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# Web Content Accessibility Guidelines 2.0

## A further step towards accessible digital information

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Received 24 November 2008  
Revised 13 May 2009  
Accepted 8 June 2009

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### Abstract

**Purpose** – The purpose of this paper is to explain the changes in the Web Content Accessibility Guidelines (WCAG) 2.0 compared with WCAG 1.0 within the context of its historical development.

**Design/methodology/approach** – In order to compare WCAG 2.0 with WCAG 1.0 a diachronic analysis of the evolution of these standards is done. Known authors and publications in the field, the Web Accessibility Initiative (WAI) web pages, WebAIM and the blogosphere were also monitored for comments and third-party analyses. The analysis of the main changes from WCAG 1.0 to WCAG 2.0 was based on personal experience with WAI guidelines, experimentation with some of the new guidelines, and a selection of best practice online services in the application of the WCAG, including WAI documentation.

**Findings** – WCAG 2.0 is more educational and is applied to more technologies than WCAG 1.0. The limitations of WCAG 1.0 are mostly due to its origin. In changing from one to the other, new priorities and new elements must be taken into account. The paper concludes that though these guidelines are a useful tool for governments, they are only the first step towards accessibility, which can only be achieved through user-centred design.

**Originality/value** – This paper explains the significance and limitations of the WCAG and gives a short guide to adapting web sites to the new regulations.

**Keywords** Worldwide web, Internet, Information media

**Paper type** Technical paper

### 1. The Web Content Accessibility Guidelines: origins and significance

The Web Content Accessibility Guidelines (WCAG) were created in 1995, when Gregg C. Vanderheiden, a far-sighted researcher at the Trace R&D Center, University of Wisconsin-Madison (<http://trace.wisc.edu/>), prepared a set of recommendations for making HTML pages viewed in the National Center for Supercomputing Applications (NCSA) Mosaic more accessible to users with disabilities. This research was financed by the US Department of Education and the NCSA Mosaic Access Project. One year later, Vanderheiden's colleague Wendy A. Chisholm joined the team working on the guidelines and helped to update them. Several other centres collaborated in the project. It was extended to other browsers apart from Mosaic and no longer focused exclusively



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on HTML. In 1998, the development of the guidelines was transferred to the Web Accessibility Initiative (WAI – [www.w3.org/WAI/](http://www.w3.org/WAI/)) Working Group of the World Wide Web Consortium (W3C), leading to the incorporation of Ian Jacobs as an author. In 1998 the guidelines were given the name Web Content Accessibility Guidelines (WCAG) and were opened to public discussion. The definitive version was published in May 1999 ([www.w3.org/TR/WCAG10/](http://www.w3.org/TR/WCAG10/)).

Though the WCAG were initially created as recommendations, in many countries they have been incorporated in the legislation because information policy-makers found them to be a convenient tool for determining whether a website is accessible. The first country to do so was the USA, which included the guidelines in the Americans with Disabilities Act (ADA – [www.ada.gov/](http://www.ada.gov/)). Other countries that have incorporated the WCAG in their legislation include Australia, Canada, France, Germany, India, Japan, Spain and the UK (Meinhardt, 2005).

This change of orientation and importance gave the WCAG a greater profile, and the attempt to make a second version therefore received much attention from many sectors. Though work on the second version began in 2001, it took seven years to be approved, because the thousands of amendments suggested to the drafts made it extremely difficult to reach a final consensus – see for example the WCAG Samurai initiative, which is supported by leading authors such as Joe Clark (WCAG Samurai, 2008).

WCAG 1.0 was published in 1999, when the web was ten years old and had only recently become a public resource. Since then, the web has been completely redefined, changing from a simple channel for disseminating information to the online desktop of most computer users.

## 2. An overview of WCAG 2.0

WCAG 2.0 is published with a great deal of supplementary documentation (“How to Meet WCAG 2.0”, “Understanding WCAG 2.0”, etc.) that make it easier to understand and apply. This material makes WCAG 2.0 far more educational, less ambiguous and more testable than WCAG 1.0. The former checkpoints have become success criteria and are based on four principles:

- (1) perceivable;
- (2) operable;
- (3) understandable; and
- (4) robust.

In WCAG 1.0 many points were so ambiguous that functionally deficient web sites were able to comply with the letter of the accessibility standards, whilst infringing its spirit.

As stated by several authors (e.g. Kelly *et al.*, 2007), WCAG 2.0 is not tied to any specific technology and leaves a wide margin for future technologies and the evolution of existing ones (e.g. assistive technologies). Whereas WCAG 1.0 was intended to be applied exclusively to HTML documents, WCAG 2.0 can be applied to formats such as Cascading Style Sheets (CSS), Synchronized Multimedia Integration Language (SMIL), Scalable Vector Graphics (SVG) and Extensible Markup Language (XML). Furthermore, the concept of the website is extended to all types of virtual communication, all types of content or pages that are generated dynamically and all interactive multimedia content.

WCAG 2.0 is also more usability-oriented. For example, it includes some of the *Research-based Web Design & Usability Guidelines* (US Department of Health and Human Services, 2006), including Guideline 2.4 “Navigable”, Guideline 1.3.2 “Meaningful sequence” and Guideline 3.2.3 “Consistent Navigation”. Furthermore, significant changes have been introduced to allow the user to control the interface (e.g. the time of reproduction of multimedia content or the keyboard).

WCAG 2.0 covers more types of disability than version 1.0, including cognitive, language, learning and physical disabilities. However, it still fails to deal decisively with aural pages (Bolchini *et al.*, 2006) and the problems of older individuals. There are several success criteria and related techniques that consider the problem of users with low vision – a group that is practically ignored in version 1.0 – and users with reduced mobility. In its new, more educational line, for each success criterion the additional material available in “Understanding Success Criterion ...” identifies the types of disability that will benefit with compliance. This seems to indicate that studies involving users were taken into account to draw up WCAG 2.0, but these are not documented.

### 3. Business cases

To show the importance of the new guidelines we will examine them on three popular Web 2.0 environments: Facebook, YouTube, and eBay.

The first web site is Facebook ([www.facebook.com/](http://www.facebook.com/)). It is one of the most used and renowned social networking web sites. Any blind user, without considering WCAG 2.0 guidelines, who is connecting to Facebook with a screen reader has to hear the whole page again when a friend, for instance, posts a new Twitter entry. The screen reader identifies each change as a new page and then starts reading the whole page from the beginning.

The second one is YouTube ([www.youtube.com/](http://www.youtube.com/)). It is the biggest video repository on the internet. YouTube, partly because of WCAG 2.0, has recently added new functionality to its system allowing the users to caption their uploaded videos. Although ‘prosumer videos’ (i.e. videos produced by professional consumers) tend not to follow guidelines as in professional web sites, captions could also be created by the community, as initiatives such as dotsub (<http://dotsub.com/>) have well demonstrated. It is clear this functionality benefits people with hearing loss.

Finally, the third and last web site is eBay ([www.ebay.com/](http://www.ebay.com/)). It is selected as an example of a transactional e-commerce web site. All users, with the advent of WCAG 2.0, are able to participate (without being blocked with inaccessible CAPTCHAs), and people with mobility impairments do not have to be penalised for making mistakes in an auction, therefore, there is a guarantee that they can use the keyboard interface to correct potential errors.

### 4. WCAG 1.0 and 2.0 face to face

In this section we will first present the new points that are covered by WCAG 2.0. We will then discuss the changes in Conformance Levels A and AA, which are compulsory by law in several countries like Australia, Canada, Italy, New Zealand, Portugal, Spain and the United Kingdom. All the examples in this section were taken from the WAI WCAG 2.0 implementation test ([www.w3.org/WAI/GL/WCAG20/implementation-report/results](http://www.w3.org/WAI/GL/WCAG20/implementation-report/results)).

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New points:

- *Enough time.* WCAG 2.0 Guideline 2.2 incorporates the concept of the user adjusting the timing of viewing or reading website content such as multimedia content, interactive content and administrative and e-commerce transactions. For example, users should be able to adjust the time in which they fill in an online survey or form, or view interactive content. For example, Hauptbahnhof Wien web site ([www.hauptbahnhof-wien.at/](http://www.hauptbahnhof-wien.at/)), has a mechanism to pause the retransmission of its live webcams.
- *No keyboard trap.* WCAG 2.0 Guideline 2.1.2 states that the user who uses a keyboard to navigate the content should not be caught in any piece of content.
- *Instructions provided for understanding and operating content do not rely solely on sensory characteristics of components such as shape, size, visual location, orientation, or sound.* Success Criterion 1.3.3 stresses the importance of identifying and describing any element whose meaning, position or location is transmitted non-textually, such as the instructions for filling in a form or using a search engine. Non-text content must be identified and described in order to facilitate the location and use of content. Though WCAG 1.0 already dealt with some of these aspects, they are extended in WCAG 2.0.
- *Text alternatives.* WCAG 2.0 Guideline 1.1 includes CAPTCHA, which are not mentioned in version 1.0, but in recent years have become important features of internet security. CAPTCHA is an acronym for Completely Automated Public Turing Test to Tell Computers and Humans Apart and is a challenge-response test used in informatics to determine whether or not the user is human. The typical test consists of the user introducing a set of characters shown on the screen in a distorted image. It is assumed that only a human is capable of understanding and introducing the sequence correctly. WCAG 2.0 Guideline 1.2 provides specific details of how to create accessible alternatives for live multimedia, audio, video, synchronised multimedia, etc. For example, Research e-Labs (<http://research.elabs.govt.nz/>) has a CAPTCHA not based on distortion but on the solution of a simple linguistic guess like “is rain wet or dry?”.
- *Audio control.* WCAG 2.0 Guideline 1.4.2 forces the creation of a mechanism to stop, pause or modify the audio volume of the page.
- *Input errors and related messages.* WCAG 2.0 Guideline 3.3 deals with errors arising from incorrect input of data by the user. It provides suggestions on how to avoid such errors (e.g. by providing sufficient information for the user to fill in a form properly) or on how to correct them if they occur. This guideline is of vital importance because Web 2.0 has given the internet an increasingly participative role, electronic administration has become a reality, and the internet is now a consolidated channel for e-commerce. For example, eBay ([www.ebay.com/](http://www.ebay.com/)) tells you the total cost of the final purchase and informs you of the legal commitments before you confirm a bid.
- *Success Criterion 4.1.2* establishes that “users of assistive technologies must be able to activate, modify and read any type of interface component”, from a form control to a Java applet or a Flash application. This point is particularly important and applicable for the accessibility of the increasingly widespread Rich Internet

Applications (such as all the ones made with AJAX, JavaFX, Flash and Silverlight). The WAI Accessible Rich Internet Applications (WAI-ARIA) group of the W3C is working on guidelines for the accessibility of RIA (Rich Internet Applications). The latest draft is available at: [www.w3.org/TR/wai-aria/](http://www.w3.org/TR/wai-aria/)

- *The importance of navigability.* Guideline 2.4 introduces navigability as an essential element of web accessibility. It is one of the best examples in which WCAG 2.0 incorporates general principles of usability, recognising the link between usability and accessibility. This point stresses that sites must be usable in order to be really accessible, as several authors had already suggested (e.g. Theofanos and Redish, 2003, 2005). For example, the beta version of the new video searching feature in Disabilities, Opportunities – Internetworking and Technology (DO-IT) ([www.washington.edu/doi/Video/Search](http://www.washington.edu/doi/Video/Search)) permits users to retrieve videos from a textual search within the transcripts of the videos (Figure 1).
- *Success Criterion 1.3.1* stresses the importance of the “semantic structure of content” (through headers, lists, etc.) in order to help users of screen readers and devices with small screens to understand the structure of the web page and to locate the content that interests them more easily. This was one of the points that was not recognised correctly by many automatic validation tools and was often overlooked in manual validation. For example, the Law Office of Lainey Feingold web site (<http://lfllegal.com/>) offers brief summaries for each article (Figure 2).
- *Success Criterion 2.4.2:* Page titled, now it is compulsory to add a title for every page, while in WCAG 1.0 it was only a requirement for frames.

Points of WCAG 1.0 that have been raised to Level A:

- WCAG 1.0 checkpoint 3.6: Mark-up lists and list items properly (previously Priority 2).
- WCAG 1.0 checkpoint 3.7: Mark-up quotations. Do not use quotation mark-up for formatting effects such as indentation (previously Priority 2).
- WCAG 1.0 checkpoint 4.3: Identify the primary natural language of a document (previously Priority 3).
- WCAG 1.0 checkpoint 5.3: Do not use tables for layout unless the table makes sense when linearised (previously Priority 2).

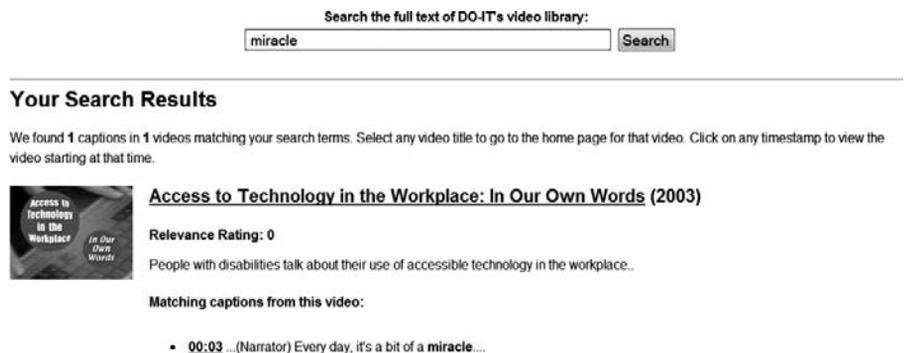


Figure 1.  
Video search interface at  
DO-IT



Source: <http://llegal.com/>

**Figure 2.**  
Law Office of Lainey  
Feingold web site (<http://llegal.com/>), handheld  
version with added  
navigation options

- WCAG 1.0 checkpoint 5.4: If a table is used for layout, do not use any structural mark-up for the purpose of visual formatting (previously Priority 2).
- WCAG 1.0 checkpoint 6.4: For scripts and applets (9.2 for any element of their interface; 9.3 for the scripts) ensure that event handlers are input device-independent (previously Priority 2).
- WCAG 1.0 checkpoint 7.2: Until user agents allow users to control blinking, avoid causing content to blink (previously Priority 2).
- WCAG 1.0 checkpoint 7.4: Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages (previously Priority 2).
- WCAG 1.0 checkpoint 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 (previously Priority 2).
- WCAG 1.0 checkpoint 9.4: Create a logical tab order through links, form controls, and objects (previously Priority 3).

- WCAG 1.0 checkpoint 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 (previously Priority 2).
- WCAG 1.0 checkpoint 12.3: Headings and labels (previously Priority 2).
- WCAG 1.0 checkpoint 12.4: Associate labels explicitly with their controls (previously Priority 2).
- WCAG 1.0 checkpoint 13.1: Clearly identify the target of each link (previously Priority 2).
- WCAG 1.0 checkpoint 13.6: Group related links, identify the group (for user agents), and provide a way to bypass the group (previously Priority 3).

Points of WCAG 1.0 that have been lowered to Level AA:

- WCAG 1.0 checkpoint 4.1: Clearly identify changes in the natural language of a document's text and any text equivalents (previously Priority 1).

Points of WCAG 1.0 that have been lowered to Level AAA:

- WCAG 1.0 checkpoint 12.3: Divide large blocks of information into more manageable groups where natural and appropriate (previously Priority 2).
- WCAG 1.0 checkpoint 14.1: Use the clearest and simplest language appropriate for a site's content (previously Priority 1).

The last two points are highly related to usability and have become less important in WCAG 2.0. The main reason for this is the difficulty of testing them automatically, which could lead to a great deal of ambiguity over compliance.

Other points are no longer requirements in WCAG 2.0, though they are still included in the supporting material as recommended techniques or documented examples of errors. Most of them have disappeared because the common browsers already provide mechanisms for solving them. Some examples of these are:

- WCAG 1.0 checkpoint 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 (previously Priority 3).
- WCAG 1.0 checkpoint 5.5: Provide summaries for tables (previously Priority 3).
- WCAG 1.0 checkpoint 5.6: Provide abbreviations for header labels (previously Priority 3).
- WCAG 1.0 checkpoint 7.3: Until user agents allow users to freeze moving content, avoid movement in pages (previously Priority 2).
- WCAG 1.0 checkpoint 9.5: Provide keyboard shortcuts to important links (including those in client-side image maps), form controls, and groups of form controls (previously Priority 3).
- WCAG 1.0 checkpoint 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 (previously Priority 2).
- WCAG 1.0 checkpoint 10.3: Until user agents (including assistive technologies) render side-by-side text correctly, provide a linear text alternative (on the current

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- page or some other) for all tables that lay out text in parallel, word-wrapped columns (previously Priority 3).
- WCAG 1.0 checkpoint 10.4: Until user agents handle empty controls correctly, include default, place-holding characters in edit boxes and text areas (previously Priority 3).
  - WCAG 1.0 checkpoint 10.5: Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links (previously Priority 3).
  - WCAG 1.0 checkpoint 11.2: Avoid deprecated features of W3C technologies (previously Priority 2).
  - WCAG 1.0 checkpoint 12.2: Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone (previously Priority 2).
  - WCAG 1.0 checkpoint 13.2: Provide metadata to add semantic information to pages and sites (previously Priority 2).
  - WCAG 1.0 checkpoint 13.5: Provide navigation bars to highlight and give access to the navigation mechanism (previously Priority 3).

## 5. How to migrate from WCAG 1.0 to WCAG 2.0

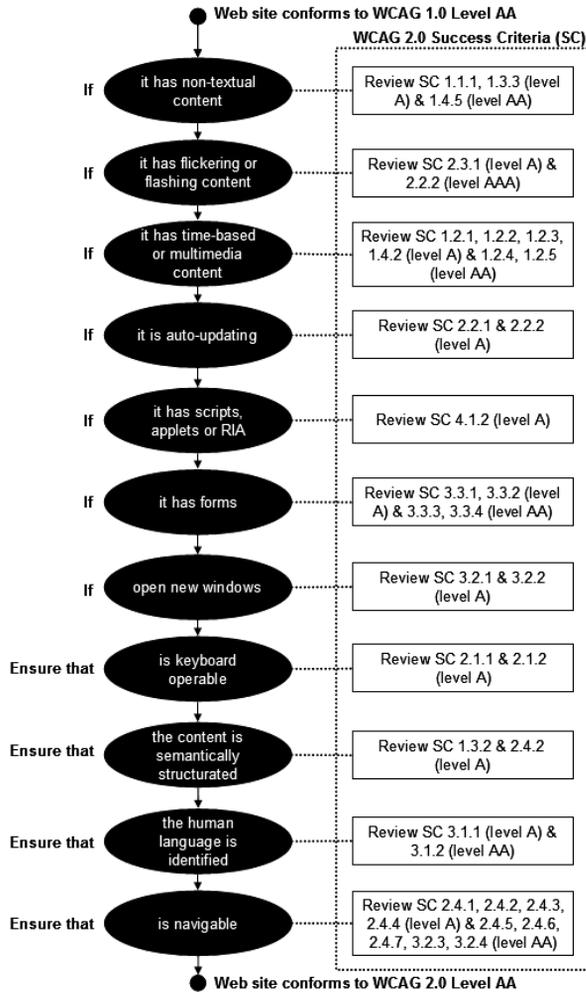
Many institutions and companies, both public and private, have made a human and economic effort to adapt their web sites to Level AA of WCAG 1.0. The additional effort that they must make to adapt to the same level of WCAG 2.0 will vary in each case, according to the complexity of the website (pages generated dynamically by content management software (CMS) or by other tools, and pages containing multimedia content will require more work than static pages with mainly plain text) and how thoroughly the developers resolved some of the most ambiguous points of WCAG 1.0.

Figure 3 shows a flow chart that may help web site developers and webmasters who wish to make an initial assessment of the cost and effort involved in attaining Level AA of WCAG 2.0. It is intended as an initial guide, but in order to ensure full compliance site managers must check all the guidelines thoroughly.

The success criteria (SC) of WCAG 2.0, in the right side of the flowchart, show the greater changes with regard to the previous version, WCAG 1.0. They are grouped by content typology or subject, and ordered by priority level (A or AA) and by number. One should remember that this illustration only includes level A and level AA success criteria, for as mentioned before, they are the ones included in current policies.

The effect of the guidelines will vary according to the structure and content of each web site. Thus, the first seven boxes are not always compulsory, its applicability depends on content type and interaction included in the analysed web. This is the reason why a conditional sentence “if . . .” precedes each of these groups and makes it quick and easy to decide upon application. On the other side, the last four boxes affect all web sites, and that is the reason they are preceded by “ensure that . . .” sentences, which force the webmaster to guarantee their conformance.

After the analysis proposed in the flow chart, managers must apply specific techniques to achieve the success criteria laid down in WCAG 2.0. For example, a web having a contact form falls into the “if it has forms” category, and thus authors should



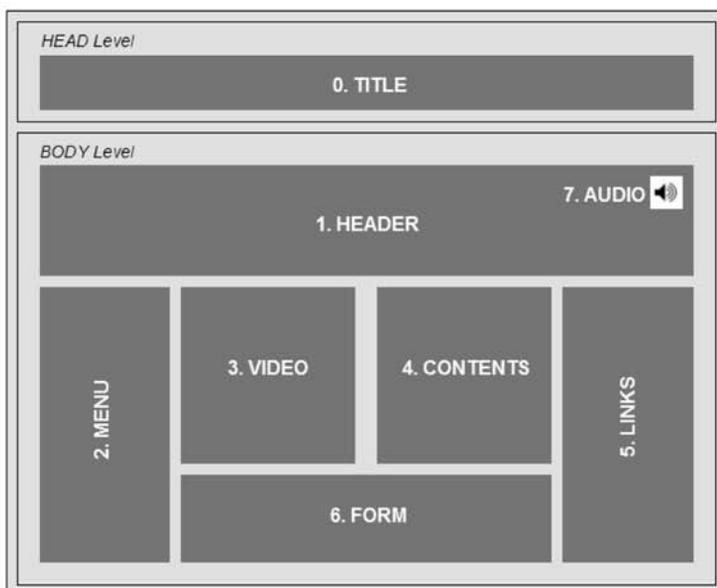
**Figure 3.** Flow chart for adapting a WCAG 1.0 Level AA web site to WCAG 2.0 Level AA

review success criteria 3.3.1 error identification, 3.3.2 labels or instructions, 3.3.3 error suggestion and 3.3.4 error prevention for conformance with the new guidelines.

Once it is decided which success criteria are applying to a web site, the webmaster will have access to additional help to implement each of the selected points in the WCAG 2.0 set of documents. Every success criterion is complemented in the guidelines with a “how to meet . . .” section referring to a general techniques document where tips and recommendations are explained to get it done.

An example of migration in a hypothetical web site is now considered. In Figure 4 a hypothetical wireframe is designed with usual sections as menu, forms, links, video, etc.

For each of these sections the most relevant techniques are described with a brief explanation, its number, and with an indication of the corresponding success criterion.



## 0. Title

All the pages of the site must have a descriptive title of their specific content in the element<title></title>.

(General Technique 88) (WCAG 2.0 success criterion 2.4.2 Page Titled, Level A).

## 1. Header

Provide a link at the beginning of each page that allows the user to bypass headings, and the menu and access the content of the page directly (General Technique 123) (WCAG 2.0 success criterion 2.4.1 Bypass Blocks, Level A)

## 2. Menu and navigation

Ensure that users can navigate and interact through all web pages, at least, with tab key. Users which are not able to use the mouse should not become trapped in any place or content of the site. (General Technique 21) (WCAG 2.0 success criteria 2.1.2, No Keyboard Trap, level A).

Provide a site map (General Technique 63) (WCAG 2.0 success criterion 2.4.5 Multiple Ways, Level AA).

Provide a table of contents (or a link to a table of contents) for all pages that provide information in different sections (General Technique 64) (WCAG 2.0 success criterion 2.4.5 Multiple Ways, Level AA.)

## 3. Video

Create captions for any live audio-visual content (General Technique 9) (WCAG 2.0 success criteria 1.2.3, Captions (live), level AA).

(continued)

**Figure 4.**  
Outline of a web site to be updated to WCAG 2.0 and techniques to be applied

#### 4. Content

Ensure that a contrast ratio of at least 5:1 exists between text and background. If text is at least 18 points (or 14 points bold) the minimum contrast ratio is 3:1 (*General Techniques 18 and 145*) (WCAG 2.0 success criteria 1.4.3 Contrast minimum, level AA)

Provide descriptive headings for each section of the content and mark them correctly as h1-h6 elements (*General Technique 130*) (WCAG 2.0 success criterion 2.4.6 Headings and Labels, Level AA)

#### 5. Links

Enhance visually links when they receive focus from mouse or keyboard (*General Technique 149*) (WCAG 2.0 success criteria 2.4.7, level AA).

#### 6. Form

Any form that causes a change of context in the content must have a submit button to allow the change to be controlled by the user (*General Technique 80*) (WCAG 2.0 success criteria 3.2.2 On Input, Level A).

Provide the user with information when a change in a form control is going to cause a change of context (*General Technique 13*) (WCAG 2.0 success criteria 3.2.2 On Input, Level A; 3.3.2 Labels or Instructions, Level A).

Provide sufficient textual information (type of error, field, etc.) when a user tries to send a form without completing one of the required fields (*General Technique 83*) (WCAG 2.0 success criteria 3.3.1 Error Identification, Level A; 3.3.2 Labels or Instructions, Level A; 3.3.3 Error Suggestion, Level AA).

Provide sufficient textual information (type of error, field, etc.) when a user tries to send a form with unaccepted field formats or values (*General Technique 85*) (WCAG 2.0 success criteria 3.3.1 Error Identification, Level A; 3.3.2 Labels or Instructions, Level A; 3.3.3 Error Suggestion, Level AA).

Provide descriptive labels for the different fields of the form and mark them with the element<label></label> (*General Technique 131*) (WCAG 2.0 success criteria 2.4.6 Headings and Labels, Level AA; 3.3.2 Labels or Instructions, Level A).

If a form has many parts and the user has a time limit for completing each part, there must be a checkbox to allow the user to extend or turn off the time limit (*General Technique 133*) (WCAG 2.0 success criterion 2.2.1 Timing Adjustable, Level A).

Enhance visually form fields or form control components when they receive focus from mouse or keyboard (*General Technique 149*) (WCAG 2.0 success criteria 2.4.7, level AA)

#### 7. Automatic audio

If the page has an audio file that is executed automatically on access to the page, the audio must not last more than three seconds and it must stop automatically (*General Technique 60*) (WCAG 2.0 success criterion 1.4.2 Audio Control, Level A).

For example, to make accessible forms, according to WCAG 2.0 guidelines, we could apply techniques number 80, 13, 83, 85, 131, 133 and 149, corresponding to success criteria 3.3.1 to 3.3.4, 2.2.1, 2.4.6 and 2.4.7.

## 6. Accessibility in information services

The web accessibility regulations are highly relevant to information centres (Schmetzke, 2008) because in many countries institutions that depend on the public administration (i.e. public, university and school libraries, administrative archives, documentation centres of government departments, etc.) are now obliged by law to guarantee that the information they disseminate is accessible. Some of these institutions generate their own information (tutorials, reading guides, reports, etc.), but they often act as mediators of information contracted from third parties, so they must take a series of steps in order to guarantee accessibility.

First, all resources and services that are contracted must be subject to a set of conditions aimed at establishing a minimum level of accessibility. Though a single institution may not have enough strength to exert pressure on suppliers, a group of institutions, especially those working in a consortium, can be strong enough to enforce these requirements. One example of this is the licensing of electronic journals, which is often already carried out consortially and currently suffers serious shortcomings in terms of accessibility. Another example is that of collections of electronic books, which are increasingly common, especially in technical fields.

Second, a workflow must be established in the creation, modification and management of internal resources to ensure accessibility at any point in the document chain. The range of actions to be implemented include asking graphic designers to include alternative texts in the graphics they create, defining accessible templates for standard documents of the institution, defining a policy of semantic and technical metadata, and creating a style guide to improve the language and facilitate the reading of texts. These tasks require an initial investment of time, money and effort, but quickly become worthwhile because they often increase the effectiveness of the institution and avoid costly reformulations. Furthermore, improvements in accessibility will directly improve usability, create greater user satisfaction and loyalty, and enhance the impact of the institution's activities.

A very simple example of these tasks would be the creation of a template for generating lists of new publications. In the first stage this may involve an investment of several hours, carrying out tests to check the resulting accessibility, readability, and so on. But in the medium term it will greatly facilitate the work of creating each new list because an established model will be used, and the list will be easily and quickly converted to other formats (HTML, PDF, RSS, Word, etc.).

Finally, as many current technologies do not facilitate the creation of accessible documents, a policy for generating documents in multiple formats must be established. Especially if real, functional (and not just legal) accessibility is sought, it is necessary to plan for easily readable documents, and alternative documents to video and audio recordings. Furthermore, copies of source documents must be kept pending technological improvements in the format of the published documents. Decisions must be taken regarding the formats used in the transformation protocols, and all participants in the document chain must be involved.

One example of this is the creation of accessible PDF documents. Current tools hinder the creation of accessible PDFs and, unless digital rights protection is very important, it is advisable to offer alternative versions in HTML or even in Microsoft

Word. The original document must be saved for a time when the tools have improved or an accessible PDF document can be created automatically. Another example more related to usability is the distribution of music in MP3 format, which is very popular, is supported by many reproduction devices and is therefore ideal for distribution through the internet. New formats that have appeared recently (MP4 and AAC) are technically superior and offer better sound for the same file size, so a good policy is to save the file in the original format so that new versions can be regenerated when the new formats become more widespread.

### 7. Conclusions: beyond WCAG

Because of their wide dissemination, the WCAG have often been criticised by experts in usability and human-computer interaction and by associations of people with disabilities. Some of its more radical changes, such as the definition of the “baseline” technology for the assessment of accessibility, have had to be extensively reformulated because of the controversy that they have caused ([www.w3.org/WAI/WCAG20/baseline/](http://www.w3.org/WAI/WCAG20/baseline/)). Four main criticisms have been made:

- (1) *They are not based on statistically validated research of users.* At no time have the Consortium or the Trace Research Center validated their recommendations and priorities on the basis of real experiments with users (Clark, 2006; Petrie and Kheir, 2007; Boscarol, 2006).
- (2) *They do not deal with the needs of persons with cognitive disabilities and the elderly* (Milne *et al.*, 2005). It has repeatedly been said that WCAG places too much attention on the needs of blind people, and too little on the needs of pre-lingual deaf persons. See, for example, the differences found between research with users and the WCAG test in the Disability Rights Commission (DRC) Report (2004). Nevertheless, Paul Bohman, a recognised author in the field of accessibility for cognitive disabilities, formed part of the WCAG 2.0 working group.
- (3) *They are not comprehensible for a typical webmaster* (Winberg, 2001). The overly technical language of WCAG and the lack of examples prevents a thorough understanding of the reasons behind the recommendations (Brys and Vanderbauwhede, 2006), leading to absurd designs such as providing textual alternatives for bullets in list items with the text ‘bullet’. This point has been exacerbated by the emergence of automatic revision tools that can only verify syntactic compliance.
- (4) *They encourage webmasters to seek easy compliance rather than real accessibility.* The fact that they are recognised as accessibility benchmarks and required standards causes webmasters to focus more on passing the test than on actually making accessible web sites (Kelly *et al.*, 2005; Sampson-Wild, 2007).

In our view most of these criticisms are the result of the change of direction in WCAG, which was not foreseen in its initial design. First, the design principles began as recommendations based on the experience acquired in a centre working mainly with blind users (were Schneiderman’s eight golden rules for interface design (Shneiderman and Plaisant, 1998) ever backed up by research with users?). Second, in the case of older users it should be mentioned that a new working group specially geared to the needs of accessibility for the elderly was recently created within the WAI (Arch, 2009). Third, when they were first created, web sites were reserved for specialists who knew the

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technology very well – the first internet users were experts and technologists. Finally, the tendency to “pass the test” rather than investigating the reasons behind the recommendations is an evil that is affecting society in general, in areas such as education, research and public health.

It is the use of WCAG which gives it this orientation towards “validation”; in opposition to it many of the documents published by the WAI working group promote a user-centred design, a good example being the manual *Just ask: Integrating Accessibility Throughout Design* (Henry, 2007) published by Shawn Lawton Henry, one of the members of the WAI.

WCAG must be judged in the context of the WAI, which establishes other regulations that affect browsers (user agents) and authoring tools. However, if a giant like Microsoft fails to comply with the regulations in Internet Explorer; Microsoft Frontpage creates invalid code; content management systems as widespread as Vignette fail to facilitate the monitoring of accessibility guidelines; and the new tools of participation in Web 2.0 fail to create accessible content (Power and Petrie, 2007), what chance do the W3C or governments have of enforcing the rules? In these circumstances, is it fair to place all the responsibility for accessibility on content creators? Until all the actors are truly involved, including those who are developing the latest technologies for creating, managing and disseminating content, it will not be possible to guarantee the total accessibility of web content.

Owing to their definition and form, the WCAG can only be a starting point on the path towards accessibility, and unfortunately even this starting point often seems too far away. Real accessibility can only be achieved through the observation of users and a thorough knowledge of their needs.

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