Using CMS to implement accessibility and improve ROI
Do current CMSs help businesses to deploy accessible sites that also provide ROI?

James F. Lofton
HCI511–Designing for Disabilities
Instructed by: Dr. Adam Steele
DePaul University
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ABSTRACT

Content management systems (cms) have become ubiquitous in the maintenance and update of web sites for most organizations. As with the architecture of building/facilities, many organizations are realizing the need for creating web site architectures that are accessible to those with disabilities. This paper reviews the accessible capabilities of several cms's, whether they really support/enforce accessibility and how easily can it be supported, how can you evaluate this capability and what are the costs involved.

KEY WORDS
content management, accessibility, ROI, WAI compliant, section 508

1. Introduction

Many organizations today have moved to using a content management system (cms) for managing and updating their web sites. While the term content management system can be applied to a broad range of applications/systems, for our purposes here, a cms is a web based interface to a database or other storage type that allows web content to be displayed in a template or grid. The updating and editing of content is also done typically via a web interface. Many organizations use CMSs to ease web site management by allowing nontechnical users to own/update content. It also provides brand reinforcement and consistency to site presentation. Different CMSs offer a variety of other capabilities, such as; workflow management, calendars, forums, mailing lists and other web applications that make online interactive relationships possible with customers, vendors, and the public in general.

Making a web site accessible is often an afterthought to most organizations. While guidelines have been established for over 5 years, after a series of well publicized court cases, it is only recently that organizations have begun to take them seriously, On the other hand, many governments (including the US) have already made accessibility a requirement for agency web sites. With the advent of CMSs, making web sites accessible should be easier, but this is still dependent on the CMS design and implementation. Accessibility may still require extensive training of content managers and the proper design of templates even if the CMS is compliant. Implementing accessibility may be somewhat costly, but the ROI of making a site accessible should offset those costs. First, by opening your site to a segment of customers you were not reaching before, you should realize some increase in revenue or cost savings from web based self-service. Additionally, you will also avoid costly legal liability which should be calculated by both the potential damages and the impact of negative publicity. Lastly, using a CMS can help lower the costs by minimizing the amount of effort required for keeping a site accessible.

2. Web Accessibility Guidelines and Requirements

The Americans with Disabilities Act & Section 508 of the Rehabilitation act

The Americans with Disabilities Act (ADA) is a Federal civil rights law that prohibits the exclusion of people with disabilities from everyday activities, such as buying an item at the store, watching a movie in a theater, enjoying a meal at a local restaurant, exercising at the local health club or having the car serviced at a local garage.[1] While the ADA does not specifically address the internet or web sites, it has been a growing area of potential risk for organizations if their sites fail to be accessible, given that all web sites have been developed after the ADA was passed. On the other hand, Section 508 of the Rehabilitation Act requires the web sites of federal/state agencies be accessible to persons with

disabilities. Section 508 was specifically created to address the fact that the services and resources of the federal government, provided through web sites, must be accessible to all citizens.[2] They provide a checklist of items to implement in order for a page to be considered accessible. Together the ADA and section 508 of the Rehabilitation act form a foundation upon which legal precedence is being built on. Later in this paper I will look at some of the recent legal cases and their impact on future legal liability.

WCAG

The World Wide Web Consortium (W3C) has produced a set of guidelines for making web sites accessible appropriately labeled Web Content Accessibility Guidelines (WCAG).[3] While not legal statute, the guidelines establish standards which could be used as means of judging whether a site is accessible or not. These guidelines are broken out in three priority levels, where meeting priority 1 is considered the minimum acceptable level for meeting accessibility requirements. These include providing text equivalents for non-text elements, information conveyed in color is available without color, leading ultimately to the fall back of providing alternate pages that are accessible. Priority level 2 are things that improve the accessibility significantly, but if not used, make the page difficult for one or more groups or populations. These include using proper coding techniques, avoid effects that may cause problems for assistive technologies, and do not use tables for layout unless the content makes sense linearized. Priority level 3 deals with improving accessibility as a holistic process. This includes adding redundant navigation, organizing content/navigation, and creating consistency in the overall site. Most of the section 508 and WCAG guidelines are related to visibility based accessibility.

3. Tools for measuring accessibility

To evaluate the accessibility of a CMS, A variety of tools can be found at the WCAG site (http://www.w3.org/WAI/ER/existingtools.html). For the purposes of my review, I looked at a few tools based on how they can be used, between web based and client tools.

Web based tools

There are a number of tools for measuring or evaluating the accessibility of a web site. First, I looked at web based tools as these can be easily applied in most cases. One of the most well known is Bobby (http://bobby.watchfire.com/bobby/html/en/index.jsp) [4]. Simply type in (or copy from the address bar for the lazy) an URL, select a standard (WCAG or section 508) and Bobby will do an instant analysis. The first part of the report is the page you entered stripped of styles and some other formatting/layout with the addition of icons that indicate where possible accessibility problems occur. This is followed by a break out by priority level and separates automatic violations from those that require user assessment (for WCAG analysis).

Another tool available is called CynthiaSays which uses the HiSoftware engine (http://www.contentquality.com/) it is similar to Bobby, but offers an in depth analysis of the img tag alt attributes.[5] The report generated also includes a full checklist of all priority items including ones that it couldn't evaluate. This is helpful to users in being able to run the report and then print it out to do the user/manual checks. It also allows you to emulate browsers, although I am not sure what the purpose is as the failure of a checkpoint will be the same in any browser... a missing alt text is a missing alt text.

Client Applications

There are a number of client applications that can be used from the desktop and can be used on sites in development that may not be available to the outside internet. Both Bobby, and Cynthia Says offer client versions of their tools. As well there is a tool called aDesigner, which tries to measure more than just compliance (http://www.alphaworks.ibm.com/tech/adesigner).[6] And of course Dreamweaver MX has built in accessibility reporting, which can be run on one or more pages in a site.[7] There are also some plug-ins available for DreamWeaver such as one offered by the Usablenet group.[8]

Effectiveness

All of these tools are limited in how much they can validate by automatic means, as there may be elements that are not evaluated because the guideline requires more refined judgment of the content in its context. As Sloan noted, they do not offer any judgment on actual usability for either disabled or non-disabled persons [9] A major drawback of the web based tools is the ability to only check one page at a time. For the client tools, while they can typically be run against a group of pages or a whole site, there are a number of issues which include such things as, they may pass pages that actually should fail because they do not properly evaluate scripting elements or other dynamic components. Tools that run on the client will also need to be upgraded if there is a change in

the guidelines, and of course they usually cost money.

User Assistive Applications

Aside from automated tools there of course are a number of user applications that are used to browse the web that provide assistance to users with disabilities. A more formal analysis should be conducted using real users who have visual disability. For my purposes I selected a couple of applications to do some basic heuristics in evaluating the experience.[10] The two applications I used were Simply Web 2000 (http://www.econointl.com/sw/) and the Lynx text browser. Simply Web is a screen reader type browser similar to the IBM home page reader. It is free, and works only on Windows systems, but does not seem to be actively developed as there is no XP version. The Lynx text browser is a command line tool that displays the page as, you may have guessed it, text only. This is useful as it allowed me, as a visual user, to see how the page is presented serialized, as Lynx does not support CSS or javascript.

4. Review of several CMSs capabilities for accessibility

As noted in the introduction, a CMS should make meeting accessibility requirements easier. I selected a range of CMSs to evaluate, from an enterprise commercial option to an open source solution. This was done to understand the process involved in making a site accessible and to be able to estimate the costs.

Review of select CMSs

The process for choosing a CMS for evaluation involved a number of steps. Using a few sites for research, I looked for CMSs that were WAI compliant.

Information on CMSs

- **CMS matrix**
  (http://www.cmsmatrix.org/matrix?func=search&wid=2)
  An excellent resource that allows you to select the features in a an CMS that you are looking for and do a search, once you have the results you can do a comparison of a select few or look at the details of a particular result.

- **CMS watch**
  (http://www.cmswatch.com/ContentManagement/Products/)
  This site does reviews of a variety CMSs and maintains a list of what they consider the top 40 CMSs. They evaluate and list a broad number of CMSs from commercially developed to open source. They sell a full report that provides in depth analysis of the features and capabilities of selected CMSs.

- **Open Source CMS**
  (http://www.opensourcecms.com/)
  This resource site provides access to working versions of selected open source CMSs. You can get in and actually play around with the application.

After I had selected a few systems to explore further, I then visited the CMS vendor site and did a search for the term “accessibility”. Once I had reviewed the information provided by the vendor, I narrowed the selection down to four. Then I looked for a customer who used the CMS, preferably one that mentioned using the CMS to help them meet accessibility requirements or a government site. I tested the customers site using two different automated tools, Bobby & CynthiaSays. I initially chose the WCAG setting for testing, but after evaluating the process I decided to use only the Section 508 setting. The reason for doing that was to focus on the requirements that are actual law. The WCAG guidelines are only standards and not codified. As well, I tried to select customers who were government entities to which it would be more appropriate to evaluate based on section 508.

CMSs evaluated

Interwoven
(http://www.interwoven.com/solutions/features/government/accessibility.html)
This is an commercially produced system classified as an enterprise CMS. In this case enterprise is primarily an indication of its price tag. Interwoven TeamSite ranges in price from Generally, only a large corporation/organization can afford this product. But for that expense, this system provides a great deal of features and is extensively supported by the vendor. The salient point here is that they provide service and support to a number of federal agencies who must comply with section 508 requirements. Interwoven offers specific training and support for agencies to get their sites in compliance.

- Patent & Trademark

Automated testing of uspto.gov homepage:
Bobby: failed
CynthiaSays: passed

Bobby failed the site because one form control was missing a label attribute. Using SimplyWeb 2000 to

browse the uspto.gov site, there are a modest number of links at the start of the template they use. The first link is to a text only version of the site. Yet that also starts out with a similar number of links prior to reaching the content of a page. Going into the guides section I quickly came upon content that was available only in PDF.

MS-CMS
Microsoft offers a CMS which is much more modest in cost. Originally a product created by nCompass labs, MS acquired it back in 2001. It is now well integrated into MS server suite. While MS has a statement of their commitment to meeting section 508 requirements, MS-CMS does not seem to have any info about it's ability to fulfill this objective. I did find info where MS partners with HiSoftware's Accessibility tools to provide solutions that will meet the section 508 requirements.[5]

- MBA.com

Automated testing of mba.com homepage
Bobby: failed
CynthiaSays: failed

Bobby failed this site on several counts of missing alt text for images and missing label for form controls. Using SimplyWeb the site contained javascript navigation which did not display at all. To be fair this is not a government site, which is not saying it shouldn't pass the automated tests, but it is likely that the designers/developers for this site are not aware of the accessibility issues.

PaperThin
The CMSwatch review of PaperThin CommonSpot CMS rates it at/near the top for supporting accessibility. It requires the ColdFusion application server, an additional cost besides the CMS itself. However, the cost is still well under that of an Interwoven or MS-CMS. They also offer a range of support options which given their focus on accessibility should include assisting an organization with making sure the site is Section 508 compliant.

- http://www.nps.gov/

Automated testing of nps.gov homepage
Bobby: failed
CynthiaSays: failed

Bobby failed this site for missing form control label and missing two alt text for an image map hotspots. Visiting the site using the SimplyWeb screen reader provided the best experience of all the sites tested. There were many links which allowed skipping material/navigation that may be otherwise annoying to wait for the reader to pass through.

ezPublish
An open source product that is growing in popularity. It is based on the PHP application server and can use other open source components. It has a very good basic template that is based on W3C standards which is compliant with WCAG priority level 1. While it is open source that does not mean there will be no cost, you will still have to configure/implement the product and you can purchase support for this product if needed.

- http://www.elliott.nt.gov.au/

Automated testing of elliot.nt.gov.su homepage
Bobby: failed
CynthiaSays: failed

Bobby failed this site for missing a label for a form control. This is the text entry box for the search field, and since the search button where the screen reader will tell the person what the field is for comes after the field, this is a problem. It should be noted that this is an australian government site, and so the US section 508 code is not necessarily applicable as they incorporate parts of the WCAG requirements in their legal framework. [11]

5. Costs of implementing accessibility

From the reviews in the previous section it is clear that using a CMS does not automatically make a site accessible. There is no switch or button that can be set which will instantly convert a noncompliant site into a compliant one. The costs of making a site accessible using a CMS can generally be estimated as shown in table 1. This is based on a site with 1000 pages or content views, with 5 content designers/editors.

The process of making a site accessible would begin with creating a template. This can be achieved by finding a preexisting template that has been proven to be accessible. An accessible template can be found and adapted to a CMS for around $500. Generally, there will be a need to create a custom template. Ideally the process should involve a full usability/accessibility iterative design methodology. This includes prototyping and testing with target users. The cost for this will vary significantly, but as a rough estimate one can use the cost of an agency/consultant working 2-3 weeks.

Table 1 - Estimated Costs of CMS accessibility

Design/Redesign Templates	$500 - $15000+
Training of content managers (including Documentation/Resources)	$3000 - $10000+
Revise/edit old content	$2000 - $4000+
Total	**$5500 - $29000+**

all amounts are USD

Another area of cost will be in providing training for the content editors. There are options to consider here including having onsite training, sending employees to a seminar/conference or simply acquiring documentation/self-instructional material. If your organization is near a major metropolitan area finding an usability/accessibility consultant and having them come onsite can probably be done for around $3000 depending on the curriculum/scope of the training.

One last area of cost will be in converting preexisting content/page parts to be accessible. This can be accomplished by having interns supervised by one of your recently trained staff to go through this content adding/editing accessible information as needed. The largest cost here may involve converting/transcribing video content or other multimedia/alternative documents on your site. For a 1000 page site this would take approximately 200 hours, calculated at $10-$20 an hour.

Another option is to employee a device/server based solution which provides some automation. The folks at Usablenet have a version of their Lift product line that runs as a proxy and will serve a text version of your site. It also provides a suite of testing tools for content designers/editors to use for checking when they create/add content to the site (http://www.usablenet.com/). I have my doubts as to how effective this is but for some organizations the supporting tools may well be worth the purchase price ($7200 - $48000 US).

6. ROI of having an accessible web site

Using a CMS to manage a large site will generate significant return on investment (ROI) in and of itself. Microsoft provides an excel spreadsheet that will generate solid figures that any number cruncher will love (http://www.microsoft.com/cmserver/evaluation/roicalculator.xls).[12] Although geared towards promoting their own CMS, it could be used to crunch numbers on other systems as well.

Measuring ROI

Just as the cost estimates are rough, the measure of ROI here is meant as base to give an understanding of the potential. Depending on the size of an organization and its site the ROI may be significantly greater.

According to Microsoft cost reductions for CMSs generally fall into three areas; content updates and accuracy, reinforcement of corporate style and branding, application development.[12] For our purposes we will use the more traditional view of internal and external ROI factors.[13]

Internal ROI
- Increased content admin productivity
- Decreased content admin errors
- Savings gained from creating content that meets guidelines in the editing process

External ROI
- Increased sales
- Decreased customer support costs
- Avoid costly legal risk and negative publicity

For internal benefits, the key areas of ROI for making your site accessible with using a CMS are increased content admin productivity where implementing a template change is much more efficient using a CMS than updating static pages. There is also the reduction in errors as the change only needs to be made to the template and not each individual page. This is modestly estimated to be approximately $1000-$2000+, based on 50-100 hours time saved. And then there is the savings from creating content that meets guidelines while editing/creating, which would be estimated at $1000 - $2000+.

The external ROI is in increased sales/promotional costs. It is estimated that people with disabilities have $220 billion in disposable income. [14] It is reported that 4 out of 10 persons with disabilities conduct business and personal activities online. By making your site accessible you are opening up to a market that may include as much as 20% of the US population. If that increases your sales by just 1%, for a site that may do $1,000,000 annually in sales, that equates to $10,000.

Probably the most important ROI factor is avoiding the legal penalties and associated negative publicity that comes with being singled out for noncompliance. As noted in the beginning of this article the legal framework is in place and a number of precedents have been set. A

recent case involving Southwest Airlines has been dismissed, but it would be a mistake to think that this means your organization (if not a federal agency) is not at risk. Southwest was dismissed on a technicality.[15] Other cases have not gone so well and a number have been settled out of court. Recently the New York Attorney General gained settlements from two prominent online businesses, Ramada.com and Priceline.com to the tune of $37,500 and $40,000 respectively.[16] Wadell and Thomas make the case that non-government organizations are not exempt from the ADA's requirements.[17]

7. Propose research & development of a CMS that is more than just WAI compliant

CMS Accessibility Improvements

Further research into the use of CMSs to help organizations meet the accessibility requirements is needed. While it may be easier to start working on compliance with WCAG and/or Section 508 with a CMS it is not a quick and cheap endeavor. There is a need to go beyond simple compliance as the user experience can still suffer. There is a need for developing a CMS that enforces accessibility in the content editorial/design process. A CMS while allowing distributed content creation can retain tight control over the template and styles, but fail to extend that control in the content authoring level. Howard (2004) at the CMSwatch web site sums up this problem well;

> In an interesting development, a few CMS vendors have made claims that their product is able to ensure compliance with accessibility standards. Well, of course they can. So can any decent CMS package with a reasonably robust templating engine. If HTML or XML code can be written to meet a standard, then templates can be built to output content within that framework. A vendor may offer prefab web templates they deem compliant with a particular standard, but it is unlikely that those templates are perfect for any given site. [18]

This may be too complex to solve at this time. But then training materials could be offered that address specific ways of creating accessible content using the CMS. Matthew May of the W3C, offers an excellent outline on integrating accessibility into a CMS [19], which shows the amount of work needed to improve the accessibility landscape for web sites.

CMS Authoring Accessibility

Another area of research and analysis is in the development of a CMS where the content editorial/design part of the application should be made to be accessible. In the past I have tried all of the CMS systems basic administrative screens listed in this article and all of them would fail to meet accessibility guides for authoring tools. At the very least, they all could use a good round of usability testing and analysis in general, as I also found them to be a challenge to use as a “non-disabled” person.

8. Conclusions

The current CMS solutions are still not holistic in approach. This creates the problem of accessibility viewed as an evaluation of individual pages and not as architectures and/or systems. While templates can help with the over all structure of sites, individual pieces of content still need to be created with accessibility in mind. Accessibility is often an afterthought that is looked at only when an organization faces possible penalties or adverse media exposure. And as any basic user testing will show, providing an alternate text only solution is generally not adequate. This is because concept of separate but equal is also not acceptable. While a CMS will help minimize the cost in maintaining two versions, since the content is stored in a database, preferably not marked up. But that is not always the case, as most CMSs allow authors to add inline formatting to text content and also upload custom graphics/multimedia. Clearly if no effort is made to make content accessible in the first place, having a two design site, one for visual users and one for non-visual users will only devolve into the haves and have-nots. Your accessible customers/clients will know the difference and may even prefer to use the same site as everyone else regardless of the quality of a text only version aside from whether one exists or not.

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References

[1] US Department of Justice ADA, *ADA guide for small business* (http://www.usdoj.gov/crt/ada/smbustxt.htm)

[2] Access Board, *Section 508 of the Rehabilitation Act: Electronic and Information Technology Accessibility Standards*, (http://www.access-board.gov/sec508/guide/act.htm)

[3] Ben Caldwell, et al., *Web Content Accessibility Guidelines 1.0*, W3C web site, (http://www.w3.org/TR/WCAG10/), May 1999

[4] Bobby, (http://bobby.watchfire.com/bobby/)

[5] CynthiaSays Portal, (http://www.contentquality.com/)

[6] aDesigner, (http://www.alphaworks.ibm.com/tech/adesigner)

[7] Macromedia, (http://www.macromedia.com)

[8] Usablenet, Lift products (http://www.usablenet.com/)

[9] David Sloan, et al., *Accessible accessibility*, Proceedings on the 2000 conference on Universal Usability, November 2000

[10] Claire Paddison and Paul Englefield, *Applying heuristics to perform a rigorous accessibility inspection in a commercial context*, ACM SIGCAPH Computers and the Physically Handicapped , Proceedings of the 2003 conference on Universal usability, Issue 73-74, June 2002

[11] WebAIM; Web Accessibility in Mind, *Australia; Applicable Legislation,* (http://www.webaim.org/coordination/law/australia/)

[12] Microsoft, (http://www.microsoft.com/cmserver/default.aspx?url=/cmserver/evaluation/roi/default.htm), April 2002

[13] Aaron Macus, *Return on Investment for Usable User Interface Design: Examples and Statistics*, Aaron Marcus and Associates (http://www.amanda.com/resources/ROI/AMA_ROI WhitePaper_28Feb02.pdf), February 2002

[14] Solutions Marketing Group, *Disability Facts; Disability Market Demographics*, (http://www.disability-marketing.com/facts/)

[15] Patrick Thibodeau, "Judge rejects Web site disability suit," Computerworld. Framingham: Nov 11, 2002. Vol.36, Iss. 46; pg. 18

[16] Eliot Spitzer, Spitzer Agreement To Make Web Sites Aaccessible To The Blind And Visually Impaired, New York States Attorney, (http://www.oag.state.ny.us/press/2004/aug/aug19a_04.html), August 2004

[17] Cynthia Waddell and Kevin Thomason, *Is Your Site ADA-Compliant... or a Lawsuit-in-Waiting?*, (http://www.icdri.org/CynthiaW/is_%20yoursite_ada_compliant.htm)

[18] Jim Howard, *Content Management Systems Can Improve Accessibility,* (http://www.cmswatch.com/Features/OpinionWatch/FeaturedOpinion/?feature_id=102), April 2, 2004

[19] Matthew May, "The Market for Accessible CMS," W3.org, (http://www.w3.org/People/Matt/Papers/XML2003.html)