

Bridging the digital divide

How are government websites meeting
the accessibility needs of users?

A survey of 150 government agency websites
for the Office for Disability Issues

by AccEase Limited

November 2005



Contents

Executive Summary	iv
Are government websites delivering information to New Zealanders?.....	iv
How we surveyed the agencies.....	iv
Results	v
Findings by specific user group (Steps 3 and 4)	vi
Conclusions	vi
Introduction	1
What is accessibility?	2
Who is affected?.....	3
Government information accessibility standards.....	4
Universal design.....	6
Methodology	7
Sites undergoing redesign.....	7
Sampling strategy.....	7
Overall findings	9
Best sites.....	9
General comments	10
Issues that make it impossible to access some information.....	11
Issues that make it difficult to access information	15
Beyond compliance to user testing	18
Findings by specific user group	20
Low-vision	20
Blind	21
Mobility-impaired	21
Reading-impaired	21
Conclusions	23
References	24
Works quoted in this report or referred to in the preparation of this report.....	24
Useful texts on accessibility	24
Appendix 1: Websites tested	25
Group 1: sites where automated testing disclosed substantive faults.....	25
Group 2: sites whose mission-critical information was not accessible	27
Group 3: sites that were tested through all four steps.....	29
Appendix 2: Our methodology	32
Step 1: automated testing	32
Step 2: visual verification.....	33
Step 3: key compliance requirements	34
Step 4: user test	36

Appendix 3: Web Content Accessibility (WCAG) Guidelines	38
Guideline 1. Provide equivalent alternatives to auditory and visual content.....	38
Guideline 2. Don't rely on color alone.....	39
Guideline 3. Use markup and style sheets and do so properly.	39
Guideline 4. Clarify natural language usage	40
Guideline 5. Create tables that transform gracefully.	41
Guideline 6. Ensure that pages featuring new technologies transform gracefully.....	42
Guideline 7. Ensure user control of time-sensitive content changes.....	43
Guideline 8. Ensure direct accessibility of embedded user interfaces.	43
Guideline 9. Design for device-independence.....	44
Guideline 10. Use interim solutions.	44
Guideline 11. Use W3C technologies and guidelines.	45
Guideline 12. Provide context and orientation information.....	46
Guideline 13. Provide clear navigation mechanisms.....	47
Guideline 14. Ensure that documents are clear and simple.....	48
Appendix 4: Sample questionnaires	49
Appendix 5: The Principles of Universal Design	52
UNIVERSAL DESIGN:	52
PRINCIPLE ONE: Equitable Use	52
PRINCIPLE TWO: Flexibility in Use	52
PRINCIPLE THREE: Simple and Intuitive Use	53
PRINCIPLE FOUR: Perceptible Information	53
PRINCIPLE FIVE: Tolerance for Error	53
PRINCIPLE SIX: Low Physical Effort	54
PRINCIPLE SEVEN: Size and Space for Approach and Use	54
Appendix 6: AccVerify reports	55

Executive Summary

Are government websites delivering information to New Zealanders?

In June and July 2005, AccEase Ltd, on behalf of the Office for Disability Issues, undertook a survey of 150 websites owned by government agencies or agencies funded by government.

The purpose of the survey was to explore the ways in which government agencies are meeting the requirements of Objective 6 of the Disability Strategy, and in particular the requirement to take into account the needs of disabled people when providing public-access information by means of a website.

Methodologies for building sites that are accessible have been codified in the E-government Guidelines (particularly section 6) and in the international Web Content Accessibility Guidelines (WCAG 1.0) to which the E-government Guidelines refer. An accessible site is one whose information and services are available to everyone, regardless of physical, sensory or cognitive disabilities, work constraints or technological barriers. To make a site accessible is to make it barrier free.

While compliance with such guidelines is not in itself sufficient to guarantee that a site is barrier free, it is an important first step – and failure to comply makes it almost certain that some users will be unable to access some information.

The percentage of the population affected by such barriers is substantial. Twenty percent of adult New Zealanders identified in the 2001 Disability Survey (Statistics New Zealand) as having a physical, sensory or cognitive disability. Fifty percent of adult New Zealanders have poor reading skills (International Literacy Survey). More than 80% of New Zealanders access the Internet via a dial-up connection when connecting from home, as do many small businesses and community agencies. Beyond that, a study by Forrester Research in the United States suggests that up to 60% of adults would benefit from accessibility features (such as the ability to enlarge text, change contrast or use keyboard commands) some of the time, perhaps in poor light or when they were tired.

How we surveyed the agencies

It was a good site to use, with good enlargement and restful colour.

AccEase tester

In Phase 1 of the survey, we used WCAG 1.0 as a filtering mechanism, testing sites with an automated testing tool (AccVerify from HiSoftware) in Step 1, and manually verifying checkpoints that were not amenable to automated testing (Step 2). From the results of this phase, we selected 56 sites for testing in Phase 2.

Phase 2 comprised a user test (Step 4) and a technical test of key e-government and WCAG guidelines that had not been tested in Phase 1 (Step 3).

Sites tested in Phase 2 were examined not only for their overall accessibility, but also for their accessibility to four specific disability groups disadvantaged by non-compliance (vision impaired, blind, mobility impaired, reading impaired).

Results

*Download times were longer on this site than on other sites I have tested.
Navigating was a bit hard at times. The language, font size and presentation of
the text was difficult.*

AccEase tester

Our survey highlights that the most accessible sites pay attention to the following points:

- Organisations should not use pdfs as the sole means of providing accountability reports and other information crucial to the purpose of the websites. Such a publication strategy excludes many users.
- All images – even decorative images – must have a text alternative that provides equivalent information to the information provided by the image. Where the image conveys no information (such as an image the same colour as the background used as a spacer between visible elements) the required text alternative is *alt=""*
- Low vision users require good contrast in order to use a site. Even if the contrast is sufficient to access information with difficulty, low vision users may find it extremely tiring to use a site.
- The ability to enlarge text is also a necessity for users with low vision.
- A standard list of shortcut key combinations (shortcut keys) is required for all government sites.
- Focal points for links to other site areas or for returning to the top of the page need to be large enough to be easy to use for people with a mobility impairment such as a tremor or poor co-ordination.
- Rather than focusing on compliance, a good accessibility statement attempts to consider and meet the needs of the widest possible audience.
- Home pages need to avoid presenting too much information.

Best sites overall

*Found this the best so far. Apart from finding no accessibility statement,
everything was laid out in a manner I found understandable and also attractive
and not confusing.*

AccEase tester

Twelve of the 150 sites achieved a score of 75 or more out of a possible 100. These were: 4 million careful owners, Bioethics Council, E-government Unit, Families Commission, Ministry for the Environment, Ministry of Transport, New Zealand Embassies, Office for Disability Issues, Office for Senior Citizens, Reduce your Rubbish, Skill New Zealand and StudyLink.

Findings by specific user group (Steps 3 and 4)

To find out which sites best served the needs of specific disability groups, we selected from the step 3 questions those known to impact on accessibility for specific groups and produced a composite score with the step 4 (user test) results.

Testers with low vision found at least one question impossible to answer for three quarters of the 56 sites tested in phase 2. The three sites we found to best serve the needs of our low vision user group were those of the Ministry for the Environment, the Bioethics Council and the E-government Unit.

Blind testers recorded the widest range of results of the four groups, with both the least approved and the second best site. The three sites that best served the blind testers were those of the E-government Unit, the Office for Senior Citizens, and Reduce your Rubbish.

Mobility-impaired testers were less likely than those with low vision to find a task impossible, but more likely to find it very hard. The five best sites for this user group were the Ministry for the Environment, the Ministry for Culture and Heritage, 4 million careful owners, New Zealand Embassies and Reduce your rubbish.

Reading impaired users were more likely than any other users to find a question impossible to answer. The four best sites were Office for Disability Issues, Population Statistics, E-government and Reduce your rubbish.

Conclusions

This survey shows that many agencies are making strenuous efforts to meet compliance requirements and to go beyond them to create truly user-centred websites. We hope this report will contribute to helping site owners and builders to understand what the barriers are, who they affect, and how they may be removed.

Introduction

Disability is not something individuals have. What individuals have are impairments. They may be physical, sensory, neurological, psychiatric, intellectual or other impairments. Disability is the process which happens when one group of people create barriers by designing a world only for their way of living, taking no account of the impairments other people have.

New Zealand Disability Strategy

This survey is one of the activities that the Office for Disability Issues has undertaken in order to report on actions taken by government agencies to implement the *Disability Strategy*. Objective 6 of the Strategy is to:

“Foster an aware and responsive public service: ensure that government agencies, publicly funded services and publicly accountable bodies (such as territorial authorities) are aware of and responsive to disabled people.”

Three of the actions arising from this objective relate to the websites developed by such agencies:

- 6.3 *Ensure that all government agencies treat disabled people with dignity and respect.*
- 6.4 *Improve the quality of information available, including where to go for more information, the services available and how to access them.*

And, in particular:

- 6.5 *Make all information and communication methods offered to the general public available in formats appropriate to the different needs of disabled people.*

Therefore, the *Disability Strategy* requires government agencies to take into account the needs of people with disabilities when providing public-access information by means of a website. Some of these needs relate to how easily – or even whether – people can access the information.

In December 2003, a Cabinet Paper called *The New Zealand Government Web Guidelines* was presented to Cabinet. In its preamble, it states:

- 2 *Many New Zealand Internet users have disabilities, or face particular circumstances, that limit their ability to access government websites. Often, this problem is exacerbated by the choices government agencies make about website design and technology without properly considering user needs. In most cases, agencies have technologies and design options available to them that would help avoid this problem.*
- 3 *The premise of this paper is that building websites that unnecessarily limit some peoples' access to government amounts to discrimination. In terms of the requirements of the Official Information Act 1982 and Human Rights Act 1993, and the relevance of core Public Service values, provision of government information and services via websites is no different from government in the physical world. Discriminating against people online is the same as doing so anywhere else.*

Government websites are public property - all New Zealanders using the Internet should be able to access them as of right, unless there are legitimate reasons to restrict access.

In response to this Cabinet Paper, *Cabinet minute (03) 41/2B Government Web Standards* mandated, as a standard for government websites, compliance with the *E-government Web Guidelines version 2.1*. These guidelines are discussed below.

Compliance with the guidelines is not, in itself, enough to ensure accessibility, although failure to comply with the guidelines makes it probable that a website, or parts of a website, are inaccessible to some audience members. It is therefore fair to use compliance as a proxy for accessibility (see *Appendix 2: Our Methodology* for a description of the steps). However, a site might be compliant and still present barriers to accessibility; the proof of the accessibility of a website is whether or not it can be used by people who face barriers in their daily experience of the Internet. Therefore, the focus of this survey is not on “does this website comply”, but on “can the information in this website be accessed”.

Throughout the report, we've included comments testers have made in their test reports. We hope this will give readers a sense of the current state of government agency websites; what people enjoy and what they dislike. We hope also to promote understanding of the frustration caused by poor accessibility, and the tremendous benefits that accessible sites offer to people like our testers. (Note that these comments relate only to the 56 sites that were tested in Phase 2.)

What is accessibility?

Access keys link should be at the top of the page, not bottom. A screen reader user wouldn't know it was there unless [it is] close to the top, since we have to read the whole page to know what's there i.e. can't just glance and see it. A lot of links, are they all necessary? Feels slightly cluttered but very accessible. Lots of helpful verbal comments

AccEase tester (Blind)

The e-government guidelines define accessibility as:

- *providing online content that is accurate, timely and relevant.*
- *opening the door to government by removing impediments to online access.*

In the wider internet community, the focus is on the second of these two bullet points. For a website to be accessible, the information and services it provides must be available to everyone, regardless of physical, sensory or cognitive user disabilities, work constraints or technological barriers.

Therefore, accessibility is measured by how barrier free the technology is. Accessibility problems are those that make it more difficult for those with disabilities, work constraints or technological barriers to use a website than for a person who does not have disabilities, constraints or barriers. Accessible websites ensure that:

- No member of the public is faced with a barrier to obtaining information and services that are available to the wider public audience

- Content is presented in a clear and simple manner, and it is easy to navigate within and between pages.

Note that these same measures also apply to Intranets, Virtual Private Networks and software applications – and the e-government guidelines recommend that agencies should apply the guidelines in the development of such resources in order to provide equal employment opportunities for all employees.

Who is affected?

“Site was one of the better ones, and was well laid out and colourful.” Tester A

“It was horrible to use this site with ZoomText because of the colour scheme.”

Tester B

AccEase testers with different experiences of the same site

Accessibility affects far more people than those who identify as having a physical, sensory or cognitive impairment. In fact, most people who need accessible websites do not consider themselves “disabled”.

The issue of accessibility affects those who:

- Are not able to see, hear or move easily or at all
- Have difficulty seeing text. In its simplest form this barrier applies to people who need reading glasses and find small text won’t enlarge on screen
- Have difficulty processing some types of information
- Have difficulty reading or comprehending text. Literacy statistics for New Zealand (quoted later in this report) suggest that this applies to around 50% of the working age population, as well as to people with specific learning, reading or cognitive impairments
- Do not have or are not able to use a keyboard or mouse
- Have a text-only screen or a small screen
- Have a slow Internet connection such as the dial-up connections in most Internet-connected homes, small businesses and community organisations. This applies even more so to those using dial-up connections in rural environments
- Are not fluent in the language in which the website is written
- Are in a situation where environmental factors interfere with their use of hands, eyes or ears, or where their hands, eyes or ears are busy
- Are using non-standard technology, including earlier or unusual versions of browsers or operating systems. This includes not only older technology but ensures future proofing for the increasing trend towards hand-held devices with access to the internet.

In research commissioned by Microsoft, Forrester Research (2003) found that 60% of working-age computer users in the United States could benefit from accessibility features;

38% (64.2 million) of working-age adults are likely to benefit from the use of accessible technology due to mild difficulties and impairments.

22% (37.2 million) of working-age adults are very likely to benefit from the use of accessible technology due to severe difficulties and impairments.

40% (67.6 million) of working-age adults are not likely to benefit due to no or minimal difficulties or impairments.

Similar research has not been conducted in New Zealand. However, 20% (743,800) of New Zealander adults identified in the *2001 Household Disability Survey* as having a disability, very similar to the Forrester figure of 22%. Of this 20%, 65% (405,100) report some kind of physical disability involving some restriction of movement or loss of agility. Sensory disabilities, including loss of sight or hearing, affect 41% (256,300). Speaking, learning or remembering disabilities affect 39% (245,000), and another 5% (28,900) have an intellectual disability. Sixty percent of people have more than one disability.

As regards access to the Internet, New Zealand has a high uptake of technology, with around 65% reporting in the *E-government 2004 Channel Surfing* survey that they had used the Internet during the previous year. However, in December 2004, New Zealand ranked 22nd in OECD countries for uptake of broadband (high-speed Internet access) technologies, with 4.7 broadband subscribers per 100 inhabitants. It follows that government departments should assume that as many as five out of six users will be accessing information via a modem connection.

Accessibility is related to usability, as both improve ease of website use. However, usability is aimed at ensuring that all website users have a happier experience of the website; accessibility is aimed at ensuring that one or more groups of users do not find it more difficult than others to use the site.

Government information accessibility standards

*A pain to have to scroll back and forth along the line. Text enlarged quite well.
Contact vanished off the side with enlargement.*

AccEase tester

Government agencies are required to comply with two internet information accessibility standards:

- the New Zealand *E-government Guidelines* and
- the international *Web Content Accessibility Guidelines (WCAG)* version 1.0 (these international standards are mandated by the e-government guidelines, in clause 6.3.2).

Failure to comply with these guidelines means that disabled people are likely to be excluded from information on the site.

There are three levels of compliance. Failing to comply with all WCAG Priority 1 and e-government “must” requirements means that some audience members will find it impossible to access information. This level is mandatory. Failing to comply with all WCAG Priority 2 and e-government “should” requirements means that some audience members will find it very difficult to access information. This level is strongly recommended. Failing to comply with all WCAG Priority 3 and e-government “may” requirements means that some audience

members will find it somewhat difficult to access information. This level is recommended where the site can comply cost-effectively.

Automated testing

Pages were obviously divided into sections, but html heading code was not used so the pages appeared to me to be disorganised.

AccEase tester (Blind)

Machine testing of accessibility compliance is a useful adjunct to manual testing. In fact, testing tools can detect some errors (such as missing text alternatives for images) more efficiently than human reviewers. In addition, industry leaders such as Jim Thatcher state categorically that, in their experience, there is a high correlation between errors that can be checked by software (such as whether there is a text alternative) and those that must be checked by a human reviewer (such as whether the text alternative is a true text equivalent and makes sense in the context).

However, automated testing cannot substitute for human review; there are many checkpoints in both the international and the New Zealand guidelines that are not amenable to testing and that are crucial to real-life users. Therefore, passing an automated test does not necessarily mean that a site complies nor that it is accessible (not necessarily the same thing, as discussed below). However, the converse is not true. Failing an automated test guarantees that the site does not comply and it is highly unlikely to be accessible.

Some of the checkpoints in the current WCAG guidelines, version 1.0, are ambiguous; their meaning has been hotly disputed over several years, and there is now wide international agreement on what needs to be tested and why. It is intended that criteria for version 2.0, which is currently under discussion, will be testable; that is, "a person should be able to determine if they have satisfied a given criteria" (Wendy Chisholm, World Wide Web Consortium (W3), on a WCAG discussion group, August 2005). The 30 June 2005 Working Draft of version 2 says: "When multiple people who understand WCAG 2.0 test the same content using the same success criteria, the same results should be obtained."

Note that the requirement is for testing to be completed by someone who understands the guidelines: a tester with understanding is important both for manual testing and for interpreting the results of automated testing.

E-gov Watch testing

Supporting the text with visual information could aid accessibility to this site.

AccEase tester

In 2003, 2004 and again this year, the State Services Commission commissioned a quality assessment of certain sites against the e-government guidelines and other criteria. This assessment covered required government content, useability, information delivery, e-services delivery, personalisation, cross-organisational integration, feedback and e-consultation, as well as accessibility. The methodology was based on sampling from the site, and provided weighted scores to produce a ranking for each category as well as an overall ranking. The testing is not, and does not claim to be, an accessibility audit, and it is by no

means a comprehensive check of accessibility. Its focus is on assessment against the criteria, providing a score that can be used to benchmark the site against others as well as against its own progress, and providing useful feedback for site improvement. While useful to agencies that seek to continuously improve their sites, this process does not – and does not pretend to – offer an assurance that sites are accessible.

AccEase undertook the testing of accessibility-related criteria for E-gov Watch, the agency employed by the State Services Commission to provide this service.

Beyond compliance

I felt confused and anxious when trying to find information. Not a user-friendly site. Site is okay visually, but navigating through it is frustrating.

AccEase tester

Compliance – even with all three priority levels – does not necessarily mean that the site is accessible. For example: a coloured font may be quite legible at a large size and pass the colour contrast tests; however, if the same font is presented in a small size it may blend into the background and be lost to users. Small navigation buttons such as > may present difficulties for those with mobility impairments such as sufferers of Parkinson's syndrome. Sites may be accessible to people who are blind, but totally inaccessible to people who have low vision; accessible to well-educated people with mobility impairments but inaccessible and frustrating to those with reading impairments.

The e-government guidelines recommend user testing, with accessibility-challenged testers. These are the 20% of users who are most likely to meet barriers when using a site. If the website works well for those who face barriers due to mobility, sensory or cognitive impairments of reasonable severity all of the time, then it will work well for the other 30–40% who face such barriers part of the time, as well as for the remainder of the population.

Universal design

Lots of visual information which slows down navigation e.g. innercurve.gif (1062 bytes) corner.jpg (1481 bytes) Not necessary. For a good screenreader user this site is satisfactory, but less skilled users would be confused by the information described above.

AccEase tester

In essence, the various guidelines promote the principles of universal design, though they seldom use this term.

Universal design is the design of products or environments to be usable by all people to the greatest extent possible without the need for adaptation or specialised design. For example, road crossings in most major cities use universal design principles, providing multiple feedback modes to indicate the presence of a crossing and whether or not it is safe for pedestrians to cross. Tactile surfaces indicate the edge of the footpath; sound and light signals indicate the time to wait and the time to move; but whether they are conscious of one signal or three, all pedestrians cross together.

For more about universal design, see *Appendix 5: Principles of Universal Design*.

Methodology

Plenty of useful information and you can get at it.

AccEase tester

We used a two-phase, four-step methodology.

Phase 1 used a combination of automated testing (step 1) and manual verification (step 2).

Phase 2 comprised:

- a technical test of the remaining WCAG level 1 and key e-government and WCAG 2 and 3 guidelines (step 3). Sites received a score for each checkpoint/question. These scores were then compiled to give a total
- a user test (step 4).

Those sites that were tested during Phase 2 were also assessed for their accessibility to specific groups disadvantaged by non-compliance (vision impaired, blind, mobility impaired, reading impaired).

Sites undergoing redesign

A pain having to get mouse right in circle to fill in form. Will be interesting to see the new site.

AccEase tester

We recognise that websites are continually being redeveloped and relaunched. Several sites had a major upgrade during the month of the survey (June, with some clarification testing in July 2005), and others will no doubt be relaunched between the survey and the publication of this report.

We have attempted to avoid a “skewed” result where different steps in the survey were completed before and after a major upgrade of a site, in some cases redoing earlier steps in order to ensure that later results applied to the same site.

However, this survey is intended to be a “snapshot”, showing the compliance level at a particular point in time (July 2005).

Sampling strategy

Site was really well constructed and laid out. Everything seemed to be where it should be and was easy, and more importantly, logical. Some sites have so much information in obscure areas it is hard to extract what you require. Good site.

AccEase tester

In steps 2 and 3 of the survey, and in step 1 for those sites not susceptible to the crawling software used by our testing tool, we used a sampling strategy for tests. For each test, we always tested the home page. We then selected several other pages from various parts of

the site, with a bias towards sections of the site that were obviously aimed at the general public.

The methodology is described in detail in Appendix 2.

Overall findings

The site is compact. Logical and easy to follow. No unnecessary information on pages.

AccEase tester

There are a number of high-quality websites in the government sector, and many agencies have made a considerable commitment to ensuring that their sites are accessible.

Best sites

This website could be used as a model for all the government websites. It has everything. It's eye-catching; has clearly visible labelled links; has clear informative, easily readable text; and gets its message across in as few words as possible.

AccEase tester

The best sites, achieving between 75 and 82 points out of a total possible 100 points, are listed below.

4 million careful owners	http://www.4million.org.nz
Bioethics Council	http://www.bioethics.org.nz/
E-government	http://www.e-government.govt.nz
Families Commission	http://www.familiescommission.govt.nz
Ministry for the Environment	http://www.mfe.govt.nz
Ministry of Transport	http://www.transport.govt.nz
New Zealand Embassies	http://www.nzembassy.com
Office for Disability Issues	http://www.odi.govt.nz
Office for Senior Citizens	http://www.osc.govt.nz
Reduce your rubbish	http://www.reducerubbish.govt.nz
Skill New Zealand	http://www.skillnz.org.nz
StudyLink	http://www.studylink.govt.nz

General comments

"The site map is orange, which makes it hard to see."

"Lots of orange – even orange on orange."

"It is hard to see the orange links or the white links on an orange background."

"The page tops are hard to see because they are in orange."

"Once you get past the home page it's okay. Lots of orange."

"I found the combination of burnt orange, navy and white, with its cramped text, very hard on my eyes."

"Lots of orange and some poor contrast"

"Orange spots already!"

AccEase testers giving their view of the most popular colour scheme in the test sample

Our survey indicates that the following points require emphasis:

- When pdfs are used as the sole means of providing mission-critical reports and other such information, many users are excluded by such a publications strategy. These include users under time constraints, those connecting via modems, and vision and mobility impaired users. For this reason, when information is provided in pdf, it is a Priority 1 requirements of WCAG, and a 'must' requirement of the e-government guidelines, that it is also available in html.
- All images – even decorative images – must have a text alternative that provides equivalent information to the information provided by the image. It follows that, when the image provides no information, a null alt (alt="") meets the requirement. Screen readers will ignore a null alt, but will speak the word "image" when no alt is provided.
- There are three specific issues to be aware of when writing text alternatives. First, images provided for visual spacing purposes should have null alts – screen reader users find it irritating when sites read "shim, shim, shim" or "spacer, spacer, spacer". Second, the alt for a graphic should be written to provide the user not receiving images with the same information available to a user that is using images. Simply repeating the caption or information available from the surrounding text is redundant and seldom meets the information requirement. Third, complex images such as charts and graphs generally require a paragraph or more of text – either on the same page or linked to the image – that fully describes the content of the image. For example, an image of a flow chart describing the organisational structure of an organisation requires the same information to be provided in html, perhaps as a structured list on a linked page.

Again, this is a Priority 1 and "must" requirement.

- Low vision users require good contrast in order to use a site. Even if the contrast is sufficient to access information with difficulty, low vision users may find it extremely tiring to use a site. Orange was found to be a particular problem – our low vision testers all complained of headaches. Dark text on a light background of the same colour also causes difficulties. The problems experienced by users with a medium or severe vision impairment are also experienced to a lesser extent by most users over the age of 45. This is a large audience segment for most sites. In addition, designers

need to allow for common forms of colour blindness. Contrast of text with background is a priority 3 WCAG requirement and a “must” e-government requirement.

- The ability to enlarge text is also a necessity for users with low vision. Key text (such as menu and other navigation information) is particularly important – and particularly problematic when such information is provided in images and therefore does not enlarge. It is also important to ensure that the initial text size is large enough so that the “Largest” setting in Internet Explorer makes text easy for a low vision user to read. This is a Priority 2 and “must” requirement.
- It is an e-government requirement that a standard list of access keys is used for all government sites. This allows users to become familiar with a single set of pan-government keyboard shortcuts. Use of non-standard keys, or no access keys at all, reduces the usefulness of the keys on all other sites by lowering user confidence.
- Focal points for links to other site areas or for returning to the top of the page need to be large enough to be easy to use for people with a mobility impairment such as a tremor or poor co-ordination.
- Rather than focusing on compliance, a good accessibility statement attempts to consider and meet the needs of the widest possible audience
- It is important that home pages should avoid being too busy; that is, presenting too much information. Remember that users with low vision need to retain context when the screen is enlarged, and those with reading impairments are more likely to find the information they needed if the page is simple and clearly laid out.

Issues that make it impossible to access some information

Found this to be a totally bewildering site. Nothing seemed to be placed logically, and the one thing I found was by accident.

AccEase tester

Alts, page size, scripting

Most of the things I found were done by guesswork or accident. It was giving me a lot of what sounded like html code which was visible to JAWS.

AccEase tester

The automated testing disclosed a need for some site managers to address the following:

- All images require text alternatives (alts).
- Programmes for automated testing are readily available, and would pick up many faults that might cause accessibility issues.
- Site managers need to ensure that scripting is accessible, or that text alternatives are available.
- The e-government guidelines mandate against the use of frames, because they isolate some sectors of the community from the information contained in them.

- Files need to be small enough to download quickly on a slow connection (as noted in *Appendix 2: Our methodology*, for the purpose of this evaluation we considered a file oversized at 200Kb – this is double the e-government standard of 100Kb).
- Automated testing would pick up errors in a template that therefore replicated throughout the site and also missing text alternatives for images that had no information content (such as one pixel spacers – as noted above, these require an empty alt so that screen readers don't repeat "image" "image" "image" over and over again).
- The WCAG requirement to use a text equivalent to identify the input field to adaptive technology applies to search boxes, which are often found on every page of a site. (Methods for doing this include using an alt for the INPUT element, or coding to associate the input field with a text label.)

Such matters are usually easy to test for and fix, and many sites could be dramatically improved with a few minor changes¹.

The site was, in fact, fairly user-friendly – but if I can't find what is required, it suggests that there is still something lacking.

AccEase tester

Data tables

Good mark-up of data tables is absolutely crucial to making the information they contain available to blind users. For simple data tables, this merely requires column and row headers to be marked using the appropriate html tag (<th>). . The markup of complex data tables is considerably more difficult – but also more important. Poor markup of complex or large data tables excludes blind website users from the information they contain.

For example, on the following chart, reader technology for a blind person will probably read across the columns so that at one stage it will read the figures; 654, 516, 547, 468, 383, 383, 383 with no cognitive link to the category of information. Depending on the html coding and the settings on the screen reader, it may read vertically one column at a time. In either case, the blind person needs to retain a mental image of the headings and on a large chart this is at best difficult. With a correctly coded table, a modern screen reader will read:

“Retail stock and other, 2004 Actual, 654, 2005 Prev. Budget, 516, 2005 Forecast, 547, 2006 Forecast, 468, 2007 Forecast, 383 , 2008 Forecast, 383 , 2009 Forecast, 383 ... “

¹ See Appendix 6 - for those sites that can be “crawled” by the automated verifier, AccEase is able to produce detailed reports identifying the url of pages which have errors, the nature of the error and the line of code in which they will find the error.

Forecast Statement of Borrowings for the years ending 30 June

(\$ million)	2004 Actual	2005 Prev. Budget	2005 Forecast	2006 Forecast	2007 Forecast	2008 Forecast	2009 Forecast
Sovereign Guaranteed Debt							
New Zealand-Dollar Debt							
Government stock	17,351	16,283	15,992	15,313	14,467	15,415	15,385
Treasury bills	5,525	5,393	5,390	5,273	5,327	5,332	5,338
Loans and foreign-exchange contracts	(1,098)	(500)	1,050	275	(625)	(1,618)	(1,615)
Retail stock and other	654	516	547	468	383	383	383
Total New Zealand-Dollar Debt	22,432	21,692	22,979	21,329	19,552	19,512	19,491
Foreign-Currency Debt							
United States dollars	3,079	1,998	1,879	2,379	2,880	3,280	3,280
Japanese yen	1,015	729	557	557	557	557	557
European and other currencies	3,432	2,201	2,285	2,285	2,285	2,244	2,244
Total Foreign-Currency Debt	7,526	4,928	4,721	5,221	5,722	6,081	6,081
Total Sovereign Guaranteed Debt	29,958	26,620	27,700	26,550	25,274	25,593	25,572

Use of JavaScript for core functions

Plenty of useful information and you can get at it. OnMouseOver doesn't work correctly, but well defined headings are useful.

[AccEase testers](#)

JavaScript is often turned off by organisational firewalls and does not work with some adaptive technology. Therefore, sites must always supply text based alternatives to any JavaScript functions, particularly navigation or search facilities. This applies particularly to mission-critical information, though the use of JavaScript or other programming to operate peripheral functions (such as games) can also be annoying to those who are therefore excluded from the information when no text-based alternative is provided.

Use of pdfs alone for mission-critical information

I couldn't answer this question, because the information was in a pdf document.

[AccEase tester](#)

This document has already commented that pdfs must not be the exclusive mechanism for providing mission-critical information. Pdf documents are generally highly inaccessible to those with vision impairments or slow bandwidths, and somewhat inaccessible to those with mobility impairments.

Conversion software doesn't work well on documents with coloured backgrounds, multiple columns, and other common design features – and screen-reading software also chokes on such visual effects. For example, dropped capitals or text on a coloured background may be

treated as graphics and ignored, so a dropped capital “When” will read as “image hen”. Tables may be read one complete column at a time, and multi-column pages may be read across consecutive lines of each column – across each first line of all columns, then each second line and so on.

In addition, images in pdfs are invisible to blind users unless the creator has tagged the file with text alternatives (which is an expensive undertaking, requiring more effort than conversion to html). People with low vision are likely to have problems with colour contrast in the pdf, as well as with finding their place in the document once it is blown up to a size that makes the text legible.

Pdf documents tend to be much larger than equivalent html documents, which reduces the speed of download and increases the amount of storage required. For example, one file we converted from pdf was 2,733 Kb. It became a series of interlinked html files of around 33Kb each, with a total document size (including graphics) of 449 Kb. Users with slow access are therefore prevented from accessing the original file, but can easily browse through the html version.

Pdfs created as a by-product of the print process and produced as a final press quality file should never be published on a website. High, press-quality resolution makes very large files that are slow to download and many retained all the colour images and background design work behind the text. These are difficult if not impossible for readers with low vision. In addition, they often reproduce poorly on a home printer and require extensive use of coloured inks. The e-government guidelines require that documents print well in monochrome on a home printer.

Text alternatives that do not provide true text equivalence

Overall, this site was poor. While there is plenty of information on this site, labelling seems particularly bad.

AccEase tester

When sites provide information in the form of images of graphs, organisational charts and tables, these images require text alternatives that provide the full information available to those that can see the image. A text alternatives that simply repeats the image caption, or that describes the nature of the image such as “Organisational chart” or “Consultation process”, but provides little or no information about the image content is of no use to blind readers and excludes them from the information provided by the image. This is particularly annoying where the image is referred to in the text but the content of the image is not disclosed, as in: “Graph 7, below, shows the number of New Zealanders, by age group and location, with Internet access.” The blind user knows that useful information is in the graph, but has no access to it.

It was a real pain that the search box can only be accessed from the home page because you have to keep going back all the time.

AccEase tester

Issues that make it difficult to access information

Technologies not used according to specification

I had to double check whether I had the right information. It was that easy to find.

AccEase tester

Six sites achieved a perfect score on hypertext mark-up language (html) and cascading style sheet (css) validation. While many of the errors on other sites were trivial, non-compliant pages are likely to behave in unexpected ways in non-standard browsers or user agents, causing problems for users of alternative technologies such as screen-readers, hand-held personal organisers and mobile phones, voice-operated computers and so on.

Structure and design not separated

Good to very good. Site not too cluttered, easy to navigate, big print size, good information.

AccEase tester

There were 15 sites with a perfect score for separation of structure and design. We commend those that use html structural mark-up correctly, and that keep all of their style instructions in separate style sheets. Note that css styles and html mark-up should not be used to give ordinary html text the visual impact of a heading or other structural element, as those who do not have visual information available to them are dependent on the structural markup for clues about the information hierarchy of the page. In-line styles are less useful than separate style sheets because the use of in-line styles can prevent users from applying their own styles to documents in order to improve legibility. They also markedly increase the cost of maintaining the site as each line of code must be changed when style changes are called for.

Insufficient contrast between text and background

Yuk, yuk, yuk. Are they trying to destroy what vision I have left?

AccEase tester

Colour contrast makes a huge difference to the accessibility of a site – not only for people with vision impairments, but for many others who have less than 20:20 vision. Three sites in the survey achieved a perfect score. Note that good enlargement can often ameliorate the effects of poor contrast, particularly if the colours come from the colder end of the spectrum. We particularly commend site designers who have ensured good contrast of links to pages describing accessibility features, and to pages of Maori text.

While we did not, in this survey, evaluate sites for their use of “web-safe” colours we do recommend that non web-safe colours should be used for background underneath text. There are 216 colours in the web-safe palette compared to approximately 16 million in print. Understandably some designers prefer to use the corporate colours of an agency or not limit

themselves to a small palette. However, the use of non-standard colours may result in colours breaking up into multiple small squares on devices such as mobile phones and personal organisers, and this may affect readability.

Information presented exclusively in proprietary non-html formats

The site was not terrible and I might have marked it as satisfied if not for the poor contrast and navigation and unmarked pdfs with no alternative.

AccEase tester

As we had already filtered out the sites that depended heavily on pdf, it is hardly surprising that 23 of the 56 sites achieved a perfect score for providing documents in html (or with accessibility features). Four sites had only html documents. As noted elsewhere in this report, pdfs cause problems for users with vision and mobility impairments, and may be totally inaccessible to those who are blind and/or on slow internet connections. We believe that the WCAG and e-government requirements to present all information in html, even if it is also presented in pdf, to be absolutely essential for user accessibility; html format is superior to pdf format – and, for that matter, to Word and other proprietary formats – for reasons of accessibility and file size.

Missing text alternatives or text alternatives that do not comply with guidelines

Everything appears to be well labelled and the information is very useable.

AccEase tester

Six sites achieved a perfect score for valid text alternatives, complying with all WCAG and e-government guidelines. Others were close. Text alternatives for all non-text information are essential for those who do not have access to the images perhaps because they are blind or are viewing sites with images turned off in order to conserve bandwidth. (Non-text information may include images, graphical representations of text (including symbols), image map regions, animations, applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds, stand-alone audio files, audio tracks of video, and video itself.) A good example of the use of text alternatives to video can be seen on the New Plymouth District Council site. A video of a television advertisement offers an accessible transcript of the song on the video so deaf people can appreciate the presentation. It also has a text file describing the video images for those who are blind.

Fixed-sized screens and text

Text enlarges well, but very poor contrast. One of the few sites I had to scroll back and forth to read across the screen.

AccEase tester

Seventeen sites had excellent resizable text and screen width (fluid design) in both Internet Explorer and Firefox. Fluid design makes a huge difference to people with low vision and also to users of non-standard screens such as hand-held devices.

As noted above, menu text should not be provided in images, as images don't change size even when all other text does so.

We also think it logical to ensure that links to pages describing accessibility features are not the smallest and the hardest to find on sites

Loss of information or functionality when scripting is disabled

We have a touch of the orange and grey disease with the drop down menus. They are hard to use, particularly if I am tired and my hand-eye co-ordination gets worse.

AccEase tester

Most government sites continue to work well, losing neither information nor functionality, when scripting is disabled.

Lack of access keys and ways to bypass the navigation menus

While this site does include access keys, incorporating punctuation symbols into them is not useful.

AccEase tester

We tested for either or both of access keys or a way to skip navigation to reach the main content (or, if the site was built the other way around, to skip the main content in order to reach the navigation). Implementing a standard set of access keys greatly improves accessibility for all users who prefer keyboard access. In particular, keyboard access is vital for those with impaired mobility or coordination. It is also very important to blind users. Even when access keys are implemented, skip navigation features still need to be provided, as users who don't know the shortcut keys will have the 'skip navigation' link read to them and will be able to use it. Blind users and users of mobile devices particularly benefit from skip navigation features.

Language level requiring too many years of schooling

The language level and added visual information could be looked at to increase the accessibility of this site.

AccEase tester

In testing the language level, we took the approach that language pitched at readers with eight years of schooling would achieve a perfect score. Four sites met or exceeded this standard. The International Adult Literacy Survey (1996)² found that nearly 50% of adult New Zealanders and 72% of Maori and Pacific adults functioned at the two lowest levels of

² The data was collected in 20 countries between 1994 and 1998 using nationally representative samples of the adult population aged 16 to 65.

literacy measured by the survey (level 1 is “only very poor skills”; level 2 is “able to deal only with simple material”).

Poorly marked-up forms

Messy form that seemed to need a whole lot of unnecessary information.

AccEase tester

Forms were found on 25 of the 56 sites. Two of these used all necessary mark-up to increase accessibility. See *Appendix 2: Our methodology* for a description of the necessary mark-up. Forms without mark-up are not accessible to blind users. Correct mark-up can also improve accessibility for cognitively and reading impaired users.

Beyond compliance to user testing

VERY SATISFIED. Everything seemed to work well, well organised and easy to navigate.

AccEase tester

At step 4, we tested the same 56 sites that were tested in step 3. Our user test panel was asked to answer five questions, rate the ease with which they were able to find the answers, and give an overall rating and some general comments on each site³. The questions required users to find and use:

- a) a public accountability, consultation or other information document
- b) a feedback or other type of form
- c) contact details (some inter-agency sites did not have specific contact details; in this case we sent our testers to find equivalent information about the project the site represented).

For the first three questions, we tailored the question to the site, sending users to find information that we knew was available on the site. For the next two questions, we sent users to find information that is mandatory for government websites, whether or not it was present on the site in question.

- d) a purpose statement (this might be a specific statement or one gleaned from the information on the home page; the e-government guidelines require that such information is provided for all single-agency or business unit sites)
- e) an accessibility statement (or, if there is not specific accessibility statement, information about access keys or alternative ways to access the site. That such information is mandatory for government websites is indicated by the inclusion in the e-government guidelines of a required access key for accessing a list of access keys).

³ Because of the volume of work required and to ensure consistency across sites, the questions given to our user test panel in step 4 were simple and straightforward. AccEase testers are usually given much more complex tests, requiring them to explore a site in much greater depth.

There was a strong relationship between the average result for the first three steps and the average result given by users in step 4. For 44 sites, there was small (around one or two point variance between these two averages. Of the remaining 12 cases, only one site was substantially more preferred by users than the compliance-related tests suggested, and this was because one tester gave it a much higher than average rating. The other 11 sites were substantially less preferred by testers than the compliance-related result suggested: in each case, one or more testers gave a zero score for one or more questions because information was impossible to find. In our view, this indicates that compliance testing is a good, but not perfect, proxy for accessibility and an important first step, but nothing can replace user testing.

Issues arising from user testing

Yuk flashing stuff. Slightly stripy stuff in banner was not comfortable. The information is easy to find and written in good, easy to understand English. I think I could use this site.

AccEase tester

Of the 56 sites tested, 48 presented at least one insurmountable barrier to at least one tester (that is, information was either impossible to access or could not be found at all). Of the remaining eight, only three provided all users with an average or better user experience for all five questions. These were the sites of the Bioethics Council, the E-government Unit and Studylink. The Electoral Commission site was the only site in the survey to receive a rating of Excellent (from one tester for one question).

Findings by specific user group

There is a lot of text information on the home page that is not supported by visual information. This may be overwhelming or difficult for people whose disability affects their English literacy.

AccEase tester

People's experience of the web depends very much on the barriers they encounter when they try to use it – and this varies from person to person. In this section, we explore the priority issues for each of four user groups represented by our test panel:

- low vision
- blind
- mobility impaired
- reading impaired.

We then comment on testers experience with sites tested in Phase 2.

Low-vision

It is hard to see the side menus, with the text being white on light blue.

AccEase tester

Priority issues for low-vision users are contrast and fluid design. Other important issues are:

- menus and other navigation details in text, rather than graphics
- separation of structure and design – this allows knowledgeable users to substitute their own style sheets, giving them access to an otherwise inaccessible site
- well-structured documents, with plenty of visual cues to indicate structure
- choice of colour – orange is particularly tiring to our low vision testers
- graphics that supplement, illustrate and explain the text
- warning if the focal point changes from one window to another
- documents in html (so that contrast and size can be easily adjusted).

Comments from the testers indicate that low vision users may be less well served by New Zealand government websites than mobility impaired or blind users (though their user experience is slightly better than that of reading impaired users).

Top websites for this group are those of the E-government Unit, the Bioethics Council and the Ministry for the Environment.

Blind

The site did have quite a few extraneous characters in it like a “shim” word that kept appearing and being repeated. I note there are a number of pdf files in there.

AccEase tester

Keyboard navigation, good text alternatives, documents in html and good html coding of headings, forms and tables are all very important to blind users. In addition, adherence to formal published grammars is important, since this provides a standard for creators of screen readers to test their products on, and codes and scripts that do not conform may not work with screen readers. Pop-up windows that take the focal point away from the main site may be very confusing, and a user may become lost and unable to navigate back to the original site.

New Zealand sites varied widely, with this particular user group reporting the widest range of ratings – from the second highest overall to the lowest.

Particularly good sites for this group were those of the E-Government Unit, the Office for Senior Citizens and Reduce your Rubbish.

Mobility-impaired

I would have given this site a fantastic rating but for two drawbacks. That it is mouse-dependent and there is no information about its accessibility through a keyboard.

AccEase tester

Mobility-impaired users are a very diverse group, with a range of accessibility needs. Our testers include a person with tetraplegia who uses voice commands and a forehead wand, testers with the use of only one hand, testers with poor co-ordination, and testers with severe tremors.

Most of these testers find keyboard commands – such as access keys – helpful. Small focal points are a problem, as are any actions that require precise mouse movements. Developers should be aware that mobility impairments are often the result of degenerative disorders or accidents, and so users may well have age-related vision impairments as well.

Particularly good sites for this group were the Ministry for the Environment, the Ministry for Culture and Heritage, 4 million careful owners, New Zealand Embassies and Reduce your rubbish sites.

Reading-impaired

The language used for some of the links is confusing. e.g: what information you would find under “Reports” and “Reviews” could easily be confounded by people who do not have a high language level.

AccEase tester

This group of users – arguably the largest group likely to face barriers to Internet use – are also those most poorly served by the sites tested. Users may be reading impaired for a variety of reasons: for example, they may be poorly educated, or have an intellectual impairment, or have English as a second language. There are a variety of strategies for making sites more accessible to such users – including using plain English, active sentences, lots of headings and sub-headings, graphical illustrations, and lists.

The four sites that were found particularly good by this group were: Office for Disability Issues, Population Statistics, E-government and Reduce your rubbish.

Conclusions

The only difficulty with this site was dragging myself away from it long enough to answer the questions.

AccEase tester

The internet is becoming a key resource for:

- news, information, commerce, entertainment
- classroom education, distance learning
- job searching, workplace interaction
- civic participation, public services.

It is complementing or even displacing traditional sources of information and interaction such as:

- schools
- libraries
- print materials
- the discourse of the workplace.

A truly accessible internet would mean *unprecedented* access to information for people who do not have physical access to resources – perhaps because of a disability, technology or even a geographic location – for such people, the Internet as a gateway to the world is even more important than for the rest of the population.

If anybody asks me what the Internet means to me, I will tell him without hesitation: To me (a quadriplegic) the Internet occupies the most important part in my life. It is my feet that can take me to any part of the world; it is my hands which help me to accomplish my work; it is my best friend — it gives my life meaning.

Dr. ZhangXu, practising orthopaedic surgeon (via the Internet), Anshan, China

The E-government web guidelines, which mandate compliance with the international WCAG guidelines, show the importance that government places on providing free and full access to the information and services they provide through the internet.

This survey shows that many agencies are making strenuous efforts to meet the requirements and to go beyond them to create truly user-centred websites. However, it also shows that much work remains to be done, not least in helping those who commission, fund, build and maintain sites to understand what the barriers are, who they affect, and how they may be removed.

We hope this report will contribute to that understanding.

References

Works quoted in this report or referred to in the preparation of this report

2001 Household Disability Survey (2001) Statistics New Zealand

Accessible Technology in Computing — Examining Awareness, Use, and Future Potential (2004) Study Commissioned by Microsoft, Conducted by Forrester Research, Inc.

E-government 2004 Channel Surfing (2004) State Services Commission

E-government Web Guidelines version 2.1 (2004) State Services Commission

Government Web Standards: Cabinet Minute (03) 41/2B, New Zealand Government

International Adult Literacy Survey (1996)

New Zealand Disability Strategy, New Zealand Government

The New Zealand Government Web Guidelines (2003) Paper to Cabinet from the Minister of State Services

The Wide Range of Abilities and Its Impact on Computer Technology (2004) Study Commissioned by Microsoft, Conducted by Forrester Research, Inc.

Web Content Accessibility Guidelines 1.0 (1999) W3C

Web Content Accessibility Guidelines 2.0 (Working Draft) (June 2005) W3C

Useful texts on accessibility

Cederholm, D., (2005) *Bulletproof Web Design*, Berkley, CA

Horton, S., (2005) *Access by design: A guide to universal usability for Web designers*, Berkley, CA

Slatin, J. and Rush, S., (2003) *Maximum Accessibility*, Addison-Wesley

Thatcher, J. et al, (2002) *Accessible Websites*, Apress

WEBAIM, (2005) *Guide to Accessibility Techniques and Concepts*,
<http://www.webaim.org/products/training>

Appendix 1: Websites tested

Step 1 was an automated test of the first five levels of the website, using an automated web crawler. Sites were tested against the WCAG Priority1 guidelines. Step 2 was manual verification of WCAG Priority 1 checkpoints flagged by the automated verifier that were not amenable to automated testing.

After completion of step 1 and 2 we carried out a further manual verification of sites against WCAG checkpoint 11.4 (That is, provision of an alternative in html if information is in an inaccessible format).

Step 3 comprised a technical test of the remaining WCAG level 1 and key e-government and WCAG 2 and 3 guidelines (step 3). Step 4 was the user test, which entailed our user test panel answering a set of questions on each site, and rating the ease of access.

The key requirement for inclusion in Phase 2 of the testing (steps 3 and 4) was not compliance with the highest number of WCAG Level 1 requirements, but that mission-critical information was available to all users (that is, it was in html – either solely or as an alternative – was accessible without scripting, and was coded to provide structural information). This reflects our philosophy that accessibility, not merely compliance, is the objective. However, the results of our step 4 user tests, when compared to the step 1, 2 and 3 (compliance-related) results, indicate a strong connection between compliance and accessibility, confirming the view that compliance is an important first step.

For further details of our methodology, see Appendix 2.

Below, sites are listed in three groups: sites that were tested at the first step only, sites that were tested at the first and second step, and sites that completed all four steps

Group 1: sites where automated testing disclosed substantive faults

Group 1 is all sites tested through step 1 only. To pass step 1:

- The automated checker passed four or more checkpoints on ninety-five percent or more of pages and more than 90% of images had alternative text descriptions (set using the html alt attribute) OR
- The automated checker passed five or more checkpoints on ninety-five percent or more of pages and more than 80% of images had alternative text descriptions.

Name of agency	Website
100% New Zealand	http://www.newzealand.com
Accident Compensation Commission	http://www.acc.co.nz
Broadcasting Standards Authority	http://www.bsa.govt.nz
Community Organisation Grants Scheme	http://cogs.cdgo.govt.nz ⁴
Companies Office	http://www.companies.govt.nz

⁴ This site was not active at the time of testing.

Name of agency	Website
Creative New Zealand	http://www.creativenz.govt.nz/
Crown Law Office	http://www.crownlaw.govt.nz
Department of Building and Housing	http://www.dbh.govt.nz/
Department of Child, Youth and Family Services	http://www.cyf.govt.nz
Dictionary of New Zealand Biography	http://www.dnzb.govt.nz/dnzb
Elective Services	http://www.electiveservices.govt.nz
Employment Relations Service	http://www.ers.govt.nz
Energy Efficiency and Conservation Authority	www.eeca.govt.nz
Energy Safety Service	http://www.ess.govt.nz
Government Communications Security Bureau	http://www.gcsb.govt.nz
Health Research Council	www.hrc.govt.nz
High and Complex Needs Unit	http://www.hcn.govt.nz
Housing and Tenancy Services	http:// www.dhb.govt.nz/housing/index.html
Housing Corporation	http://www.hnzc.co.nz
Legal Services Agency	http://www.lsa.govt.nz
Legislation	http://www.legislation.govt.nz
Maori Land Court	http://www.justice.govt.nz/maorilandcourt
Ministry of Women's Affairs	http://www.mwa.govt.nz
Modern Apprenticeships	http://www.modern-apprenticeships.govt.nz
Motor Vehicle Traders Register	http://www.motortraders.med.govt.nz
National Ethics Advisory Committee	http://www.newhealth.govt.nz/neac.htm
Office of the Ombudsmen	http://www.ombudsmen.govt.nz
Prime Minister	http://www.primeminister.govt.nz
Protect New Zealand	http://www.protectnz.govt.nz
Public Trust	http://www.publictrust.co.nz
Sport and Recreation New Zealand	http://www.sparc.org.nz
Sustainable Management Fund	http://www.smf.govt.nz
Tax Policy	http://www.taxpolicy.ird.govt.nz
Te Kete Iperangi	http://www.tki.org.nz/
Te Puni Kokiri	http://www.tpk.govt.nz
TeachNZ	http://www.teachnz.govt.nz
The New Zealand Housing Strategy	http://www.hnzc.co.nz/nzhousingstrat/index.htm

Group 2: sites whose mission-critical information was not accessible

Group 2 is all sites that were tested in steps 1 and 2 only. To pass step 2:

- Mission-critical large data tables needed correct structural mark-up
- Mission-critical functions did not rely on JavaScript (such as essential navigation with text alternatives)
- Mission-critical documents, such as annual reports, were in html alone, in html as well as pdf, or in pdf alone with accessibility tagging
- Mission-critical information, such as compliance-related financial information, was in html, or in images, had html text alternatives
- Frames, if used, had mark-up to assist adaptive technology.

Name of agency	Website
Archives New Zealand	http://www.archives.govt.nz/index.html
Building controls	http://www.building.dhb.govt.nz
Crown Company Monitoring Advisory Unit	http://www.ccmdu.govt.nz/
Department of Corrections	http://www.corrections.govt.nz
Department of Labour	http://www.dol.govt.nz
E-Learn	http://www.elearn.govt.nz
Foundation for Research, Science and Technology	http://www.frst.govt.nz
Government Superannuation Fund Authority	http://www.gsfa.govt.nz
Hazardous substances and new organisms	http://www.hsno.govt.nz
Health and Disability Commissioner	http://www.hdc.org.nz
Health Workforce Advisory Committee	http://www.hwac.govt.nz
Healthy Women	http://www.healthywomen.org.nz
Housing Innovation New Zealand	http://www.hnzc.co.nz/HIO/index.html
Human Rights Commission	http://www.hrc.co.nz
Inland Revenue Department	http://www.ird.govt.nz
Land Information New Zealand	http://www.linz.govt.nz
Land Transport New Zealand	http://www.landtransport.govt.nz
Law Commission	http://www.lawcom.govt.nz
Local Government Commission	http://www.lgc.govt.nz
Maori Language Commission	http://www.tetaurawhiri.govt.nz/
Mental Health Commission	http://www.mhc.govt.nz
Ministry of Agriculture and Forestry	http://www.maf.govt.nz/mafnet/

Name of agency	Website
Ministry of Civil Defence and Emergency Management	http://www.mcdem.govt.nz
Ministry of Defence	http://www.defence.govt.nz
Ministry of Fisheries	http://www.fish.govt.nz
Ministry of Justice	http://www.justice.govt.nz
Ministry of Pacific Island Affairs	http://www.minpac.govt.nz
Ministry of Research, Science and Technology	http://www.morst.govt.nz
National Ethics Committee on Assisted Human Reproduction	http://www.newhealth.govt.nz/necahr
National Health Committee	http://www.nhc.govt.nz
National Library	http://www.natlib.govt.nz
New Zealand Customs	http://www.customs.govt.nz
New Zealand Food Standards Safety Authority	http://www.nzfsa.govt.nz/
New Zealand Qualifications Authority	http://www.nzqa.govt.nz
NZ Trade and Enterprise	http://www.nzte.govt.nz
NZAID	http://www.nzaid.govt.nz
Occupational Safety and Health	http://www.osh.dol.govt.nz/
Office for the Community and Voluntary Sector	http://www.goodpracticeparticipate.govt.nz
Office of Ethnic Affairs	http://www.ethnicaffairs.govt.nz
Office of the Clerk of the House of Representatives	http://www.clerk.parliament.govt.nz
Office of the Commissioner for Children	http://www.occ.org.nz
Office of Treaty Settlements	http://www.ots.govt.nz
Police	http://www.police.govt.nz
Quality Planning	http://www.qualityplanning.org.nz
Radio Spectrum Management	http://spectrumonline.med.govt.nz
Regional Health and Disability Ethics Committees	http://www.newhealth.govt.nz/ethicscommittees
Retirement Commissioner	http://www.retirement.govt.nz
Serious Fraud Office	http://www.sfo.govt.nz
Statistics New Zealand	http://www.stats.govt.nz/
Te Papa	http://www.tepapa.org.nz
Tertiary Education Commission	http://www.tec.govt.nz

Name of agency	Website
Tertiary Education Portal	http://www.ted.govt.nz
Treaty of Waitangi	http://www.treatyofwaitangi.govt.nz
Work and Income NZ	http://www.workandincome.govt.nz
Workinfo	http://www.workinfo.govt.nz
Workplace	http://www.workplace.govt.nz
Youth Court	http://www.justice.govt.nz/youth

Group 3: sites that were tested through all four steps

The following sites were tested through all four steps. Sites that achieved good results in all four steps are likely to be substantially compliant with all WCAG and e-government guidelines, and users are likely to be able to access all information on the site.

Name of agency	Website
4 million careful owners	http://www.4million.org.nz
Biodiversity New Zealand	http://www.biodiversity.govt.nz
Bioethics Council	http://www.bioethics.org.nz/
Department of Conservation	http://www.doc.govt.nz
Department of Internal Affairs	http://www.dia.govt.nz
Department of Prime Minister and Cabinet	http://www.dpmc.govt.nz
DHB Toolkits	http://www.newhealth.govt.nz/toolkits
Education Centre	http://www.edcentre.govt.nz
Education Gazette	http://www.edgazette.govt.nz
Education Review Office	http://www.ero.govt.nz
E-government	http://www.e-government.govt.nz
Electoral Commission	http://www.elections.govt.nz
Executive Government	http://www.beehive.govt.nz
Families Commission	http://www.familiescommission.govt.nz
Family and Community Services	http://www.familyservices.govt.nz
Government Portal	http://www.govt.nz
Governor General	http://www.gg.govt.nz
Health Education	http://www.healthed.govt.nz
Heartland Services	http://www.heartland.govt.nz
LeadSpace	http://www.leadspace.govt.nz

Name of agency	Website
MedSafe	http://www.medsafe.govt.nz
Ministry for the Environment	http://www.mfe.govt.nz
Ministry of Consumer Affairs	http://www.consumeraffairs.govt.nz
Ministry of Culture and Heritage	http://www.mch.govt.nz/index.html
Ministry of Economic Development	http://www.med.govt.nz/
Ministry of Education	http://www.minedu.govt.nz
Ministry of Foreign Affairs and Trade	http://www.mfat.govt.nz
Ministry of Health	http://www.moh.govt.nz
Ministry of Social Development	http://www.msd.govt.nz
Ministry of Tourism	http://www.tourism.govt.nz
Ministry of Transport	http://www.transport.govt.nz
Ministry of Youth Development	http://www.myd.govt.nz
New Zealand Embassies	http://www.nzembassy.com
New Zealand Government jobs online	http://www.jobs.govt.nz
New Zealand Health Information Service	http://www.nzhis.govt.nz
New Zealand History Net	http://www.nzhistory.net.nz/index.html
New Zealand Immigration Service	http://www.immigration.govt.nz
New Zealand Injury Prevention Strategy	http://www.nzips.govt.nz
NZ Gazette	On Department of Internal Affairs website www.dia.govt.nz
Office for Disability Issues	http://www.odi.govt.nz
Office for Senior Citizens	http://www.osc.govt.nz
Office for the Community and Voluntary Sector	http://www.goodpracticefunding.govt.nz
Parliament	http://www.parliament.govt.nz
Parliamentary Counsel Office	http://www.pco.parliament.govt.nz
Population statistics	http://www.population.govt.nz
Public Sector Training Organisation	http://www.psto.govt.nz
Reduce your rubbish	http://www.reducerubbish.govt.nz
Skill New Zealand	http://www.skillnz.govt.nz
Sorted	http://www.sorted.org.nz
State Services Commission	http://www.ssc.govt.nz
Strengthening Families	http://www.strengtheningfamilies.govt.nz/

Name of agency	Website
StudyLink	http://www.studylink.govt.nz
Te Ara	http://www.teara.govt.nz
Tourism Research Council	http://www.trcnz.govt.nz
Treasury	http://www.treasury.govt.nz/
Worksite	http://www.worksite.govt.nz

Appendix 2: Our methodology

The survey used a two-phase, four-step methodology.

Step 1: automated testing

In step 1, we tested all 150 sites selected by the Office for Disability Issues using an automated verifier that crawled the pages. This verifier was set to check for compliance to WCAG guidelines level 1.

Tool used

To undertake the automated testing, we used AccVerify, by Hiawatha Software Ltd. We examined several products, but found that AccVerify was ideal for our purposes. For most sites (124 of the 150 selected by the Office for Disability Issues), we were able to enter the name of the homepage, then leave the software to “spider” through the site, collecting html files, plus information about all other files linked to each file collected. The software then verified the html code against the WCAG guidelines we had preselected (in this case, all level 1 guidelines) and produced a series of summary and detail reports.

In order to speed the process, we chose to collect only those files that appeared on levels 1 to 5 of the site. We assumed that these were representative of the site and that any accessibility issues at a deeper level would be picked up in later testing.

The systems of web page compilation used by the remaining 26 sites prevented AccVerify’s spidering engine from crawling the site and required us to use another AccVerify feature. Using this, we entered the site and created a script to undertake a series of verifications on a series of files. While this meant fewer pages were collected (between 50 and 200 pages per site), the content-management-system-based nature of the sites also meant that accessibility issues tended to be spread throughout the pages.

Checkpoints tested⁵

AccVerify was able to test and automatically verify the following checkpoints, where they applied to a site:

- Checkpoint 1.1:** Provide a text equivalent for every non-text element.
- Checkpoint 6.3** Ensure that pages are usable without support for scripts, applets or other programmatic objects.
- Checkpoint 7.1** Avoid causing the screen to flicker.
- Checkpoint 9.1** Use client-side image maps rather than server-side image maps where possible.
- Checkpoint 11.4** If you cannot make a page accessible, provide an equivalent accessible page.
- Checkpoint 12.1** Add titles to frames.

⁵ For a full description of these checkpoints, including the user groups advantaged by compliance, see *Appendix 3: Web Accessibility Initiative Guidelines version 1.0*.

Sites were scored out of 25, with points given for the number of checkpoints passed, the percentage of files that were 100% compliant, and the percentage of images with text alternatives set using the html alt attribute.

Compliance standards required to move to Step 2

Where a small number of errors had been replicated throughout a site due to the use of templates or other such devices, we passed the site to step 2 unless the error was sufficiently serious to form a barrier to entry. An example of a non-serious error was where a single decorative graphic on a template had no alt and so the error was perpetuated over every web page and therefore the score from the automated testing did not fairly represent the true level of barrier to accessibility.

We used the following criteria to filter out sites that would not be further tested:

- The automated checker failed two or more checkpoints on five percent or more of pages and fewer than 90% of images had alternative text descriptions (set using the html alt attribute) OR
- Fewer than 80% of images had alternative text descriptions.

You will note that our methodology gives great weight to the presence of text alternatives for images, without consideration of the information value of those images. Those users who cannot see the image know only that an image exists if there is no alt. They have no information to indicate whether or not they are missing out on something important. If website owners wish to see how annoying this might be, they need only to look at their site in a text-browser with images turned off (for example, Opera on text emulation or Firefox with the Fangs extension).

Step 2: visual verification

Step 2 comprised manual verification of potential breaches of the guidelines. The automated verifier flagged code that might indicate non-compliance with WCAG guidelines level 1, but that still required a visual check to confirm whether or not the site complies.

Checkpoints tested⁶

AccVerify required visual verification of the following checkpoints, where they applied to a site:

- Checkpoint 1.2:** Provide text links to emulate server-side image maps.
- Checkpoint 1.4:** For multimedia, ensure that timing of alternative descriptions is synchronised with the presentation.
- Checkpoint 5.1:** For data tables, identify row and column headers.
- Checkpoint 5.2:** For complex data tables, use mark-up to associate data cells and header cells.

⁶ For a full description of these checkpoints, including the user groups advantaged by compliance, see *Appendix 3: Web Accessibility Initiative Guidelines version 1.0*.

Checkpoint 6.3: Ensure that pages are usable without support for scripts, applets, or other programmatic objects. (This appears on both the step 1 and step 2 lists because AccVerify tested the scripts it found when possible, and flagged those it could not test.)

Sites were scored out of fifteen, with a score for each checkpoint that applied. In scoring the individual checkpoints, we took into account compliance with relevant e-government guidelines.

Compliance standards required to move to Phase 2

Again, only non-compliance that prevented access to mission-critical information was sufficient to prevent a site from moving through to step 3.

The following criteria were used:

- Mission-critical data tables without correct structural mark-up
- Mission-critical functions that relied on JavaScript
- Mission-critical documents, such as annual reports, in pdf alone without accessibility features
- Mission-critical information, such as compliance-related financial information, in images alone without accessible alternatives
- The use of frames without mark-up to assist adaptive technology.

Key information in pdf alone

Compliance with level 1 guidelines requires that information in pdf, Word and other proprietary technologies should also be available in html (WCAG checkpoint 11.4; several e-government checkpoints also relate to pdfs) unless the proprietary technology is fully accessible.

For the purposes of this survey, having mission-critical information in pdf was regarded as non-compliance with WCAG level 1. "Mission critical" was taken to mean information private citizens were likely to require, and that it was the job of the agency to provide, or a core accountability document such as an Annual Report or Statement of Intent.

Step 3: key compliance requirements

We tested 56 sites through the ten questions and series of checkpoints that made up step 3⁷. Please note that the step 3 and step 4 results need to be considered together. The step 4 results represent actual experience, but testers were asked a structured series of simple questions so we expected testers to avoid some of the barriers uncovered in step 3, and for scoring to reflect this. However, the results show that sites that did well in step 3 also did well in step 4, and that step 3 tests related to specific barriers (blindness, low-vision and mobility) also produced results that correlated reasonably well with step 4 results from testers with those particular impairments. Generally, the results from step 3 were more

⁷ In our normal accessibility audits, AccEase undertakes a full compliance check against all e-government and WCAG checkpoints. For the purposes of this survey, we focused on ten major areas that formed particular barriers and the multiple checkpoints associated with these barriers.

positive than those from step 4, reflecting the reality that sites often present barriers to users that are not easy to test for – usually relating to structure and organisation.

WCAG has detailed ten areas for web designers to be aware of when minimising barriers to accessibility. Our tests of the 56 sites that passed to Phase 2 focused on these 10 areas:

1. Do html and css validate? Using the specifications of these technologies is needed to ensure that the site operates as expected in browsers and user agents.
2. Are the structure and visual design separated? Keeping the structure and visual design separated ensures that non-visual user agents (such as screen readers) can provide structural information to their users. It also makes for easier (and cheaper) site maintenance and the site as a whole is likely to require less storage.
3. Is there sufficient colour contrast? This is necessary for people with low vision, monochromatic visual displays or poor lighting. This is a very subjective issue, but we have applied some rigour through the use of an automated colour contrast analyser that uses internationally-accepted colour contrast algorithms. This has made it possible for us to fairly compare sites, though we recognise that individual users will each have their own experiences on the margins of acceptable contrast.
4. Are documents available in html, and if not, do they have accessibility features? Sites frequently use pdf, Powerpoint, MS Word and MS Excel documents. Pdf documents have been discussed briefly above. The other documents also present accessibility challenges, not least of which is the requirement to own the proprietary software required to read them.
5. Does the site have valid text alternatives for non-text elements? Automated testing can decide whether or not a site has text alternatives; what it cannot do is verify that the text alternatives are, in fact, true text equivalents.
6. Does the site have resizable text and screen width? Fluid design means that those with low vision (or who have left their glasses at home) can enlarge the site to make it readable, without then needing to scroll horizontally. It also means that those working on non-standard-sized monitors can readily access information.
7. Is all information still available if scripting is disabled? We focused on JavaScript, given its prevalence, though keeping an eye out for other technologies that might form barriers if present. Note that 10% of the population doesn't have JavaScript enabled, and some user agents are not able to use JavaScript.
8. Are there access keys and a way to skip navigation to reach the main content? Being able to navigate using the keyboard provides enormous benefits to those with mobility and vision impairments, as well as users of mobile devices. We are conscious there has been some criticism of access keys in the international accessibility community because there is no single standard, meaning that users need to learn a new set of access keys for each site. However, New Zealand does have a single standard, as set by the e-government unit. We would like to see it more widely implemented and accepted as the industry standard for New Zealand. Note that many users are unaware of the existence of access keys and don't use them. Therefore, even when access keys are present, a separate "skip to content" (or "skip to navigation" if the content is at the top of the structural layout) is essential for easy navigation of the site.

9. Is the language and structure clear and easy to follow? Clarity in language and structure is very important for the vision, cognitive and print impaired⁸, and users for whom English is a second language (including culturally Deaf). It is also useful for everyone else. We used the Gunning-Fog Index algorithm⁹ to provide a proxy for clarity of language. The fog index tends to reward short words and short sentences, so a mediocre result does not necessarily mean that the site is unreadable. Nor does an excellent result necessarily mean that a site is highly readable, since passive sentences, negative constructions, long noun strings and nominalisations (turning verbs into nouns) make writing harder to read than long words and sentences on their own. However, research and experience suggest that the six faults tend to go together, and that the fog index does provide a general indication of readability. At the least, a low score should prompt website owners to take another look at the accessibility of their language in relation to their audience. By way of comparison, the Readers Digest has a fog index of 8 to 9, and the Times magazine a fog index of about 11.
10. Do forms include features to ensure their accessibility? In accessible forms html code is used to link each input field with its label. In addition, html code is used to group form elements into coherent categories; for example, all contact information, all information relating to a particular query and so on. This coding provides structural and informational elements that help reading, cognitively, mobility and vision-impaired people to navigate the form and to orient themselves within it.

Scores out of a total of 30 were assessed using criteria from relevant WCAG and e-government guidelines.

Step 4: user test

Fifty-six sites were passed to our user test panels for assessment. Our testers have a range of disabilities, and use technology to help them find information that would otherwise be very difficult for them to access. On our panels are people who have low vision, are blind, culturally Deaf, mobility impaired (tetraplegia or having a severe tremor), or cognitively impaired.

For each site, we set a test that required users to find and use:

- f) a public accountability, consultation or other information document
- g) a feedback or other type of form
- h) contact details
- i) a purpose statement
- j) an accessibility statement.

Users were also asked for general comments on the site.

Again, we scored sites out of 30.

⁸ See earlier comments about adult literacy; according to the International Adult Literacy Survey (2001) half of all working-age New Zealanders are print-impaired to some degree.

⁹ (Average number of words per sentence + number of words of three syllables or more)* 0.4

Timeframe

For the purposes of this survey, we drastically reduced our usual time limit for answering each question, asking testers to pass on to the next question if they had been unable to find the information in five minutes. This was possible because the test was much simpler than those we usually set. In some cases (mostly reports and forms), knowing the information was buried, we gave them the url. We had a lot of sites to test, and we needed to ensure that testers tested the form rather than wasted time navigating.

That said, five minutes to find such basic information as contact details, purpose statements and accessibility statements is not unreasonable. Government agencies will be aware that people who cannot easily find information on the website, or cannot easily use the information once they've found it, are inclined to pick up a telephone instead. This means tying up staff time and resources, and represents a cost-savings opportunity lost.

Appendix 3: Web Content Accessibility (WCAG) Guidelines

(Quoted from the *Web Accessibility Initiative Guidelines, version 1.0*)

Guideline 1. Provide equivalent alternatives to auditory and visual content.

Provide content that, when presented to the user, conveys essentially the same function or purpose as auditory or visual content.

Although some people cannot use images, movies, sounds, applets, etc. directly, they may still use pages that include equivalent information to the visual or auditory content. The equivalent information must serve the same purpose as the visual or auditory content. Thus, a text equivalent for an image of an upward arrow that links to a table of contents could be "Go to table of contents". In some cases, an equivalent should also describe the appearance of visual content (e.g., for complex charts, billboards, or diagrams) or the sound of auditory content (e.g., for audio samples used in education).

This guideline emphasizes the importance of providing text equivalents of non-text content (images, pre-recorded audio, video). The power of text equivalents lies in their capacity to be rendered in ways that are accessible to people from various disability groups using a variety of technologies. Text can be readily output to speech synthesizers and braille displays, and can be presented visually (in a variety of sizes) on computer displays and paper.

Synthesized speech is critical for individuals who are blind and for many people with the reading difficulties that often accompany cognitive disabilities, learning disabilities, and deafness. Braille is essential for individuals who are both deaf and blind, as well as many individuals whose only sensory disability is blindness. Text displayed visually benefits users who are deaf as well as the majority of Web users.

Providing non-text equivalents (e.g., pictures, videos, and pre-recorded audio) of text is also beneficial to some users, especially non-readers or people who have difficulty reading. In movies or visual presentations, visual action such as body language or other visual cues may not be accompanied by enough audio information to convey the same information. Unless verbal descriptions of this visual information are provided, people who cannot see (or look at) the visual content will not be able to perceive it.

Checkpoints:

- 1.1 Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content). *This includes:* images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video. [Priority 1] For example, in HTML:
 - Use "alt" for the IMG, INPUT, and APPLET elements, or provide a text equivalent in the content of the OBJECT and APPLET elements.
 - For complex content (e.g., a chart) where the "alt" text does not provide a complete text equivalent, provide an additional description using, for example, "longdesc" with IMG or FRAME, a link inside an OBJECT element, or a description link.

- For image maps, either use the "alt" attribute with AREA, or use the MAP element with A elements (and other text) as content.

Refer also to checkpoint 9.1 and checkpoint 13.10.

1.2 Provide redundant text links for each active region of a server-side image map. [Priority 1] Refer also to checkpoint 1.5 and checkpoint 9.1.

1.3 Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation. [Priority 1] Synchronize the auditory description with the audio track as per checkpoint 1.4. Refer to checkpoint 1.1 for information about textual equivalents for visual information.

1.4 For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation. [Priority 1]

1.5 Until user agents render text equivalents for client-side image map links, provide redundant text links for each active region of a client-side image map. [Priority 3] Refer also to checkpoint 1.2 and checkpoint 9.1.

Guideline 2. Don't rely on color alone.

Ensure that text and graphics are understandable when viewed without color.

If color alone is used to convey information, people who cannot differentiate between certain colors and users with devices that have non-color or non-visual displays will not receive the information. When foreground and background colors are too close to the same hue, they may not provide sufficient contrast when viewed using monochrome displays or by people with different types of color deficits.

Checkpoints:

2.1 Ensure that all information conveyed with color is also available without color, for example from context or markup. [Priority 1]

2.2 Ensure that foreground and background color combinations provide sufficient contrast when viewed by someone having color deficits or when viewed on a black and white screen. [Priority 2 for images, Priority 3 for text].

Guideline 3. Use markup and style sheets and do so properly.

Mark up documents with the proper structural elements. Control presentation with style sheets rather than with presentation elements and attributes.

Using mark-up improperly -- not according to specification -- hinders accessibility. Misusing mark-up for a presentation effect (e.g., using a table for layout or a header to change the font size) makes it difficult for users with specialized software to understand the organization of the page or to navigate through it. Furthermore, using presentation mark-up rather than structural mark-up to convey structure (e.g., constructing what looks like a table of data with an HTML PRE element) makes it difficult to render a page intelligibly to other devices.

Content developers may be tempted to use (or misuse) constructs that achieve a desired formatting effect on older browsers. They must be aware that these practices cause accessibility problems and must consider whether the formatting effect is so critical as to warrant making the document inaccessible to some users.

At the other extreme, content developers must not sacrifice appropriate mark-up because a certain browser or assistive technology does not process it correctly. For example, it is appropriate to use the TABLE element in HTML to mark up tabular information even though some older screen readers may not handle side-by-side text correctly (refer to checkpoint 10.3). Using TABLE correctly and creating tables that transform gracefully (refer to guideline 5) makes it possible for software to render tables other than as two-dimensional grids.

Checkpoints:

- 3.1 When an appropriate markup language exists, use markup rather than images to convey information. [Priority 2] For example, use MathML to mark up mathematical equations, and style sheets to format text and control layout. Also, avoid using images to represent text -- use text and style sheets instead. Refer also to guideline 6 and guideline 11.
- 3.2 Create documents that validate to published formal grammars. [Priority 2] For example, include a document type declaration at the beginning of a document that refers to a published DTD (e.g., the strict HTML 4.0 DTD).
- 3.3 Use style sheets to control layout and presentation. [Priority 2] For example, use the CSS 'font' property instead of the HTML FONT element to control font styles.
- 3.4 Use relative rather than absolute units in markup language attribute values and style sheet property values. [Priority 2] For example, in CSS, use 'em' or percentage lengths rather than 'pt' or 'cm', which are absolute units. If absolute units are used, validate that the rendered content is usable.
- 3.5 Use header elements to convey document structure and use them according to specification. [Priority 2] For example, in HTML, use H2 to indicate a subsection of H1. Do not use headers for font effects.
- 3.6 Mark up lists and list items properly. [Priority 2] For example, in HTML, nest OL, UL, and DL lists properly.
- 3.7 Mark up quotations. Do not use quotation markup for formatting effects such as indentation. [Priority 2] For example, in HTML, use the Q and BLOCKQUOTE elements to mark up short and longer quotations, respectively.

Guideline 4. Clarify natural language usage

Use mark-up that facilitates pronunciation or interpretation of abbreviated or foreign text.

When content developers mark up natural language changes in a document, speech synthesizers and braille devices can automatically switch to the new language, making the document more accessible to multilingual users. Content developers should identify the predominant natural language of a document's content (through mark-up or HTTP headers). Content developers should also provide expansions of abbreviations and acronyms.

In addition to helping assistive technologies, natural language mark-up allows search engines to find key words and identify documents in a desired language. Natural language mark-up also improves readability of the Web for all people, including those with learning disabilities, cognitive disabilities, or people who are deaf.

When abbreviations and natural language changes are not identified, they may be indecipherable when machine-spoken or brailled.

Checkpoints:

- 4.1 Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions). [Priority 1] For example, in HTML use the "lang" attribute. In XML, use "xml:lang".
- 4.2 Specify the expansion of each abbreviation or acronym in a document where it first occurs. [Priority 3] For example, in HTML, use the "title" attribute of the ABBR and ACRONYM elements. Providing the expansion in the main body of the document also helps document usability.
- 4.3 Identify the primary natural language of a document. [Priority 3] For example, in HTML set the "lang" attribute on the HTML element. In XML, use "xml:lang". Server operators should configure servers to take advantage of HTTP content negotiation mechanisms ([RFC2068], section 14.13) so that clients can automatically retrieve documents of the preferred language.

Guideline 5. Create tables that transform gracefully.

Ensure that tables have necessary mark-up to be transformed by accessible browsers and other user agents.

Tables should be used to mark up truly tabular information ("data tables"). Content developers should avoid using them to lay out pages ("layout tables"). Tables for any use also present special problems to users of screen readers (refer to checkpoint 10.3).

Some user agents allow users to navigate among table cells and access header and other table cell information. Unless marked-up properly, these tables will not provide user agents with the appropriate information. (Refer also to guideline 3.)

The following checkpoints will directly benefit people who access a table through auditory means (e.g., a screen reader or an automobile-based personal computer) or who view only a portion of the page at a time (e.g., users with blindness or low vision using speech output or a braille display, or other users of devices with small displays, etc.).

Checkpoints:

- 5.1 For data tables, identify row and column headers. [Priority 1] For example, in HTML, use TD to identify data cells and TH to identify headers.
- 5.2 For data tables that have two or more logical levels of row or column headers, use markup to associate data cells and header cells. [Priority 1] For example, in HTML, use THEAD, TFOOT, and TBODY to group rows, COL and COLGROUP to group columns, and the "axis", "scope", and "headers" attributes, to describe more complex relationships among data.

5.3 Do not use tables for layout unless the table makes sense when linearized. Otherwise, if the table does not make sense, provide an alternative equivalent (which may be a linearized version). [Priority 2] **Note.** Once user agents support style sheet positioning, tables should not be used for layout. Refer also to checkpoint 3.3.

5.4 If a table is used for layout, do not use any structural markup for the purpose of visual formatting. [Priority 2] For example, in HTML do not use the TH element to cause the content of a (non-table header) cell to be displayed centered and in bold.

5.5 Provide summaries for tables. [Priority 3] For example, in HTML, use the "summary" attribute of the TABLE element.

5.6 Provide abbreviations for header labels. [Priority 3] For example, in HTML, use the "abbr" attribute on the TH element.

Refer also to checkpoint 10.3.

Guideline 6. Ensure that pages featuring new technologies transform gracefully.

Ensure that pages are accessible even when newer technologies are not supported or are turned off.

Although content developers are encouraged to use new technologies that solve problems raised by existing technologies, they should know how to make their pages still work with older browsers and people who choose to turn off features.

Checkpoints:

6.1 Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document. [Priority 1] When content is organized logically, it will be rendered in a meaningful order when style sheets are turned off or not supported.

6.2 Ensure that equivalents for dynamic content are updated when the dynamic content changes. [Priority 1]

6.3 Ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page. [Priority 1] For example, ensure that links that trigger scripts work when scripts are turned off or not supported (e.g., do not use "javascript:" as the link target). If it is not possible to make the page usable without scripts, provide a text equivalent with the NOSCRIPT element, or use a server-side script instead of a client-side script, or provide an alternative accessible page as per checkpoint 11.4. Refer also to guideline 1.

6.4 For scripts and applets, ensure that event handlers are input device-independent. [Priority 2] Refer to the definition of device independence.

6.5 Ensure that dynamic content is accessible or provide an alternative presentation or page. [Priority 2] For example, in HTML, use NOFRAMES at the end of each frameset. For some applications, server-side scripts may be more accessible than client-side scripts.

Refer also to checkpoint 11.4.

Guideline 7. Ensure user control of time-sensitive content changes.

Ensure that moving, blinking, scrolling, or auto-updating objects or pages may be paused or stopped.

Some people with cognitive or visual disabilities are unable to read moving text quickly enough or at all. Movement can also cause such a distraction that the rest of the page becomes unreadable for people with cognitive disabilities. Screen readers are unable to read moving text. People with physical disabilities might not be able to move quickly or accurately enough to interact with moving objects.

Note. All of the following checkpoints involve some content developer responsibility until user agents provide adequate feature control mechanisms.

Checkpoints:

- 7.1 Until user agents allow users to control flickering, avoid causing the screen to flicker. [Priority 1] **Note.** People with photosensitive epilepsy can have seizures triggered by flickering or flashing in the 4 to 59 flashes per second (Hertz) range with a peak sensitivity at 20 flashes per second as well as quick changes from dark to light (like strobe lights).
 - 7.2 Until user agents allow users to control blinking, avoid causing content to blink (i.e., change presentation at a regular rate, such as turning on and off). [Priority 2]
 - 7.3 Until user agents allow users to freeze moving content, avoid movement in pages. [Priority 2] When a page includes moving content, provide a mechanism within a script or applet to allow users to freeze motion or updates. Using style sheets with scripting to create movement allows users to turn off or override the effect more easily. Refer also to guideline 8.
 - 7.4 Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages. [Priority 2] For example, in HTML, don't cause pages to auto-refresh with "HTTP-EQUIV=refresh" until user agents allow users to turn off the feature.
 - 7.5 Until user agents provide the ability to stop auto-redirect, do not use mark-up to redirect pages automatically. Instead, configure the server to perform redirects. [Priority 2]
- Note.** The BLINK and MARQUEE elements are not defined in any W3C HTML specification and should not be used. Refer also to guideline 11.

Guideline 8. Ensure direct accessibility of embedded user interfaces.

Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc.

When an embedded object has its "own interface", the interface -- like the interface to the browser itself -- must be accessible. If the interface of the embedded object cannot be made accessible, an alternative accessible solution must be provided.

Note. For information about accessible interfaces, please consult the User Agent Accessibility Guidelines and the Authoring Tool Accessibility Guidelines.

Checkpoint:

- 8.1 Make programmatic elements such as scripts and applets directly accessible or compatible with assistive technologies [Priority 1 if functionality is important and not presented elsewhere, otherwise Priority 2.] Refer also to guideline 6.

Guideline 9. Design for device-independence.

Use features that enable activation of page elements via a variety of input devices.

Device-independent access means that the user may interact with the user agent or document with a preferred input (or output) device -- mouse, keyboard, voice, head wand, or other. If, for example, a form control can only be activated with a mouse or other pointing device, someone who is using the page without sight, with voice input, or with a keyboard or who is using some other non-pointing input device will not be able to use the form.

Note. Providing text equivalents for image maps or images used as links makes it possible for users to interact with them without a pointing device. Refer also to guideline 1.

Generally, pages that allow keyboard interaction are also accessible through speech input or a command line interface.

Checkpoints:

- 9.1 Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape. [Priority 1] Refer also to checkpoint 1.1, checkpoint 1.2, and checkpoint 1.5.
- 9.2 Ensure that any element that has its own interface can be operated in a device-independent manner. [Priority 2] Refer to the definition of device independence. Refer also to guideline 8.
- 9.3 For scripts, specify logical event handlers rather than device-dependent event handlers. [Priority 2]
- 9.4 Create a logical tab order through links, form controls, and objects. [Priority 3] For example, in HTML, specify tab order via the "tabindex" attribute or ensure a logical page design.
- 9.5 Provide keyboard shortcuts to important links (including those in client-side image maps), form controls, and groups of form controls. [Priority 3] For example, in HTML, specify shortcuts via the "accesskey" attribute.

Guideline 10. Use interim solutions.

Use interim accessibility solutions so that assistive technologies and older browsers will operate correctly.

For example, older browsers do not allow users to navigate to empty edit boxes. Older screen readers read lists of consecutive links as one link. These active elements are therefore difficult or impossible to access. Also, changing the current window or popping up new windows can be very disorienting to users who cannot see that this has happened.

Note. The following checkpoints apply until user agents (including assistive technologies) address these issues. These checkpoints are classified as "interim", meaning that the Web

Content Guidelines Working Group considers them to be valid and necessary to Web accessibility *as of the publication of this document*. However, the Working Group does not expect these checkpoints to be necessary in the future, once Web technologies have incorporated anticipated features or capabilities.

Checkpoints:

- 10.1 Until user agents allow users to turn off spawned windows, do not cause pop-ups or other windows to appear and do not change the current window without informing the user. [Priority 2] For example, in HTML, avoid using a frame whose target is a new window.
- 10.2 Until user agents support explicit associations between labels and form controls, for all form controls with implicitly associated labels, ensure that the label is properly positioned. [Priority 2] The label must immediately precede its control on the same line (allowing more than one control/label per line) or be in the line preceding the control (with only one label and one control per line). Refer also to checkpoint 12.4.
- 10.3 Until user agents (including assistive technologies) render side-by-side text correctly, provide a linear text alternative (on the current page or some other) for *all* tables that lay out text in parallel, word-wrapped columns. [Priority 3] **Note.** Please consult the definition of linearized table. This checkpoint benefits people with user agents (such as some screen readers) that are unable to handle blocks of text presented side-by-side; the checkpoint should not discourage content developers from using tables to represent tabular information.
- 10.4 Until user agents handle empty controls correctly, include default, place-holding characters in edit boxes and text areas. [Priority 3] For example, in HTML, do this for TEXTAREA and INPUT.
- 10.5 Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links. [Priority 3]

Guideline 11. Use W3C technologies and guidelines.

Use W3C technologies (according to specification) and follow accessibility guidelines. Where it is not possible to use a W3C technology, or doing so results in material that does not transform gracefully, provide an alternative version of the content that is accessible.

The current guidelines recommend W3C technologies (e.g., HTML, CSS, etc.) for several reasons:

- W3C technologies include "built-in" accessibility features.
- W3C specifications undergo early review to ensure that accessibility issues are considered during the design phase.
- W3C specifications are developed in an open, industry consensus process.

Many non-W3C formats (e.g., PDF, Shockwave, etc.) require viewing with either plug-ins or stand-alone applications. Often, these formats cannot be viewed or navigated with standard user agents (including assistive technologies). Avoiding non-W3C and non-standard features

(proprietary elements, attributes, properties, and extensions) will tend to make pages more accessible to more people using a wider variety of hardware and software. When inaccessible technologies (proprietary or not) must be used, equivalent accessible pages must be provided.

Even when W3C technologies are used, they must be used in accordance with accessibility guidelines. When using new technologies, ensure that they transform gracefully (Refer also to guideline 6.).

Note. Converting documents (from PDF, PostScript, RTF, etc.) to W3C markup languages (HTML, XML) does not always create an accessible document. Therefore, validate each page for accessibility and usability after the conversion process. If a page does not readily convert, either revise the page until its original representation converts appropriately or provide an HTML or plain text version.

Checkpoints:

11.1 Use W3C technologies when they are available and appropriate for a task and use the latest versions when supported. [Priority 2] Refer to the list of references for information about where to find the latest W3C specifications and <http://www.w3.org/TR/WCAG10/#ref-WAI-UA-SUPPORT> for information about user agent support for W3C technologies.

11.2 Avoid deprecated features of W3C technologies. [Priority 2] For example, in HTML, don't use the deprecated FONT element; use style sheets instead (e.g., the 'font' property in CSS).

11.3 Provide information so that users may receive documents according to their preferences (e.g., language, content type, etc.) [Priority 3] **Note.** Use content negotiation where possible.

11.4 If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page. [Priority 1]

Note. Content developers should only resort to alternative pages when other solutions fail because alternative pages are generally updated less often than "primary" pages. An out-of-date page may be as frustrating as one that is inaccessible since, in both cases, the information presented on the original page is unavailable. Automatically generating alternative pages may lead to more frequent updates, but content developers must still be careful to ensure that generated pages always make sense, and that users are able to navigate a site by following links on primary pages, alternative pages, or both. Before resorting to an alternative page, reconsider the design of the original page; making it accessible is likely to improve it for all users.

Guideline 12. Provide context and orientation information.

Provide context and orientation information to help users understand complex pages or elements.

Grouping elements and providing contextual information about the relationships between elements can be useful for all users. Complex relationships between parts of a page may be difficult for people with cognitive disabilities and people with visual disabilities to interpret.

Checkpoints:

- 12.1 Title each frame to facilitate frame identification and navigation. [Priority 1] For example, in HTML use the "title" attribute on FRAME elements.
- 12.2 Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone. [Priority 2] For example, in HTML, use "longdesc," or a description link.
- 12.3 Divide large blocks of information into more manageable groups where natural and appropriate. [Priority 2] For example, in HTML, use OPTGROUP to group OPTION elements inside a SELECT; group form controls with FIELDSET and LEGEND; use nested lists where appropriate; use headings to structure documents, etc. Refer also to guideline 3.
- 12.4 Associate labels explicitly with their controls. [Priority 2] For example, in HTML use LABEL and its "for" attribute.

Guideline 13. Provide clear navigation mechanisms.

Provide clear and consistent navigation mechanisms -- orientation information, navigation bars, a site map, etc. -- to increase the likelihood that a person will find what they are looking for at a site.

Clear and consistent navigation mechanisms are important to people with cognitive disabilities or blindness, and benefit all users.

Checkpoints:

- 13.1 Clearly identify the target of each link. [Priority 2] Link text should be meaningful enough to make sense when read out of context -- either on its own or as part of a sequence of links. Link text should also be terse. For example, in HTML, write "Information about version 4.3" instead of "click here". In addition to clear link text, content developers may further clarify the target of a link with an informative link title (e.g., in HTML, the "title" attribute).
- 13.2 Provide metadata to add semantic information to pages and sites. [Priority 2] For example, use RDF ([RDF]) to indicate the document's author, the type of content, etc. **Note.** Some HTML user agents can build navigation tools from document relations described by the HTML LINK element and "rel" or "rev" attributes (e.g., rel="next", rel="previous", rel="index", etc.). Refer also to checkpoint 13.5.
- 13.3 Provide information about the general layout of a site (e.g., a site map or table of contents). [Priority 2] In describing site layout, highlight and explain available accessibility features.
- 13.4 Use navigation mechanisms in a consistent manner. [Priority 2]
- 13.5 Provide navigation bars to highlight and give access to the navigation mechanism. [Priority 3]
- 13.6 Group related links, identify the group (for user agents), and, until user agents do so, provide a way to bypass the group. [Priority 3]
- 13.7 If search functions are provided, enable different types of searches for different skill levels and preferences. [Priority 3]

- 13.8 Place distinguishing information at the beginning of headings, paragraphs, lists, etc. [Priority 3] **Note.** This is commonly referred to as "front-loading" and is especially helpful for people accessing information with serial devices such as speech synthesizers.
- 13.9 Provide information about document collections (i.e., documents comprising multiple pages.). [Priority 3] For example, in HTML specify document collections with the LINK element and the "rel" and "rev" attributes. Another way to create a collection is by building an archive (e.g., with zip, tar and gzip, stuffit, etc.) of the multiple pages. **Note.** The performance improvement gained by offline processing can make browsing much less expensive for people with disabilities who may be browsing slowly.
- 13.10 Provide a means to skip over multi-line ASCII art. [Priority 3] Refer to checkpoint 1.1 and the example of ascii art in the glossary.

Guideline 14. Ensure that documents are clear and simple.

Ensure that documents are clear and simple so they may be more easily understood.

Consistent page layout, recognizable graphics, and easy to understand language benefit all users. In particular, they help people with cognitive disabilities or who have difficulty reading. (However, ensure that images have text equivalents for people who are blind, have low vision, or for any user who cannot or has chosen not to view graphics. Refer also to guideline 1.)

Using clear and simple language promotes effective communication. Access to written information can be difficult for people who have cognitive or learning disabilities. Using clear and simple language also benefits people whose first language differs from your own, including those people who communicate primarily in sign language.

Checkpoints:

- 14.1 Use the clearest and simplest language appropriate for a site's content. [Priority 1]
- 14.2 Supplement text with graphic or auditory presentations where they will facilitate comprehension of the page. [Priority 3] Refer also to guideline 1.
- 14.3 Create a style of presentation that is consistent across pages. [Priority 3]

Appendix 4: Sample questionnaires

Below, we produce three questionnaires chosen at random from those submitted to the test panel.

To enter the site, click on the following link:

<http://www.4million.org.nz>

or type the address exactly as it is above

1. Please type your name here.

2. Task specific information

For each question, please record:

1. Question number, or name or both.
2. Level of 'ease' (easy, average, hard, impossible)
3. Approximate elapsed time (please particularly note if you were delayed by slow download times, difficulties with menus, or complicated structure). Please spend no more than 5 minutes per site.

Question 1. Please find the postal address of the Privacy Officer of the Ministry for the Environment and copy the address or the url of the contact details page.

Question 2. Does the website have Purpose Statement? Type no if not found and copy and paste in the statement or url if found.

Question 3. Does the website have an Access Keys? Type no if not found and copy and paste in the statement or the url if found.

Question 4. List three ways you can reduce greenhouse gas emissions in your home.

Question 5. Complete the feedback form advising that is an accessibility evaluation and requires no response.

Question 6. Overall level of satisfaction

Rate your level of satisfaction using the site ('Terrible', 'Poor', 'Satisfied', 'Very Satisfied', 'Fantastic')

3. General comments on site and total elapsed time for test

To enter the site, click on the following link:

<http://www.med.govt.nz/>

or type the address exactly as it is above

1. Please type your name here.

2. Task specific information

For each question, please record:

4. Question number, or name or both.
5. Level of 'ease' (easy, average, hard, impossible)
6. Approximate elapsed time (please particularly note if you were delayed by slow download times, difficulties with menus, or complicated structure). Please spend no more than 5 minutes on each question.

Question 1. Please find the contact details of the organisation's head office and copy the address or the url of the contact details page

Question 2. Does the website have statement that defines its purpose or vision? Type no if not found and copy and paste in the statement or url if found.

Question 3. Does the website have accessibility functions such as access keys? Type no if not found and copy and paste in the statement or the url if found.

Question 4. In the Statement of Intent 2005-2008 the Ministry has identified five key strategic priorities for growth. What are they?

Question 5. What are your options for ordering a hard copy of a publication?

Question 6. Overall level of satisfaction

Rate your level of satisfaction using the site ('Terrible', 'Poor', 'Satisfied', 'Very Satisfied', 'Fantastic')

3. General comments on site and total elapsed time for test.

To enter the site, click on the following link:

<http://www.studylink.govt.nz>

or type the address exactly as it is above

1. Please type your name here.

2. Task specific information

For each question, please record:

7. Question number, or name or both.
8. Level of 'ease' (easy, average, hard, impossible)
9. Approximate elapsed time (please particularly note if you were delayed by slow download times, difficulties with menus, or complicated structure). Please spend no more than 5 minutes on each question.

Question 1. Please find the contact details of the organisation and copy the phone number or the url of the contact details page

Question 2. Does the website have statement that defines its purpose? Type no if not found and copy and paste in the statement or url if found.

Question 3. Does the website have accessibility functions such as access keys? Type no if not found and copy and paste in the statement or the url if found.

Question 4. You are undertaking a course of tertiary study but want to avoid a student loan. What are your options for financing your studies without a Student Loan?

Question 5. Use their contact feedback form to let them know you are doing an accessibility evaluation.

Question 6. Overall level of satisfaction

Rate your level of satisfaction using the site ('Terrible', 'Poor', 'Satisfied', 'Very Satisfied', 'Fantastic')

3. General comments on site and total elapsed time per test.

Appendix 5: The Principles of Universal Design

Version 2.0 - 4/1/97

Compiled by advocates of universal design, listed in alphabetical order:

Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden

Major funding provided by: The National Institute on Disability and Rehabilitation Research, U.S. Department of Education

Copyright 1997 NC State University, The Center for Universal Design

UNIVERSAL DESIGN:

The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

The authors, a working group of architects, product designers, engineers and environmental design researchers, collaborated to establish the following Principles of Universal Design to guide a wide range of design disciplines including environments, products, and communications. These seven principles may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments.

The Principles of Universal Design are presented here, in the following format: name of the principle, intended to be a concise and easily remembered statement of the key concept embodied in the principle; definition of the principle, a brief description of the principle's primary directive for design; and guidelines, a list of the key elements that should be present in a design which adheres to the principle. (Note: all guidelines may not be relevant to all designs.)

PRINCIPLE ONE: Equitable Use

The design is useful and marketable to people with diverse abilities.

Guidelines:

- 1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
- 1b. Avoid segregating or stigmatizing any users.
- 1c. Provisions for privacy, security, and safety should be equally available to all users.
- 1d. Make the design appealing to all users.

PRINCIPLE TWO: Flexibility in Use

The design accommodates a wide range of individual preferences and abilities.

Guidelines:

- 2a. Provide choice in methods of use.

- 2b. Accommodate right- or left-handed access and use.
- 2c. Facilitate the user's accuracy and precision.
- 2d. Provide adaptability to the user's pace.

PRINCIPLE THREE: Simple and Intuitive Use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Guidelines:

- 3a. Eliminate unnecessary complexity.
- 3b. Be consistent with user expectations and intuition.
- 3c. Accommodate a wide range of literacy and language skills.
- 3d. Arrange information consistent with its importance.
- 3e. Provide effective prompting and feedback during and after task completion.

PRINCIPLE FOUR: Perceptible Information

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Guidelines:

- 4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
- 4b. Provide adequate contrast between essential information and its surroundings.
- 4c. Maximize "legibility" of essential information.
- 4d. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
- 4e. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

PRINCIPLE FIVE: Tolerance for Error

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Guidelines:

- 5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- 5b. Provide warnings of hazards and errors.
- 5c. Provide fail safe features.
- 5d. Discourage unconscious action in tasks that require vigilance.

PRINCIPLE SIX: Low Physical Effort

The design can be used efficiently and comfortably and with a minimum of fatigue.

Guidelines:

- 6a.** Allow user to maintain a neutral body position.
- 6b.** Use reasonable operating forces.
- 6c.** Minimize repetitive actions.
- 6d.** Minimize sustained physical effort.

PRINCIPLE SEVEN: Size and Space for Approach and Use

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

Guidelines:

- 7a.** Provide a clear line of sight to important elements for any seated or standing user.
- 7b.** Make reach to all components comfortable for any seated or standing user.
- 7c.** Accommodate variations in hand and grip size.
- 7d.** Provide adequate space for the use of assistive devices or personal assistance.

Please note that the Principles of Universal Design address only universally usable design, while the practice of design involves more than consideration for usability. Designers must also incorporate other considerations such as economic, engineering, cultural, gender, and environmental concerns in their design processes. These Principles offer designers guidance to better integrate features that meet the needs of as many users as possible.

Copyright 1997 [NC State University](#), [The Center for Universal Design](#)

Appendix 6: AccVerify reports

AccVerify used an automated process to “crawl” the site, testing each html file against the Web Content Accessibility Guidelines (WCAG) version 1.0 to Priority 1 level.

Please note:

- Only 124 of the sites could be “crawled” in this way. The technology used for the remaining sites prevented this process. We were able to test the sites using another AccVerify utility, but were not able to generate summary reports.
- AccVerify can be set to generate graphic representations of the data. The graphics do not, however, provide extra information. We therefore stopped generating them after the first run in order to speed up the processing.
- AccEase is able to generate reports for each html page in the 124 sites that are amenable to automated testing. Tests can be taken to WCAG Priority 3 level, and can also include some other features if requested. These reports list the errors by url and line of code. Site quality reports can also be created, listing the urls and other details of file types, link phrases, link errors, and repetitive anchor text, and the urls of pages with data tables, errors in title elements, scripting without a noscript element, and html files larger than a selected maximum size.

Contact AccEase for more information.