New Web Site, New Opportunities:
Enforcing Standards Compliance within a Content Management System

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Abstract

This is an account of a library project undertaken by the web team at Waterford Institute of Technology Libraries in Summer 2005. The project involved the re-deployment and re-design of the library web site on web content management software. The sets out the context for the project, first by explaining what a content management system is and does and second, by outlining prevailing trends in the wider world towards both standards-compliant code and web accessibility/usability. This paper shows how a content management system can help a library to reach the goals of good accessibility and web standards compliance.

Background

Waterford Institute of Technology (WIT) Libraries consists of the Luke Wadding library and the College Street branch library. WIT Libraries caters for the 8,000 full-time students currently studying at Waterford Institute of Technology (WIT).

Due to the efforts of a small team of three library staff, with an interest in web design, the library web site (http://library.wit.ie/) had been relatively well maintained, prior to the implementation of the content management software. The role of the library site was defined at an early stage, that being, to provide access to information on all of our facilities and services as well as to creatively advertise and promote library related projects and events.

From the outset, the library site had a distinct visual appeal that quickly became its trademark feature. Thus, although the design of the site was regularly updated and amended to reflect changing content and trends (and indeed, the work of different designers), the visual impact was always very strong.

This close attention to graphics, presentation and style was balanced by an equally close attention to structure, layout and content. Library staff were very conscious of the need to order the various library facilities and services into a distinct menu structure and to provide detailed information on each of the items. A number of subject specific web pages, guides and interactive tutorials were also created for the site.

Site Management

At this stage, the site was entirely managed using Microsoft's FrontPage, which allowed for the creation and maintenance of static web pages. FrontPage integrates seamlessly with Internet Explorer. It was easy to use and provided a quick and convenient means of publishing to the web.

Creating new web pages involved opening an existing library web page in the FrontPage software and saving that page under a new name. The duplicated content in the new page could then be replaced or reworked.

This process of generating content often involved editing the text in a Microsoft Word document. The formatted text was then transferred to the FrontPage document by cut-and-paste. Content added in this way retained all of its formatting. The effect of this

was to make the web page look exactly like the original word document, in terms of font, line-spacing, colour etc.

Visually, this end result was satisfying, however, there were limitations to manually creating the site in FrontPage. Site-wide changes to the appearance, like the font colour or size had to be altered on a page-by-page basis, which proved time-consuming. The menu structure and navigation features were entirely 'man-made', that is to say, changes to the menu structure had to be wrought separately on every page. Thus, it was difficult to ensure consistency. It was also difficult to make changes in site emphasis, by taking deep links in the menu hierarchy and moving them to the upper levels.

Another 'side effect' of using FrontPage to create the site was that the HTML code required to keep text consistent with the design intent was excessively large - leading to far slower download times than necessary.

This excessive code wasted server space and bandwidth. What's worse is it was not accessible. That is to say, it neglected to consider the variety contexts in which some people access the Web. For example, although a site can be very user friendly to someone who is not disabled, it may be completely inaccessible to someone who is.

Cases in point include people who:

- *may not be able to see, hear, move or process some types of information.*
- *may have difficulty reading or comprehending text.*
- *may not be able to use a keyboard or mouse.*
- *may have a text-only screen, a small screen, or a slow Internet connection.*
- *may not be able to speak or understand fluently the language in which the document is written.*
- *may be in a situation where their eyes or hands are busy.*
- *may have an early version of a browser, a different browser, a voice browser or a different operating system*

(Craven, 2002)

These issues became increasingly clear as the site developed over the years. The opportunity to migrate the site to a web content management system provided a golden opportunity not only to make site management more efficient, but also to bring the code into line with best practice.

National and European Context

The development of the old library site was based on a somewhat limited view of accessibility: that it has to be visually appealing and content rich. A text-only version was offered at one point, but this proved to be difficult to maintain. In the meantime, number of accessibility-related initiatives had been undertaken at both at a European and a national level.

The e-Europe initiative, designed to foster greater participation in the 'Information Society', was, for instance, launched in December 1999. The Irish government released a set of guidelines on best practice for 'user friendly' public sector web sites in the same year.

In addition, the 'National Programme for Prosperity and Fairness' agreement in 2000 made an explicit commitment to accessibility:

> *Each Government Department will ensure that reasonable steps are taken to make its services and those of agencies under its remit accessible to people with disabilities. To facilitate effective action and acceptable standards in this regard, the National Disability Authority will issue guidelines in accordance with international norms and will award an accessibility symbol to compliant public offices. Government Departments and agencies will take all reasonable action to qualify within five years*. (Taoiseach, 2000)

More recently, Irish law has again recognised the need for accessibility, with Article 26 of the disability bill of 2004, clearly stating that:

> *Where a public body communicates in electronic form with one or more persons, the head of the body shall ensure, as far as practicable, that the contents of the communication are accessible to persons with a visual impairment to whom adaptive technology is available*. (Article 26.2)

The fact that this legislation was to come into effect on the 31st of December 2005, presented a natural deadline for all public bodies, (including third level educational institutions and their libraries) to solve the inconsistencies across their web sites in terms of quality of design, build and content and to embrace web accessibility standards.

What a Web Content Management System Is

A web content management system (CMS) is a collective term for the processes by which web-content providers can publish information to the web. Typically, CMS software is so powerful, that it is capable of substantially transforming the management of a web site. The key advantages of a good CMS is that, properly managed, it allows one to easily standardise the look and feel of a web site as well as to make the site more readily accessible to all types of users be and more compliant with web standards.

Because the content exists digitally, a significant fraction of web content management tasks or processes can be automated by software. This is illustrated in Figure 1. Time-intensive tasks like publishing, updating links and styles can be automated to a large degree.

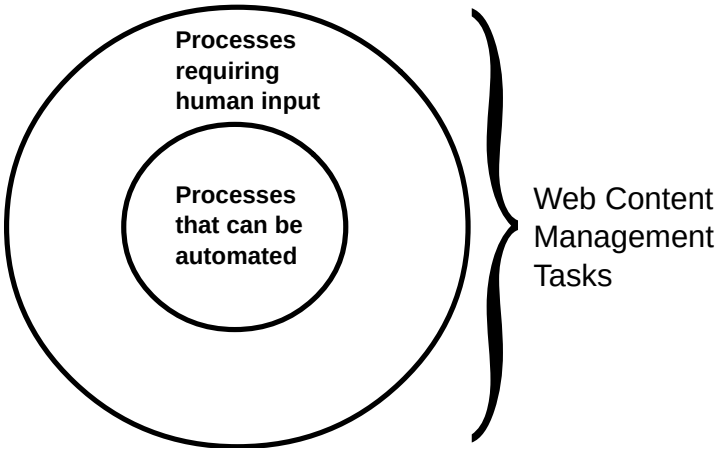

Figure 1

A web CMS should make management of a web site easier by:

- Simplifying the process of creating/maintaining content.
- Enforcing consistency of design across the site
- Allowing technical staff more time to focus on other important tasks

The template-driven consistency of the CMS software is what makes compliance to web standards and accessibility guidelines more possible. Additionally, the software is capable of managing other tasks such as, workflow, and content versioning/archiving.

A CMS has the potential to create scenario where the emphasis of the work shifts from maintenance-type tasks such as fixing links and formatting content, to more interesting optimisation and promotional type jobs such as enforcing standards compliance, accessibility/usability guidelines and restructuring the information in response to feedback from the environment.

Library Project

The library is very fortunate to have among its staff a systems expert, who had previously worked with the CMS software that we adopted and who has a strong background in web design. Together with a small team of librarians, who had worked on the old library site, the project team was formed. 'SiteManager' was the content management software adopted by the Library. SiteManager is produced by an Irish company called TerminalFour, (www.terminalfour.com). From the team's point of view, the introduction of SiteManager, combined with legislative and other initiatives, provided a timely opportunity to raise the standard of the site to very high levels in terms of accessibility, usability and web standards compliance. The team was also determined that the site would continue to be as visually engaging as ever.

While the team was set up to re-design the library site over the summer period, its longer-term aim was not simply to take advantage of the obvious features of a content management system, but also to capitalise on these features. The project is thus a work in progress, which aims, over time, to take the site to a higher level of quality by enforcing web standards, implementing web accessibility and usability guidelines and re-structuring the information in response to changes in the library environment.

Steps Involved …

Site Structure

Initial work involved creating the design template and a 'skeleton' navigational structure for the new site in TerminalFour's SiteManager software. After these two key tasks were completed, it was possible to move the content across to the corresponding sections and pages in the new site. The process of adding content to individual pages of the new web site is straightforward. No specialised technical skills or knowledge of web authoring is required.

The process works as follows. The user of the CMS software has access to all of its functionality through a web-based interface. This includes the ability to edit

presentational style, as well as content. When editing is complete and the changes are saved, the site can be 'published'. During publishing, all approved changes to the content are made live. Non-approved changes are withheld until approval. In this way the approval process acts as 'a safety net', ensuring contributors do not publish incomplete material.

The creation of a navigational structure from 'scratch', as it were, gave us an opportunity to re-examine the site's priorities. The language of the site has, for instance, been amended somewhat. Research into the area (Gibbs, 2004) has led us to realise that the librarian's perspective does not always match that of the user and that the library jargon or terminology is, if possible, best avoided. A case in point is the *Getting Started* page, which is specifically geared towards first-time library users and which has been re-written to reflect the language of the student. A catalogue tutorial has also been created, which focuses on using the library catalogue from the students' point of view.

Page Structure & Design

The creation of the design template has served to enforce visual consistency across the whole site. To explain, the content management system software allowed us to separate repetitive HTML code that does the job of formatting and structuring from the content itself. It is this template that forms the basis of all of the pages in the site. Therefore, much of the consideration around accessibility and standards compliance was focused on this template.

Figure 2, below, illustrates the way in which the content management software divides up a web page. The header and the footer, which, apart from the menu, are largely structural and static, are held separately from the content. Included in the header in this design is the menu, which is also automatically generated by the software, from information in the CMS database.

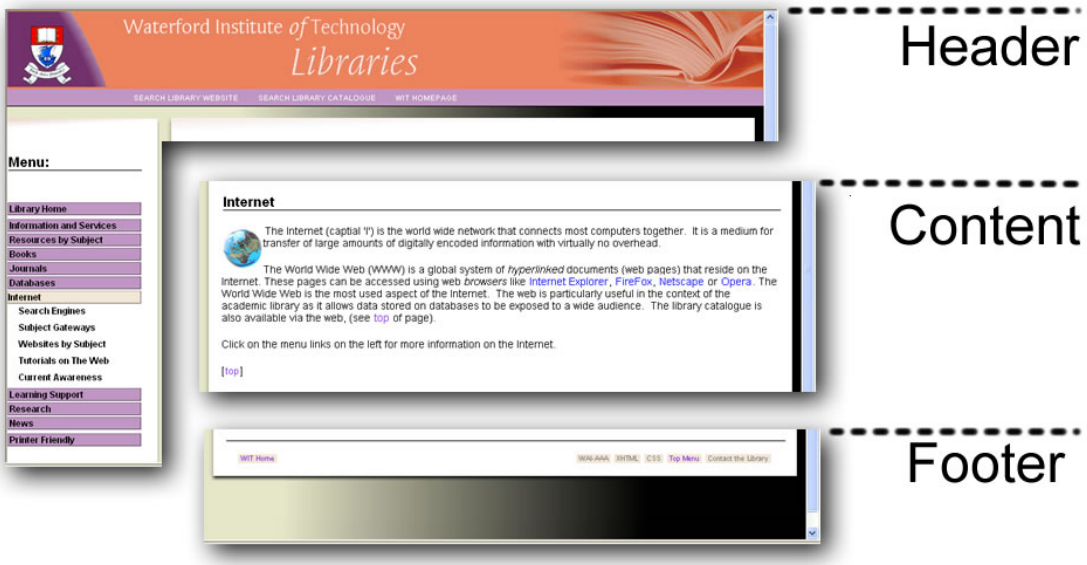

Figure 2

Figure 2 shows how the content management software creates the page from three parts. In addition to that, the spatial layout of the resulting page is controlled by what are called Cascading Style Sheets (CSS). CSS are a web standards compliant way of

changing the appearance of basic, structural HTML elements, which gives an elaborate appearance without repeating that information on every page. This is because the CSS is stored in one central place and all pages link to it. Figure 3 illustrates this point by comparing two identical pages.

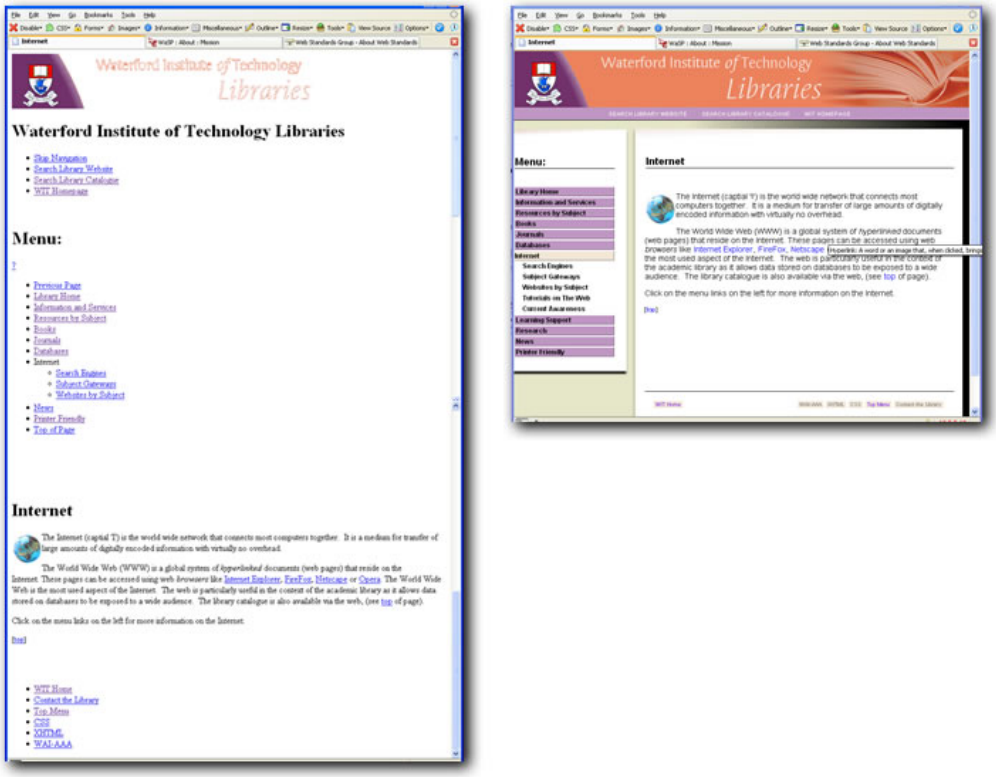

Figure 3

The use of CSS is unrelated to any particular brand of Content Management Software. It is a standard that allows designers to create highly accessible web pages without being concerned about appearance, because they know that design can be implemented at a later date, through the skilled use of CSS.

The page on the right in figure 3, above, is associated with a CSS file, giving it a designed appearance. The left hand page shows the same accessible and standards compliant HTML in its default appearance, without the influence of the CSS. The code used to generate this page is minimalistic. Its only purpose is to structure the content in a way that reflects its meaning, using headings, subheadings paragraphs etc. There are no confusing layout tables, excess images nor HTML tags that describe fonts and colours. This became the job of the single, separate CSS file.

This makes it much easier for disabled people to read these pages with adaptive software. Again, it must be emphasised that CSS is a web standard, and was enforced separately from the content management system. What the content management system did do was to make the structural HTML so consistent and predictable that we could be confident in enforcing the same set of CSS rules to all pages.

Site Navigation

A consistent navigational structure was developed for the site. The core theme is the view of the web site as a hierarchical, or tree-like, structure. This is central to the way in which the content management system organises web sites.

At the top of each page, there are two navigational menus. On the left, there is a classic navigational menu, which reflects hierarchical structure mentioned above. The other, which is towards the middle of the page, is a list of 'jump' points to the key sections within that page. Furthermore, the page is punctuated with regular links back up to these main menus. So the user never has to read through too much text before being able to re-enter to the navigational system.

This is best illustrated in figure 4, below, which shows the page without the CSS, for clarity. As users navigate down the page, they encounter regular links that can take them to the top of the page where the navigation menus are.

Take In Figure 4

The content is rendered in discreet 'chunks' by the CMS software. A link to the top of the page is added to the bottom of each. This link added by default, so that staff need not consider this when contributing to the site.

There is also a link to allow users to skip to the site navigation and go to the page navigation 'jump' points which can take them again to items of content on that page, closing the loop. This kind of navigation is very helpful for disabled users of the web site who may, for example, only be able to use the keyboard, or are not sensitive to visual cues. It is also worth noting that these 'skip' links are hidden from normal viewing of the page by certain CSS rules.

Keyboard-only users also have the advantage of links being highlighted in black against yellow. When these users move through the links in sequence (by pressing tab key), each successive link is highlighted in this way. This high-contrast colour scheme is of most benefit to partially sighted users.

Usability

The transition to the new software has prompted us to review the entire site for usability in terms of structure, content, functionality and features. Usability is a measure of the ease with which users can find the information that they are looking for. There are several objective ways in which this usability can be measured. Examples include:

Task Time: Time taken to find answers for specific questions about the content.
Errors: The percentage of incorrect answers to the question above.
Memory: How much could be remembered about the site's content.
Time to Recall Site Structure: (when asked to draw site map from memory)
Measures of Subjective Satisfaction: (Quality, Ease of Use, Likeability, User Affect)
(REF: The metrics were taken from http://www.useit.com/)

One of the measures of usability is the speed with which users can find specific information. Page layout is consistent - the first piece of content on each is a brief

overview of the entire page and includes the set of links, described earlier as 'jump points', to the major items of content further down on page.

This scheme increases usability for all users because it saves time searching for specific information by summarising that page in one or two lines. Fonts and colour coding are also used in the same way throughout the site for increased accessibility as well as for a professional appearance.

The ease with which branches of the site can now be moved to completely new locations is a new opportunity presented by the content management software. The site can, for example, be transformed to reflect changing priorities throughout the year, thus, *Information and Services*, which includes contact details and information on the basics of starting to use the library, is listed as the top menu item whereas previously, it was deeper in the site and therefore less easy to find. It would have been harder to do this before as all the links to the moved section would have to be corrected, either manually, or manually with software like Dreamweaver or FrontPage.

From the library's perspective, the relative importance of information is determined in two ways, from the top-down and the bottom-up. From the top come announcements, surveys and other new information about the library, which it needs to communicate as part of its mission. From the bottom come the patrons' priorities as revealed in the web visitor statistics, questions asked on the library floor and other sources, which alert us to how the site is actually used and what questions really need to be answered on a day-to-day basis. The feedback from patrons provides the information needed to amplify or add new information to some parts of the site and, by the same token, to phase out unused or outdated content from other areas.

Accessibility

As mentioned earlier, the transition to 'SiteManager' has made it easier to improve and maintain higher standards of accessibility in the library site. As the library learns more about accessibility and usability, improvements can be made easily by the web team, who are confident in the knowledge that the system holds these in the general design template, for propagation site-wide. With a content management system, what you get out is more than what you put in. It is only necessary to design one page template very well for it to be reflected in the entire site.

The terms 'accessibility' and 'usability' have distinct, but related, meanings. Web accessibility is the measure of usability when users are constrained by any of a number of disabilities:

- Physical accessibility barriers, including blindness and limited mobility
- Cognitive barriers, relating to the brain and mental processes or
- Circumstantial barriers, relating to the kinds of devices used to access the web. These could be devices with limited screen size, memory, or bandwidth, such as mobile phones or PDAs

(Adapted from: W3C, 2006)

So, accessibility is partly about providing the same information to all users, but in a number of different ways. An obvious example of a disability for sighted people is blindness. Because most information comes to us visually, web pages often rely on

non-textual, visual cues to impart information about structure and meaning of content and about functionality. The use of text-to-speech programs to read web pages is important for blind people. Clearly, if the front-page of the site is composed of images, or uses images as link buttons, the software will not be able to read it. Where blind people are concerned, images should be avoided, where possible, in the web pages. Where this is not possible, a short verbal description can be provided.

Certain tools are an invaluable aid in the time-consuming and sometimes frustrating task of implementing accessibility standards. Passing muster with online validation services such as WebXACT, formerly 'Web Bobby', and 'Cynthia Says', are an important foundation for developing an accessible web site. While these tools do not test for the more subjective aspects of an accessible site, they do provide an excellent starting point for development. Another tool, the W3C Markup Validation Service, proved to be very useful for implementing compliance to web standards.

Web Standards

According to the Web Standards Project web site, web standards are

> …*Technologies for creating and interpreting web-based content. These technologies, … are carefully designed to deliver the greatest benefits to the greatest number of web users while ensuring the long-term viability of any document published on the Web.* (The Web Standards Project, 2002)

All of the official web standards have been drawn up under the auspices of the World Wide Web Consortium (W3C). By adhering to these globally agreed specifications, web designers can increase the likelihood of their web pages displaying as intended on the widest possible range of web-enabled devices.

Thus, web standards are important in terms of broad based accessibility. For our part, we are working to ensure that the library site complies with universally recognised web standards. The particular standards that concern us are XHTML, a structural language and CSS (Cascading Style Sheets), a presentational language.

The development of web sites that conform to both accessibility and usability standards will support the creation of web environments which perform their function more effectively and provide an enhanced experience for the user; thus accessibility and usability standards are central to good design methodologies
(Yates, 2005, 182)

Conclusion

> *The provision of accessible electronic information relates to anyone who wishes to read the printed word. ... As well as helping people with disabilities to gain access to electronic information it is generally recommended that good design for accessibility is good design for everyone.* (Craven, 2002)

We can honestly say that the move to TerminalFour's SiteManager software has been a very positive one for the library site. It has certainly made for an increased emphasis on what Lilly (2001, 404) describes as a fundamental principle of librarianship, that is: *the provision of open and equitable access to information for all of our users.*

Despite some initial reservations, there has been no real compromise on design and visual impact, which remains an important feature of the library site, proving that, in our experience, anyhow, an accessible site need not necessarily be a bland one.

Moving the site to SiteManager software has proved beneficial in other ways as well. Time-intensive tasks have been automated to a large degree and new kinds of tasks, previously unconsidered, can be performed more easily than would have been possible before the CMS software was introduced. TerminalFour has also provided the opportunity to maintain excellent levels of compliance to accessibility guidelines and surpassing levels of standards compliance.

The project continues as a work in progress. For more information, contact David Kane at **dkane@wit.ie**

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