

Wheeler, p., and Kreps, D. (2008) User testing is not a luxury. *Electronic Markets the international journal, Issue 18/4*

#### Abstract:

Companies need to address Web Accessibility with more than just professional standards of code writing, and adherence to the Web Content Accessibility Guidelines. With funding from the European Social Fund a team at Salford University, led by the authors, undertook a research project in 2007 entitled Combating eDiscrimination in the North West. The research examined over 100 websites advertising job opportunities both regionally and nationally, and found the vast majority to be largely inaccessible. Professional standards, such as using valid W3C code and adhering to the W3C Web Content Accessibility Guidelines, were largely not followed.

The project also conducted interviews with both public and private sector web professionals, and focus groups of disabled computer users, to draw a broader picture of the accessibility of jobs websites. Interviews with leading web development companies in the Greater Manchester region, showed that there is a view there should not be any additional cost in making websites accessible, as the expertise to create a site professionally should be in place from the start, and that accessibility will follow from applying professional standards.

However, through the process of trying to create a website for the project, with such a company, it was found that following professional standards is not sufficient to catch all the potential problems, and that user testing is an essential adjunct to professional practice.

#### User Testing is Not a Luxury

##### Background

Discrimination against disabled people exists in many forms. For many in the disability movement disability is structurally created by a predominantly inaccessible built environment which discriminates against people with impairments. Discrimination exists in the labour market as much as in the built environment. According to the Shaw Trust, (Shaw Trust 2008), the largest UK provider of supported employment services for disabled people, nearly 1 in 5 people of working age (7 million/19%) in the UK are disabled, and only 50% of disabled people of working age are in work, compared with 80% of non disabled people of working age.

The Disability Rights Commission (DRC 2004) report, published in April 2004, entitled "The Web: Access and Inclusion for Disabled People: A formal investigation" concluded that, "81% of websites failed to meet the most basic criteria for conformance to web accessibility guidelines." In November 2005, the UK Presidency of the EU published a report, "eAccessibility of public sector services in the EU," (eGovernment Unit 2005) which concluded that only 3% of EU public sector websites passed that minimum Level A criterion. Both the EU and UK official benchmark for an accessible website is Level AA

of the W3C's WCAG – a standard requiring a fundamental shift in web-authoring techniques, compared to the relatively cosmetic improvements required by Level A. This is not to suggest organisations are not already rising to these challenges, indeed FAS 78 published in March 2008 was in part a response to the DRC report noted above. Additionally, there are extensive guidelines on the accessibility of websites at the WCAG in addition to organisations including the RYAL National Institute of the Blind (RNIB) in the UK who also address accessibility and provide extensive guidance on achieving accessible sites involving user testing as an integral element in the process. However, despite the vast amount of literature on this topic, it remains a persistently stubborn fact that the majority of websites remain inaccessible. The purpose of the research was to look behind the rhetorics and using disabled computer users to generate definitions and knowledge, review the issue of accessibility placing disabled users as both researchers and research subjects to gain understandings from users who previously have been excluded in the design and control of research agendas (Barnes 2003)

An inaccessible website is one which simply does not make the information it contains available to those with a range of impairments. An inaccessible website is like an elevator with no voice-over, or a building with no ramp access to a raised front door. An inaccessible website with employment opportunities or advice on it discriminates against people with impairments and disables them by refusing them access to that information. As the DRC Report alluded to above makes clear: "In contrast to other information media, [the web] is, with the benefit of assistive technology, potentially tolerant of impairment. Inclusive website design makes it easier to use these alternative means of access, without making a site less attractive to unimpaired users. Irresponsible and inconsiderate design, on the other hand, not only puts disabled users at a significant disadvantage but can make life unnecessarily difficult for everyone, whether disabled or not." [DRC 2004]

It is of particular importance for business to address the issues of inaccessible websites, if the market that people with disabilities represent is to be realised, and if inclusive ICT design is to be achieved.

#### Web Accessibility, Standards, and Testing

Many studies of the accessibility of various categories of website have been undertaken, (e.g. Zaphiris et al 2001; Ritchie et al 2003; Guo et al 2005). Research undertaken by City University for the Disability Rights Commission and published in April 2004, (DRC 2004), which examined over 1000 UK websites across all sectors, and the study of some 300 or more European Government websites published at the Ministerial eGovernment Conference in November 2005, (eGovernment Unit 2005; Thompson 2003) all used a broadly similar combination of strict pass/fail audit against the W3C's Web Content Accessibility Guidelines (W3C 1999a), to assess the accessibility of websites. It is clear that a combination of IT audit and user testing is needed because a simple automated software check against the guidelines, as commented elsewhere (XXXXX et al 2006a and 2006b) is insufficient to address all the issues.

In the course of the research project, 'Combating eDiscrimination in the North West' (XXXXX & XXXXX 2008) a list of employment related websites was drawn up covering both regional and national job adverts, and both public and private sector job opportunities in the North West of the UK. Of the 112 websites in this list 27 were local to Greater Manchester, 22 from the wider NorthWest region, 53 were national employment services covering all regions, and 10 employment agencies. These 112 websites were subjected to a rigorous audit against each of the 65 checkpoints of the Web Content Accessibility Guidelines 1.0. 15 of the websites passed all Level A checkpoints. None passed all Level AA checkpoints.

More interesting however, were the results of the disabled user testing, the interviews with web development companies, and the process of working with one of them to produce an accessible website for the project. In this project even those sites which had adhered, more or less, to professional standards of coding, nonetheless failed to be properly accessible. In the interviews with web development companies it became clear that, 'All interviewees generally agreed that the testing of websites would be important, but few of them actually did significant accessibility testing before delivering websites to clients.' (XXXXX & XXXXX 2008). During the process of creating an accessible website for the project, moreover, which was being constantly tested by one of the researchers, who is blind, using HAL, contact was made with technical experts at Dolphin, manufacturers of the HAL screen reader, to try to track down and resolve seemingly intractable problems. In the end it was discovered that, 'Coding up forms according to the guidelines, in short, worked fine in isolation, and the screen reader had no problems interpreting it properly. Within the design that had been produced, however, properly positioned using Cascading Style Sheets with structural html, the form ceased to work. An unusual, technically valid but counter-intuitive coding structure needed to be adopted, before the screen reader would work with it.' (XXXXX & XXXXX 2008)

In the final summary of this report, the following paragraph summaries the key finding of the research:

Different versions of XHTML and CSS, the range of different browsers with differing implementations of same, and the range of different assistive technologies with differing support and responses to same, altogether, present too many variables and potential for unusual outcomes, for a simple professional approach to coding to be sufficient. User testing will likely find problems needing attention. (XXXXX & XXXXX 2008)

#### Interviews with Web Developers

In the course of the project members from eleven different public and private sector organisations were interviewed. This included members from five web development companies and six members of public sector organisations in the Greater Manchester area. The method used was semi-structured interviews. Questions covered five different but related themes: web accessibility standards, industry awareness and training, marketing and cost, accessibility testing of websites, disabled people and employment.

All interviewees were asked for their experiences of the practicality and usefulness of the W3C accessibility guidelines. All were aware of the existence of the guidelines with several, particularly those concerned with web development, claiming to use and consult them. Interviews with web developers also confirmed that public sector organisations are more interested in meeting accessibility guidelines. Opinions varied in terms of the usefulness of the standards. For example, a web developer remarked: Standards are relatively useless; I use a common sense approach to accessibility. The guidelines would be too long and too complicated: If you get something under 200 pages you are doing quite well really. Even if it is under 200 pages, they're just so bloody boring. (XXXXX & XXXXX 2008: Company A: 9)

On the other hand, public sector organisations that did not have to actually use the guidelines to create websites generally held a more positive outlook on accessibility guidelines:

I think for somebody like me who is not disabled, they provide really good guidelines on what measures should be taken to make sure our website is accessible. (XXXXX & XXXXX 2008: Company PS:F).

Perhaps an approach which could be applied to understand these diverse opinions would be to consider the statements above in terms of competing discourses of rhetoric and realities. For government agencies including the office of information commissioner, positive rhetoric over the advantages of applying accessibility guidelines may be expected. After all, any negative statements could lead to the almost inevitable question of what are the agency doing about it? By contrast, the private sector web developers face the reality of having to apply the guidelines in practice.

A further issue which animated several private sector developers was the apparent impression held by many outsiders that compliance to accessibility guidelines was an objective task. Several suggested in reality subjective opinions were frequently applied in the guidelines which require a considerable element of personal judgement. Hence automated checking tools do not provide adequate checks in relation to determining website accessibility.

I think you could have automated tools to a general degree. But it is people that use it and automated tools are simply not going to do the job well enough. (XXXXX & XXXXX 2008: Company C: 12)

Guidelines do not always make sense, or need to be carefully interpreted. There is a trade-off between accessibility and usability. A website maybe fully accessible, but can at the same time be a complete nightmare to use. Some of the websites which are 'Bobby approved' or are 'AA' are in fact very unusable. (XXXXX & XXXXX 2008: Company A: 16).

Hence there is an apparent difference between a website attaining accessibility accreditation and how useable any site is for people using

assistive technologies to access web materials. If accessibility guidelines do not necessarily produce usable websites, then the question becomes are the guidelines of any value? Here opinions ranged from limited support for the guidelines to unqualified statements towards their value.

So we have got a framework that is there that is reasonably solid. I wouldn't want to say that it perfected accessibility ... But at least there is a framework there. (XXXXX & XXXXX 2008: Company D: 5)

It's a guideline, isn't it? It might help a few people, might be worse for others as well. (XXXXX & XXXXX 2008: Company B: 5)

They are quite restrictive. Things like the WCAG are just best practices. (XXXXX & XXXXX 2008: Company E: 4)

Unsurprisingly, the level of support for accessibility guidelines depended on whether or not the person making the statement was directly involved in the practical application of their use. Practitioners all identified the limitations and contradictions in the guidelines, whereas those who simply worked with websites constructed for them were generally under the impression that compliance to guidelines was necessary to produce accessible websites. This divergence between rhetoric and reality lead into a consideration of the use of education and training for those involved in producing and using accessible web content.

### Industry Training

All private sector organisations were asked their views on training and where training was available within the industry. It was suggested by several interviewees the IT industry in Manchester in the form of Manchester Digital would push for higher professionalism with respect to producing accessible websites. 'Manchester Digital has a partnership... based in London. And they get people rather than trainers down. Trainers are people who are actually doing it in industry and achieving results.' (XXXXX & XXXXX 2008: Company C: 5).

We raised the issue of whether the expertise of making websites accessible would originate from the university sector or from within the industry. It appears that university education was not widely regarded by interviewees. Most of the web developers we spoke to had either not finished their university degree in computer science or spoke very critically of university IT courses. One company stressed that when hiring new staff they let people work on a trial basis, as university qualifications would not be any proof that people can actually build websites:

'That is the only way we can find new people and see how they work. An interview doesn't tell you anything, a CV tells you even less it seems.' (XXXXX & XXXXX 2008: Company A: 2).

Another recruitment strategy was to ask university lecturers who their most talented students were, and offer them positions during their course.

Jim was halfway through a degree and then decided he could not be bothered doing it any more, because he knew more than his lecturers at the time. We

saw his work and that was the critical thing. Great we could look behind it and look at the code (XXXXX & XXXXX 2008: Web Company C: 5).

We used to take on graduates and postgraduates directly from university. We stopped doing that because it is not that the skills are out of date, but because a lot of the theory that we expect people to have picked up on a degree they haven't. So we are always starting from square one with people when they come in. (XXXXX & XXXXX 2008: Company D: 13)

This raises the question of where did the web developers get their web accessibility training. In nearly all cases it fell to the web developers to teach themselves about web accessibility. However, particularly the public sector organisations would send their staff on short training courses conducted by IT professionals to catch up with the latest accessibility issues. 'One of our officers... went down; there is a public sector forum for accessibility. Like a conference seminar.' (XXXXX & XXXXX 2008: Company PS A: 8)

Another organisation arranged for staff to gain access to a virtual book shelf where access to the latest technical books online are available. Employees who would be interested in a particular topic like accessibility could simply access the latest relevant publication from their desk.

Every time a new publication comes out, it adds an electronic book to the book shelf. And we pay about £400 a year for all our staff to have every book they do. (XXXXX & XXXXX 2008: Company D: 14).

#### Marketing and the cost of accessibility

So far we have considered internal factors of accessibility and training in individual organisations. An issue of significant relevance is contained in the private sector of web developers. These are the people who are commissioned by outside organisations to produce websites. Hence these organisations are in a position to comment how accessibility is regarded by purchasers of websites.

Some web developers claimed to use web accessibility in the marketing of their web services, while others were reluctant to do so because it may raise concerns with clients over potential additional costs.

We have been running for about five years since 2002. I remember being asked only once for an accessible site. (XXXXX & XXXXX 2008: Company A: 2).

Two web design companies said they would make websites automatically accessible, as long as no additional costs are involved, a third argued cost is more a feature of complexity and levels of accessibility:

We try to make them as accessible as possible. At least nothing that would increase the cost for the clients. (XXXXX & XXXXX 2008: Company A: 3)

The real value comes out of testing with users. Obviously that takes time and money. If you are going to a great length to make sure the website is accessible, it takes a lot of time. (XXXXX & XXXXX 2008: Company B: 4)

We used to say to everybody if your site needs to be accessible we charge you 10% premium. The cost of a site to make it accessible. We stopped doing that because it is not a flat rate in every case. In some cases it is completely something we can do in the build without costing any more money or taking any more time. (XXXXX & XXXXX 2008: Company D: 9).

One company (Web Company B) assured us that all their websites would be at least level a compliant. However, sometimes clients complain about accessibility features:

We do get clients come back to us... we end up in an argument with the client about accessibility. And actually they don't care about it - about accessibility. (XXXXX & XXXXX 2008: Company A: 3).

The issue of how many organisations which commission websites regard accessibility was succinctly presented by a web developer who had several years experience of dealing particularly with small firms who required a web presence:

Small business owners are just not aware that they ought to be accessible. What they ask you, will they prosecute me and the answer being no. No they won't. So because there are no examples of anybody being prosecuted, publicly prosecuted, business owners simply don't give a toss. (XXXXX & XXXXX 2008: Company C: 2).

Opinions did diverge over the issue of whether web accessibility costs more money. Three web development companies claimed that web accessibility would generally not result in additional costs, with two others estimating the costs for accessibility in the range between ten and thirty percent of the project costs. However, it should be noted that such statements are bounded by the individual's definition of what constitutes an acceptable level of accessibility: 'If you give us a certain turnout as a standard of single a accessible. If you go to double A we put probably about 30% on.' (XXXXX & XXXXX 2008: Company C: 2)

The reason for what may appear a confused situation on the apparently simple issue of whether making an accessible website is more expensive can again be understood by contrasting rhetoric's and realities. Some web developers regarded basic level 'A' guideline conformance as producing an accessible site. Others took a realistic stance which suggested although level 'A' can be achieved at minimal cost; this would not necessarily guarantee an unproblematic usable site:

It's just the actual process of doing and checking. You can build a website, but to make sure everything works correctly is kind of a validation process. Is everything right? Is the menu working OK? (XXXXX & XXXXX 2008: Company C: 3)

If the site is more complex you try to second-guess pathways through for people who are blind or partially sighted or things like that. A lot of thought

needs to go into this and the bigger the site the more thought and the more complicated it gets. (XXXXX & XXXXX 2008: Company B: 9)

Generally, web developers regarded basic compliance to accessibility guideline sat level 'A' as meeting accessibility requirements. At this level it was common to find the view that level 'A' would not require user testing to validate websites. The issue of validation only appeared as higher levels of accessibility were desired, and it was the issue of validating sites through testing which generated greater time and hence cost on to websites. The following section considers how web developers rationalised the use of validation through testing after commissioning a website.

#### Accessibility Testing of Websites

All interviewees generally agreed that the testing of websites would be important, but few of them actually did significant accessibility testing before delivering websites to clients. The main reason for this was the additional time and effort required for carrying out the testing:

The testing takes for ages. You certainly want to use some of the technologies that visually impaired use and make sure it is compatible with that. (XXXXX & XXXXX 2008: Company C: 3)

In the public sector, the more common practice was to purchase products including user testing from outside specialists:

The read speaker service that we are purchasing is round about £2,500. This is quite a substantial take of our budget (XXXXX & XXXXX 2008: Company PS A: 2)

This level of commitment to web accessibility seems to be rare, even in the public sector. Several private sector organisations commented that ideally websites should be tested by disabled user testers, as this would be the only way to make sure that disabled people can use the website. One company (Web Company D) said that they had done this in the past, but eventually stopped the practice because clients would not pay for it. Another web developer had similar experiences:

We realistically should use visually impaired or impaired in another way to actually go and test it. But there is no way to do that. You simply cannot deliver that bit. (XXXXX & XXXXX 2008: Company C: 2)

Some web developers (Company B) suggested that there could be a future market for user testing websites, providing legislation was enforced. At the moment, many web developers argued private sector organisations would not have to fear any legal consequences for not making their websites accessible: If the risk to me is not even one in a thousand chance. It is a one in a million chance that they have actually legal action taken against them. (XXXXX & XXXXX 2008: Company C: 8)

However, although the above applies a 'hard' business rationality to producing accessible websites, other web developers argued the essence of



accessibility should be based not only on legal enforcement policies, but also as a matter of social justice:

I think the industry generally felt it was pushed upon them... our users are not blind anyway, why should I have to bother? But these days most of us realise that it is a moral obligation as well as a legal obligation to at least do the basics. (XXXXX & XXXXX 2008: Company B: 10)

The majority of web developers agreed that the only practical way of ensuring websites were accessible would be through applying a business case rationality. However, as identified above, this view was often accompanied by the social justice argument implying organisations had a moral imperative not to discriminate against any minority in society. Whilst such arguments appear firmly rooted in the private sector, by comparison the reality of attempting to engage more disabled people in work lies firmly in the hands of employment specialists the largest of which are located in the public sector.

#### Project Website

The experience of creating the project website, with one of the companies who also gave us an interview, was both salutary and informative. One section of the website was intended to be used by disabled computer users to firstly provide proof of their internet capabilities, and secondly to generate data on the accessibility of employment related websites that were commercially operating on the web. To achieve these objectives, the website was required to collect information from user testers. From a technical perspective, the data collection required two methods of user tester interaction. Firstly, edit boxes were needed to allow user testers to fill in personal details such as name and email address; secondly radio buttons were required for answering simple binary opposites. For example the question, 'Do you define yourself as disabled?' Had two check boxes for answers, 'Yes' and 'No'. For people who do not use a mouse to position the cursor, activation of the appropriate check box is achieved by pressing the keyboard space bar when the desired answer is arrived at using the keyboard up or down arrow keys to navigate. Although entering data in text boxes never caused any accessibility problems, finding a method to allow access to the questions and radio button answer selection again proved extremely problematic. In brief, the screen reader could not initially read the related questions which required check boxes to be selected. Hence as the screen reader was moved down the webpage, it simply announced 'Yes', 'No', repeatedly without reading the related question to be answered.

There are guidelines and published techniques for ensuring that the coding behind checkboxes and radio buttons work with screenreaders, involving labelling and specific code ordering. However, the problem of reading a question and then providing radio selection buttons as responses was not in itself a simple issue of appropriate coding. After multiple unsuccessful attempts to solve the problem within the site, the web developer returned to a simple basic one page of html coding with one question: 'Do you like rabbits?' with two 'Yes/No' radio buttons for responses. This single webpage worked perfectly with the screenreader, but when this code was incorporated into the full website the problem returned.

Coding up forms according to the guidelines, in short, worked fine in isolation, and the screen reader had no problems interpreting it properly. Within the design that had been produced, however, properly positioned using Cascading Style Sheets with structural html, the form ceased to work. An unusual, technically valid but counter-intuitive coding structure needed to be adopted, before the screen reader would work with it. In this case the code that actually worked could not be described as structural html, thereby rendering most keyboard shortcuts unusable, and was on the contrary – to the eye of a web accessibility specialist - rather clumsy-looking code, yet more accessible than the original more guideline-compliant code had been.

This points to what must clearly be one of the most important findings of this part of the project: In the context of CSS positioned designs, unplanned-for anomalies, about which there is no mention in any specification or guideline on the W3C, may arise, rendering otherwise compliant code in practice inaccessible. Making the code accessible may require counter-intuitive recoding that whilst validating against specifications may run counter to the letter of the guidelines. This is most common in the case of more complex code structures such as HTML forms.

## Conclusion

It is clear from the findings of the project that most websites in the job opportunities sector are not following professional standards of web development, and that professional standards of web development need to be augmented with user testing to ensure proper accessibility.

Of particular note is that there is a common belief amongst web developers that there should not be any additional cost in making websites accessible, as the expertise to create a site professionally should be in place from the start, and that accessibility will follow from applying professional standards

This was the view found in the majority of web developers interviewed for this research. However, this research has shown these beliefs in the web development community to be quite possibly erroneous. On the contrary, it seems that additional costs may be incurred due to the need for disabled user testers to be involved in ironing out 'bugs' not foreseeable through the use of professional standards, and accessibility does not always follow from applying professional standards, but requires user testing.

A closely related outcome to the above findings, therefore, is that professional standards – i.e. the use of valid W3C code and adherence to Web Content Accessibility Guidelines – is not enough to ensure accessibility, and that different versions of XHTML and CSS, the range of different browsers with differing implementations of same, and the range of different assistive technologies with differing support and responses to same, altogether, present too many variables and potential for unusual outcomes, for a simple professional approach to coding to be sufficient. User testing will likely find problems needing attention.

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