

2012

Web Accessibility in Corporate Australia: Perceptions versus Reality

Justin Brown
Edith Cowan University

Vivienne Conway
Edith Cowan University

This article was originally published as: Brown, J. A., & Conway, V. L. (2012). Web Accessibility in Corporate Australia: Perceptions versus Reality. Proceedings of The 2012 International Conference on Internet Computing (ICOMP2012). (pp. 157-163). Las Vegas, Nevada, USA. CSREA Press.

Original article available [here](#)

This Conference Proceeding is posted at Research Online.

<http://ro.ecu.edu.au/ecuworks2012/149>

Web Accessibility in Corporate Australia: Perceptions versus Reality

Justin Brown¹, Vivienne Conway²

¹School of Computer & Security Science, Edith Cowan University, Perth, Western Australia

²School of Computer & Security Science, Edith Cowan University, Perth, Western Australia

Abstract - *In this paper we describe the results of website audits and survey responses for organizations involved in the Australia Web Awards for 2011. 160 organizations entered their sites or sites they had developed as part of the awards, and in doing so were required to select the level of WCAG compliance for their site. Audits conducted on these sites after the awards completion showed that very few of the entrants actually met their selected level of accessibility compliance, regardless of the organization type. Survey responses from participating entrants in the AWA indicated that they were aware of the WCAG guidelines and various levels of compliance, and had experience in accessible design. Entrants also indicated knowledge of accessibility tools and methodologies, yet failed to produce sites with even rudimentary levels of accessibility. The paper concludes that whilst the Australian government is moving towards a framework of mandatory accessibility, the developers and designers involved in this study still see accessibility as largely optional..*

Keywords: Web accessibility, Compliance, Guidelines, Australia, Web, Awards.

1 Introduction

Each year in Australia the Australia Web Awards recognize excellence in website design across a variety of categories and purposes. Websites can be entered in one of nine categories, Personal, Ecommerce, Commercial, Government, Education, Culture & Events, Not for Profit, Innovation and Mobile. Entrants are self nominating and their sites are judged in two stages;

Stage 1

- Site validation
- Site performance
- Accessibility Compliance
- Responsive design compliance

Stage 2

- Visual design

- Content
- User experience
- Development
- Credibility
- Accessibility

The scoring system works on a lowest score is better approach, and those sites with the lowest scores progress from Stage 1 to Stage 2. Judges are recruited from industry, government, universities and individuals with expertise and experience in the various judging categories. The authors of this paper were judges in the 2011 Awards in the Accessibility and Development categories.

This paper examines website accessibility issues associated with the 160 AWA 2011 entrants and their perception and understanding of website accessibility. The timing of this research and the data from the AWA was considered opportune given the Australian government's adoption and implementation of the Web Content Accessibility Guidelines 2.0 as of 2010. This adoption of the WCAG guidelines is laid out in the National Transition Strategy (NTS) [1, 2] and sets targets for all Australian Federal, State and Territory websites to meet WCAG 2.0 single A compliance by the end of 2012, and double A compliance by the end of 2014. Whilst these requirements do not apply to commercial and non government organizations, it will impact upon those organizations which design, implement and manage government based sites and services. Given that the AWA 2011 awards were conducted just over a year away from the 2012 deadline, it was thought that data from the 2011 awards would help communicate a certain 'state of play' as to Australian organizations and their understanding and approaches to website accessibility.

This research was conducted after the awards had been completed and winners announced. Elements of this work build on that of Freire [3], though rather than just surveying participants about their attitudes to web accessibility, this paper offers data on developers and the level of compliance they actually selected for the websites they designed.

2 Data Collection

This research made use of a number of data sources for the results presented below, including;

- a web based survey of entrant's views and understanding of accessibility issues
- each entrants claim against WCAG guidelines
- automated audits of all 160 entrant's websites
- manual audits of those websites that passed any level of WCAG compliance.

The survey and audits took place approximately eight weeks after the final winners of the 2011 AWA were announced.

2.1 Recruitment and Participants

Once the winners of the AWA 2011 awards had been announced the authors of this paper contacted the organizing committee of the AWA and requested that they assist in this research. They were asked if they would send an invitation to participate to the 160 entrants from the authors, with the invitation containing a description of the research aims, assurances of anonymity and the contact details of the authors. The entrants who responded to the invitation and made contact with the authors were then sent a fuller description of the research aims of the project and a randomly generated identifying number which they entered when filling in a web based survey. This number was linked to the name of the organization (or individual) so that each set of survey responses could be identified by the researchers, but de-identified for any published research outcomes. Participating entrants were assured of the de-identification of their organizational details for any resulting publications, and were also provided with contact details of a university Research Ethics officer who had been involved in the Ethics approval process for the research project. Participating entrants followed a URL to a web based survey which focused entirely on website accessibility.

2.2 Web Survey

The web survey consisted of 29 questions covering entrant's organization type, web development experience (in terms of years), accessibility training, accessibility testing, tools and practices as well as their own definitions of the meaning of accessibility. Some of the questions were adapted from previous research [4, 5] and were thus considered field tested. None of the questions were mandatory, so in some cases respondents could choose not to answer some of the survey questions. The survey questions included open-ended and closed responses, Likert-scale and multiple choice options. The primary aim of the survey was to provide context to the results of the site audits compared to the WCAG compliance claims of each of the entrants. Given the nature of the recruitment process and the opt-in approach to survey participation, it was expected that of the 160 AWA

entrants, perhaps 20-30 might complete the survey component of the research. However, in the end only six of the surveys were completed at the time of writing, and as a result, while occasional references will be made to survey data, it will not be presented in this paper.

2.3 AWA Data

The AWA committee provided the list of all 160 entrants in the 2011 awards, including the type, name and URL of each organization and their website as well as their self selected level of WCAG compliance. This data was useful for a number of reasons, including compliance checking and patterns as to which types of organizations chose what type of WCAG compliance (if any). The URL for each site was used to inform the automated and manual audits of the AWA entrants. The breakdown of organization type is shown in Table 1.

Table 1. Breakdown of organization types

Organization Type	Number
Commercial (C)	45
Culture and Events (CE)	17
Ecommerce (EC)	27
Education (ED)	10
Government (G)	20
Innovation (I)	12
Not For Profit (NFP)	20
Mobile (M)	6
Personal (P)	3

It is perhaps not surprising that the Commercial and Ecommerce categories were amongst the largest as these represented large organizations or website developers wishing to receive industry recognition for their online presence.

2.4 Website Audits

Each of the 160 websites was audited using SortSite, an automated accessibility testing tool developed by PowerMapper Software. SortSite is a client side rather than cloud based testing tool that checks all levels of WCAG 1A through 2AAA as well as US Section 508. SortSite was selected for this research as the authors have used it

extensively due to its strong reporting capabilities and perceived accuracy [2, 4, 5].

In a longer term study full manual audits would also have been conducted alongside the automated SortSite testing, however time constraints did not permit this approach. Manual audits were conducted, but only on those sites that were identified by SortSite as meeting a given WCAG level of compliance. This was done so as to ensure that the automated tool was not returning false positives. All sites were also run through the World Wide Web Consortium's (W3C) HTML validation tool to check for any issues of compliance to standard HTML coding conventions.

3 Results

Results from the WCAG compliance claims are shown below in Table 2. The first column in Table 2 shows the abbreviated name of the organization type, with the following columns showing the level of WCAG compliance each of the organizations selected for their site during their entry submission process. The Commercial (C) organizations show WCAG compliance selections across the board, with 35% indicating no level of compliance as the most common selection. WCAG 2.0 single A, the NTS target for 2012, received only 17% of the selections by Commercial organizations. Aside from the 'None' selection, it did appear that the Commercial organizations did favor the WCAG 2.0 compliance levels over the now outdated 1.0 options.

The Culture and Entertainment (CE) organizations also indicated 'None' as their preferred WCAG compliance selection, with 47% of the organizations choosing that option. When looking at the remainder of the CE responses, WCAG 1.0 received slightly more selections than the WCAG 2.0 options, with nothing selected at the WCAG 2.0 single A level.

Table 2: Organization type WCAG compliance claim

	None	1A	1A A	1AA A	2A	2A A	2AA A
C	16	1	3	2	8	6	1
CE	8	4	1	0	0	3	1
EC	6	3	1	0	3	7	7
ED	2	2	0	1	1	4	0
G	4	5	0	0	3	6	2
I	4	2	3	1	1	1	0
M	4	1	0	0	0	1	0

NF P	5	5	4	0	0	5	1
P	0	1	0	0	0	2	0

The Ecommerce (EC) organizations showed a greater tendency towards the WCAG 2.0 compliance options, with WCAG 2AA and WCAG 2AAA being selected most by the Ecommerce providers (26% respectively). The Ecommerce organizations were those that not only had a web presence, but conducted a majority of their business through the web. These numbers could perhaps be explained by these organizations having the web as their primary interface to their customers, and that they should not only know that the WCAG 2.0 options are the most industry relevant, but that WCAG 2.0 AA and above would be needed for successful transactional websites. Whilst there was too little survey data returned to support this thesis conclusively, given the organizational type and levels of compliance selected, it is at least plausible. The Education (ED) organizations had WCAG 2.0 AA as their most selected level of compliance (40%), with only 20% selecting 'None'. Interestingly, only one of the 10 educational organizations was a government run school, a school which will fall under the tenants of the NTS and WCAG 2A compliance by the end of 2012. The school in question selected WCAG 1AAA as their selected level of compliance but did not even achieve WCAG 1A, leaving considerable room for improvement before the end of 2012.

The Government (G) organizations saw WCAG 2AA as the most popular selection (30%) followed by 25% selecting WCAG 1A. As one might expect for government sites working within the NTS framework, WCAG 2.0 options were more prevalent than 1.0. After the Ecommerce organizations, Government had the highest number of selections in the WCAG 2AAA level of compliance, a level they most certainly did not obtain. The Innovation (I) organizations had 'None' (33%) as their most common compliance selection followed by WCAG 1AA. Whilst these organizations were defined as those being 'innovative' they did not seem to apply that approach to their accessibility compliance, with fully half of their selections coming from the dated WCAG 1.0 options. The Mobile (M) organizations had only six entrants overall, with four of those six (66%) choosing 'None' as their level of accessibility compliance. Given the nature of developing mobile technologies and the uneven spread of accessibility tools available to mobile platforms, this is perhaps an understandable outcome, certainly as of 2011/2012. The Not For Profit (NFP) organizations had 25% selecting None as their level of compliance, with 25% selecting 1A and another 25% selecting 2AA. Overall these organizations leaned towards WCAG 1.0 end of the compliance scale. Finally, the Personal (P) category was for individuals wishing to enter

their own sites for AWA 2011 judgment. There were only three entrants in this category, with two of the three selecting 2AA as their compliance level and the other selecting 1A.

Having discussed the breakdown of organization types and their claims for accessibility compliance, the results of the audits against those claims can be examined. Basically, of the 160 entrants, only two actually met or exceeded their selected level of compliance. One of the organizations was in the Ecommerce category, selecting and passing WCAG 1A, whilst the other organization was a Not for Profit, also selecting and passing WCAG 1A. Two Commercial organizations that selected 'None' as their compliance level did in fact pass WCAG 1A, with one of them just a few small errors short of WCAG 2A. Overall 17 (15.3%) of the 111 sites that had selected a compliance level passed WCAG 1A, with two of those also passing WCAG 2A. However, as these results indicate, only 1.8% of the entrants in the AWA 2011 actually met the level of compliance they indicated as part of their entry. This would seem to paint a bleak picture of the prescience of web accessibility in the processes and priorities of Australian organizations with a Web interface to the general public.

Whilst space does not permit a full discussion of the survey responses and audit results, it is worth looking at some of the most common types of compliance issues to arise during the audit of these sites. The following figures do not represent every single error present in each site merely that at least one error existed at that level.

3.1 WCAG 2.0 A Errors

Looking at the WCAG 2 single A priority level, we see that this fundamental level of accessibility compliance caused the entrants in the AWA 2011 some issues.

3.1.1 Guideline 1: Perceivable

Guideline 1.1.1 refers to text alternatives. Of the 160 entrants, 128 had a minimum of one page that failed this point. Given the automated nature of the testing tool used, these errors would be indicated when an image did not have an associated alt text value or where that alt text value contained a reference to a file extension, such as .jpg or .gif. This typically occurs where developers have used automated site design tools that automatically add text alternatives to images, using the image's filename as the default value, such as;

```

```

Such use of the alt text approach visually tells visually impaired users little if anything about the content and purpose of the image. Significantly more errors would have been identified in a manual audit of the pages in question. For example, 1.1.1 requires that the alternative text adequately

describes the information visually displayed. An image that stated 'woman on the phone' would not convey the information that this is a picture of the call centre and would be better to state 'our new state-of-the-art call centre is open to assist you'. Also alternative text is often provided for decorative images that should be ignored by screen readers by use of the null attribute (alt="") and is often provided as alt="bullet" or similar. A manual audit would highlight many instances of redundant textual information which would also fail 1.1.1. An example of this is often found in providing alternative text for an image and then having the same text in the accompanying textual information (alt="Our Call Centre" <p>Our Call Centre...</p>). This causes the information to be read to the user twice which is confusing and time-wasting. In such a case, the image would be more efficiently encapsulated with the text and provided with a null attribute. As stated, the information provided in this analysis only relates to those errors located with automated testing and serve only as a baseline estimate of the errors in the websites.

Items that generally appear under Guideline 1.3.1 Information and Relationships relate to forms and labels, tables, lists, and structure (headings). This category had one of the highest rates of errors (135 out of 160). Correctly structured web pages make it possible for users to navigate through the page via the use of the headings, understand the structure of the page and locate the desired section. It assists the user to fill in a form through the correct use of form labels and their programmatic association with the form field. Tables should be used for data purposes (rather than layout) and correctly structured with headings and summaries. Where a table is used for layout purposes (not considered best practice), there are no table headings or summaries, thereby allowing the screen reader to ignore the use of the table features. These functions are level A criteria because of their necessity for the user's interaction with the web page.

Guideline 1.4.3 relates to the minimum colour contrast which is easily checked via the Web Accessibility Toolbar [6] via the link to the Colour Contrast Analyzer application. The minimum colour contrast for normal sized text is 4.5:1. There were 75 websites where the colour contrast failed this test. In practice, the automated tools do not locate the majority of issues of colour contrast which is usually set in the CSS. Our experience has shown that many websites have at least one issue of colour contrast causing it to fail this criterion. There were also 46 websites that used colour inappropriately e.g. "Click on the red button", or where errors on form fields that require correction are indicated only by way of colour such as highlighting without additional textual clues.

Guideline 1.4.4 requires that the content of a web page may be resized by either the browser (zoom or text size options) or a provided feature on the web page. There were 130 instances of failures in this category which would require manual verification. In many instances the text can be

enlarged by using the browser zoom feature or Ctl++, but will only work in some sections of the page – e.g. main text but not within forms.

3.1.2 Guideline 2: Operable

For Guidelines 2.1 (Keyboard accessible), there were 40 pages that contained problems for the keyboard user to access all of the functions of the web page (2.1.1), including 10 instances of keyboard traps (2.1.2). A failure in 2.1.2 is a critical Level A failure point causing a whole page to fail compliance. These are areas where the user can get into a function of the page, but is unable to get out again. This is often the case with keyboard controls for multimedia features.

There were 115 instances where there was a lack of ability to bypass blocks of text (2.4.1). This is a necessity for the keyboard or screen reader user and is usually provided by way of skip links (skip to main content, skip navigation etc.), and/or properly structured headings. The user can bring up a list of headings and choose the heading they would like, thereby skipping blocks of text (navigation normally) that is repeated on every page.

Guideline 2.4.2 refers to page titles. There were 134 instances of sites with errors in this category. A page without a title or a page that has the same title as another page would prompt the automated tools to identify an error in this category. Again, a manual audit would undoubtedly locate many more errors, as the guideline requires that the title adequately describes the page content or purpose.

There were 104 errors in category 2.4.4 which refers to the provision of link text (in context). At this level, the designer may use ‘read more’ etc., but only in context such as within a sentence or paragraph which can be programmatically determined. If the link is provided on a new line the automated tools will identify it as an error. Best practice would suggest that links never be labeled in this manner as the screen reader user routinely requests a full listing of the links on a page as a more efficient method to locate required information. If a page had links displaying ‘read more’, even in context and thereby passing this criterion, the screen reader would see a list showing all links as ‘read more’ with no additional information. This would require the user to click on each link to find out where it goes. Guideline 2.4.9 which is a AAA requirement states that the link should make sense in or out of context and is often referred to as ‘best practice’.

Guideline 2.2.2 requires that wherever there is a moving image (e.g. a slide carousel) that there is a provision to pause, stop or hide the moving feature. 25 of the web sites had features that failed this criterion. This is a critical Level A failure point, W3C state that a failure in this issue would cause a whole page to fail compliance.

3.1.3 Guideline 3: Understandable

One of the most common errors in this category is the failure to set the language attribute (3.1.1) for each page. A total of 75 of the websites had at least one failure in this category which is a simple item to remedy. Failure to set the language attribute makes it difficult for the screen reader to identify the pronunciation of the words on the page. The AA requirement of setting the language of parts of the page requires that where a section of the page has information in another language (e.g. a block quote) that this information is provided at the start of this section.

3.1.4 Guideline 4: Robust

This section covers just two points, both of which are Level A criteria – parsing (code validation) and name, role, value (refers to the necessity for the name and role to be programmatically determined). In all, 105 of the 160 websites had a failure in code validation. The W3C provide a free validation service which can be accessed from the W3C service, and the Web Accessibility Toolbar[6] also provides a link to this same service. Automated tools are generally accurate in identifying these errors as they use the W3C validation service.

A common error in 4.1.2 (name, role, value) is where there are no label elements to associate the text labels with the form controls or a title has not been used in cases where a label is not possible. There were 117 of the 160 websites with errors in this category.

3.1.5 Critical Errors

WCAG 2.0 identifies four criteria that can interfere with a user’s ability to use the whole page. These are:

1.4.2. Audio Control

2.1.2. No Keyboard Trap

2.2.2. Pause/Stop/Hide

2.3.1. Three flashes or below threshold

The automated checking of the websites in this research showed that 1 website had an issue with 1.4.2, 10 had issues with 2.1.2, and 25 had issues with 2.2.2. None of the websites had an issue with 2.3.1. The fact that 16% of the websites had errors in 2.2.2 (pause/stop/hide) is a concern due to the problems that are encountered by users with moving text. The Understanding WCAG 2.0 document states:

Content that moves or auto-updates can be a barrier to anyone who has trouble reading stationary text quickly as

well as anyone who has trouble tracking moving objects. It can also cause problems for screen readers.

Moving content can also be a severe distraction for some people. Certain groups, particularly those with attention deficit disorders, find blinking content distracting, making it difficult for them to concentrate on other parts of the Web page. Five seconds was chosen because it is long enough to get a user's attention, but not so long that a user cannot wait out the distraction if necessary to use the page.[7]

3.2 Discussion

The site audits and the AWA 2011 entrants selected accessibility compliance presented in the previous sections paint a somewhat contradictory picture. Nearly 70% of the AWA 2011 entrants selected their work as being accessible to some level of WCAG compliance, though in the end less than 2% of them actually met their specified targets. It is difficult to draw conclusions as to which particular type of organization examined in this study is more accessibility conscious when so few organizations demonstrated any real accessibility acumen. Though the survey responses were limited in number (and thus not addressed here), the few responses did allude to organizations being aware of website accessibility guidelines and the need for compliance to such guidelines. The organizations even seemed to indicate a solid grasp of the technical processes of website testing and what tools are used for what purpose.

However, the above results show that for the most part accessible website design is still considered as mostly optional in the Australian developer community, or at least those represented in this study. Sloan [8] et al state in their 2006 (p 121) study of disappointing web content accessibility 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 the effective and appropriate implementation of accessible Web design techniques”. In the years since Sloan’s study, it appears that not a great deal has changed, certainly in the Australian web design landscape. Results from this study would indicate that the entrants in the AWA 2011 did appear to have a solid awareness of the need for website accessibility, and certainly indicated an understanding of the appropriate tools and techniques required to achieve accessibility compliance. What appeared to be missing was the interaction of awareness and technique leading to accessibility compliance, as demonstrated in by the WCAG 2.0 compliance issues covered in Section 3.1.

It could be argued the representative group of site owners and developers presented in this paper do have an awareness of web accessibility guidelines and techniques, and that awareness has not lead to adoption. Harper [9] discusses technology adoption timelines and concludes that technologies will be adopted when there is a compulsion to

do so, in this case, a compulsion by site owners and developers. Whilst many of the 160 AWA 2011 entrants featured HTML5, CSS, JavaScript, AJAX, CMS solutions and links to social media tools, apparently adoption of WCAG guidelines was not considered a core technology requirement. Accessibility appears to lack the ‘wow factor’ of these other immersive, visual and aural technologies.

The research of Loiacono [10] examined some of the factors which may influence large organizations not achieving appropriate levels of accessibility compliance. These factors included technical difficulty, experience levels, standards not being useful due to rapidity of technological change and financial factors. It seems likely that some of these factors might have impacted on the results of this current study, whether the respondents were aware of it or not. To a certain degree this study assumed a level of accessibility practice, due in large to 70% of the AWA 2011 entrants selecting some level of accessibility compliance. To that end the web survey did not explore reasons for non compliance, but rather reasons and methods for compliance.

4 Limitations of the Study

The primary limitation of this study was the poor response rate to the web survey component, with only six of 160 respondents to the survey providing responses. To that end the core focus of the data presented in this paper is the compliance levels selected by each of the AWA 2011 entrants and their actual level of achieved compliance as a result of automated and manual audits. Whilst the survey data was not discussed in the limited space available to this paper, the six respondents did speak positively and knowledgeably about accessibility, and in their own perceptions, saw themselves as accessibility practitioners.

5 Conclusion

This paper shows the results of a single study but one which fits in a broader group of studies looking at how Australian organizations, such as business, government, university and not for profit are moving towards a website accessibility compliance mindset. This paper is essentially a report card on Australian organizations which develop or own websites which are the primary interface to their clients and the general public. As Australia heads into an era of the NTS and its impact on the country's government and aligned organizations, it seemed opportune to take a snapshot of the Australian web community (in this case represented by the AWA 2011 field). Just as Kane's [11] university report card and Loiacono's [10] initial study of Fortune 100 organizations revealed extremely poor website accessibility compliance in those sectors, this study reports that Australian web businesses have much work to do in order to achieve the very compliance goals they set for themselves. Many chose the low hanging fruit by selecting outdated WCAG 1.0 levels of compliance, whilst others aimed high at WCAG 2 AAA. For

all but the minority of organizations in this study the results were failure. Whilst the full reasoning for this remains elusive due to small numbers of survey respondents, it appears that for now, Australian web developers are committed to website accessibility, compliance optional.

6 References

- [1] Office, A.G.I.M. Web Accessibility National Transition Strategy. 2010 [cited 10/1/2012]; Available from: <http://www.finance.gov.au/publications/wcag-2-implementation/index.html>.
- [2] Conway, V., Website accessibility in Australia and the Australian Government's <i>National Transition Strategy</i>, in Proceedings of the International Cross-Disciplinary Conference on Web Accessibility. 2011, ACM: Hyderabad, Andhra Pradesh, India. p. 1-2.
- [3] Freire, A.P., C.M. Russo, and R.P.M. Fortes, A survey on the accessibility awareness of people involved in web development projects in Brazil, in Proceedings of the 2008 international cross-disciplinary conference on Web accessibility (W4A). 2008, ACM: Beijing, China. p. 87-96.
- [4] Conway, V., Website accessibility issues in Western Australian public libraries in School of Computer and Security Science. 2010, Edith Cowan University: Perth, Western Australia.
- [5] Conway, V., Website Accessibility in Western Australian Public Libraries. Australian Library Journal, 2011. 60(2): p. 102-112.
- [6] Paciello Group. Web Accessibility Toolbar for IE, 2011. 2011 [cited 2011 September 7]; Available from: <http://www.paciellogroup.com/node/18?q=node/22>.
- [7] W3C. Understanding WCAG 2.0: A guide to understanding and implementing Web Content Accessibility Guidelines 2.0. 2012 [cited 2012 March 1]; Available from: <http://www.w3.org/TR/UNDERSTANDING-WCAG20/Overview.html#contents>.
- [8] Sloan, D., et al., Contextual web accessibility - maximizing the benefit of accessibility guidelines, in Proceedings of the 2006 international cross-disciplinary workshop on Web accessibility (W4A): Building the mobile web: rediscovering accessibility? 2006, ACM: Edinburgh, U.K. p. 121-131.
- [9] Harper, S. and A.Q. Chen, Web accessibility guidelines: A lesson from the evolving web. World Wide Web, 2010. 15: p. 61-88.
- [10] Loiacono, E.T., N.C. Romano, and S. McCoy, The state of corporate website accessibility. Commun. ACM, 2009. 52(9): p. 128-132.
- [11] Kane, S.K., et al., A web accessibility report card for top international university web sites, in Proceedings of the 2007 international cross-disciplinary conference on Web accessibility (W4A). 2007, ACM: Banff, Canada. p. 148-156.