

Web Accessibility Audit

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Abstract

Web accessibility is aimed at allowing access for all on the internet. This means following the relevant guidelines and standards to ensure that barriers are not placed in front of potential users. The aim of this audit is to evaluate the websites of four different organisations in terms of web accessibility. This audit is then used to highlight common errors with respect to web accessibility and what these may mean for users.

To complete the audit, two free-to-use tools were employed that looked at slightly different aspects of website accessibility. The results found that all four websites had accessibility issues though the degree to which these occurred varied. Furthermore, while many issues related to inappropriate use of headings and inadequate link information there were a number of issues related to syntax and visual information not being adequately translated that affect users with vision impairments in particular. As these issues may not be apparent to a sighted user it is important to highlight them to ensure they are correctly addressed by the web developer.

Keywords

Web Accessibility; Web Content Accessibility Guidelines; Standards; Usability; Web design

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Contribution of Authors

This is the first edition of the Occasional Paper: Web Accessibility Audit for the Home Modification Information Clearinghouse, UNSW Sydney.

Kim Andersen undertook the audit and wrote the report.

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Introduction

When discussing web accessibility with those who are not familiar with the area it may not be immediately clear what is meant. Similarly, as there is a wide range of disabilities which may inhibit a person's ability to fully access and understand a website's content, web accessibility can mean different things to different people. In general though, accessibility is about removing barriers to access for a place or thing to ensure all people have equal access and opportunity, no matter what impairments they may have. In terms of web accessibility, this involves making sure content is available in a manner that does not significantly advantage one group of users over another.

In practice, it can be difficult for web developers and designers to understand how different disabilities may impact web accessibility. To enable accessible design a set of guidelines was developed by the World Wide Web Consortium (W3C). W3C are an international community whose mission is to lead the web to its full potential. They complete this along two design principles: web for all and web on everything. As such, the Web Content Accessibility Guidelines (WCAG) were created to facilitate those design principles, instructing web designers in correct technique and practice to enable all people to access the internet on whatever devices they may be using. Success criteria as defined in the WCAG are divided into three classifications: A, AA and AAA. The first level, A, must be met for accessibility, AA should be met, and AAA may be met. Level A is considered the minimum for accessibility. The latest version of the guidelines (version 2.1, June 2018 at time of writing) can be found at https://www.w3.org/TR by searching "WCAG". This version of the guideline will be used throughout this report.

One potentially competing design criterion for websites is usability and this has its own set of guidelines, in this case maintained by the United States Department of Health and Human Services (DHHS). These guidelines are based on research compiled by the DHHS to reflect best practice. These guidelines overlap significantly with the WCAG, with a

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focus on ease of use rather than accessibility. There are some areas where following the WCAG without consideration of the usability guidelines may cause unintended frustration for the user and vice versa.

In legal terms¹, under the Disability Discrimination Act (1992)² content must be accessible to all users and not discriminate against any particular group, either directly or indirectly. Inaccessible content is considered to be discriminatory under section 5 of the Disability Discrimination Act (1992) by treating people with disabilities less favourably than those without. Refusal to make a reasonable adjustment to remedy issues is considered discrimination. In practice, if a website is deemed to be inaccessible a complaint may be filed against the host organisation.

The Web Accessibility National Transition Strategy was released in June 2010³. This document set out the road map for all federal, state and territory websites to conform to WCAG 2.0⁴ level AA over a four-year period. The Human Rights Commission advises that all Australian government websites should comply with timelines of the National Transition Strategy, whether mandated to do so or not. All new and existing non-government websites and web content are advised that they

¹ All cited legislation and standards in this report are current at the time of writing and may change and evolve with time.

² https://www.legislation.gov.au/Details/C2018C00125

³ https://humanrights.gov.au/our-work/disability-rights/world-wide-web-access-disability-discrimination-act-advisory-notes-ver#wcag

⁴ WCAG 2.0 was became an ISO standard in 2012 - ISO/IEC 40500:2012. This was reviewed in 2019 and remains current.

should comply with WCAG 2.0 level AA by December 31st 2013.

Documentation for the National Transition Strategy is no longer easily accessible and can only be located in web archives.

There has been lacklustre adoption of the WCAG in Australia, even amongst government websites. In the interest of improving web accessibility in Australia and driving change, an audit of four websites was conducted. The purpose of this audit is to highlight the size of the problem and potential common errors made. The results will inform the development of a guideline to supplement the WCAG and start organisations down the road to accessibility.

Methodology

The web sites for four organisations were assessed for their accessibility compliance. These organisations are repositories for data and grey literature repository and will be referred to as Org1, Org2, Org3 and Org4. The audit was completed on the 2nd of April, 2020 and all errors are correct as at that date. This audit does not necessarily reflect the current state of the websites audited.

To complete this audit, two free-to-use web tools were employed; the WAVE tool developed by WebAIM and PowerMapper (PM) developed by PowerMapper Software. Both tools have paid versions that offer more functionality, however these were not used in this audit. Each assesses accessibility on a web page after inputting a URL, but each provides results in a different way or assesses other items in addition to accessibility. The WAVE tool assesses the page found at the URL destination only, providing a visual user interface to see errors and page elements, as well as the associated code. The interface allows the number of occurrences of each issue on the page to be seen. PM, in contrast, assesses the first 10 pages from the given URL. These are the first 10 pages reached via internal links on the page. The results from PM are recorded in terms of number of issues and the number of pages that have that issue. Results presented from PM are the number of pages

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with issues, while those from WAVE are the number on the home page alone.

The PM system uses different delineations than the WAVE tool. For example, PM uses the headings Errors, Accessibility and Standards, however there is significant overlap between these sections and with the WAVE tool. In addition to the WCAG guidelines, PM also checks against the Section 508 guidelines, HTML5 and CSS⁵ standards for compliance. As the Section 508 guidelines mirror the WCAG guidelines these will not be included in the analysis. Additionally, PM also assesses compliance with the usability guidelines⁶, search engine guidelines (Google, Yahoo and Bing) and browser compatibility (both current and superseded versions). Similarly to the WAVE tool, PM also allows access to the associated code for an error, but does not have the visual user interface. A limitation of PM is that in the free-to-use version it will not show code snippets or specifics for each occurrence of an error after a limited number of results, meaning additional checks will need to be run to see all information as errors are addressed.

Neither tool used specifies the exact level of the WCAG guidelines it assesses to, that is A, AA or AAA, however as AAA results appear in the PM results it can be assumed that it evaluates to this level where possible. The WAVE tool does not include AAA results and is hence

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⁵ Cascading Style Sheet (CSS) is a language for describing the presentation of a document written in a markup language, such as HTML.

⁶ These guidelines are maintained by the States Department of Health and Human Services (DHHS). These guidelines are based on research compiled by the DHHS to reflect best practice and can be found in PDF form on the usability.gov website.

deemed to evaluate to AA level only. It is also important to note that automated tools such as PM and WAVE cannot detect all accessibility issues on a website and therefore the results contained in this report represent on a subset of potential accessibility errors. To address all accessibility errors user testing must be conducted, however this was beyond the scope of this report.

Results

The overall results for the websites, across all assessed metrics are included in Table 1. These results are reported in terms of the number of pages with issues for each metric, to a maximum score of 10 (total number of pages assessed). Each metric will have the full results posted in the appendices of this audit for further perusal, if desired.

Table 1: Overall results for each measure checked in PowerMapper.

Organisa- tion/Totals	Overall quality	Errors	Access- ibility	Compat- ability	Search Engine	Standards	Usability
Org1	8	1	8	4	8	8	8
Org2	5	0	0	5	5	0	5
Org3	6	0	6	6	6	6	6
Org4	8	0	8	8	8	8	8
Max	8	1	8	8	8	8	8
Min	5	0	0	4	5	0	5
Ave.	6.75	0.25	5.5	5.75	6.75	5.5	6.75

Accessibility

As mentioned in the Methodology section, the WAVE tool and PM present their data in different ways. The accessibility results listed on the WAVE tool include items listed under errors, standards and accessibility on PM. As such, all errors that relate to the WCAG guidelines appearing in either section are included here for completeness. Issues not related to the WCAG will appear under their own headings.

The WAVE tool reports results for each organisation divided into a number of categories; errors, contrast errors, alerts, features, structural elements and ARIA⁷. The last three categories are used to indicate the presence of the titular items to allow the user to check they are implemented correctly. For example, an image may be marked as decorative or presentation and this will be flagged by the tool to be checked and ensure this is true. As such, these categories are excluded from the analysis as the number of results has no direct bearing on the accessibility of the page. Errors for the purposes of the WAVE tool are determined violations of the WCAG. Contrast errors are related to the contrast sections of the WCAG, specifically. Alerts are related to probable violations of the WCAG and in some cases, items that WebAIM have determined to be additional factors towards accessibility. These additional items are evidence based but not yet and may never be formally adopted into the WCAG. These items are marked as N/A in Table 4. The overall number of errors by organisation is listed in Table 2 and Table 3.

Table 2: Overall results for website accessibility from the WAVE Tool.

Overall values	Org1	Org2	Org3	Org4	Total
Errors	16	0	29	10	55

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⁷ ARIA is Accessible Rich Internet Applications. ARIA attributes are added to HTML elements to enhance or change the semantic meaning of the element. The purpose of ARIA attributes is to improve accessibility.

Overall values	Org1	Org2	Org3	Org4	Total
Contrast Errors	14	0	8	5	27
Alerts	37	7	37	19	100

Table 3: Accessibility errors from PowerMapper.

Level	Measure	Org1	Org2	Org3	Org4
A	Issues	5	0	13	9
^	Pages	8	0	6	8
AA	Issues	3	0	4	2
	Pages	8	0	6	1
Total	Issues	8	0	17	11
. Star	Pages	6	0	6	8

Table 4: Accessibility results by issue from the WAVE tool.

Type	Issue	Guideline	Total
	Linked image missing alternative text	1.1.1 (A), 2.4.4 (A)	18
	Missing alternative text	1.1.1 (A)	1
Errors	Missing form label	1.1.1 (A), 1.3.1 (A), 2.4.6 (AA), 3.3.2 (A)	6
	Empty button	1.1.1 (A), 2.4.4 (A)	7
	Empty links	2.4.4 (A)	23
Contrast Errors	Very low contrast	1.4.3 (AA)	27

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Туре	Issue	Guideline	Total
	Skipped heading level	1.3.1 (A), 2.4.1 (A), 2.4.6 (AA)	14
	Broken same page link	2.1.1 (A)	2
	Redundant link	2.4.4 (A)	60
	Redundant title text	N/A	5
	Redundant alternative text	1.1.1 (A)	3
	Very small text	N/A	1
Alerts	Underlined text	N/A	6
Aierts	Missing first level heading	1.3.1 (A), 2.4.1 (A), 2.4.6 (AA)	1
	Suspicious link text	2.4.4 (A)	2
	Justified text	N/A	4
	Orphaned form label	1.1.1 (A), 1.3.1 (A), 2.4.6 (AA), 3.3.2 (A)	1
	Possible heading	1.3.1 (A), 2.4.1 (A), 2.4.6 (AA)	1

As PM reports results in a different manner, the results are tabulated by guideline with the WAVE tool results included for comparison. The number of references refers to the number of times that guideline was referenced for different issues in PM. The WAVE tool results are included for comparison. Note that because the WAVE tool results are occurrences on a single page rather than the number of pages with that error these are not directly comparable by number alone. It is included as an indirect measure of the size of the issue on the pages flagged.

Table 5: Accessibility guidelines referenced in PowerMapper results.

WAVE tool results are included for comparison.

Guideline	Level	PM Refs.	Pages	WAVE Refs.	WAVE #
1.1.1 Non-text Content	A	3	28	6	36
1.2.1 Audio-only and Video- only (Prerecorded)	А	1	8	0	0
1.3.1 Info and Relationships	А	3	14	5	23
1.3.5 Identify Input Purpose	AA	1	8	0	0
1.4.3 Contrast (Minimum)	AA	2	2	1	27
1.4.4 Resize Text	AA	2	12	0	0
1.4.6 Contrast (Enhanced)	AAA	1	1	0	0
1.4.8 Visual Presentation	AAA	1	1	0	0
2.4.1 Bypass Blocks	А	2	4	3	16
2.4.4 Link Purpose (In Context)	А	2	17	5	110
2.4.6 Headings and Labels	AA	2	12	4	23
2.4.9 Link Purpose (Link Only)	AAA	1	15	0	0
3.1.1 Language of Page	Α	1	1	0	0
3.3.2 Labels or Instructions	Α	0	0	1	7
4.1.1 Parsing	А	4	20	0	0
4.1.2 Name, Role, Value	А	4	48	0	0

There was only one error reported under that heading in PM. One organisation had a broken link on a single page. This error was not listed with an associated guideline, however the WAVE tool flagged a broken same page link under Section 2.1.1 of the WCAG, a level A guideline, for the same organisation on their homepage. As such, the error flagged in

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PM will not be discussed further in its own section and will instead be included in the accessibility section.

Once issues presented under standards were compared to the accessibility results, all errors related to the WCAG in standards were in the other section. As such these will only be discussed under accessibility. The remaining issues were related to HTML implementation (29 issues, 118 pages) and CSS validation (1 issue, 1 page). As these items do not relate to the accessibility and usability of the website per se these will not be discussed further. A list of issues flagged under standards will be presented in Appendix 3: Standards Results.

Usability

The results in the following table (Table 6) show the overall results for each organisation in PM. These issues are sorted by priority level where P1 is the highest priority and P5 is the lowest. There were no P4 errors found in the usability analysis.

Table 6: Overall usability results from PowerMapper.

Priority	Measure	Org1	Org2	Org3	Org4
P1	Issues	1	0	1	2
	Total pages	1	0	2	7
P2	Issues	4	4	1	1
. 4	Pages	8	5	6	8
Р3	Issues	3	2	2	1
	Pages	3	2	6	2
P5	Issues	0	1	0	0
P5	Pages	0	1	0	0
Total	Issues	8	7	4	4

Priority	Measure	Org1	Org2	Org3	Org4
	Pages	8	5	6	8

Table 7: Usability errors found using PowerMapper.

Priority	Issue	Guideline	Pages
	Users should be able to quickly look at each link and tell where it goes	10.1	6
P1	Have a link labelled 'Home' on every page on the site, except for the home page	5.1	7
	Minimize the time required to download a Web site's pages	2.6	3
	Omitting 'img width' or 'height' attributes makes the page layout jump about as images load	14.3	14
P2	Use 'label' elements for each data entry field to show what data is expected	13.5	2
	An active 'Home' link on the home page makes some users think that it's not the home page	5.6	1
	Use text links rather than image links. In general, text links are more easily recognized as clickable.	10.6	5
	Use italic text sparingly - for one or two words or a short phrase	11.10	2
P3	Use link text between 3 and 100 characters so it's long enough to be understood, but avoids line wrapping	10.11	4

Priority	Issue	Guideline	Pages
	Use option groups when a drop down list has more than 10 items	13.12	
	Use at least a 12-point font on all web pages	11.8	6
	Use bold text sparingly - for one or two words or a short phrase	11.5	5
P5	P5 Capitalize the first letter of the first word in lists		1

Browser compatibility

While browser compatibility is not traditionally considered an accessibility metric it does however speak to the availability of the website and its usability. The browsers assessed were Internet Explorer, Edge, Firefox, Safari, Opera, Chrome, iOS and Android. The specific issues found are included in Appendix 4: Browser Compatibility Results.

Table 8: Overall results for browser compatibility from PowerMapper.

Priority	Measure	Org1	Org2	Org3	Org4
P1	Issues	1	1	0	0
	Pages	1	5	0	0
P2	Issues	2 0 1	1	0	
. –	Pages	1	0	6	0
P3	Issues	4	0	1	1
_	Pages	3	0	5	8
Total	Issues	7	1	2	1
	Pages	4	5	6	8

Search Engine Guidelines

Similarly to browser compatibility, the compliance of a website with guidelines relating to internet search engines is not traditionally considered an accessibility metric. In this case it would provide an indication of the ease with which potential users may find the website to access the content. If a potential user is unable to find the website this presents a barrier to participation. Full results for this section can be found in Appendix 5: Search Engine Results.

Table 9: Overall search engine guideline compliance from PowerMapper.

Priority	Measure	Org1	Org2	Org3	Org4
P1	Issues	1	0	2	0
	Pages	8	0	3	1
P2	Issues	0	1	2	0
	Pages	0	1	5	0
Р3	Issues	2	2	3	1
	Pages	8	5	6	8
Total	Issues	3	3	7	1
	Pages	8	5	6	8

Discussion

Accessibility

A review of the results from both the WAVE tool and PowerMapper resulted in a shortlist of success criteria that were not met by the websites assessed. A review of those criteria showed that many can be grouped into the following categories:

- Text alternatives
- Labels
- Visual

- Links and navigation
- Other

Text alternatives

The audit found three criteria related to text alternatives that were not met by the websites, all level A. The first is success criterion 1.1.1 Non-text content, which states that all non-text content must have a text-based alternative. There are exceptions to this for controls and input (to be discussed under Labels), tests, sensory, CAPTCHA, time-based media, and decorations. In practice, the lack of alternative text on objects would mean that content is not presented to all users. This could mean information is not available to some users or an item is presented to the user without explanation. For example, a screen reader may indicate to a user that an image is present but not tell them what the image is.

The time-based media alternatives are covered under guideline 1.2 of the WCAG. Success criterion 1.2.1 Audio-only and video-only (prerecorded) was flagged in the audit. In cases of audio-only content, an alternative to the time-based media must be included. This would typically be text based though this is not specified under the success criterion. In the case of video-only content, an alternative like that used for audio-only can be used or an audio track can be included to describe the video. Notably, if an audio description track that describes or explains the video is included then a text-based alternative to the audio is not required. In addition to screen reader users, providing alternative forms of content can aid those with cognitive impairments in understanding the information presented.

Finally, the audit found violations of success criterion 1.3.1 Info & relationships. This criterion specifies that the information, structure and relationships that are presented to the user can be programmatically determined or are available in text. That is, software can read information provided by the author to extract and present the information to users with different modalities. In practice, this means that software is

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reading the tags and attributes used in the construction of the website to present information to a user in a method appropriate for their access type. In general, this requires content creators to use the appropriate tags for content to ensure that something that is visually evident is also evident to a user who may not 'see' the page in the same way.

Nearly all errors flagged by the two tools for these three criteria relate to the criterion as mentioned above, or to the inclusion of form labels which will be discussed later. There is one exception where an issue was found with relation to criterion 1.1.1 Non-text content. This issue related to repeated content where alternative text was the same on adjacent images. This would result in a perceived stuttering of a screen reader as it reads the content again. It may not be entirely clear that the description is for a new image and may confuse and/or frustrate the user.

Labels

As mentioned in Text alternatives, there is an exception for 1.1.1 Non-text content related to controls and inputs. Specifically, the criterion references the level A success criterion 4.1.2 Name, role, value. This criterion specifies that for all user interface components, the name and role can be programmatically determined and the items that can be set by the user can be programmatically set. Additionally, changes to these items can be communicated to the user, including those using assistive technologies. Standard HTML implementation to its specification meets these requirements by default. This would mean that issues flagged for this criterion relate to improper HTML implementation or custom user interface components. If interface components are not appropriately labelled then their use and the desired input might not be clear to all users.

Related to this is the level A requirement to provide labels and/or instructions when user input is required, covered under success criterion 3.3.2 Labels and instructions. Form labels identify and describe the purpose of form controls on a web page. Form controls can include text fields, checkboxes, radio buttons and drop-down menus. Labels are used

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to ensure a user knows what data or input is expected at a given input field. Example of this are a date input box that shows the correct date format, required and optional inputs that are clearly marked, and address inputs that separate the components such as street number and name to avoid confusion with input format. Form labels can be hidden visually where the purpose is clear from context, but they still need to be provided for other presentation or interaction, for example, screen readers and speech input devices.

The level AA success criterion, 1.3.5 Identify input purpose builds on this requirement to add that the purpose of each input field can be programmatically determined when the following conditions are met; the input field serves a purpose under guideline 7 of the WCAG⁸ and the content is implemented using technologies with support for identifying the expected meaning for form and input data. The purpose is to increase the potential for users and assistive technologies to apply personal presentations which in turn enables more people to understand and use the content.

Finally, labels are used to help users understand what information is included in a web page and its purpose. These should be clear, concise and descriptive. Success criterion 2.4.6 Headings and labels (level AA) set out how best to implement this criterion.

The majority of issues found in this audit related to missing form labels followed by incorrect label implementation. These issues were prevalent across three of the four audited websites and typically occurred on 6-8

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⁸ This guideline "Input Purposes for User Interface Components" sets out a list of common user interface component input purposes. The list is not exhaustive.

pages out of 10. This indicates this is a very common issue and possibly an invisible issue, in that it may not be evident to web masters that they are making their content inaccessible to a subset of users as it is visually clear.

Visual

While previous sections have largely dealt with provisions for assistive technology, such as screen readers, there are other elements that affect users who may have visual impairments that don't necessitate the use assistive technology. For example, level AA success criterion 1.4.4 Resize text requires that text can be resized up to 200% without the use of assistive technology or any corresponding loss of functionality or content. Captions and images of text are exempt from this requirement. Some users may have difficulty reading smaller text due to both cognitive or visual impairments and this provides an option to increase that size. The issue in this case related to zoom being disabled and as such no mechanism to increase text was available to the user.

An extension of this that was flagged in the audit is the level AAA success criterion 1.4.8 Visual presentation. In this criterion there should be a mechanism for blocks of text to be resized as in 1.4.4 without a need to scroll horizontally when the window is full screen. Additionally, line spacing should be at least 1.5 times the font size, paragraph spacing at least 1.5 times the line spacing (2.25x font size), text should not be justified and no more than 80 characters or glyphs wide, and the user should be able to select fore and background colours. While this is a AAA criterion and therefore not required, these items represent good practice with regards to text presentation both on the web and in documents creation.

With respect to colour there are minimum requirements (1.4.3 Contrast [minimum] AA) and a higher guideline 1.4.6 Contrast [enhanced] AAA). These guidelines provide for the required contrast ratio for text, large

text, images of text, logotypes⁹, and incidental text¹⁰. There are no contrast requirements for logotypes or incidental text. For regular text and images of text the minimum requirement is a ratio of 4.5:1 while the enhanced requirement is 7:1. For large text the minimum requirement is 3:1 while the enhanced requirement is 4.5:1. There are a number of free tools available to check colour contrast. Insufficient colour contrast may make it difficult for some users to see content which may turn users away from the website.

Links and Navigation

For both visual users and those using assistive technology it is important that a website is easy to navigate. This means that in general links and headings need to be clear and act as expected. Level A criterion 2.4.4 Link purpose (in-context) states that the purpose of each link needs to be determinable from the link text alone or the link text in combination with its programmatically determined link context. In this case the link context could be the preceding paragraph text or the contents of a table cell containing the link and other content, as examples. There are exceptions to this where the link content would be ambiguous to all users such as web-based browser games or tests. Empty and redundant links would also flag under this criterion with the evaluation tool though the WCAG does not specifically mention these under this criterion. An empty link is one with no text or no destination while a redundant link is a duplicated link. Links that say "Click Here" are considered ambiguous and should be avoided where possible. The level AAA extension of this

⁹ Text that is part of a logo.

¹⁰ Text that is for decoration, invisible to the user or part of content that is significantly visually based.

criterion is 2.4.9 Link purpose (link only) where the link itself should present all the context required.

Links on a webpage may be used to aid navigation within the website or even on the same page. As many webpages repeat content in the header and navigation panes there should be a mechanism to skip this content. This is covered by level A success criterion 2.4.1 Bypass blocks. While sighted users can move past this repeated content, a person using a screen reader would be read out all the content of the header each time they load a new page on the website. A skip link placed early in the website, which may be hidden from sighted users, allows this to happen. On one webpage the skip link was present but broken as the target did not exist or was commented out.

Navigation is also aided with the use of headings which may double as in-page navigation for web browsers and assistive technologies. As such, it is important that these headings are clear to the user, no matter the technology they are using. Screen readers will read out the heading level along with the heading itself when progressing through the web page. Best practice is to nest headings by their level or rank, that is heading level 1 (<h1>) is followed by subheadings at level 2 (<h2>), and so on. Heading levels should not be skipped except when closing subsections. Issues found related to empty headings, missing first level headings and skipped heading levels. It is important to check headings are specified correctly, especially if content is being added or changed.

Other

The last two criteria flagged by the audit relate to the language of the page and parsing 11 and are both level A. Success criterion 3.1.1 Language of page stipulates that the language of each web page can be programmatically determined. In most systems for web design the language is set in the initial setup. Language may need to be specified if the web page is multilingual and hence one language for a single page is insufficient. The language tag is used by screen readers to determine word pronunciation and ensure content is read correctly.

Success criterion 4.1.1 Parsing requires that the syntax of content implemented with markup languages (e.g. HTML or CSS) is syntactically correct. This means that start and end tags are complete, elements are nested according to their specification, elements do not contain duplicate attributes and any IDs are unique. Exceptions to this are allowed if the specification permits. Incomplete start and end tags may be missing a character which is a common coding error. Issues found in this audit related to all these aspects of correct syntax. The code on these websites needs to be checked to see if this is a coding error rather than an implementation error.

Usability

The usability of a website is related to its accessibility but is looked at through a different lens. There is a large amount of crossover between the WCAG and the Usability guidelines but there are additional elements or a different focus placed on the same topics. Investigating both and building a website with both in mind will ensure the best possible website

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¹¹ Parsing is a computer term related to breaking code into smaller parts and the correct use of syntax.

for all users. In addition to the priority levels (1 – highest, 5 – lowest) the Usability guidelines also provide an indication of the strength of the evidence supporting their guidelines, rated on a scale of 1-5 where 1 is low and 5 is highest.

Load time

The time it takes to load a page can influence the number of people who will ultimately make it to the website. If it takes too long to access a website then users may turn away to other sources and this could negatively affect user opinion of the website. Two Priority 2 guidelines were flagged in the audit that related to the load time of the pages. The first, 2.6 Minimise page download time, suggests that download time is best reduced by reducing the number of bytes per page. Additionally, the other guideline, 14.3 Ensure that images do not slow downloads, provides more detail on measures related to page load time. While related to images, the guideline suggests that download speeds should be less than five seconds and page sizes should be limited to less than 30,000 bytes. These differences are not likely to be noticeable to users with high-speed internet connections but could be noticeable for users with poorer connections and hotspot users.

An additional reason to minimise download time with respect to images is to stop page reflow. Page reflow is an issue where a page loads but the images load afterwards causing the content to shift to account for the image. This is an issue in that someone may be reading or browsing content on a page which then shifts the content. Image dimensions should be specified with the image reference to ensure that the image has allocated space. This means that even if an image fails to load or takes longer the website will look as expected.

To improve speeds it is suggested that several small images are used instead of a single large image, use repeated images where possible and save images with the interlaced or progressive options. Repeated images are where a large image with a repeating pattern is broken up into a smaller image and tiled to create the same visual effect in a manner akin

to bathroom tiling. The strength of the evidence for these two guidelines is 4, suggesting strong evidence for both the guidelines and suggested methods for improvement.

Links

As touched on previously, links are the core mechanism for navigation on a webpage. As such it is important that links are usable and clear to all users. Previous discussion centred on the purpose of the link being determinable from context and the usability guidelines flagged support this endeavour. For example, the priority 1 guideline 10.1 Use meaningful link labels requires that labels and concepts should be meaningful, understandable and easily differentiated by users rather than designers. Link labels should be clearly differentiable from each other. The guideline also makes the point that the more decisions a user needs to make regarding links the more chances they have to make the wrong decision. The strength of evidence for this guideline is 4 which aligns with WCAG levels for the corresponding guidelines.

When making links meaningful it is also important to use text for links where possible, according to 10.6 Use text for links (priority 2). Text links are considered to be more recognisable as clickable, download faster than image links and tend to be preferred by users. Using text links also allows users with deactivated graphics or text-only browsers to see navigation options without additional coding in the website. Following on from using text links is the priority 1 guideline, 5.1 Enable access to the homepage, which requires that a link is provided to enable people to return to the homepage from any point in the site. Many sites use the logo on the top of a page as a link to the homepage but many users may not realise that it is a link. Therefore, a link labelled 'Home' should also be included for those users. The strength of the evidence for these two guidelines are 4 and 3, respectively.

Finally, of lower priority than the previously mentioned guidelines at priority 3 but with a high strength of evidence (4) is the guideline 10.11 Use appropriate text link lengths. The aim of this guideline is to ensure

that links are long enough to convey meaning but short enough to read quickly. Line wrapping is to be avoided where possible however it is not always possible to control how links will look to all users as browser settings and screen resolutions vary.

The flagged issues for this category were spread across the four organisations, with all appearing in the results. The most common issue was the lack of homepage links closely followed by unclear link text, image links and finally link length.

Visual

Where accessibility guidelines mentioned above for visual items tended to focus on users with low vision, the usability guidelines from the audit tend to focus on usability for all users and visual cues on the webpage. The first is the priority 2 guideline 5.6 Ensure that the homepage looks like a homepage which is as stated. The issue in this case was caused by a home link being present on the homepage which may cause users to think it is not the homepage. The strength of evidence for this item is 4.

The following priority 3 guidelines relate to the text styles; 11.5 Use bold text sparingly, 11.8 Use at least 12-point font and 11.10 Emphasise importance. They have evidence strengths of 3, 4 and 5, respectively. Bold text is typically looked at more often than non-bolded text and as such should be used sparingly to ensure focus is not pulled from content when that is not the desired response. Fonts that are smaller than 12point slow reading speeds and font sizes less than 9-pt should never be used. If the target audience for the website is over 65 years old, then the font size should be at least 14-point. The caveat to this is that fonts may appear differently with respect to size on Windows and Macintosh (Apple) systems and high pixel density displays may also have an impact. Finally, underline should be avoided as a method of adding emphasis as it may be mistaken for a link. Additionally, font characteristics that are not the same as the surrounding text will pull focus from the more routine text. Relatively lower ranked at priority 5, is 12.9 Capitalise first letter of first word in lists with an evidence strength of 2.

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Only one organisation had no issues in this category. It is also worth mentioning that some elements flagged here may not be issues per se and have been implemented correctly. For example, PM will identify usages of bold, italic and underlined text in the page as this may be pulling focus from the desired part of the content. This usage may be deliberate and for that very purpose and much like how the ARIA tags are listed in the WAVE tool these are used to identify areas to check.

Labels

The usability guidelines that came up in the audit align well with the WCAG guidelines with respect to labels. There were only two usability guidelines flagged, the first of which was priority 2 guideline, 13.5 Label data entry fields clearly. The guideline requires that for each data entry field a descriptive label is provided to help users understand what entries are desired. These labels should be distinct enough that readers do not confuse them with the entry itself, should use common terms when labelling, bold for labels and asterisks for required fields. If a specific format is required this should be specified either as part of the label of with on-screen help text. The issue in relation to this item was related to missing data labels which is an accessibility issue as well.

The second guideline 13.12 Partition long data items (priority 3) is to aid users in detecting erroneous entries. For example, long numbers such as phone numbers or bank details are easier to understand when entered as smaller groups of numbers. In the case of this audit the issue found related to separating large drop-down lists into smaller option groups. As with the visual usability guidelines, it may be the large drop-down list is the best or most correct way to present that information and may be intended rather than an error.

Browser Compatibility

The browser compatibility results found only one issue related to a current version of a browser, however that browser, Internet Explorer, has been discontinued. All other errors related to browser versions five

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or more years old. No errors were found in Edge, Firefox, Opera or Chrome. In general the errors related to the inclusion of elements that are not supported by older browsers such as SVG ¹² images (P1), certain CSS properties (filter, transform [P2] and box-shadow [P3]) and various elements (details, figcaption, figure and summary [P3]).

While these issues are related to older browser versions there may still be users with older devices running these systems. People who are older and those who are poorer may not be able to afford to or may choose not to upgrade devices. This uneven distribution of access to technology is known as the Digital Divide. Ensuring that websites are compatible with older browsers will allow those who cannot, or choose not to keep up with the latest hardware and software to maintain access to those websites and the information contained therein.

Search Engine Guidelines

The ability for users to find a particular website to get information is important in terms of barriers to access to information. If websites are not easily searchable by internet search engines then resources may not be presented to the user and those websites will not receive as much traffic as they should. The major search engines, Bing, Yahoo and Google all have guidelines and algorithms that can be optimised to help raise a website's ranking in search results.

Issues found in this audit related to missing heading level 1 elements (h1) or multiple h1 elements (P1), title elements that are too long (P2) and missing meta descriptions (P3). Most errors found related to Bing's search guidelines. In the case of the heading and title errors these will

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¹² Scalable Vector Graphics is a vector image format developed by W3C

penalise websites in that the algorithm may not present the correct information on the search page or may not include the full titles in its search. With regards to meta descriptions these help search engines understand the content of the page such that they can display the information to the searcher. Meta descriptions that are too long may not be searched fully by the engine. If a meta description is not included then it cannot be searched. No organisation applied meta descriptions consistently across all pages assessed on their website.

Finally, use of the rel=nofollow tag can dilute PageRank. PageRank is an algorithm used by Google to determine the relative importance of a webpage. It is not the only algorithm used by Google. The algorithm counts the number and quality of links to a page, however the rel=nofollow attribute allows links to be removed from consideration. This is common in forums to prevent artificial boosting of PageRank. Placing this on internal links of a website can dilute the PageRank score and is not the intended use of this attribute.

Conclusion

While there have been a number of issues related to accessibility and usability noted in this audit these can be remedied with time and investment. The majority of issues found related to page navigation, form labels, link implementation and alternatives to non-text content. This represents a significant barrier to users with vision impairments. As it is a reasonable assumption to make that web designers are typically sighted users then this may be an area of oversight and lack of awareness that needs to be brought to their attention. It is important to consider that just because a website may look aesthetically pleasing and be navigable and usable for a sighted user does not mean that it is the same for all potential users. Engagement with user groups and people with disabilities is required to fully test the accessibility and usability of a website, in addition to the tools used in this audit.

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Appendices

The appendices included in the following pages are listed below.

- Appendix 1: Accessibility Results
- Appendix 2: Usability Results
- Appendix 3: Standards Results
- Appendix 4: Browser Compatibility Results
- Appendix 5: Search Engine Results

Appendix 1: Accessibility Results

Table 10: WAVE tool accessibility results.

Type	Issue	Guideline	Organisation	#	Total
	Linked image missing alternative text	1.1.1 (A), 2.4.4 (A)	Org1	16	18
	Linked image imssing afternative text	1.1.1 (A), 2.4.4 (A)	Org4	2	10
	Missing alternative text	1.1.1 (A)	Org3	1	1
Errors	Missing form label	1.1.1 (A), 1.3.1 (A),	Org1 Org4	2	6
LITOIS	Witssing form laber	2.4.6 (AA), 3.3.2 (A)	Org4	4	0
	Empty button	1.1.1 (A), 2.4.4 (A)	Org3	7	7
	Empty links	2.4.4 (A)		19	23
	Empty miks	2.4.4 (A)		4	
			Org1	14	
Contrast errors	Very low contrast	1.4.3 (AA)	Org1 Org4 Org3 Org3 Org4 Org3 Org4 Org1 Org3	8	27
			Org4	5	-
			Org1	2	
	Skipped heading level	1.3.1 (A), 2.4.1 (A), 2.4.6 (AA)	Org3	10	14
Alorto		21113 (71117)	Org3 10 Org4 2	2	-
Alerts	Broken same nage link	2.4.6 (AA) Org4 2 Org1 1 2.1.1 (A)	2		
	broken same page iink		Org3	1	2
	Redundant link	2.4.4 (A)	Org1	28	60

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Type	Issue	Guideline	Organisation	#	Total
			Org3	21	
			Org4	11	-
	Redundant title text	None	Org3	5	5
	Redundant alternative text	1.1.1 (A)	Org1	3	3
	Very small text	None	Org2	1	1
	Underlined text	None	Org2	6	6
	Missing first level heading	1.3.1 (A), 2.4.1 (A), 2.4.6 (AA)	Org1	1	1
	Suspicious link text	2.4.4 (A)	Org1	2	2
	Justified text	None	Org4	4	4
	Orphaned form label	1.1.1 (A), 1.3.1 (A), 2.4.6 (AA), 3.3.2 (A)	Org4	1	1
	Possible heading	1.3.1 (A), 2.4.1 (A), 2.4.6 (AA)	Org4	1	1

Table 11: PM Accessibility Results.

Level	Issue	Guideline	Organisation	Pages
	with an 'alt' attribute	WCAG 2.1 A F89	Org1	1
Level A		Section 508 (2017) A	Org3	6
Level A		F89	Org4	8
			Org1	1

Level	Issue	Guideline	Organisation	Pages
	'iframe' and 'frame' elements must have a 'title' attribute	WCAG 2.1 A 2.4.1 Section 508 (2017) A 2.4.1	Org3	2
	Link uses general text like 'Click Here' with no	WCAG 2.1 A F63	Org1	1
	surrounding text explaining link purpose	Section 508 (2017) A F63	Org3	1
	The 'aria-controls' attribute must point to IDs of elements in the same document	HTML5 WCAG 2.1 A 1.3.1 Section 508 (2017) A 1.3.1	Org1	7
	This skip link is broken. The target anchor does not exist or is commented out	WCAG 2.1 A 2.4.1 Section 508 (2017) A 2.4.1	Org1	1
	Content inserted with CSS is not read by some screen readers, and not available to people who turn off style sheets	WCAG 2.1 A F87 Section 508 (2017) A F87	Org3	6
	Duplicate 'id' - the same ID is used for more	HTML5	Org3	6
	than one element	Section 508 (2017) A	Org4	1
		HTML5	Org3	1
	End tag 'a' violates nesting rules	WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org4	8
			Org3	6

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Level	Issue	Guideline	Organisation	Pages
	HTML form control has no label	WCAG 2.1 A F68 Section 508 (2017) A F68	Org4	8
	'img' elements must have an 'alt' attribute	WCAG 2.1 A F65	Org3	6
		Section 508 (2017) A F65	Org4	8
	No space between attributes	HTML5 WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org3	3
	This 'button' element is empty and has no accessible name	WCAG 2.1 A F68 Section 508 (2017) A F68	Org3	5
	This form control has a blank label or title	WCAG 2.1 A F68	Org3	6
		Section 508 (2017) A F68	Org4	8
	Use the 'lang' attribute to identify the language of the page	WCAG 2.1 A 3.1.1 Section 508 (2017) A 3.1.1	Org3	1
	Using the same 'alt' text on adjacent images results in screen readers stuttering as the same text is read out twice	WCAG 2.1 A 1.1.1 Section 508 (2017) A 1.1.1	Org3	6
	'alt' text should not contain placeholders like 'picture' or 'spacer'	WCAG 2.1 A F30 Section 508 (2017) A F30	Org4	8

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Level	Issue	Guideline	Organisation	Pages
	An element with 'aria-hidden=true' contains focusable content	WCAG 2.1 A 1.3.1 Section 508 (2017) A 1.3.1	Org4	1
	The interactive element 'input' must not appear as a descendant of the 'a' element	HTML5 WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org4	1
	Bad value for attribute 'autocomplete'	HTML5 WCAG 2.1 AA 1.3.5	Org1	8
	Form field labels should be unique to a page, of enclosed in a 'fieldset' with a 'legend' that makes the label unique	WCAG 2.1 AA 2.4.6 Section 508 (2017) AA 2.4.6	Org1	8
			Org4	1
	Headings should not be empty	WCAG 2.1 AA G130 Section 508 (2017) AA G130	Org1	1
			Org3	2
Level AA	Do not use the 'meta viewport' tag to disable zoom	WCAG 2.1 AA 1.4.4 Section 508 (2017) AA 1.4.4	Org3	6
	Ensure that text and background colors have enough contrast	WCAG 2.1 AA 1.4.3 Section 508 (2017) AA 1.4.3	Org3	1
	Use relative units in CSS property values when zoom is disabled by meta viewport	WCAG 2.1 AA 1.4.4 Section 508 (2017) AA 1.4.4	Org3	6

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Level	Issue	Guideline	Organisation	Pages	
	If you set any of the colors on the 'body' or 'a' elements you must set all of them	WCAG 2.1 AA F24 Section 508 (2017) AA F24	Org4	1	

Table 12: PM Error Results.

Priority	Issue	Guideline	Organisation	Pages
Priority 1	This link is broken. The target anchor does not exist or is commented out	Broken Link	Org1	1

Appendix 2: Usability Results

Table 13: PM Usability Results.

Priority	Issue	Guideline	Organisation	Pages
	Users should be able to quickly look at each link		Org1	1
D	and tell where it goes	Usability.gov 10:1	Org3	2
Priority			Org4	3
1	Have a link labelled 'Home' on every page on the site, except for the home page	Usability.gov 5:1	Org4	7
	Minimize the time required to download a Web		Org1	2
Priority 2	site's pages	Usability.gov 2:6	Org2	1
2			Org1	1

Priority	Issue	Guideline	Organisation	Pages
	Omitting 'img width' or 'height' attributes makes	Usability.gov 14:3	Org2	5
	the page layout jump about as images load	W3C	Org4	8
	The 'img width' and 'height' attributes don't		Org1	8
	match the actual image size. This means the image with be distorted or resize during loading	W3C	Org3	6
	Use 'label' elements for each data entry field to show what data is expected	Usability.gov 13:5	Org1	2
	An active 'Home' link on the home page makes some users think that it's not the home page	Usability.gov 5:6	Org2	1
	Use text links rather than image links. In general, text links are more easily recognized as clickable.	Usability.gov 10:6	Org2	5
	Use italic text sparingly - for one or two words or a short phrase	Usability.gov 11:10	Org1	2
Priority	Use link text between 3 and 100 characters so		Org1	1
3	it's long enough to be understood, but avoids line wrapping	Usability.gov 10:11	Org2	1
Ü			Org4	2
	Use option groups when a drop down list has more than 10 items	Haabilitu aan 42 42	Org1	1
	Inote than 10 items	Usability.gov 13:12	Org2	1

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Priority	Issue	Guideline	Organisation	Pages
	Use at least a 12-point font on all web pages	Usability.gov 11:8	Org3	6
	Use bold text sparingly - for one or two words or a short phrase	Usability.gov 11:5	Org3	5
Priority 5	Capitalize the first letter of the first word in lists	Usability.gov 12:9	Org2	1

Appendix 3: Standards Results

Table 14: PM Standards Results.

Priority	Issue	Guideline	Organisation	Pages
	Attribute ':autocorrect' not allowed on element	HTML5	Org1	1
Priority	Duplicate attribute 'src'	HTML5	Org1	2
1	Element 'style' not allowed as child element in this context	HTML5	Org1	1
	No 'p' element in scope but a 'p' end tag seen	HTML5	Org1	1
		111111123	Org4	1

Priority	Issue	Guideline	Organisation	Pages
	The 'aria-controls' attribute must point to IDs of elements in the same document	HTML5 WCAG 2.1 A 1.3.1 Section 508 (2017) A 1.3.1	Org1	7
	The 'frameborder' attribute on the 'iframe'		Org1	1
	element is obsolete. Use CSS instead	HTML5	Org3	2
	An 'img' element must have an 'alt' attribute,		Org3	6
	except under certain conditions. For details, consult guidance on providing text alternatives for images	HTML5	Org4	8
	Consider avoiding viewport values that prevent users from resizing documents	HTML5	Org3	6
	CSS Validation Error	CSS Validation	Org3	1
	Duplicate attribute 'class'	HTML5	Org3	6
	Duplicate 'id' - the same ID is used on more	HTML5	Org3	6
	than one element	WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org4	1
	Element 'div' is not allowed as a child element	LITALE	Org3	6
	in this context	HTML5	Org4	1

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Priority	Issue	Guideline	Organisation	Pages
		HTML5	Org3	1
	End tag 'a' violates nesting rules	WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org4	1
	End tag 'br'	HTML5	Org3	6
	No space between attributes	HTML5 WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org3	3
	Start tag 'a' seen but an element of the same type was already open	HTML5	Org3	1
	Stray tag end 'a'	HTML5	Org3	1
	End tag 'p' seen, but there are open elements	HTML5	Org4	1
	Reference to non-existent ID	HTML5	Org4	8
	The interactive element 'input' must not appear as a descendant of the 'a' element	HTML5 WCAG 2.1 A 4.1.1 Section 508 (2017) A 4.1.1	Org4	1

Priority	Issue	Guideline	Organisation	Pages
	The value of the 'for' attribute of the 'label' element must be the ID of a non-hidden form control	HTML5	Org4	8
	Unclosed element 'a'	HTML5	Org4	1
	Attribute 'aria-required' is unnecessary for elements that have attribute 'required'	HTML5	Org1	1
	Bad value for attribute 'autocomplete'	HMTL5 WCAG 2.1 1.3.5	Org1	8
	Empty heading	HTML5	Org1	1
		HIMES	Org3	2
Priority 2	The 'button' role is unnecessary for element 'summary'	HTML5	Org1	1
	The 'navigation' role is unnecessary for element 'nav'	HTML5	Org1	1
	Section lacks heading. Consider using 'h2'-'h6'		Org3	6
	elements to add identifying headings to all sections	HTML5	Org4	1

Priority	Issue	Guideline	Organisation	Pages
	Article lacks heading. Consider using 'h2'-'h6' elements to add identifying headings to all articles	HTML5	Org4	1
	The 'border' attribute on the 'img' element is obselete. Consider specifying 'img (border: 0;)' in CSS instead	HTML5	Org4	8

Appendix 4: Browser Compatibility Results

Table 15: PM Compatibility Results.

Priority	Issue	Guideline	Organisation	Pages
Priority	SVG images are not supported by older	Andraid 4- 2	Org1	1
1	orowsers	Android <= 2	Org2	5
	The CSS 'filter:' property is not supported by some browsers	Internet Explorer Safari <= 9 iPhone/iPad <= 9	Org1	1
Priority 2	The CSS 'transform:' property is not supported by some older browsers	Safari <= 8 iPhone/iPad <=8	Org1	1
	CSS custom properties are not supported on some browsers	Internet Explorer	Org3	6

Priority	Issue	Guideline	Organisation	Pages
	The 'details' element is not supported by some browsers	Internet Explorer Safari <= 5 Android <= 5	Org1	1
	The 'figcaption' element is not supported by older browsers	Safari <=5 Android <=2	Org1	2
Priority	The 'figure' element is not supported by older browsers	Safari <=4 Android <=2	Org1	2
3	The 'summary' element is not supported by some browsers	Internet Explorer Safari <=5 Android <=5	Org1	1
	Support of conditional comments has been removed from IE10 and later	Internet Explorer >= 10	Org3	5
	The 'box-shadow:' CSS property is not supported by older browsers	Safari <= 5.1	Org4	8

Appendix 5: Search Engine Results

Table 16: PM Search Engine Results.

Priority	Issue	Guideline	Organisation	Pages
	This page has no 'h1' element which violates Bing	Bing	Org1	8
	webmaster guidelines	Billig	Org3	1

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Priority	Issue	Guideline	Organisation	Pages
Priority 1	This page has more than one 'h1' element, which violates Bing webmaster guidelines	Bing	Org3	3
	'title' element is too long for Bing. Bing	Org 2	1	
Priority	recommends using titles up to 65 characters long	Billg	Org3	5
2	'title' element is too long for Yahoo. Yahoo recommends limiting your title to 67 characters	Yahoo	Org3	5
	Meta description tag is too long for Bing. Bing recommends keeping the description text under 160 characters in length.		Org1	5
		Bing	Org2	2
			Org1	3
	No meta description tag found. Use a description tag that accurately describes the content of a web	Yahoo Google	Org3 Org2 Org3 Org3 Org1 Org2 Org1 Org2 Org2 Org3 Org4 Org3	3
Priority	page	Bing		6
3		Org4	Org4	8
	Search engines may penalize invisible text where color is nearly identical to the background color	Google Yahoo Bing	Org3	1
	Using 'rel=nofollow' on internal links dilutes PageRank flow through your site.	Google	Org3	6