

Accessibility

of museum, library and archive websites:
the MLA audit

City University



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1. Introduction

The research undertaken by City University for this report shows that the current level of accessibility of museum, library and archive websites is not high. Less than half the sites audited (42%) met the most basic technical accessibility guidelines and a User Panel of disabled people did not find them particularly easy to use.

The report also shows that the number of different Web Accessibility Initiative checkpoints and user problems that need addressing is not exceptionally high (the typical home page needs to look at approximately six different checkpoints and solve 13 user problems to address 68% of the problems encountered by users).

This makes us believe that significant improvements in web accessibility can be achieved by museums, libraries and archives through commitment, planning, training and by making web accessibility a criterion for every web development tender brief.

The methodologies used for the audit were similar to those used for the Formal Investigation into Website Accessibility for the Disability Rights Commission (DRC), undertaken by City University one year earlier. It is encouraging that more museum, library and archive websites meet basic accessibility guidelines than the corresponding figure in the DRC study, which found that 19% of a sample passed the basic Level A criterion. In part this reflects the existing commitment of MLA to web accessibility by encouraging the adoption of technical standards by those projects available through Enrich UK, and other funding programmes.

Although we may celebrate this relative achievement, above all, the findings show us that we must re-invigorate our commitment to ongoing improvements in web accessibility. Web accessibility is an essential dimension of an accessible museum, library or archive and of Inspiring Learning for All, the transformational framework for the sector. We owe it to disabled people and our values of access and inclusion that we make web accessibility integral to our Web development processes. In so doing, we are likely to meet our obligations under the Disability Discrimination Act - whose Code of Practice recognises websites as a service; and the accessibility provisions of e-government policies which apply to public sector websites.

Mark Wood, Chair

2. Executive summary

Context

The MLA Audit of 300 museum, library and archive websites in England and a comparison of 25 international museum websites, was commissioned by City University in 2004. The policy context for the audit was set by the Disability Discrimination Act [1], which covers websites [2] and the e-government 2005 policy [3] which requires that public sector websites meet specified web accessibility guidelines (WCAG1 Level AA) by 2005.

Methodology

The methodology involved the automated testing for compliance to the WCAG1 checkpoints of the home pages of all 325 websites selected with WebXM™, an accessibility checking tool developed by the Watchfire Corporation [4]. In addition, in-depth automated testing of the complete site and user testing of a sample of 25 websites (20 English sites and five international sites) was undertaken.

Key findings

- Nearly 42% of the English home pages and 20% of the international home pages meet basic web accessibility guidelines (WCAG1 Level A) although only approximately 3% meet WCAG1 Level AA when assessed by automated testing tools (see Table 2).
- Archive websites had the highest percentage of compliance (51% for Level A and 6% for Level AA) and the only website to meet standard Level AAA was an archive website (see Table 2).
- The average museum, library and archive home page presents disabled users with nearly 216 potential accessibility stumbling blocks (56.9 known violations of WCAG1 checkpoints and 159 warnings of violations). English museum home pages presented the lowest number of potential accessibility stumbling blocks (173.2, compared to 206.7 for archive home pages, 239.4 for international museum home pages and 267.4 for Library home pages) (see Table 3).

- A User Panel of blind, partially sighted and dyslexic people could successfully complete only 75.6% of the basic tasks they were asked to undertake on the websites, 24.4% of these tasks they found impossible to complete (see Table 6).
- Blind User Panel members found it impossible to complete 33.3% of the tasks they undertook, highlighting the particular problems that blind people face in using the websites (see Table 6).
- The User Panel gave English museum, library and archive websites a mean rating of 3.8 on a scale of 1 (very difficult) and 7 (very easy) when asked to rate the ease of use of the websites (see Table 8).
- Approximately 56% of the User Panel members felt 'lost' at least once when exploring the websites, not knowing where in the website they were (see Table 10).
- 22% of problems experienced by the User Panel with the websites were not identified by automated testing of the WCAG1 checkpoints, This makes a compelling case for user involvement in web accessibility testing (see Table 11).
- Violations of five of the 65 WCAG1 checkpoints accounted for 44% of all problems encountered by the User Panel (see Table 12).
- The 11 most common problem types accounted for 68% of all instances of problems encountered. These include poorly named links that lead to unexpected content, and the lack of skip navigation links and descriptions (ALT-text) on images.
- Poor colour schemes and contrast were among the most mentioned complaints by the users, with pale text on pale background being a common problem. Another frequently mentioned problem was the lack of accessibility options, which allow users to change the presentation of the site (e.g. colour and text size).
- The User Panel liked features such as good use of colours to highlight visited links and proper links labelled individually which means 'no trawling is necessary'.
- Websites of national museums in England achieve higher levels of compliance with WCAG1 checkpoints than comparable museum websites overseas.

Conclusions and recommendations

This report has shown that the current level of accessibility of museum, library and archive websites is not high. Less than half the sites audited met the most basic technical accessibility guidelines and a User Panel of disabled people did not find them particularly easy to use. However, the number of different technical checkpoints and user problems that need addressing is not exceptionally high (the typical home page needs approximately six different checkpoints to be addressed and solving 13 user problems would address 68% of the problems users encountered).

Museums, libraries and archives need to engage with the WAI Web Content Accessibility Guidelines. They also need to engage directly with users to understand their needs and to ensure that disabled people can use their sites.

Recommendations

Museums, libraries and archives should:

- make web accessibility an integral part of their web development process;
- establish the current state of accessibility of their websites and develop policies, plans and targets for improvements to the accessibility of their websites; and
- involve disabled people in the web development process and make web accessibility an integral criterion in the web design brief process.

MLA should:

- promote guidance and good practice of web accessibility for the museum, library and archive sector, building on the strengths of the WAI guidelines and include aspects of accessibility that are little or not covered by them;
- harness the unique contribution online museum, library and archive collections can make to web accessibility, by presenting and interpreting collections in ways that are accessible to specific groups of disabled people.

3. The audit, its objectives and methods

The audit investigated the accessibility of 300 English museum, library and archive websites and an international comparison group of 25 museum websites from around the world.

The main objectives of the audit were to:

- establish the current state of accessibility of museum, library and archive websites in England;
- benchmark the current state of accessibility against national and international standards;
- identify current areas of best practice and those which require improvement; and
- create a strategy for improving accessibility of websites in the sector.

Two methods of investigation were used: automated testing of the websites against the Web Content Accessibility Guidelines Version 1 (WCAG1), to investigate the levels of conformance with these internationally recognised guidelines; and user testing with a panel of disabled people, to establish how easily people with disabilities, using a range of assistive technologies, could access basic information on the websites and what problems they encountered.

3.1 The sample of museum, library and archive websites

A total of 300 museum, library and archive website home pages were selected for automated testing. The sample comprised 100 museum, 100 library and 100 archive websites and covered a number of categories (see Table 1). In addition, 25 national museum sites from across the world were selected, to allow a measure of international comparison.

The 300 museum, library and archive websites were selected by City University, using criteria provided by MLA, MLA databases and online resources such as the UK Archives Network [5]. The sample reflects the geographical distribution of institutions within each domain and the size of their website and is broadly representative of museum, library and archive websites.

The sample of 25 national museums from across the world was selected to form the international comparison group. Three criteria were used in making this selection:

- that the museums have an English language website (to allow us to understand the results of the automated accessibility testing and to have English speaking disabled people conduct user testing with some of the websites, see below);
- that websites were chosen from all the continents of the world and a broad range of countries; and
- that the museums be of national or international standing.

Table 1: Number of websites automatically tested in the three MLA domains

Museum domain	Number of websites automatically tested
Academic	20
Local authority	31
Independent	30
National	19
Total	100
Library domain	
Academic	30
Public	60
Specialist	10
Total	100
Archive domain	Number
Academic	15
Business	5
Local authority	60
National	10
Specialist	10
Total	100

3.2 Automated testing of websites

Automated testing can detect some of the accessibility violations identified by the web Accessibility Initiative (WAI) web Content Accessibility Guidelines (WCAG1) [6], thus providing an initial assessment of the technical accessibility of a website.

The 14 WCAG1 guidelines are broken down into 65 checkpoints and each checkpoint has a priority level (1, 2 or 3) assigned to it, based on the checkpoint's expected impact on accessibility. Thus, violating Priority 1 checkpoints are said to have the largest impact on a website's accessibility, while violating Priority 3 checkpoints are said to have less impact on accessibility.

The tool used in this study was the accessibility module of WebXM™ from Watchfire [7]. Like other automated testing tools, it can check the conformance of a website against some of the 65 checkpoints. However, many of the checkpoints require human judgement. For example, an automated tool can check whether images on a website have descriptions associated with them (Checkpoint 1.1: Provide a text equivalent for every non-text element), but at the moment, an automated tool cannot check whether the colour contrast on the page is adequate (Checkpoint 2.2: Ensure that foreground and background colour combinations provide sufficient contrast when viewed by someone having colour deficits or when viewed on a black and white screen); this requires a human judgement. However, automated tools can give warnings, that is, indicate aspects of a page that should be manually checked by a human. To ensure that a site is fully conformant with the WAI guidelines, both automatic and manual checking of WCAG1 Checkpoints is required.

The home pages of all 325 websites were tested using the accessibility module of WebXM™ against those WCAG1 checkpoints which can be automatically tested.

Following this initial audit, 20 English museum, library and archive websites and five international museum websites were selected for in-depth automated and user testing. The selection criteria for these sites took into account the categories of each domain, the varying popularity of the sites, the results of initial automated testing and whether the site was embedded into a host site.

Up to 700 pages of each of these 25 sites (or the whole site if smaller) were tested with the accessibility module of webXM™.

3.3 User testing of websites

The 25 websites were tested by a User Panel of 15 disabled people at City University.

The User Panel included blind people, partially sighted people and people with dyslexia. Previous research conducted into website accessibility by City University showed that these three groups are amongst the most disenfranchised users of the web [1].

The User Panel consisted of:

- five people who are totally blind or have no functional vision (who use screen readers with synthetic speech or braille output to interact with the web)
- five people who are partially sighted (who may use screen magnification programs or large screen monitors to interact with the web)
- five people with dyslexia (who may use specialist web browsers that highlight words, change text/background colours and convert text to speech to interact with the web)

As far as possible, the User Panel reflected the diversity of disabled people in Britain in terms of age, gender, technology/computing/internet experience and assistive technologies used. Although the research took place in London we included people from other parts of England in the User Panel.

The evaluations of websites were run individually in dedicated testing areas at City University. Participants were provided with assistive technologies they normally use such as JAWS, ZoomText, Read-Please and large screen monitors. All 25 sites were evaluated three times – once by a member of each of the three User Panel groups.

Each User Panel member assessed four websites, undertaking two representative tasks with each site:

- What time does the museum/library/archive open on a Monday?
- What facilities does the museum/library/archive provide for disabled visitors?

Information collected for each task included:

- how easy the Panel members found it to perform the task, irrespective of whether or not they succeeded (rated on a scale of 1 to 7, where 1 indicates 'very difficult' and 7 indicates 'very easy' (see 'Task ratings' for further information)
- what made it particularly easy or difficult to do the task
- how easy the Panel members found it to navigate the site when attempting the task (rated on a scale of 1 to 7)
- problems encountered, as articulated by the User Panel members or observed by the researchers

Additional information collected for a whole site included:

- the extent to which the Panel members believed each site took their impairment into account (rated on a scale of 1 to 7)
- whether the Panel members experienced a feeling of being 'lost' when navigating around the site
- what Panel members most liked and disliked about the site

To summarise, data for this report was collected from two sources:

- automated testing of 300 museum, library and archive websites and 25 international museum websites. This served to identify the current state of the accessibility of websites in the sector in England;
- user testing of 25 museum, library and archive and international websites, with a panel of disabled people, to establish how easily people with disabilities could access basic information on the websites and what problems they encountered, using a range of assistive technologies.

Assistive technology

There are numerous technologies specifically designed for disabled people to access computers and the internet. For example, screen readers change text into speech or braille information for blind users and allow interaction with a website via designated keyboard commands. Partially sighted people often use a combination of screen reading and magnification software that can increase the size of the page by up to eight times – although this can be experienced as disorienting. Technologies for dyslexic users can also change text into speech information and provide simultaneous highlighting of the text being read aloud. Partially sighted people and people with dyslexia also commonly use software which allows changing the text size and colours to suit individual preferences.

With websites constantly incorporating new features and technologies, assistive technologies are often unable to keep pace and provide solutions to new technologies as they appear. Users of assistive technology also face financial barriers (many screen readers cost around £800 and version updates cost around £100). Training in using the software most effectively is often inadequate (for further information about assistive technologies, see www.abilitynet.org.uk).

4. Results

This section summarises the major findings from each of the data collection activities.

4.1 Automated testing

The home pages of the sample of 325 museum, library and archive websites in England's museums, libraries and archives as well as international websites were tested using the accessibility module of WebXM™ against those of the 65 WCAG1 accessibility checkpoints that can be automated.

4.1.1 Priority 1 Compliance (WCAG1 Level A)

Of the 300 museum, library and archive home pages tested, 125 home pages (41.7%) had no WAI Priority 1 checkpoint violations that automated testing could detect (see Table 2). However, all of these 125 home pages did incur WCAG1 Priority 1 'warnings' indicating that manual checks were recommended, an average of 8.9 warnings per page. For pages to be WCAG1 Level A conformant, they must also pass their Level A manual checks as indicated by the warnings. It is almost certain that some of the home pages would have failed some of the manual checks. So 41.7% is the maximum level of basic accessibility one can expect from this set of home pages.

The 100 websites from the archive sector achieved the best results with 51 of the home pages (51.0%) satisfying automated Level A conformance. This compares to 34.0% in the museum sector and 40.0% in the library sector.

Of the 25 international museum home pages tested, 5 (20.0%) had no WAI Priority 1 checkpoint violations that automated testing could detect (see Table 2). However, all of these 125 home pages did incur some WCAG1 Priority 1 'warnings' for manual checks, on average 9.6 warnings per page.

4.1.2 Priority 1 and 2 Compliance (WAI Level AA)

A total of ten homepages (3.4%) had no automatically detectable Priority 1 and Priority 2 checkpoint violations and were thus potentially Level AA conformant. Once again the archive domain was the most conformant, with 6 sites recording no automated AA violations, compared to 1 museum and 3 library websites. However, these sites did carry a mean of 23.1 Priority 1 and 2 ‘warnings’ and may therefore not have been fully AA conformant.

None of the international museum home pages passed the automated Priority 1 and 2 tests, so could not be Level AA conformant.

4.1.3 Priority 1, 2 and 3 Compliance (WAI Level AAA)

One website in 300 achieved automated AAA Compliance, having no automated Priority 1, 2 or 3 checkpoint violations. It was an archive website. However, it did generate 32 ‘warnings’.

None of the international museum home pages passed the automated Priority 1 and 2 tests, so could not be Level AA conformant.

Table 2: Number (and percent) of sites that passed automated WCAG1 testing

English MLA domains	Priority 1 (A)	Priority 1 +2 (AA)	Priority 1, 2 + 3 (AAA)
Museum	34 (34%)	1 (1%)	0
Library	40 (40%)	3 (3%)	0
Archive	51 (51%)	6 (6%)	1 (1%)
Total	125 (41.7%)	10 (3.4%)	1 (0.4%)
International museums	5 (20%)	0	0

4.1.4 Designer measure and user measure of accessibility

Looking at whether a web page passes a particular WCAG1 level of accessibility provides only a very simple measure of its technical accessibility. A web page might miss achieving Level A conformance by failing on only one instance of one Priority 1 Checkpoint, or it might have 20 instances of 10 different Priority 1 checkpoints. However, to fully understand all the information about the accessibility of a page, one can try to digest the full set of figures available on the technical accessibility: for example, the number of different Checkpoints violated, the number of instances of those violations, the number of different Checkpoints giving warnings and the number of instances of warnings. This is likely to overwhelm one with information and makes it very difficult to make meaningful comparisons between web pages or over time (in understanding whether changes are improving the accessibility of a page).

We have therefore developed two measures of accessibility to provide more detailed, but comprehensible, information about technical accessibility [8]: the 'Designer Measure' and the 'User Measure'. The Designer Measure of accessibility is the number of different Checkpoints violated (at any level of priority). We have called it the Designer Measure is because it indicates the number of *different* accessibility issues the designers of the particular site need to consider and understand in order to develop a process for implementing a design solution which will yield an accessible website. The User Measure of accessibility is the number of instances of violations of all Checkpoints. We have called it the User Measure because every single instance of a violation of a Checkpoint is a potential stumbling block to using a web page for a disabled user, so the higher the User Measure, potentially the worse the user experience for disabled users. These stumbling blocks may range from a page which completely prevents a disabled web user from progressing any further in a website (which following Nielsen and Mack [9], might be termed an "accessibility catastrophe") to aspects of a page which simply cause irritation. Of course, not all disabled web users will be affected by all the instances of all the accessibility problems. Some instances relate specifically to the use of the web by blind people, others relate to use by dyslexic people and so on. In addition, disabled users will not always read every part of a web page, and will therefore not encounter every accessibility problem. Nonetheless, the total number of instances of violations of Checkpoints on a web page, the User Measure, is a reasonable measure of its

overall accessibility and usability from the viewpoint of disabled users, and the quality of the disabled user experience.

The Designer and User Measures can be calculated both for the actual violations of checkpoints automatically detected by an accessibility tool (Designer/User Measure – Violations) and for the warnings indicated by an accessibility tool (Designer/User Measure – Warnings).

To understand the relationship between the Designer Measure and the User Measure, consider the following example:

On a particular home page there may be violations of two Checkpoints: failure to provide ALT text for images (Checkpoint 1.1) and failure to identify row and column headers in tables (Checkpoint 5.1). The number of different Checkpoints violated, the Designer Measure, is 2. However, if there are 10 images that lack ALT text and 3 tables with a total of 22 headers, then the number of instances of violations of all Checkpoints, the User Measure, is 32. This example also illustrates how violations of a small number of checkpoints can easily produce a large number of instances of violations.

Across the whole sample of MLA home pages, the Designer Measure (Violations), the mean number of different checkpoints actually violated, was 5.9 per home page (see Table 3). In other words, the average home page violates approximately 6 different WCAG1 Checkpoints.

The average number of instances of all checkpoint violations, the User Measure (Violations), was 56.9 per home page across the whole MLA sample. So the average home page gives approximately 60 instances of known problems for disabled users.

Looking at the Designer and User Measures (Violations) for the three domains, archives had the lowest average Designer Measure (5.6, see Table 3), followed by museums. For the User Measure, museums had the lowest average value (49.4), followed by archives.

Turning to the warnings of possible Checkpoint violations, an average of 34.3 different checkpoint warnings, the Designer Measure (Warnings), was found per home page across the whole sample. There were also 159.0 instances of Checkpoint warnings, the User Measure (Warnings), per home page.

Thus, in total, the average museum, library and archive home page presents a disabled user with an average of 215.9 instances of potential stumbling blocks – 56.9 known violations of checkpoints and 159 warnings of possible violation checkpoints. One now begins to understand why disabled users typically experience such problems with websites.

Museums had the lowest average Designer and User Measure warnings (32.4 and 123.8 respectively, see Table 3). Library websites had the highest average Designer and User Measure warnings, and Archive sites had intermediate values.

Table 3: Designer and User Measures per average home page

	Designer Measure (Violations)	User Measure (Violations)	Designer Measure (Warnings)	User Measure (Warnings)	Total number of possible problems
MLA domains:					
Museum	5.8	49.4	32.4	123.8	173.2
Library	6.2	66.8	36.5	200.6	267.4
Archive	5.6	54.5	34.1	152.2	206.7
All Domains	5.9	56.9	34.3	159.0	215.9
International museums	6.9	67.9	35.2	171.5	239.4

Table 4: Mean Designer and User measures for Museum domain

Museum category	Designer Measure (Violations)	User Measure (Violations)	Designer Measure (Warnings)	User Measure (Warnings)
Academic	5.2	37.5	31.7	104.4
Local authority	5.4	32.6	30.5	83.7
Independent	6.0	63.7	31.7	128.1
National	6.8	67.1	37.2	207.2
Total	5.8	49.4	32.4	123.8

The categories within the three MLA domains also revealed some clear patterns summarised below.

The results for the museum domain are shown in Table 4. National museum home pages had the highest average Designer and User Measures for both known violations and warnings, followed by Independent museums. Academic and Local Authority museums fared better.

The international museums fared less well than the English museums on the Design and User Measures, for both known violations and warnings. The average Designer Measure (Violations) for the international museums was 6.9 – so they had approximately 7 different WCAG1 checkpoints violated per home page (compared to an average of 5.8 for English museums). The average User Measure (Violations) was 67.9 compared to an average of 49.4 for English museums. So the average international museum home page presented disabled users with nearly 70 known problems. In terms of warnings, the average Designer Measure (Warnings) for the international museums was an average of 35.2 compared to 32.4 for the English museums. The average User Measure (Warnings) was 171.5 compared to 123.8 for English museums.

Thus, the average international museum home page presents a disabled user with an average of 239.4 instances of potential accessibility stumbling blocks – 67.9

known violations and 171.5 warnings of possible problems. This compares with the average English museum home page which presents a disabled user with an average of 173.2 potential accessibility stumbling blocks (49.4 known violations and 123.8 warnings of possible problems).

The results for the library domain are shown in Table 5. There was little difference in the Designer Measure (Violations) for the three library categories, although specialist libraries showed a substantially higher User Measure (Violations). Similarly for the Designer Measure on warnings, there was little difference between the three categories, but public libraries showed the highest User Measure.

Table 5: Mean Designer and User measures for Library domain

Library category	Designer Measure (Violations)	User Measure (Violations)	Designer Measure (Warnings)	User Measure (Warnings)
Academic	6.2	44.8	34.9	111.4
Public	6.1	74.6	37.0	241.8
Specialist	6.8	86.1	38.1	220.9
Total	6.2	66.8	36.5	200.6

For the archives domain there were no substantial differences between the sub-categories.

4.2 User testing

The 15 members of the panel attempted a total of 120 tasks with the 20 MLA websites selected for in-depth testing (20 websites x 2 tasks/website x 3 evaluators/website = 120) and of these, 119 (99%) were logged and analysed. Detailed analysis of the international museum data are available in a separate publication [10].

4.2.1 Overall performance and opinions

The panel members could only successfully complete 75.6% of the attempted tasks they undertook and were not able to complete 24.4% of them.

As Table 6 illustrates, blind participants had more difficulty in using the websites, successfully completing only 66.7% of their tasks, compared to a combined average of 80.0% for the other two user groups. This is a statistically significant difference between the groups. Further evidence of the problems with the websites for blind members of the User Panel was the fact that failure to complete tasks was experienced by a broad cross-section of blind Panel members, not just a minority of individuals.

Table 6: Success at basic website tasks for different user groups

User group	Success at basic tasks
Blind	66.7%
Dyslexic	82.5
Partially-sighted	77.5
All Users	75.6%

There was also a notable difference in success rates between the three domains, with archive websites producing the most task failures (30.6%) (see Table 7). This failure rate is almost 9% higher than the combined average of the other two domains (21.7%).

Table 7: Success at basic website tasks for different domains

MLA Domain	Success
Museum	76.2%
Library	80.5
Archive	69.4
Total	75.4

Table 8 shows the mean ratings of ease of use of the websites for each domain. The mean perceived ease of use across the three domains was 3.8, fairly close to the midpoint of the rating scale (4.0 being midway between 1 which represents the ‘most difficult’ rating and 7 which represents the ‘easiest’ rating). Library websites were perceived as being the easiest to use by the Panel members (mean of 4.5) and archive websites the most difficult (mean of 3.1)

Task ratings

For each task, users were asked to quantify their experience of attempting the task on a rating scale which ran from 1 to 7. 1 represented the ‘most negative’ rating and 7 the ‘most positive’ rating. Each user was asked to choose one number between 1 and 7 which most closely reflected their experience. One rating was of the ease of completing a task and another was of the ease of navigating information on a website.

Table 8: Mean ease of use rating for the three MLA domains

MLA Domain	Mean Rating	Standard Deviation
Museum	3.9	1.70
Library	4.5	1.76
Archive	3.1	1.51
All domains	3.8	1.65

NB. 1 = very difficult, 7 = very easy

The members of the Panel were asked to rate the ease of navigation around the site when attempting the tasks. The mean for all groups was 4.6. The dyslexic users felt the navigation was easier than the other groups (see Table 9). This is particularly interesting, as dyslexic people often experience particular problems in orienting and navigating in information.

Table 9: Mean ease of navigation ratings for each user group

Disability Group	Mean ease of navigation rating
Blind	4.5
Dyslexic	5.0
Partially sighted	4.3

NB. 1 = very difficult, 7 = very easy

Table 10 shows that more than half of the Panel members felt ‘lost’ on at least one occasion when exploring the websites. They did not know where in the site they were, how they got there or how to return to their previous path of navigation. This was especially evident in relation to library and archive sites.

Table 10: Percentage of Panel feeling ‘lost’ on at least one occasion

MLA Domain	Percentage
Museum	47.0
Library	60.0
Archive	60.0
All domains	55.7

4.2.2 User problems

The problems observed by the Panel Members and the researchers at City University were collated and categorised. Overall, 189 instances of problems were identified during the user testing sessions. 147 (78%) directly related to Checkpoints in the WAI guidelines, but 42 (22%) did not. Below we outline the most common problems users encountered, the number of instances when they were reported and if the problem is covered by the WAI guidelines.

Table 11: Most frequent user testing problems

Problem	Instances	In WCAG1?
Target of links not clearly identified	30	Yes
Information presented in dense blocks with no clear headings to identify informational content	17	Yes
Inappropriate use of colours and poor contrast between content and background	14	Yes
Navigation mechanisms used in an inconsistent manner	13	Yes
Links not logically grouped, no facility to skip navigation	10	Yes
Text and images do not increase in scale when browser option selected	7	Yes
External information and navigation on page, not associated with page content	6	No
Important information not located at top of list, page etc	6	Yes
ALT tags on images non-existent or unhelpful	6	Yes
Graphics and text size too small	5	No
Distraction and annoyance caused by spawned and pop-up windows	5	Yes
Labels not associated with their controls	5	Yes
Images and graphical text used in-place of plain text	5	Yes

The 13 problems outlined in Table 11 constitute 68% of the total number of problems uncovered through user testing. Over half of them relate to orientation and navigation (see Table 12). The five most frequent problems alone account for 44% of the total number of problems uncovered. Of these, four are orientation and navigation problems.

Table 12: Navigation and orientation problems

Navigation and orientation problems
Target of links not clearly identified
Information presented in dense blocks with no clear headings to identify informational content
Navigation mechanisms used in an inconsistent manner
Links not logically grouped, no facility to skip navigation
External information and navigation on page, not associated with page content
Important information not located at top of list, page etc
Labels not associated with their controls

Some of the issues uncovered by the User Panel were specific to their individual impairment, others were problems encountered by all the users groups. Two of the most prominent problems for all three groups were centred on the issue of navigation, these are presented in Table 13.

Table 13: Key problems for each user group

Key problems experienced by blind users	Instances
Target of links not clearly identified	12
Links not logically grouped, no facility to skip navigation	7
ALT tags on images non-existent or unhelpful	5
Information presented in dense blocks with no clear headings to identify informational content	5
Labels not associated with their controls	3
Key problems experienced by dyslexic users	Instances
Target of links not clearly identified	11
Inappropriate use of colours and poor contrast between content and background	6
Information presented in dense blocks with no clear headings to identify informational content	6
Navigation mechanisms used in an inconsistent manner	5
Graphics and text size too small	5
Key problems experienced by partially sighted users	Instances
Inappropriate use of colours and poor contrast between content and background	8
Target of links not clearly identified	7
Text and images do not increase in scale when browser option selected	7
Navigation mechanisms used in an inconsistent manner	6
Information presented in dense blocks with no clear headings to identify informational content	6

The problems encountered by the User Panel members are those that prevent disabled users from utilising the full potential of museum, library and archive websites. They can cause very

real difficulty and frustration. The issues can be grouped under three headings and are examined in more detail below.

Issues related to presentation of content

Many of the complaints from the dyslexic and partially sighted members of the User Panel related to the colour scheme and contrast used for page designs. While perceptions can be very specific to individuals, colour schemes clearly affected the ability of many users to perform tasks, particularly when the contrast between the text and the background was inadequate. Pale text on pale backgrounds was a common problem. Moreover, different users benefit from different colour schemes. For example, while many partially sighted users appear to benefit from a very strong contrast such as yellow text on a black background, one dyslexic user found this “too glaring” and preferred black text on a pastel blue background. Many sites did not support colour change due to the hard coding of this information. Even when it was possible to change colour schemes, very few users seemed to be aware of this possibility.

Use of colours and contrast

If colour is used as the sole method for identifying important distinctions on a web page, users who are partially sighted, dyslexic or colour blind may find the website unusable (10% of males have some form of colour vision impairment [11]). Low contrast between the colours such as blue links on a black background, or red text on a green background can also make a website difficult read for all users. Therefore colours alone should not be used to convey distinctions and high contrasts between colours should be implemented. Style sheets should also allow users to change the presentation of the site by using the accessibility options of their browser.

The experts observed that for dyslexic users text sizes were commonly perceived to be too small on many sites. Few users seemed to be aware that the size of the text could be increased from the browser menu. Partially sighted participants who tried to increase the size of the display by using such controls however noted that this often failed, once again due the hard coding of text size.

Navigation and orientation problems

In terms of navigating sites, two key problems emerged. Firstly, poorly named links that led to unexpected content were responsible for many of the navigation problems. Similarly, information was often not in places where it might be expected to be found. In undertaking the task of finding the opening hours of a museum, members of the User Panel often found this information on a page or in a section entitled 'Contact Us'. As one dyslexic user commented "...important information like opening times and access for disabled people should not be hidden under obscure titles... why can't they just put a link saying Opening Times". Secondly, many sites offered inconsistent navigation mechanisms. Links were not located in navigation bars but dispersed across the page, and icons and images were inconsistently used as active links.

A specific problem for many blind users was the lack of a Skip Navigation link at the top of pages to enable them to jump to the main content of a page (by-passing the page's top navigation). When such links are missing, blind participants using screen readers are compelled to listen to the navigation elements that appear at the top of every page. This repetitive information is often described as audio "clutter" by blind people. It was obvious that the users found moving through this clutter very frustrating and exhausting. While JAWS, the most common screen-reading software the User Panel members used, does have some support for skipping over this clutter relatively efficiently, this does not always work and not all users have the latest versions of JAWS which provide this facility.

Poor page design (in terms of layout) led to recurrent orientation problems for all the user groups. Both the members of the User Panel and the experts at City University considered many sites to have overly complex and 'cluttered' pages with dense blocks of text. The lack of clear indication of main headings, secondary headings and so on was a recurring problem across the three domains. While sighted users could infer some of the logical form of pages from text sizes, colour coding, etc, blind users did not have access to this and experienced pages as lacking a logical structure.

The pre-evaluation research conducted by the experts at City University identified that many academic and local authority museum, library and archive sites are deeply embedded into a host institution's external site (often a university or local authority). This caused confusion to all user groups. Users were often unaware that many of the navigational links available did not

directly relate to main content of the page: "[It] keeps giving me information about other things...information about the Civic Centre" (comment by partially sighted User Panel member).

Alternative descriptions of images and other media

Another common problem for the blind User Panel members was a lack of informative descriptions of images. This problem did not only apply to image files that were visual information, but also to graphical text. For example, one site used graphical text image for their link to an 'Accessible Site' but failed to provide any form of description to that image, so blind users were unaware that this option existed.

Use of images and new media

It is a basic requirement that all non-text items such as images and graphical text need to have an informative text alternative attributed to them. This includes Flash animation where the user should be able to freeze any moving elements and stop audio.

When museums, archives or libraries put collections of objects on the web, they should consider providing more detailed descriptions specifically written for visually impaired people, together with background and interpretive information (see www.rnib.org.uk/audiodescription, then click 'museum and gallery professionals').

Audio information should be supported by subtitles for hearing impaired users. A transcript of audio files that are not associated with any streaming video should be made available for hearing impaired users. Multimedia presentations can be made accessible to visually impaired people by providing descriptions of essential visual information they may otherwise miss.

4.3 Accessible design features

In addition to the specific problems they encountered, the Panel members were also asked to report what they particularly liked about the sites they evaluated. Perhaps unsurprisingly, many of the positive aspects were the opposite of the problems outlined above. For example, partially sighted Panel members appreciated "good use of colours to highlight visited links". Blind Panel members enjoyed logically structured pages, and as one user put it; "proper links, labelled individually and properly mean no trawling is necessary." Generally Panel members liked sites with clear navigation mechanisms, logical page layouts, clear contrast, reasonably sized text and straight-forward language.

4.4 Overall accessibility of museum, library and archive websites

The Panel members, when asked about the extent to which their impairments were taken into account they gave a mean rating of 3.4 on a scale of 1 to 7. This is not a ringing endorsement of the current accessibility of English museum, library and archive websites.

It appears that many problems are common to all user groups, and are common to all the museum, library and archive domains investigated. While text size and colour schemes are clearly unproblematic to totally blind users, unclear labelling of links and dense information with no structured headings did affect users irrespective of their impairment. Moreover, the most common and serious problems relate to navigation and orientation, not technical accessibility problems that can be addressed simply by modifying aspects of the HTML code of pages. Rather the most serious problems are those with the use of pages by users that clearly require design skills and user testing to overcome and avoid in future designs. Many of these problems are not detectable by automated testing tools, but require human judgement.

4.5 Automated testing versus user testing

The detailed automated testing of up to 700 pages from each site (or the whole site if smaller), led to the testing of nearly 5,000 web pages. The results of this testing showed very similar findings to the automated testing of the 300 museum, library and archive website home pages, so these will not be presented in detail here.

Interesting differences were found between the results of the automated testing and the user testing. For example, the user testing showed that the User Panel was least successful in completing set tasks on archive websites and rated the ease of use of the archive domain below that of museums and libraries. In contrast, the automated testing evaluation established that the archive sector was the most conformant with the WCAG1 checkpoints.

This is due to the fact that, in many cases, automated testing alone is not able to identify the problems that users encounter. Of the 13 most frequent problems encountered by the User Panel as a whole (accounting for 68% of the total number of problems, see Table 11), only one problem can be identified solely by automated testing ('Text and images do not increase in scale when browser option selected'). Therefore, 12 of the 13 problems will require human inspection.

5 Conclusions and recommendations

The research conducted for this report has shown that the current level of accessibility of museum, library and archive websites is not high. Less than half the sites audited met the most basic Web Accessibility Initiative technical accessibility guidelines and a User Panel of disabled people did not find them particularly easy to use. However, the number of different technical checkpoints and user problems that need addressing is not exceptionally high (the typical home page needs approximately 6 different checkpoints to be addressed and solving 13 user problems would address 68% of the problems users encountered).

Museums, libraries and archives need to engage with the WAI Web Content Accessibility Guidelines. They also need to engage directly with users to understand their needs and ensure that disabled people can use sites. For example, none of the websites audited provided any information in British Sign Language – arguably an important access feature for many people who are born deaf. Many of the problems encountered by the User Panel members concerned navigation and orientation. These problems would have been easy to address if user testing of prototype versions of sites had been undertaken before release of the site.

5.1 Recommendations

These recommendations made below are specifically for the museum, library and archive sector. They complement the generic recommendations of the Disability Rights Commission Audit Report [1]. These outline areas for action for all stakeholders, ranging from disability organisations to website commissioners and website developers.

Museums, libraries and archives – and particularly staff with a responsibility for commissioning, managing and designing and promoting websites within the sector – should:

- meet service provider duties under the Disability Discrimination Act (DDA) and e- government 2005 policies for public sector websites
- make web accessibility an integral part of access policies and plans
- develop policies, plans and targets for continuous improvements to the accessibility of their websites
- establish the current state of accessibility of their websites
- involve disabled people in the web development process

- make accessibility an integral criterion in the Web design brief process. The brief should require that tender responses provide evidence of the skills and experience they have in designing accessible websites and their experience of involving disabled people
- give consideration to user groups whose requirements are not documented in the WAI Web Content Accessibility Guidelines, such as the provision of essential information in British Sign Language
- give consideration to developing specific resources for presenting and interpreting online collections to specific user groups, using e.g. descriptions of objects for visually impaired people and accessible language and communication through symbol systems and images for people with learning difficulties.

MLA should:

- promote good practice and raise awareness of web accessibility as an integral feature of inclusive museums, libraries and archives
- develop or support the development of web accessibility guidance for the sector, which clearly builds on the strengths of the WAI Web Content Accessibility Guidelines, but also embraces the requirements of user groups whose specific needs are not or are little covered by the WAI guidelines, such as deaf people and people with learning difficulties
- promote good practice in the presentation and interpretation of online collections to specific groups of disabled people, where the sector can make a unique contribution to the accessibility of websites, in an area that is outside the remit of WAI guidelines.

6 References

[1] Disability Rights Commission. (2004). *The web: Access and Inclusion for Disabled People*. London: The Stationery Office.

Available at: www.drc-gb.org/publicationsandreports/report.asp and
hcid.soi.city.ac.uk/research/Drc.html

[2] Disability Discrimination Act. (1995). Available at: www.disability.gov.uk/dda/

[3] Disability Rights Commission. (2002). *Code of Practice: Rights of Access Goods, Facilities, Services and Premises*. London: The Stationery Office.

[4]

eEurope Resolution (2002). Available at: [europa.eu.int
/information_society/eeurope/2005/index_en.htm](http://europa.eu.int/information_society/eeurope/2005/index_en.htm)

UK government eGov initiative:

eGovernment Unit. (2005). *web handbook. Checklist: universal accessibility*. Available at:
www.cabinetoffice.gov.uk/e-government/resources/handbook/html/usechecklist.asp

[5] Access to archives. (2005). *Access to archives: the English strand of the UK archives network*. Available at: www.a2a.org.uk [from March 2005: www.nationalarchives.gov.uk/a2a]

[6] World Wide web Consortium. (1999). *web Content Accessibility Guidelines 1.0*. Available from: www.w3.org/TR/WAI-WEBCONTENT/

[7] Watchfire. (2004) *webXM*. Available at:
www.watchfire.com/products/webxm/accessibilityxm.aspx

[8] Petrie, H., Hamilton, F. and King, N. (2004). *Tension? What tension? – website accessibility and visual design*. Proceedings of the International Cross-Disciplinary Workshop on web Accessibility. New York: ACM Press. pp 13 - 18. ISBN 1-58113-903-9.

[9] Nielsen, J. and Mack, R. L. (Eds.) (1994). Usability inspection methods. New York: John Wiley & Sons.

[10] Petrie, H., King, N., Hamilton, F. and Weisen, M. (In press). The accessibility of museum websites: results from an English investigation and international comparison. Proceedings of HCI International 2005. Mahwah, NJ: Lawrence Erlbaum.

[11] Birch, J. (2001). Diagnosis of Defective Colour Vision. 2nd Edition. London: Butterworth Heinemann.

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