

Accessibility in e-Learning
Standards and Specifications

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Web Content Accessibility Guidelines 2.0

The W3C Web Content Accessibility Guidelines (WCAG), with the 2.0 specification having been released in 2008 [1], is considered to be the global standard for web accessibility. Many countries use these guidelines as a basis for their specific accessibility guidelines. WCAG was introduced as a set of general guidelines for creating accessible web content that would provide accessible content for anyone who might be viewing it, independent of ability or disability.

WCAG 2.0 is divided into four principles, which are divided into three levels of importance.

The WCAG 2.0 principles state that the web content must be:

1. Perceivable (available through multiple senses).
2. Operable (functional with mouse and keyboard).
3. Understandable (consistent, predictable, readable, preventing errors).
4. Robust (usable across technologies).

The guidelines are prioritized by their relative importance, and the relative impact of barriers created when they are not followed:

1. Level A: **Must** be followed or some group will not be able to access content.
2. Level AA: **Should** be followed or some group will have difficulty accessing content.
3. Level AAA: **Could** be followed to improve accessibility and usability further.

Along with the WCAG 2.0 specifications document, the guidelines provide supporting documents that list and detail **success criteria** (or requirements) for web accessibility, as well as the **techniques** to implement web content that meets these criteria.

An example of a success criteria for Guideline 1.1.1:

- Providing text alternatives for any non-text content so that it can be changed into other forms, such as large print, Braille, speech, symbols, or simpler language.

An example of a corresponding technique for this success criteria:

- H37: When using the `img` element, specify a short text alternative with the `alt` attribute.

When talking about HTML, you will often hear the words “**element**” and “**attribute**.” To clarify these terms, an element is often referred to as a HTML tag, and an attribute is a property of a tag. In the example that follows, an image tag is represented by the `` element; its properties are the “`src`” attribute, which contains the path to the image or “source” file, and the “`alt`” attribute, which contains the text alternative describing the image.

HTML Elements and Attributes

```
// HTML elements are often referred as tags  
// The <img> element below has an "src" attribute containing the path to the image file  
// and an "alt" attribute containing the text alternative describing the image
```

```

```

Authoring Tool Accessibility Guidelines 2.0

In 2000, the W3C released Authoring Tool Accessibility Guidelines (ATAG) 1.0 as its counterpart. (ATAG 2.0 [2] is currently in progress, approaching a stable release that will soon supersede ATAG 1.0.) ATAG provides guidelines for developers on the creation of authoring tools that produce accessible content that conforms to WCAG standards; the tools must conform to WCAG, ensuring their accessibility too. For the types of tools used to create web content, see the *Authoring Tools* section in *Accessibility in e-Learning: What You Need to Know*.

Like WCAG, ATAG is organized by principles, guidelines, success criteria, and levels of conformance. Part A reflects the WCAG requirement that the authoring tool be accessible, and Part B describes principles associated with producing accessible content.

ATAG Principles – Part A (accessible user interface):

- A1: The authoring tool user interface follows applicable accessibility guidelines.
- A2: Editing views are perceivable.
- A3: Editing views are operable.
- A4: Editing views are understandable.

ATAG Principles – Part B (produce accessible content):

- B1: Fully automatic processes produce accessible content.
- B2: Authors are supported in producing accessible content.
- B3: Authors are supported in improving the accessibility of existing content.
- B4: Authoring tools promote and integrate their accessibility features.

In the case of B1, tools that automatically generate HTML markup with little or no interaction from the author must produce markup that is accessible by default. For example, if a tool generates a table, it must properly nest the table elements, open and close all elements in the table, and must produce valid markup.

In case of B2, tools must provide a means to add accessibility features into content. For example, if a tool creates a table, it must provide a way for authors to add a table summary and to create table header rows for labelling the content in columns and rows.

In the case of B3, the tool must allow authors to modify an existing table or add accessibility features into it.

In the case of B4, accessibility features must be integrated among all features and not separated out on their own. For example, adding a text alternative for an image should be possible in the area of the tool used to add the image, not just in a separate location where accessibility features are added.

Accessible Rich Internet Applications 1.0

The Accessible Rich Internet Applications (ARIA) [3] is perhaps the most significant specification related to web accessibility that has emerged in recent years. Being created along with HTML5, it allows developers to describe the function or interactivity of their custom web features – especially when used with scripting such as Javascript – in a way that makes them meaningful to assistive technology users.

Before the introduction of ARIA, most of the custom interactive features on websites were unusable by people using assistive technologies. Although a relatively new technology, ARIA is supported by most current browsers and assistive technologies, and its use in developing accessible web applications and websites is quickly becoming standard practice.

Here is a simplified list of ARIA's key components that help improve a user's access to dynamic, custom, interactive features of websites:

Live Regions: A live region is an area of a web page that dynamically updates with new information without reloading the page. In the past, features such as updating new feeds, injecting dynamically presented feedback messages into a page when errors occur, and live updating text chats would have been largely inaccessible to assistive technology users. Live regions now make this type of “live” information available to everyone.

Landmarks: A landmark is a feature added to various elements in a website's interface that define key navigation points using a “role” attribute. When a web page with landmarks is accessed by a person using assistive technology, such as a screen reader, the person is able to list the landmarks and navigate to any one of them. Landmarks might be added to a navigation bar (role=“navigation”), a search field (role=“search”), or to the main content area (role=“main”), for example, adding the ARIA role attribute to existing HTML tags.

Labels and Relationships: ARIA provides a number of attributes that allow developers to make direct associations between custom features and their descriptions. In the past when assistive technologies accessed custom features (provided they were accessible by keyboard), the user would often hear nothing because there was no standard way to describe these features. With attributes such as “aria-labelledby” and “aria-describedby” developers are able to describe the elements of the web features they create in a way that would be meaningful to assistive technology users.

IMS AccessForAll / ISO 24751

The AccessForAll 1.0 standard was released by the IMS Global Learning Consortium in July 2004 and updated to AccessForAll 2.0 [4] in 2008, when it was adopted by ISO/IEC as the ISO 24751 standard.

AccessForAll is a three-part standard that essentially matches user needs and preferences with content and user interface adaptations.

- Part 1 is the Framework and Reference model, which is used as a guide for developing applications that consume and produce AccessForAll content, and consume and produce AccessForAll preference profiles.
- Part 2 is the Digital Resource Description (DRD), which describes adaptation for content, such as text captions for audio tracks, or text alternatives for graphics.
- Part 3 is the Personal Needs and Preferences for Digital Delivery (PNP), which provides a means for learners to describe their personal learning needs, such as captions for a person who is unable to hear the audio track in a video.

AccessForAll is not yet widely implemented in e-learning systems, though it is a major component of the upcoming Global Public Inclusive Infrastructure (GPII), which is detailed in the *Future of Accessibility* section in *Accessibility in e-Learning: What You Need to Know*.

AccessForAll 2 (ISO 24751) has been implemented in the ATutor Learning Management System (LMS) [5] as a demonstration. Learners are able to define their preferred format of learning content. Figure 1, which follows, displays the “Content Alternative” preference panel. Learners can choose to have content presented with various adaptations that either replace the original content or are appended to it. For example, in the “Alternative to Text” area, a person might choose to add audio versions of content (if available) to the existing text content, perhaps in another language, so s/he could read along while listening to the audio output of that content. That person could also choose to replace the original text content with the audio version.

Figure 2 shows the AccessForAll authoring screen in the ATutor content editor. The first column lists resource files in the content page being edited, which in this case are images. In the second column, authors can define the type of content for each resource: auditory, textual, visual, or a combination of these. In the next four columns, authors can upload text, audio, visual, or sign language adaptations for the original content.

Preferences

ATutor Settings Text Settings **Content Alternatives** Learner Supports Navigation

Alternatives To Text

If you want alternatives to text content when it is available, select "Yes", choose the type of Preferred Alternative, then choose to have the alternative appended to, or replace the original text content

Use Alternative To Text
 Yes No

Preferred Alternative

Append or Replace Original Content
 Append Replace

Preferred Language

Alternatives To Audio

If you want alternatives to audio content when it is available, select "Yes", choose the type of Preferred Alternative, then choose to have the alternative appended to, or replace the original audio content.

Use Alternative To Audio
 Yes No

Preferred Alternative

Append or Replace Original Content
 Append Replace

Preferred Language

Alternatives To Visual

If you want alternatives to visual content when it is available, select "Yes", choose the type of Preferred Alternative, then choose to have the alternative appended to, or replace the original visual content

Use Alternative To Visual
 Yes No

Preferred Alternative

Append or Replace Original Content
 Append Replace

Preferred Language

Figure 1: The ATutor LMS Content Alternatives preference screen. (This image is unavailable in French.)

Content Properties Glossary Terms **Adapted Content** Tests and Surveys

Save Close Close after saving

Original resource	Resource type	Alternatives			
		Text	Audio	Visual	Sign Language
images/profile.gif	<input type="checkbox"/> Auditory <input type="checkbox"/> Textual <input type="checkbox"/> Visual	Add	Add	Add	Add
images/browse.gif	<input type="checkbox"/> Auditory <input type="checkbox"/> Textual <input type="checkbox"/> Visual	Add	Add	Add	Add
images/search_icon.gif	<input type="checkbox"/> Auditory <input type="checkbox"/> Textual <input type="checkbox"/> Visual	Add	Add	Add	Add
images/logout.gif	<input type="checkbox"/> Auditory <input type="checkbox"/> Textual <input type="checkbox"/> Visual	Add	Add	Add	Add

Figure 2: The ATutor AccessForAll authoring tool allows authors to define resource types and add text, audio, visual, and sign language alternatives for each resource in the content being edited. (This image is unavailable in French.)

Accessibility for Ontarians with Disabilities Act (AODA)

The web accessibility requirements of the *Accessibility for Ontarians with Disabilities Act* came into effect on January 1, 2012, when all Government of Ontario websites were required to conform to WCAG 2.0 Level A guidelines. Designated public sector organizations and other large organizations with 50 or more employees, including colleges and universities, must conform to WCAG 2.0 Level A guidelines as of January 1, 2014 for any new websites launched after this date and for any website significantly refreshed (50% or more) since January 1, 2012. By January 1, 2021, these same organizations must conform to WCAG Level AA guidelines.

The AODA web accessibility requirements mirror those in WCAG 2.0, with two exceptions. WCAG requires live-streaming content to include captions in Guideline 1.2.4; and it requires audio description for Level AA conformance in Guideline 1.2.5. The AODA does not have these requirements for public sector and large organizations, although government will be required to provide video description by 2020. Captions and audio description are described in detail in the *Multimedia Production* section in *Accessibility in e-Learning: What You Need to Know*.

Section 508 (U.S.)

In the United States, Section 508 was added to the Rehabilitation Act and came into force in 2000. It applies to electronic and information technology procured by the U.S. federal government, including computer hardware and software, websites, phone systems, and copiers. Section 1194.22 of the Act outlines 16 accessibility requirements for websites and other electronic information, but these requirements are based on WCAG 1.0 guidelines, not the current WCAG 2.0 guidelines. Keep this mind should your institution procure e-learning software or learning materials from U.S. sources that claim Section 508 compliance, or have issued a Voluntary Product Accessibility Template (VPAT). It should not be assumed that U.S. technology will meet the accessibility requirements of the AODA or the WCAG 2.0.

References

1. W3C Web Content Accessibility Guidelines 2.0 <http://www.w3.org/TR/WCAG20/>
2. W3C Authoring Tool Accessibility Guidelines 2.0 <http://www.w3.org/TR/ATAG20/>
3. Accessible Rich Internet Applications (ARIA 1.0) <http://www.w3.org/TR/wai-aria/>
4. IMS Global Learning Consortium Accessibility (AccessForAll) <http://www.imsglobal.org/accessibility/>
5. ATutor Learning Management System <http://www.atutor.ca>