groups. A default interface was used, as well as showing other configurations of the icons and layout which would meet individual needs and preferences. Once the appropriate switches/scanning interfaces/other hardware were set up by the project's technical support, the users then had 'hands-on' experience with the simulated browser for at least one-half hour, during which time the project team were there to answer questions and observe the users' behaviour and interaction with the system. Although the main focus of the evaluation was the simulated Web browser, it was also possible to

obtain valuable information on the use of symbols to support Internet access (Nicolle *et al.*, 2002).

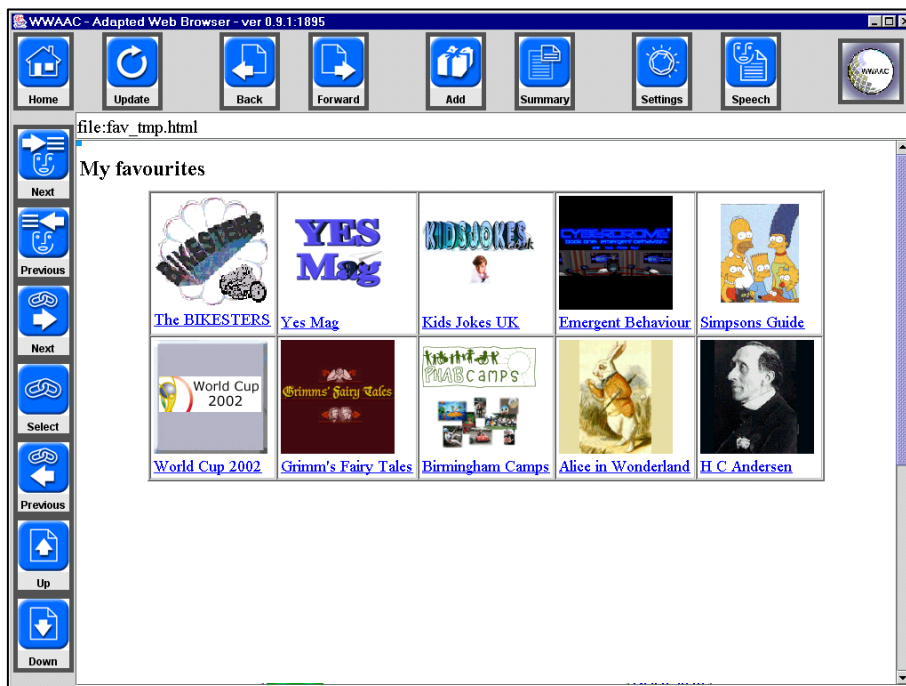


Figure 8.1 The simulated Web browser

These preliminary evaluations with users suggested that the software was a significant step towards independent use of the Internet by people who use AAC. More specific comments made by the users, their facilitators and family confirmed the importance and the benefits of particular features of the WWAAC browser, including:

- a graphical based, easy to use favourites page
- speech output, synchronised with the visual focus on the screen
- a summary page enhanced with symbol support
- compatibility with the person's own switch(es) and/or AAC system, and
- flexibility to configure the interface to meet the needs of individuals.

8.4 Development and Evaluation of the Alpha Browser

The user requirements and evaluation activities described above led to the development of the Alpha version of the prototype software, which included, in addition to the functionality of the simulator, the following key features:

- Integrated speech output to support text presentation of site content suitable for AAC users
- Full accessibility from the keyboard
- Built in simple scanning interface to allow single or two switch/button entry
- Some configurability of displayed controls and layout
- Simple icon-based access to page favourites
- Filtering of Web page content to provide simple text summaries and lists of available links
- Go anywhere capability

Some of these Web browsing features are available from other commercial products. In addition, other systems under research and development, such as the AVANTI Web browser (Stephanidis *et al.*, 2001) and BrookesTalk (Zajicek and Morrissey, 2001), are exploring ways of providing more adaptable and usable interaction for people with disabilities. However, it is in the area of symbol support that the WWAAC project will be providing a unique contribution. Additional aspects of the development work are to provide symbol support both for the conversion of symbol to text (for emails and on-line form filling) and for assistance in reading Web content (using symbols to support text and speech output).

The Alpha evaluation of the WWAAC browser involved 4 end users in the UK (two direct-access users, and two switch users), 2 end users in Sweden (both using direct access), and 1 direct-access user in the Netherlands, along with additional comments from teachers and facilitators.

Following introduction to the project and the demonstration of the browser's functionality to the end-user and his or her facilitator, the evaluation of the software was conducted on a one-to-one basis with 2 evaluators, one with the task of working with the user and the other observing and recording. Following the user's familiarisation with the browser, a range of tasks were performed, including for example, selecting a Web site from the favourites page, reading some text, and then selecting a link. A template was provided for the evaluator to record problems observed and specific comments for each task. Each participant was then interviewed following a short pro-forma established for the project. Talking Mats™, also used during the user requirements phase, often proved helpful in eliciting the views of end-users on abstract issues which they do not often address in their everyday conversations (Murphy, 1998; Clarke *et al.*, 2001). The workshop lasted for about 5 hours in total, over two sessions, as well as about an additional hour for detailed discussions with local facilitators and experts.

Some of the key points which emerged from the user testing and further expert interviews have been summarised under the headings below:

8.4.1 Speech Mode

The speech synthesiser (very different in many respects to conventional screen readers for visually impaired users) was considered by many end users and experts to be one of the key features of the browser. It was felt that end users need to be able to choose the most appropriate mode (word by word, line by line, sentence by sentence, or continuous reading). Some suggested that the speech support would help with the development of literacy skills.

8.4.2 Summary Page

Even in its present simplistic form, end users found the summary helpful to identify the main content of the site and to view and make use of the list of available links on the page. There is a need for symbol embellishment of the text summaries.

8.4.3 Favourites

End users liked the large icons on the favourites page. They commented that they would like an easy way to add a clear image to identify a new favourite site. Control over the size of the image and text on the favourites page was felt to be important.

8.4.4 Icons

In some cases understanding the icons that signified particular functions was a problem. It was suggested that while a good default set of icons was needed, the facility to import your own would be useful. Potentially, these icons could be selected from the person's own symbol set.

8.4.5 Button Layout/Appearance

It was noted that it would be useful to be able to hide some of the buttons for certain end users, to create one's own layout, and to be able to use different colours on the buttons to indicate different groups of functions. A layout editor is needed to configure the display to meet individual needs.

8.4.6 Alternative Scanning Interface

The browser must be compatible with other commercial keyboard/mouse emulators such as SAW and The Grid. If someone is using their own scanning interface, the browser's own buttons should be able to be hidden.

8.4.7 Navigating Through and Selecting Links when Scanning

It is necessary to improve navigation on pages for non-mouse users where there are a large number of links. The current method of scrolling through links one-by-one was seen to be tiring and frustrating. Some form of 'fast forward'/'rewind' buttons was suggested.

8.4.8 Entering URLs

End users need help to enter new Web sites.

8.4.9 Output/Display

An easy facility is needed for people who use AAC to change the size and colour of the text on the Web page.

8.4.10 Scrolling

Even though some end users were able to use the scroll bar, for others the browser's scroll up/down buttons proved very helpful.

8.4.11 Training

With such a diverse end user group, there was much variety in use: after a morning familiarisation, one person was able to make use of a number of the browser's features independently that afternoon. However, another person required support throughout the day to remember what button to use when.

8.4.12 Comparison with Alternatives

End users and their facilitators were aware only of the standard Internet Explorer browser. They expressed a preference for the WWAAC browser over the standard browser.

8.5 Formulating New Web Accessibility Guidelines

The user requirements activities and the evaluation of the WWAAC project's adapted Web browser has provided valuable and unique insight into the guidance that is needed by developers to make the Internet simpler to access by people with complex communication and physical needs. Whilst it is not realistic to expect Web developers to create symbol-based Web pages as standard, access to Web

pages by symbol users can be facilitated by careful design. The WWAAC project is, therefore, contributing to the W3C Web Content Accessibility Guidelines, by suggesting guidelines for developing symbol-enabled Web pages for people with complex communication needs (Poulson and Nicolle, 2002; Poulson and Nicolle, in print). A selection of draft guidelines under discussion in the project is given below, with rationale based on the user requirements and evaluation work. Many of these ideas will support best practice when designing Web pages for people who use AAC, as part of Guideline 3.3 in draft WCAG 2.0, which recommends that 'Content is no more complex than is necessary and/or is supplemented with simpler forms of the content' (W3C-WAI, WCAG 2.0 Working Draft).

Table 8.1. Draft guidelines under discussion in the WWAAC project

Draft Guidelines	Rationale
Provide a clear representational image on the site's home page	Identification of the most representative image would enable people with complex communication needs (and others) to more readily guess what the site is about. Tagging the most representative image in the content could be used in automatic creation of a thumbnail image for the favourites page
Provide a page-graphic tag, which can be used to retrieve a clear thumbnail image of the page itself (min 64 x 64 pixels)	For people who use AAC and the envisaged usage of the WWAAC browser, a small graphic on the favourites page may not be enough. A graphic of the entire page, in a much larger size (min. 64 x 64 pixels) may facilitate recognition of the Web site on the favourites page by end users
Provide Alt tags which give prime information for the user and distinguish between salient (most prominent) and non-salient content	End users with complex communication needs should be spared extraneous information. Some non-text content relates only to decorative images, and for some users, this just provides unnecessary clutter. The WWAAC project would recommend that graphics without content (such as a line, spacers, background) are marked as such. In addition, images that are not essential for the content of the site are also identified as, for example, background, decorative, advertising, etc.
Provide simple page descriptions as meta data (i.e., Alt-Content)	Some users will benefit from a simple summary of Web content, displayed according to their preferences in simple text and/or symbols. Alt-Content would potentially be a useful way of providing a simple summary and would also support symbol translation. This could be produced for the page, or parts of a page, by the Web author, and stored within the page itself. This would be done with 'in-page annotation,' using existing or emerging document formats, to support access to the content.

8.6 Conclusions and Next Steps

The WWAAC project team is planning to assess some of these draft design guidelines with experts and end-users in the remaining months of the project, in particular the provision of Alt-Content and ways of providing summary information, for example, by means of a concept encoded Dreamweaver extension for symbol embellishment. In addition, the results of the Alpha evaluations described above have now been fed into the development of the Beta version of the software to improve its accessibility and usability.

Evaluation of the Beta browser and email software will run from October to end-December, 2003. These will be conducted in a similar fashion to the Alpha evaluation activities. However, following our experiences it is possible to make certain refinements to procedures, for example, advising evaluators to ensure that non-verbal communication from the end-user is captured, and the interview templates now provide a reminder to record this.

These Beta evaluations of the adapted browser will be followed by longitudinal case studies with 3 to 4 end users in each of three countries early in 2004 and by a series of informal end user and expert consultations. This final evaluation phase will demonstrate integration with the concept coding aspects of the project and hopes to prove a big step forward in making the Internet more accessible and usable for people who use AAC. The current adapted browser will be made freely available via various websites, but it is hoped that a sustainable commercial version will follow in late 2004.

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