Accessible Design Issues

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Abstract

The Internet provides a unique opportunity to widen access to information for everyone. The variety and levels of information provided online is vast and growing on a daily basis. Increasingly this may also be the only format that is readily available and for some people this can present a barrier in terms of access. Access can be problematic for people who cannot see or who cannot easily read text or graphics on-screen, as well as for people who have early versions of a web browser or a slow Internet connection. To ensure people are not excluded from the information society, access to information and the development of fully accessible web sites must be given a high priority. This briefing paper considers the concept of universal web design and how legislation now requires service providers to take steps to ensure barriers to access are removed. It will then look at how these barriers can be removed through the use of access technology and through adopting good practice methods in interface design, and finally highlight some of the technological developments emerging in the area of accessibility and design for all.

1 Universal Web Design

Universal design or design for all means systems and interfaces are designed in a way that can be easily read by all users regardless of any disability or access preference they may have. The RNIB describes design for all in relation to web sites as “a single version of the web site which is accessible to everyone, however they access the Internet”(1).

The Internet provides a unique opportunity to widen access to information for everyone. The variety and levels of information provided online is vast and growing on a daily basis, increasingly this may also be the only format that is readily available. Therefore to ensure people are not excluded from the information society, access to information and the development of fully accessible web sites must be given a high priority.

In order to access online or digital information it is necessary to either own or have access to the appropriate equipment such as a personal computer (although television and mobile phone based access are now becoming more widely available) and to appropriate online services. These factors in themselves can contribute to putting up barriers to accessibility but access can also be hampered if the information itself is not structured and displayed in a format which can be read or interacted with by all. This paper will focus

on the provision of accessible electronic information, which is an issue for anyone who wishes to read text whether as the printed word or on-screen. It is also an issue for anyone who wishes to listen to audio clips and web casts, or to interact with services such as online learning packages or virtual conferences.

The Web Accessibility Initiative (see 3.1) illustrates the need to consider the different contexts people operate in when using the Web, for example:

- People who may not be able to see, hear, move or process some types of information.
- People who may have difficulty reading or comprehending text.
- People who may not be able to use a keyboard or mouse.
- People who may have a text-only screen, a small screen, or a slow Internet connection.
- People who may not be able to speak or understand fluently the language in which the document is written.
- People who may be in a situation where their eyes or hands are busy.
- People who may have an early version of a browser, a different browser, a voice browser or a different operating system(2).

Each of the contexts described above can be divided further, as individual needs must also be taken into account. For example, people who are blind or visually impaired could be totally blind or may only have central or peripheral sight, or they may have a generally lowered vision which cannot be corrected with glasses. This illustrates the problem of providing one product or service to meet the needs of many and how individual needs must be taken into account when considering the design of accessible information.

As well as helping people with disabilities to gain access to electronic information it is generally accepted that good design for accessibility is good design for everyone. The Trace Center for Research and Development in the U.S (see 3.4) list the benefits for good design as helping:

- People in a noisy shopping mall who cannot hear a kiosk
- People who are driving their car who must operate their radio or phone without looking at it
- People who left their glasses in their room
- People who are getting older
- People with disabilities
- Almost anyone(3).

2 Legislation influencing accessibility

Apart from the ethical reasons for making information accessible, legislation has come into force which requires the general provision of accessible services to disabled people. Examples include the **Disabled Persons Act** 1986(4), which contains provisions that place responsibility on local authorities to provide equitable services to all members of the community and the **Human Rights Bill**(5) (UK , 2000) which has several sections relating to the rights of people with disabilities. The **Disability Discrimination Act (DDA)**1995(6) requires (under Part III of the Act) providers of “goods, facilities

and services", such as libraries, to provide an equal level of services to all their customers. It states also that no extra charges can be imposed for service provision in relation to a person's disability, for example charging a fee to produce materials in alternative formats.

Implementation of measures outlined in the DDA under "goods, facilities and services" is required to take place between 1999 and 2004, by which time service providers must have taken "reasonable steps" to meet the needs of disabled people and to be providing an equitable service to all. As a provider of services, public libraries must ensure their buildings are accessible and to consider alternatives to service provision for those who cannot physically visit the library. Libraries should also provide alternative means of accessing resources, such as reading aids and alternative formats. This will help break down barriers to the information society, in particular to information that is available electronically.

Exemptions under the goods, facilities and services section of the Act originally included the educational provision of an institution, such as a university. However, **The Special Educational Needs (SEN) and Disability Act**, 2001(7) makes changes to the existing framework placing new anti-discrimination duties on schools, colleges, universities and providers of adult education, thus removing the exemption of education from the Disability Discrimination Act. To help clarify the requirements of the Act, a Draft Code of Practice to the Special Educational Needs and Disability Act 2001 was published in July by the Disability Rights Commission(8).

It should be noted that legislation such as the DDA usually provides a definition of disability in order to clarify who is and who is not eligible for protection under the legislation. However this may exclude groups of people who fall short of the DDA's definition of disability but still experience accessibility problems. For example, elderly people may only have a limited degree of sight impairment but nonetheless have difficulty in reading the printed word. More generally those people whose problems are not great enough for them to be registered as disabled may still need help and support in accessing information.

3 Organisations which support universal design

Many organisations are committed to developing and promoting universal access. This includes the development of standards for good web design and the creation accessibility features to be applied to web pages. Tools have been developed which can be used to check web pages for accessibility as well as guidelines and advice on designing accessible web pages. This section includes a small selection of such organisations.

3.1 World Wide Web Consortium

The World Wide Web Consortium (W3C)(9) is the body responsible for co-ordinating developments on the Web, and in particular for encouraging the use of standards by developers. The W3C launched the **Web Accessibility Initiative** (WAI) in 1997 with a commitment to lead the Web to its full potential including promoting a high degree of usability for people with disabilities. The WAI looks at the fundamental design of the Web, with the aim of ensuring that a browser can adapt its output automatically to the needs of the user, whatever those needs may be, without the loss of significant information content.

3.2 The RNIB Campaign for Good Web Design

In the UK, the Royal National Institute for the Blind established the **Digital Access Campaign** in 1999 to raise awareness of accessibility issues and to provide advice and guidelines on better web design. It also provides a forum for joint work in campaigning for better web accessibility through its mailing list, which is provided via email. Now renamed the **RNIB Campaign for Good Web Design**(10), it invites people to alert it to poorly designed web pages so that it can offer some initial help or pointers to guidelines and advice on accessibility. A video produced by the Campaign called **Websites that work**(11) is available free of charge from the RNIB. It can now also be viewed online. The video covers the main areas of accessible web design and demonstrates how good design can help people with a variety of disabilities.

3.3 Technology for Disabilities Information Service (TechDis)

This Joint Information Systems Committee (JISC) funded service was formerly called **Disability and Information Systems in Higher Education (DISinHE)**(12). Based at the University of Dundee, it worked with higher education institutions and other relevant bodies to develop and advise on the use of technology to support students and staff with disabilities as part of the standard provision of support available.

DISinHE funded a number of supporting studies aimed at helping to ensure that the technological requirements of disabled staff and students in HE are met. In 2001 **TechDis** took over the DISinHE service and broadened its remit to include further education. The aims of TechDis are:

“Enhancing access for those with learning difficulties and/or disabilities, to learning and teaching, research and administration across higher and further education through the use of information and communication technologies” (13)

A number of relevant articles on accessibility are available from the TechDis web site.

3.4 TRACE (University of Wisconsin).

TRACE(14) is a leading US centre for research and development in accessible technologies. Founded in 1971, it forms part of the Department of Industrial Engineering at the University of Wisconsin-Madison, and is part funded by the US Department of Education’s National Institute on Disability and Rehabilitation Research. In 1984 it co-ordinated the first US national

initiative to promote the accessibility of computers. It is currently working on ways to make standard information technologies and telecommunications systems more accessible and usable by people with disabilities.

3.5 National Center for Accessible Media (NCAM)

NCAM(15) is based in Boston, Massachusetts and has undertaken a wide range of work on accessibility issues. It has undertaken projects on making CD-ROMs accessible and on video captioning, as well as promoting the 'Web Access' symbol (with its accompanying alt-text tag) for sites which meet its criteria. An initiative called the *Web Access Project(16)* has concentrated on developing and testing new methods of integrating access technologies (such as captioning and audio description) into web sites, with particular emphasis on public broadcasting sites.

3.6 Centre for Applied Special Technology (CAST)

CAST(17) was founded in 1984. It has a long involvement in the development of assistive technology including the design of disability-friendly learning systems. It is best known for its web accessibility checker, Bobby (see 5.3.3).

4 Access to the Internet

Access to information can be defined in more than one way: "firstly through the use of access technology and secondly through adopting good practice methods in interface design"(18). Assistive technologies help users to access on-screen information in a way that is more appropriate to their needs and, ideally, to be able to access it independently. In addition to this, desktop accessibility allows users to change the settings on their PC to meet individual requirements.

4.1 Assistive Technologies

Assistive technologies help users to access the Internet in all its different forms, including text, video, graphics, sound and interaction through form filling or search functions. For a blind or visually impaired person, assistive technologies enable them to access graphical and text based information from a computer screen. The devices available for this can be grouped into three general headings:

- Screen magnification.
- Speech output systems.
- Electronic Braille output (or refreshable Braille bars).

As with all systems and software programs, training and support is an essential element in ensuring the best from assistive technologies. Further details of the assistive technologies described in this section can be obtained from suppliers such as Sight and Sound Technology and Dolphin Systems(19) or the Manual of Best Practice(20).

4.1.1 Screen magnification

Screen magnification systems will enlarge text or images as they appear on the computer screen. Depending on how large the magnification has been set to, only part of the original screen display will appear on screen. The user

selects a section of the page using the mouse or by tab keys. Software can also be used with screen magnification systems to enhance the cursor or mouse pointer by increasing its size, colour and speed.

It is worth noting that screen magnification systems differ from package to package. Some may be able to magnify text but not graphics, or may not be compatible with certain hardware or software applications. Also, because most magnification systems are software programs that are used on top of other applications, users will need specific training in its use. Examples of screen magnification packages are Lunar, MAGic and ZoomText.

4.1.2 Speech output systems

There are generally two elements to speech output systems: the speech synthesiser and the screen reading program. A speech synthesiser produces speech from text, which has been sent from the screen reader. The screen reader is a software program, which interprets what is on screen and presents it to the user in a meaningful way via the speech synthesiser. This method has been succinctly described thus: “the screen reader is the brains of the outfit, and the speech synthesiser the voice”(21).

Speech or voice output could include the full screen or a user defined area of the screen (for example by highlighting areas). It can read word by word or give a verbal description of what is on screen, such as an icon or a graphic. It is also possible for the user to define the speed of the speech output, the pitch and the language.

Examples of windows screen readers are Hal and JAWS for Windows. Hal supports both speech and Braille access and includes features such as verbal descriptions of graphical elements. JAWS for Windows also supports speech and Braille, offers a script language for speech enhancements and a tool for identifying hardware and software problems (Dr JAWS). JAWS for Windows also allows the user not only to choose the language of preference but also the accent – for example English or American.

Voice output technology can also be achieved through text only web browsers such as PWWebSpeak (although this particular brand is no longer available for purchase it is still used by some libraries and individuals). A text only browser works by translating the HTML used to create a web page into speech. This method allows users to navigate the site using the content of the page rather than the display of the information. Text browsers are relatively user friendly, however access still relies on the web designer creating an accessible site. If the HTML has not been applied in a logical or accessible manner, the browser will be unable to translate it properly.

Another example of a text only browser is Lynx. Unlike PWWebspeak, Lynx simply coverts a web page into text only, the assistive technology then needs to be implemented to enable voice output. Lynx is also good for viewing sites in a non-graphical way and can be useful for anyone using a less powerful PC as the downloading of graphics is not performed. However, the use of

appropriate text alternative tags in the HTML is necessary to enable full access to a page.

4.1.3 Braille bars

Soft Braille or refreshable Braille is a tactile, electronic Braille display or Braille bar, which by connecting to a computer allows the user to read from a computer screen by touch in Braille. This is achieved through an electronically driven series of pins which are displayed in a row, generally of 40 to 80 characters of 6 pins per Braille cell (although there are size variations). The pins are electronically controlled to move up and down to display a Braille version of what is read on screen. Some Braille bars include a router button or status cell, which informs the users where the text cursor is on screen. Another useful feature is the ability to speak prompt commands, which helps speed up input and enhances navigation and understanding of text.

Braille bars can be used under the keyboard of a standard computer but are also available as smaller, more portable versions, which can be used with laptop computers and will operate from battery driven laptops.

4.2 Desktop accessibility

4.2.1 Screen, keyboard and mouse enhancement

Screen enhancement features are now built into most systems and allow the user to set the desktop to their individual preferences. Most systems allow preferences to be set (as standard) which allows flexibility in the choice of settings. These could include:

- Colour and contrast settings to allow the user to set a specific colour and contrast, including inverted options.
- Adjustments to font size for titles and menus.
- Settings to control the mouse using the numeric key pad.
- Enlarged, solid, inverted or trailing mouse pointer for easier viewing.
- Magnification which enables portions of the screen to be enlarged in a separate window.
- A text-to-speech feature that will work like a screen reader on certain packages (new development for Windows 2000).

Advice on how to modify the standard keyboard and mouse are available from the UK charity **Ability Net** who aim to bring “the benefits of computer technology to adults and children with disabilities”(22).

4.2.2 Browser Settings

The default colour for most browsers is grey background, black text, blue hypertext links and purple visited links (23). These can be changed to default to the settings preferred by the user as well as the font size and style. The National Library for the Blind (NLB) provide simple instructions for adjusting a number of web browsers to make web pages more accessible via their **Access Helpline** web pages(24).

Setting the browser or the screen preferences works well for users with dedicated computers. In libraries and open access computing areas this is more difficult, as many people could be using the same computer during just one day. The use of roaming profiles seems to be the way forward as these will re-set the default settings according to the individual's user profile at log-in stage.

5 Accessible Web design

"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect"(25).

The previous section describes ways to make the Web more accessible through:

- assistive technologies to help users interpret what is on-screen
- adjustment of desktop and browser settings to help render the pages accessible.

This section will look at accessible web design and how the content of the page can be designed in a way that helps to enable access for all. The following points are based on recommendations of the **World Wide Web Consortium Accessibility Guidelines** (WCAG)(26), which explain how to make web content accessible to everyone, regardless of disability. The guidelines are a very comprehensive guide to most aspects of accessible web design but at times they can be rather daunting for anyone new to web authoring. For this reason the WAI have produced a **Quick Tips Guide** which cover the main accessibility features and also provide pointers to more detailed information.

The techniques described are all simple design features which, if implemented from the beginning, should not impose any extra costs other than those already set aside for the development of the web site. In many cases these features can be added on after the development stage, again at very little extra cost.

5.1.1 Page organisation

Keep the layout of all pages as simple as possible and maintain consistency throughout the site. Particular attention should be paid to the order in which elements occur as these can be learnt by the user and applied to the rest of the site. Similarly, keep the navigation structure simple, clear and consistent as this is often the most frequently used feature of any web site (27).

As well as being consistent, the layout of the site needs to be relatively easy to navigate. In general it is better to use a larger number of pages containing fewer links, and to place more emphasis on ensuring clarity and consistency of layout and navigational links than by cramming numerous links onto one page. For someone using assistive technology such as a screen reader a page with many links can be tedious to navigate, as the user would have to listen to all of the links read out and then possibly go back and listen again to ensure nothing was missed.

5.1.2 Use of site maps

Offer a text index or site map with links so that users can navigate directly to pages rather than having to work through the whole site. This helps overcome problems of navigating through a large site. On each page there should always be a link back to the home page or to other major pages on the site.

5.1.3 Alternative Text for auditory or visual information

All sound files should be backed up by captioning, for example of speech or a verbal description, or alternative text to describe a sound (such as a bell ringing, or a loud bang). This will help people who have difficulty listening to auditory information or who have a hearing impairment.

Images, video clips, photographs etc. will not be read out by a screen reader or Braille display unless the alternative text (ALT) tag has been applied to the HTML. Therefore all non-textual information including graphical hypertext links (ie. clickable images) should be described using the 'ALT' tag. The text alternative must also be appropriate, simply using terms such as 'photo' or file names such as 'blue.gif' to describe a photograph or an image will not be giving the user enough information. Examples of appropriate text alternative could be 'a photograph of the library building' or 'image of students using computers'.

Where images are used simply for decorative purposes such as bullet points or fancy lines it is best to use a null ALT tag (ALT="") which will enable the browser to skip any non-essential graphics or images.

5.1.4 Longer descriptive text

Where the non-textual element requires more than just one or two words as a description then the 'LONGDESC' tag should be used. Examples of this could be to explain a video clip or to provide a more in-depth description of a famous painting or photograph.

5.1.5 Acronyms and abbreviations

A speech browser or screen reader will read out the text on screen literally and this can be confusing if the user cannot recognise what is being said. The addition of the ACRONYM element will clarify what the acronym stands for, which is often helpful information for any user. A similar addition is the ABBR element which will clarify what has been written, for example to explain that HTML means hypertext mark-up language.

5.1.6 Hypertext links

Ensure all hypertext links are properly described and separated either by a line or space or by having just one link per line. Label hyptertext links clearly and avoid using 'click here' to indicate a link. 'Click here' will not tell the user where 'here' is or where they will be taken to. Also, if the user does not use a mouse then 'click' is not necessarily an instruction they will easily recognise. So, for example, appropriate text for a hyptertext link could read 'information on x', or 'link to information about y'.

5.1.7 Colours and background

As a general rule it does not really matter which colours are used as long as they are contrasting ones. For example, avoid using dark blue text on a lighter blue background. Other points for consideration are colour blindness. Someone who is colour blind may find it difficult to differentiate between certain colours; red and green may appear as a neutral shade such as grey. Decorative backgrounds, shadowing and watermark images should also be avoided or used with care as they can mask content for partially sighted readers.

It is important to always ensure that colour schemes can be over-ridden by the browser settings. This is because users will have different preferences for colour settings depending on their level and type of sight loss.

5.1.8 Fonts

The National Library for the Blind (NLB) recommends avoiding fancy fonts as these can be difficult to read. As a general rule the RNIB recommends typefaces that people are familiar with and will recognise easily; a sans serif font is a good example of a clear, plain font.

A 12 point size is suggested as a minimum although the RNIB recommends 14 point where possible, as this will reach more people with low vision. As individual font size requirements are difficult to define it is best to allow users to adjust the size using the browser settings to suit their needs.

Underlining of text can prove difficult to read, as can the prolific use of capitalisation and the use of bold is to be preferred to italics where emphasis is needed. It should be noted that some fonts may appear to be readable on screen, but when viewed using a magnification package may become broken and hard to decipher.

5.1.9 Use of tables

Tables used for page layout are not recommended by the W3C unless the table still makes sense when read across the page. This is because some screen readers will not read tables cell by cell but in a linear way, which will probably not make sense. Tables used to display data (such as a list of services provided) can be used, but care should be taken to provide appropriate headings to describe each cell.

5.1.10 Frames

Where pages use frames, the home page should offer a NO-FRAMES alternative, which is applied consistently throughout the site with links to frames-free versions of the pages. It is also desirable to provide links from the home page or text index to each frame and to ensure each frame has a TITLE in the HTML.

5.1.11 Interactive elements

Interactive elements include Plug-ins and Java programmes. These make web pages interactive and may not always be interpreted by assistive technology. Always provide a text alternative for interactive elements and

avoid their use for effects like scrolling text or flashing banners, which can be difficult for partially sighted users to access.

5.1.12 Online Forms

Forms should be clearly marked up and follow a logical order. This will be of particular benefit to people with cognitive difficulties, although well organised forms are of benefit to everyone. Forms should also be designed in a way that enables them to be read by a screen reader. Creation of accessible forms can be achieved by ensuring:

- All fields follow a logical order.
- Labels are placed next to their controls.
- The appropriate HTML mark-up tags have been used throughout(28).

5.1.13 Text alternative pages

Current recommendations from the RNIB promote the design of web sites that are based on universal design. This refers to the creation of ONE site, which through the use of alternative delivery methods is made accessible to ALL

If text alternative pages are used, it is essential that they are updated at the same time as all other pages. It is worth considering using something like the BBC Education Text to Speech Internet Enhancer or **BETSIE** software(29), which was produced in collaboration with RNIB and BBC Online. This reformats pages into a text only version for people using screen-reading software. The use of BETSIE will also eliminate the need to update separate pages as this software converts pages in real time.

5.1.14 Provision of a contact name or email

Always provide a contact name and email address on each page, or at least on the home page, so that users can send queries if there is something they cannot read or need explained.

5.2 Web Authoring Tools

Some web authoring tools offer accessibility features to create accessible web content. Dreamweaver and Frontpage are two examples, instructions on how to implement their accessibility features are provided on the **Web Accessibility in Mind (WebAIM)** web site(30). Other authoring tools have been developed to include accessibility ‘prompts’ for the author. SoftQuad International have produced the AdaptAbility Toolkit which includes an automatic prompt which suggests adding certain features which will make a page more accessible(31).

5.3 Checking for accessibility

It is possible to test all pages for accessibility before they are launched. This can be undertaken using a combination of self-tests, user feedback, validation and accessibility checking tools such as **Bobby** or **Lynx View** (see 5.3.3 and 5.3.4). It is important to include feedback from the users themselves as they may experience problems which checking methods have overlooked. Accessibility checking tools cannot guarantee total accessibility. Errors are sometimes picked up that in reality are not too problematic, or can miss errors such as inadequate alternative text or poorly contrasting colours.

5.3.1 Self and User testing

Always use a sample of users to try out the web site and provide feedback on features such as readability, consistency, ease of navigation and general appearance. Make sure that any comments made on accessibility are taken into consideration and acted upon where appropriate.

Font size, style and colours can vary from browser to browser, therefore pages should be tested for accessibility using a variety of web browsers. Try each page with the images turned off to ensure all non-textual elements are correctly labelled. Another tip is to set the monitor to a variety of background colours and textual colours to establish a combination that is pleasing to look at but also contrasting.

5.3.2 Validation Services

Validation services can be used to check for consistent application of HTML coding according to standard recommendations such as those offered by the World Wide Web Consortium (W3C). Some validation services will also check for accessibility. For example, **HTML Tidy**(32) helps authors tidy up their HTML and identifies areas such as the addition of the ALT text tag for graphics.

5.3.3 Bobby

The **Bobby Web Accessibility Checker**(33) was developed by the Center for Applied Technology (CAST). Bobby is used to check web sites against a standard accessibility check-list developed in accordance with the W3C/WAI Guidelines. The software will analyse individual pages of a web site and produce a textual report (see fig.1.) which identifies whether there are any accessibility errors and allocates priority ratings according to importance.

A Priority 1 rating indicates problems that seriously affect the page's usability and must be fixed if the page is to be accessible. Priority 1 errors are depicted graphically as a policeman's hat with a wheelchair. A policeman's hat with a question mark indicates that there may be a priority 1 error that can only be checked manually, not by Bobby itself.

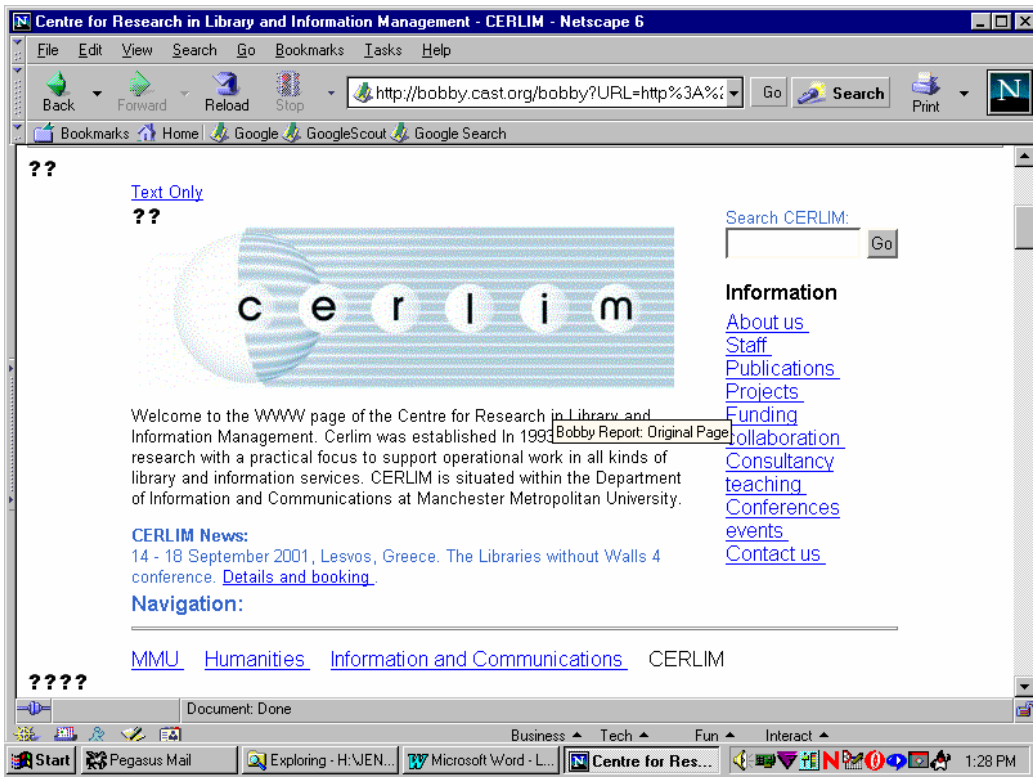
There are two more priority levels Bobby uses to identify problems. Priority 2 indicates problems, which should be fixed if possible and Priority 3 indicates problems that should, if possible, be taken into consideration. Both levels usually recommend manual checking on certain items. Other issues that Bobby takes into consideration are browser compatibility and download time, both of which can impact on the accessibility of the site.

Bobby reports can be difficult to read, particularly for anyone unused to HTML terminology. One recommendation is, in the initial stages, to concentrate on the Priority 1 errors only and ensure they are fixed.

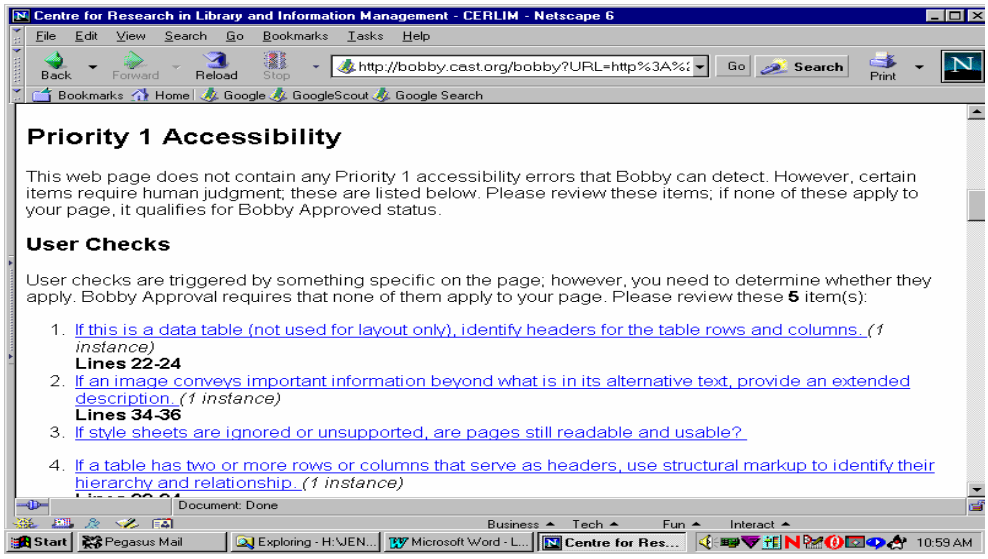
It should be noted that whilst Bobby is an excellent tool for initially checking for accessibility, it can miss some important errors such as inappropriate alternative text, colours and font styles. It therefore recommends a number of manual checks are also undertaken.

Fig.1.

Example of a Bobby report
The report displays the web page and indicates (in this case) with question marks that a manual check should be performed on certain areas.



A textual report then outlines any areas which need further consideration.



(Reproduced with kind permission of CAST)

5.3.4 Lynx View

Lynx View(34) will display the page as text only (as it would appear to a text browser such as Lynx) indicating how a screen reader may interpret the page. Viewing a page through Lynx will identify any images for which alternative text has not been applied (if alternative text for a graphic or image has been missed, Lynx View will display this as 'INLINE' or 'LINK'). It will show whether the page layout is in a clear and logical order, whether links are separated clearly and how tidily the HTML has been applied.

5.3.5 Vischeck

It is possible to check pages and individual images such as logos or photographs using a web site called *Vischeck*(35) which will display images and whole pages to simulate how it would look to people with various sorts of colour blindness or when viewed at a distance.

5.4 Guidelines on Accessibility

In an attempt to provide more user-friendly recommendations for good web design, many organisations have produced their own versions of the W3C/WAI accessibility guidelines. For example, see the **REVIEL Project 20 Golden Rules to Web Page Design**(36), **How to judge a websites accessibility level**(37) (which is available, together with other relevant information, from the **TechDis web site)**, or the **Accessibility of Online Learning Materials Project** at Aberdeen University(38).

The **National Library for the Blind Website accessibility guidelines**(39) has been produced with the needs of blind and visually impaired users in mind and provides a bullet point list covering accessibility issues such as text, images, tables, frames, hyperlinks, structure and navigation. The guidelines provide a general overview of accessibility issues and how they can be addressed; they also direct users to further information by recommending the work of the Web Accessibility Initiative.

The RNIB's hints on **Accessible web design**(40) provides advice on designing accessible web pages stressing that accessibility does not have to compromise on attractive dynamic designs. In other words an accessible page does not necessarily have to be a boring one. It covers some of the main points such as background and text, images, links and frames and also some of the more advanced features such as JavaScript and plug-ins. The RNIB also refers users to the W3C/WAI for further advice on this subject.

Several newsletters and web sites cover pertinent issues relating to the provision of electronic information. ***Free Pint***(41) covers general electronic information issues and a useful paper appeared in Issue 14 (May 1998) describing the issues that affect deafblind users of the Web. ***E-Access Bulletin***(42) is a free monthly email newsletter which covers technology issues for people who are blind or visually impaired. Examples of experts in the field of web usability include Jakob Nielsen and Michael Paciello**. Jakob Nielsen** has produced books and articles on the subject(43) as well as an online bi-weekly column on web usability which is available via the **Useit** web

site(44). **Michael Paciello** is the founder of **WebABLE**(45) a consulting business dedicated to ensuring equality of access to information for all people. He is author of the book *Web accessibility for people with disabilities*. (46) which includes examples of how accessibility features can be applied to the HTML of a document.

6 Future developments

Technological developments are likely to increase accessibility considerably. New versions of screen readers are able to handle more complex web pages, including tables and frames; software is now available which converts web sites to text in real time, thus reducing the need to constantly update text only versions of pages.

The use of Cascading Style Sheets (CSS) is recommended by the W3C to provide a more efficient way of designing the presentation, layout and style of web pages. This in turn provides a more efficient way for assistive technologies to interpret the structure of the page and to read it back. For example, it can specify that tables have been used and to read them out cell by cell, or to define what is called the 'media type' for specific devices such as speech synthesis or Braille output. This means that the site will be delivered to the users in the most appropriate way for them.

Another important development has been that of personalisation. This can be defined as "web design that ensures accessibility for every user by adapting to the user's preferences"(47). Work undertaken for the UK Library and Information Commission has looked into the feasibility of enabling blind and visually impaired users to set up their desktop preferences in a way that can be moved to whichever computer they are using(48).

Roaming profiles are used in a growing number of UK academic organisations. The user's preferences are stored on the hard drive and then picked up from the user's networked area at log-in stage, this will re-set the default to the individual's profile. Despite some problems regarding the interaction of profiles with assistive technology and the possibility that personalisation may be used as an excuse for bad web design, the use of roaming profiles seems to be a very positive way forward to help enable universal access for all.

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