

Contextual Web Accessibility - Maximizing the Benefit of Accessibility Guidelines

David Sloan
Digital Media Access Group
University of Dundee
Dundee, UK
+44 1382 385598
dsloan@computing.dundee.ac.uk

Brian Kelly
UKOLN
University of Bath
Bath, UK
+44 1225 383943
b.kelly@ukoln.ac.uk

Andy Heath
Axelrod Research and Consulting
51 Paterson Close
Stocksbridge, Sheffield, UK
+44 7881 955997
AndyHeath@axelrod.plus.com

Helen Petrie
Department of Computer Science
University of York
York, UK
+44 1904 434336
helen.petrie@cs.york.ac.uk

Fraser Hamilton
Designed for All Ltd
109-111 Farringdon Road
London, UK
+44 2078 417417
fraser@designedforall.com

Lawrie Phipps
JISC Executive
Beacon House, Queens Road
Bristol, UK
+44 117 954 5078
l.phipps@jisc.ac.uk

ABSTRACT

We argue that while work to optimize the accessibility of the World Wide Web through the publication and dissemination of a range of guidelines is of great importance, there is also the need for a more holistic approach to maximizing the role of the Web in enabling disabled people to access information, services and experiences. The persistently disappointingly low levels of usability of Web content for disabled people indicates that focusing on the adoption of accessibility guidelines by content authors, tool developers and policy makers is not sufficient for a truly inclusive Web. This approach fails to acknowledge the role of the Web as an enabler in a broader context and may stifle creative use of Web content and experiences to enhance social inclusion.

Using e-learning as an example, and describing current metadata developments, we present a framework that will guide Web authors and policy makers in addressing accessibility at a higher level, by defining the context in which a Web resource will be used and considering how best existing or new alternatives may be combined to enhance the accessibility of the information and services provided by the site in question. We demonstrate how guidelines such as those produced by the W3C's Web Accessibility Initiative have a role to play within this wider context, along with metadata and user profiling initiatives.

Categories and Subject Descriptors

H.5.2 [User Interfaces – Evaluation/methodology]; K.4.2 [Social Issues - Assistive technologies for persons with disabilities]

General Terms

Measurement, Documentation, Human Factors, Standardization, Legal Aspects, Verification.

Keywords

Web accessibility, people with disabilities, WAI, WCAG, guidelines, methodologies, metadata, contextual design.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

W4A at WWW2006, 23rd-26th May 2006, Edinburgh, UK
Copyright 2006 ACM 1-59593-281-x/06/05...\$5.00.

1. INTRODUCTION

Accessibility of the World Wide Web (the Web) to end users, regardless of ability or browsing environment, is widely accepted as a fundamental requirement if the Web is to reach its true potential as an enabler for the widest possible audience. Indeed, the rights of Web users with disabilities are becoming ever more defined in anti-discrimination policy and legislation around the world [49].

Unfortunately studies have regularly shown that the accessibility of Web sites falls short of an acceptable level. This is despite an ever-increasing quantity of work that has gone into:

- developing tools to support Web content providers in authoring accessible material and evaluation of the accessibility of content [46].
- developing assistive technologies for end users, whether hardware or software, adaptations or extensions to browsers, or server-side transformation tools to allow disabled people to overcome or reduce the impact of their impairment when interacting with Web content.
- disseminating the importance of, and best practices in, accessible Web design, e.g.[34],[44].

The reasons behind the continuing disappointing levels of Web content accessibility have been widely discussed (e.g. [13]). What seems clear is that, while still a factor, a lack of awareness of the importance of accessibility amongst Web developers and site commissioners is no longer the predominant issue. A key challenge is effective and appropriate implementation of accessible Web design techniques. Other challenges include the perceived complexity and cost of the task of making a Web site accessible [28], and also the need to unambiguously define what is actually meant by 'accessible', understand what is required to develop a Web site to be considered to have met that definition, and to evaluate it such that once can judge whether it has met the specified level of accessibility [3].

From the disabled Web user's perspective, complicating factors include the browsing and assistive technologies available, the user's ability to use these technologies, and the difference between the technologies available and those most appropriate for the user's needs.

2. W3C, WAI AND WEB ACCESSIBILITY

2.1 The WAI Model of Accessibility

As the body responsible for the coordination of developments to Web standards, the World Wide Web Consortium (W3C) has taken a lead in promoting accessibility of the Web for disabled people, not only as Web users, but also as Web authors. Since 1997, the W3C's Web Accessibility Initiative (WAI) has been extremely active and very successful both in raising awareness of the importance of Web accessibility and in developing a model which can help organizations to develop accessible Web resources. This model provides guidelines which can be used to ensure that Web resources are optimally accessible, as well as influencing the development of other W3C standards for Web technologies.

The WAI promotes a tripartite model of accessibility, with the goal of universal Web accessibility in theory provided by full conformance with each of three components [7]. Of particular relevance to developers of Web resources is the Web Content Accessibility Guidelines (WCAG) [52]. WAI has been successful in promoting the WCAG around the world, the guidelines having been adopted by many organizations, embraced by the Web Standards movement [55], and are increasingly being adopted at a national level [49].

In the WAI model, the WCAG is complemented by accessibility guidelines for browsing and access technologies (the User Agent Accessibility Guidelines, UAAG [51]) and for tools to support creation of Web content (Authoring Tools Accessibility Guidelines, ATAG [46]). This approach acknowledges that in addition to providers of Web content, developers of authoring tools and of browsers, media players and access technologies also have responsibility towards the provision of accessible Web content.

2.2 Shortcomings of the WAI Model

Although WAI has been very successful at a political level, and to a large extent at a technical level, the authors feel that the model of Web accessibility adopted by WAI is flawed. This is due partly to the nature of the WCAG and also to the overwhelming domination of the role of WCAG with respect to the other guidelines in the accessibility of online information and services.

2.2.1 Limitations of WCAG

Shortcomings of the WCAG have been noted by a number of commentators (e.g. [8], [12]), and documented by the authors [25]. In brief, these include:

- **Theoretical nature of the guidelines:** current guidelines promote the use of open, W3C standards, and ignore widely used proprietary technologies, many of which have made significant improvements in accessibility support in recent years.
- **Dependencies on other WAI guidelines:** conformance of a site to WCAG may not be enough to ensure optimal accessibility if this conformance results in a site that requires use of a UAAG-conformant browser.
- **Ambiguity of the guidelines:** It is well documented that there is a significant degree of subjectivity in applying many WCAG checkpoints; and some are conditional on levels of support for a feature across browsing technologies.
- **Complexity of the guidelines:** The organization of the guidelines (each with constituent checkpoints of varying

priority) means that the WCAG can be difficult to understand and apply to a particular situation. We expect this to be remedied in future versions of WCAG, but interpretation difficulties may be hard to avoid.

- **Logical flaws of the guidelines:** The content of some WCAG checkpoints is such that they are open to quite extreme interpretations.
- **Level of understanding of accessibility issues required:** Given the range in technical abilities of the intended audience (anyone who creates Web content), there may be significant cognitive demand on understanding the principle behind a specific checkpoint, and applying that in a particular situation. Indeed, the format of the WCAG was found several years ago to present developers with problems of interpretation [10].

At this point we must acknowledge the ongoing development of WCAG 2.0 [53]. We have confidence that, when published, WCAG 2.0 will address many of the problems highlighted above. We are less confident that the release of a revised set of guidelines will overcome the wider issues addressed in this paper.

2.2.2 The dominance of WCAG

The WAI model also places significant responsibility on end-users to be aware of the technologies that most suit their needs. The need for improved user awareness, through better training and support, was a point noted by the UK Disability Rights Commission's Formal Investigation into Web site accessibility [13]. It has also been echoed by many developers promoting Web standards (e.g. [29]) who express frustration over the lack of user awareness and uptake of standards-conformant browsers and assistive technologies, of accessibility features of browsers and operating systems, and the resulting impact on the effectiveness of moves to promote adoption of Web standards.

Nevertheless, Web developers remain comparatively powerless to persuade end-users to adopt conformant browsing technologies. The lack of awareness about assistive technology and more capable browsing technology amongst the wider Web-using population has been found to be a significant issue [31]. Developers are limited to attempting to provide bespoke accessibility features such as large-print style sheets [9] or audio-enabled versions of their pages, for example through Readspeaker [37].

Since usage of UAAG-conformant browsing technologies cannot be relied upon, and usage of ATAG-conformant authoring tools can neither be relied upon nor guaranteed to produce WCAG-conformant content, WCAG remains the ultimate standard which developers must meet. Even then, accessibility problems may remain, as discussed further in *Section 3*.

2.3 Alternatives to WCAG

The W3C process of developing its "Recommendations", in the form of specifications is a lengthy, but thorough and robust process, involving domain experts and public consultation. Yet evidence used to support decisions made, for example in formulating the WCAG, is not made explicitly available as part of the guidelines or the supporting documentation, and thus the guidelines have been criticized as lacking empirical evidence [32].

Some sets of guidelines have applied the WCAG to a particular environment, for example the IMS Guidelines for accessible e-learning [18]. In addition, research-based guidelines for Web accessibility and usability for groups who would appear to be

catered for by the WCAG, including disabled and elderly people, have emerged over recent years, (e.g. [11], [27], [32] and [45]).

Some of these guidelines are broadly in agreement with the WCAG; some are more prescriptive, while there are also situations whereby comparison of these guidelines may result in potential conflict between the needs of specific user groups. Even the fact that the research teams producing the above guidelines felt the need to carry out the work indicates a level of dissatisfaction with the nature and content of the WCAG, in particular with respect to lack of published supporting evidence for specific checkpoints.

This situation reinforces the need for guidelines to be perceived to be useful and usable by developers - in terms of being credible, proving sufficient information on the consequences of following (or ignoring) particular checkpoints, and clearly defining the scope of applicability of a particular checkpoint.

3. UNIVERSAL USABILITY OR INCLUSIVE DESIGN?

3.1 Accessibility? Or Usability for Disabled People?

The relationship between accessibility and usability has long been a source of discussion, and as yet no definitive model exists [4]. However, it may be an unnecessary and artificial distinction in practice [1], [44]. This is illustrated by a discussion of the findings of the DRC's Formal Investigation into Web Site Accessibility [13]. The results produced two telling conclusions:

1. Some problems encountered by disabled people could not directly be matched to any single checkpoint of the WCAG. A WAI response [50] argued that many of these problems could be caused by non-conformant user agents and authoring tools. However, an expectation that all disabled people use conformant user agents is, we would argue, hopelessly idealistic at the present time, not least given that if a UAAG-conformant user agent exists, the likelihood that many disabled people would be aware of it, and have the means to obtain it, install it and use it, would be low.
2. Some Web sites were found to perform extremely well in usability evaluations with disabled people, yet did not meet certain WCAG checkpoints. When these sites were announced some commentators (e.g. [54]) criticized the DRC for hailing as examples of best practice sites that did not meet basic conformance levels of the WCAG. Thus, the somewhat strange situation emerged whereby sites that were found to be usable by disabled people were nevertheless rejected by Web developers as being inaccessible!

The WCAG may imply that full conformance will result in a universally accessible Web site, yet the very goal of universal accessibility has been questioned. For example, Newell and Gregor [34] acknowledge the limitations of universal accessibility by proposing a new approach of "user-sensitive inclusive design", while Nevile [33] describes the problems that can face an attempt to create and provide universally accessible resources, noting that:

"...it is not conceivable that even the new guidelines (WCAG 2.0)...will solve all the problems. Perhaps it is just not sensible to expect such guidelines to anticipate every solution and provide for it."

3.2 One Site for All – Always?

The one-site-for-all approach to accessibility has, correctly in the authors' opinion, largely conquered the perception that accessibility can be achieved through a separate stand-alone text-only Web site. Yet advocates of the single-site approach have shown a remarkable intolerance of attempts to use the Web to reach out to neglected groups, in particular people with severe learning difficulties, and who may have requirements quite distinct from most other Web users.

For example, a recent request was made to a Web accessibility email discussion list for feedback on a site designed for children with severe learning disabilities. This request produced feedback that was extremely critical of the appearance and content of the site. Yet while the distinct lack of evidence-based guidelines for Web site design for people with learning disabilities has been pointed out [8], [39] the reaction to the email request indicated an expectation that the resultant site should be equally understandable and usable by the members of the list as well as by the target audience.

We argue that this appears to be a prime example where the Web can be used to enhance the quality of life for a specific group of disabled people through providing information and entertainment, and facilitating communication, yet in a way that may present other people with significant disability problems. Here, the Web is enhancing accessibility for disabled people – but not through a universally accessible Web site.

In fact, there appears to be increasing use of solutions such as text-transcoders, text-to-speech features and alternative style sheets to provide on-the-fly alternative formats of one single site. This could be seen as a realization that designing one WCAG-conformant site for all, and leaving users to adopt UAAG-conformant browsers, is not a realistic approach at the present time.

3.3 Context of Use

Designing digital systems to meet the requirements of the people who will be using it is the classic approach to usability. One can group requirements into several categories, including:

- User characteristics: the abilities (and disabilities) of the target users including perceptual, cognitive, motor, and linguistic abilities.
- Domain requirements: the tasks that need to be supported, group, social and cultural dynamics, communication patterns, environmental factors, and so on.
- Technological requirements: such as availability of hardware and software and the availability of plug-ins.
- Performance requirements: for example, task success rates, task-completion times, satisfaction ratings, and quality of task output (e.g. comprehension outcomes in an e-learning environment).

Taken together these categories of requirements are often called the "context of use" [2]. Ultimately the stakeholders associated with a particular digital system want that system to be "successful". Success, however, can only be identified and measured if requirements such as these are identified and, ideally, specified. The key measure of a digital system is whether it fits its context of use: whether the people for whom it is designed can use it with acceptable levels of usability, for the tasks that they need to do, in the social setting in which these tasks take place, using the technologies they have available.

