W3C

Techniques for Web Content Accessibility Guidelines

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Checkpoint Checklist for Web Content Accessibility Guidelines
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Abstract

This document is a list of techniques that implement the guidelines described in "Web Content Accessibility Guidelines". This document includes primarily techniques that HTML authors may use to implement the guidelines, but also refers to some CSS techniques as well.

While Web Content Accessibility Guidelines strives to be a stable document (as a W3C Recommendation), the current document will undoubtedly evolve as technologies change and content developers discover more effective techniques for designing accessible pages.

This document is part of a series of accessibility documents published by the Web Accessibility Initiative.

Status of this document

This is a W3C Working Draft for review by W3C members and other interested parties. It is a draft document and may be updated, replaced or obsoleted by other documents at any time. It is inappropriate to use W3C Working Drafts as reference material or to cite them as other than "work in progress". This is work in progress and does not imply

endorsement by, or the consensus of, either W3C or members of the WAI GL Working Group.

Please note that previous versions of this document were entitled "Techniques for WAI Page Author Guidelines".

This document has been produced as part of the W3C WAI Activity. The goal of the WAI-GL working group is discussed in our charter.

Available formats

This document is available in the following formats:

HTML:
http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth-tech.html
A plain text file:
http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth-tech.txt,
HTML as a gzip'ed tar file:
http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth.tgz,
HTML as a zip file (this is a '.zip' file not an '.exe'):
http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth.zip,
A PostScript file:
http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth-tech.ps,
A PDF file:
http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth-tech.pdf.

In case of a discrepancy between the various formats of the specification, http://www.w3.org/WAI/GL/WD-WAI-PAGEAUTH-19990225/wai-pageauth-tech.html is considered the definitive version.

Comments

Please send detailed comments on this document to w3c-wai-gl@w3.org.

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Priorities

Each checkpoint in this document (introduced by the word "Checkpoint") is rated according to the following system:

[Priority 1]
This checkpoint **must** be implemented by an author, or one or more groups of users will find it impossible to access information in the document. Implementing this checkpoint is a basic requirement for some groups to be able to use Web documents.

[Priority 2]
This checkpoint **should** be implemented by an author, or one or more groups of users will find it difficult to access information in the document. Implementing this checkpoint will significantly improve access to Web documents.

[Priority 3]
This checkpoint **may** be implemented by an author to make it easier for one or more groups of users to access information in the document. Implementing this checkpoint will improve access to Web documents.

Some checkpoints may have more than one rating. This occurs when the importance of the checkpoint varies with the importance of the information being presented. For instance, if an author considers a vital chart or graph more important than a small graphic, it may be more important to implement a given checkpoint for the former but not the latter.

The checkpoints in this document are numbered to match their numbering in Web Content Accessibility Guidelines.

---

1 Accessibility Themes for HTML

The following sections discuss some accessibility that authors should keep in mind as they design HTML documents.

1.1 Structure vs. Presentation

When designing a document or series of documents, page authors should strive to identify the desired structure for their documents without thinking about how the documents will be presented to the user. Distinguishing the structure of a document from how the content is presented offers a number of advantages, including improved accessibility, manageability, and scalability.

Identifying what is structure and what is presentation may be a challenging task at times that authors must develop a mindset for recognizing. For instance, many authors consider that a horizontal rule (the HR element) communicates a structural division. This may be true for sighted users, but to unsighted users or users without graphical browsers, a rule has next to no meaning (One might"guess" that an HR element implies a structural division, but without other information, there is no guarantee.) Authors should use the HTML 4.0 header elements (H1-H6) to identify new sections. These may be *complemented* by visual or other cues such as horizontal rules, but should not be replaced by them.

The inverse holds as well: authors should not use structural elements to achieve presentation effects. For instance, even though the BLOCKQUOTE element may cause indented text in some browsers, that is not its meaning, only a presentation side-effect. BLOCKQUOTE elements used for indentation confuse users and search robots alike, who expect the element to be used to mark up block quotations.

The next two sections identify (by theme) precisely those elements and attributes considered structural (and some of their uses) and those that are considered to control presentation. The section on style and style sheets [p. 31] discusses how to use CSS to accomplish the same tasks as the HTML presentation elements and attributes.

Elements and attributes that are deprecated in HTML 4.0 ([HTML40] [p. 42]) appear in red and followed by an asterisk (*) in this document. Most presentation elements have been deprecated in HTML 4.0.

[Checkpoint 13.2] If W3C technologies are used, avoid deprecated language features whenever possible. [Priority 2]

Structural elements and attributes

Document head and body	HTML [p. 44] , HEAD [p. 44] , BODY [p. 44]
Data about the document	TITLE [p. 46] , META [p. 45] , ADDRESS [p. 43]
Attributes	alt, title, longdesc
Chapters, sections, etc.	H1 [p. 44] -H6
Author-defined structures	DIV [p. 44] , SPAN [p. 45]
Attributes	class, id
Language, writing direction	BDO [p. 43]

Attributes	lang, hreflang, dir
Creating paragraphs	EM [p. 44] , STRONG [p. 46]
Acronyms and abbreviations	ACRONYM [p. 43] , ABBR [p. 43]
Subscripts and superscripts	SUB [p. 46] , SUP [p. 46]
Inserted and deleted text	INS [p. 45] , DEL [p. 44]
Attributes	cite, datetime
Quotations	BLOCKQUOTE [p. 44] , Q [p. 45]
Attributes	cite
Identifying chunks of text	DFN [p. 44] , CODE [p. 44] , SAMP [p. 45] , KBD [p. 45] , VAR [p. 46] , CITE [p. 44]
Lists	UL [p. 46] , OL [p. 45] , LI [p. 45] , DL [p. 44] , DT [p. 44] , DD [p. 44] , DIR* [p. 44] ,
Attributes	start*, value*
Tables	TABLE [p. 46] , CAPTION [p. 44] , THEAD [p. 46] , TFOOT [p. 46] , TBODY [p. 46] , COLGROUP [p. 44] , COL [p. 44] , TR [p. 46] , TH [p. 46] , TD [p. 46]
Attributes	abbr, axis, headers, scope, rowspan, span, summary
Links	LINK [p. 45] , IMG [p. 44] , OBJECT [p. 45] , PARAM [p. 45] , APPLET* [p. 43] , MAP [p. 45] , AREA [p. 43]
Attributes	shape, ismap, coords
Forms and keyboard control	FORM [p. 44] , INPUT [p. 45] , BUTTON [p. 44] , SELECT [p. 45] , OPTGROUP [p. 45] , OPTION [p. 45] , TEXTAREA [p. 46] , LABEL [p. 45] , FIELDSET [p. 44] , LEGEND [p. 45] , ISINDEX* [p. 45]
Attributes	tabindex, accesskey, label, for
Scripts	SCRIPT [p. 45] , NOSCRIPT [p. 45]
Attributes	onblur, onchange, onclick, ondblclick, onfocus, onkeydown, onkeypress, onkeyup, onload, onload, onmousedown, onmousemove, onmouseout, onmouseover, onmouseup, onreset, onselect, onsubmit, onunload

Presentation elements and attributes

Note 1. Not all attributes are listed in this section. Only those deemed pertinent to accessibility have been listed.

Note 2. While the STYLE element is presentational, it may be used to *enhance* the presentation of structural elements. The other presentation elements are often used *instead of* structural elements.

Style sheets	PRE [p. 45] , CENTER* [p. 44] , BR [p. 44] , STYLE [p. 46]
Attributes	align*, valign*, clear*, nowrap*, char, charoff , style
Spacing	
Attributes	hspace*, vspace*, cellpadding, cellspacing, compact*, type*
Text style and fonts	TT [p. 46] , I [p. 44] , B [p. 43] , BIG [p. 43] , SMALL [p. 45] , STRIKE* [p. 46] , S* [p. 45] , U* [p. 46] , FONT* [p. 44] , BASEFONT* [p. 43]
Attributes	face*, size*
Colors	
Attributes	background*, bgcolor*, color*, text*, link*, alink*, vlink*
Rules and borders	HR [p. 44]
Attributes	border, noshade*, rules, size (deprecated according to element).
Frames	FRAMESET [p. 44] , FRAME [p. 44] , IFRAME [p. 44] , NOFRAMES [p. 45]
Attributes	target, marginheight, marginwidth, frame, frameborder, noresize, rows, cols, scrolling

1.2 Alternative text and descriptions

Text is considered accessible to almost all users since it may be handled by screen readers, non-visual browsers, braille readers, etc. It is good practice, as you design a document containing non-textual information (images, graphics, applets, sounds, etc.) to think about supplementing that information with textual equivalents wherever possible.

There are several types of textual supplements to consider:

Alternative text (Alt-text)

Alternative text represents the **function** of the content. Alternative text should not describe visual appearance or how something sounds. For example, if an image of a magnifying glass is used for a search button, the alt-text would be "Search" rather than "Magnifying glass".

Quicktest! A good test to determine if a text equivalent is useful is to imagine reading the document aloud over the telephone. What would you say upon encountering this image to make the page comprehensible to the listener?

Related checkpoints:

1. See also checkpoint 1.1.
2. See also checkpoint 1.2.
3. For all image map links:
   - See also checkpoint 1.3.
   - See also checkpoint 1.4.
4. See also checkpoint 1.5.
5. See also checkpoint 1.6.
6. See also checkpoint 2.2.
7. See also checkpoint 5.4.

Brief descriptions

Sometimes, a brief inline description of content (of a sound, an abbreviation, an image) may complement alt-text. In general, a brief description should describe visual appearance or how something sounds.

1. [Checkpoint 14.1] Title each frame so that users can keep track of frames by title. [Priority 1]
2. See also checkpoint 1.2.

Long descriptions

In general, a long description should describe visual appearance or how something sounds. Long descriptions are generally stored in external documents (but may be inline if necessary).

1. See also checkpoint 2.1.
2. [Checkpoint 14.2] Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone. [Priority 2]

HTML allows authors to specify these substitutes in several ways. Here is a summary of attributes used for alt-text and long descriptions and the elements they apply to (by version of HTML):

To implement alt-text, use the "alt" attribute.

In HTML 4.0, applies to: IMG, AREA, INPUT, APPLET. The attribute is mandatory for the IMG and AREA elements. For other elements, use the "title" attribute.
In HTML 3.2, applies to: IMG, AREA, APPLET.
In HTML 2.0, applies to: IMG.

To implement brief descriptions, use the "title" attribute

In HTML 4.0, applies to almost every element
In HTML 3.2, applies to: LINK, A
In HTML 2.0, applies to: LINK, A

To implement long descriptions, use the "longdesc" attribute

In HTML 4.0, applies to: FRAME, IFRAME, IMG
In HTML 3.2, applies to: N/A.
In HTML 2.0, applies to: N/A.

Not every user agent supports these attributes. When required to design documents for a version of HTML known not to support one of these attributes, authors should implement alt-text or descriptions in other ways. Methods include:

- Inline text equivalents or descriptions. For example, include a description of the image immediately after the image.

- Links to descriptions (called description links or "d-links"). Description links should be ordinary links (on the same page or another designed for such links) that designate a document containing a long description. The link text (content of the A element) should be "[D]".

Each of the HTML topics [p. 13] below describes prioritized scenarios for alt-text and descriptions.

Some image formats allow internal text in the data file along with the image information. If an image format supports such text (e.g., PNG) authors may also supply brief descriptions there as well.

1.3 Alternative pages

Although it is possible to make most content accessible, it may happen that all or part of a page remains inaccessible. Here are several additional techniques for creating accessible alternatives:

- Allow users to navigate to a separate page that is accessible and maintained with the same frequency as the inaccessible (original) page. There are several techniques for linking to an accessible alternative page:
  1. Provide links at the top of both the main and alternative pages to allow a user to move back and forth between them.
  2. Use the LINK element to designate alternative documents. Browsers should load the alternative page automatically based on the user's browser type and preferences.
- Instead of static alternative pages, set up server-side scripts that generate accessible versions of a page on demand.
- [Checkpoint 8.1] Provide an alternative page when the primary content is dynamic. [Priority 2] . See the examples for Frames [p. 36] and Scripts [p. 40] .
- Otherwise provide a phone number, fax number, e-mail, or postal address where information is available and accessible, preferably 24 hours a day

Example.

User agents that support LINK will load the alternative page for those users whose browsers may be identified as supporting "aural","braille", or "tty" rendering.

```
<HEAD>
<TITLE>Welcome to the Virtual Mall!</TITLE>
<LINK title="Text-only version"
      rel="alternate"
      href="text_only.html"
      media="aural, braille, tty">
</HEAD>
<BODY><P>...</BODY>
```

End example.

1.4 Keyboard access

Not every user has a graphic environment with a mouse or other pointing device. Some users rely on keyboard or voice input to navigate links, activate form controls, etc. Authors should always ensure that users may interact with a page with devices other than a pointing device. A page designed for keyboard access (in addition to mouse access) will

generally be accessible to users with other input devices. What's more, designing a page for keyboard access will usually improve its overall design as well.

Keyboard access to links and form controls may be specified in two ways:

Keyboard shortcuts
: Keyboard shortcuts allow users to combine keystrokes to navigate links or form controls on a page.

Tabbing order
: Tabbing order describes a (logical) order for navigating from link to link or form control to form control (usually by pressing the "tab" key, hence the name).

Here is a summary of attributes used for keyboard access and tabbing order and the elements they apply to (by version of HTML):

To implement shortcuts, use the "accesskey" attribute.
: In HTML, 4.0 applies to: A, AREA, BUTTON, INPUT, LABEL, LEGEND, TEXTAREA
: In HTML, 3.2 applies to: N/A.
: In HTML, 2.0 applies to: N/A.

To implement tabbing order, use the "tabindex" attribute
: In HTML, 4.0 applies to: A, AREA, BUTTON, INPUT, OBJECT, SELECT, TEXTAREA
: In HTML, 3.2 applies to: N/A
: In HTML, 2.0 applies to: N/A

In the following example, if the accesskey "C" is activated,"doc.html" is retrieved by the browser:

Example.

```
<A accesskey="C" href="doc.html" hreflang="en"
   title="XYZ company home page">
      XYZ company home page</A>
```

End example.

The next example assigns "U" as the access key. Typing "U" gives focus to the label, which in turn gives focus to the input control, so that the user can input text.

Example.

```
<FORM action="submit" method="post">
<P>
      <LABEL for="user" accesskey="U">name</LABEL>
      <INPUT type="text" id="user">
</FORM>
```

End example.

In the next example, we specify a tabbing order among elements (in order, "field2", "field1", "submit"):

Example.

```
<FORM action="submit" method="post">
<P>
<INPUT tabindex="2" type="text" name="field1">
<INPUT tabindex="1" type="text" name="field2">
<INPUT tabindex="3" type="submit" name="submit">
</FORM>
```

End example.

[Checkpoint 11.1] If possible, ensure that all elements that have their own interface are keyboard operable. [Priority 2] Some elements import objects whose interfaces cannot be controlled through HTML (applets, images, etc.) In such cases, users should ensure that the imported objects themselves provide accessible interfaces.

1.5 Navigation

[Checkpoint 16.3] Create a consistent style of presentation between pages. [Priority 3]

A consistent style of presentation on each page allows users to easily find navigation buttons between pages, as well as find the primary content for each page. While this helps make it easier for everyone, it especially benefits people with learning and reading disabilities. Making it easy to predict where the needed information is found on each page will increase the likelihood that it will be found.

Examples of structures that may appear at the same place between pages:

1. navigation bars
2. the primary content of a page
3. advertising

[Checkpoint 15.3] Use a clear, consistent navigation structure. [Priority 3]

A navigation structure is the set of possible paths available for a user to take through the content on your site. Providing navigation bars, site maps, and search features all increase the likelihood that a user will navigate easily to the information that they seek on your site. If your site is highly visual in nature, the structure might be harder to navigate through if the user can't form a mental map of where they are going or where they have been. Therefore, provide a description that will help users discover the mechanisms you have provided.

- [Checkpoint 15.4] Offer navigation bars to highlight and give access to the navigation structure. [Priority 3]
- [Checkpoint 15.6] Provide a description of the general layout of the site, the access features used, and how to use them. [Priority 3]
- [Checkpoint 15.5] Offer a site map or table of contents that makes the structure of your site apparent and facilitates navigation. [Priority 3]
- [Checkpoint 15.7] Offer different types of searches for different skill levels and preferences. [Priority 3]
- [Checkpoint 15.2] Use metadata to add semantic information to your page and site. [Priority 2] . See the W3C Metadata Activity.

[Checkpoint 15.8] Place distinguishing information at the beginning of headings, paragraphs, lists, etc. [Priority 3]

See also the section on links [p. 21] .

1.6 Comprehension

1. [Checkpoint 16.1] Use language that is as simple as possible, while appropriate for the content of your site. [Priority 1]
2. [Checkpoint 16.2] Use icons or graphics (with a text equivalent) where they facilitate comprehension of the page. [Priority 3]

Follow these writing suggestions:

-
- Strive for clear and accurate headings and link descriptions. Scrutinize every heading, outline, and menu to see if the crucial words mean exactly what is intended, and if there are more common words that would convey the same meaning.
- State the topic of the sentence or paragraph at the beginning of the sentence or paragraph.
- Limit each paragraph to one main idea.
- Avoid idiomatic language, technical jargon, and other unfamiliar vocabulary and expressions.
- Avoid specialized meanings of familiar vocabulary, unless explanations are provided.
- Avoid the passive voice.
- Avoid complex sentence structures.
- Make link phrases terse and meaningful when read out of context.

Because people tend to scan rather than read Web pages, the quality of headings is particularly important. Good headings will at least get people to a section that has the information they need. From there they can go to a dictionary or even print out a section and ask for help.

1.7 Content negotiation

[Checkpoint 13.4] *For servers.* If a resource is served in various formats or languages, use content negotiation to determine the format or language preferred by the user. [Priority 3]

1.8 Automatic page refresh

Authors sometimes cause pages to refresh or change without the user requesting the refresh. This automatic refresh can be very disorienting to some users. There are two types of refresh mechanisms commonly used.

[Checkpoint 9.1] Until user agents provide the ability to stop the refresh, do not use periodically auto-refreshing pages [Priority 1] This type of refresh changes the user's page at regular intervals. This might be accomplished by the following HTML markup:

Deprecated example.

```
<META http-equiv="refresh" content="60">
<BODY>
<P>...Information...
</BODY>
```

Authors should **not** use this technique to simulate "push" technology. Authors cannot predict how must time a user will require to read a page; premature refresh can disorient users. Authors should avoid periodic refresh and allow users to choose when they want the latest information.

[Checkpoint 9.2] Until user agents provide the ability to stop the refresh, do not use one-time refresh in place of server redirect. [Priority 2] This type of refresh redirects the user from one page to another generally after a timeout. The following HTML markup is frequently used to achieve this effect:

Deprecated example.

```
<META http-equiv="refresh" content="5;
         http://www.acme.com/newpage">
<BODY>
<P>If your browser supports Refresh,
you'll be transported to our
<A HREF=http://www.acme.com/newpage<new site</A>
in 5 seconds, otherwise, select the link manually.
</BODY>
```

However, users should **not** redirect users with this markup since it disorients users and can disrupt a browser's history of visited pages. Instead, authors should use server-side redirects.

Note. Checkpoints 9.1 and 9.2 address problems posed by legacy user agents. Newer user agents should disable refresh and substitute a link to new information at the top of the page.

1.9 Other topics

[Checkpoint 15.9] Facilitate off-line browsing by creating a single downloadable file for documents that exist as a series of separate pages. [Priority 3]

For example, Indicate which is the first page of the document and which page follows the current one. (e.g., by using LINK).

1.10 Testing

1. Use an automated accessibility, and browser validation tool such as Bobby
2. Use the W3C HTML Validation Service, available at http://validator.w3.org/
3. Use the W3C CSS Validation Service, available at http://jigsaw.w3.org/css-validator/
4. Test your pages with a text-only browser such as Lynx or a Lynx emulator such as Lynx Viewer or Lynx-me.
5. Use multiple graphic browsers, with:
   - sounds and graphics loaded,
   - graphics not loaded,
   - sounds not loaded,
   - no mouse,
   - frames, scripts, style sheets, and applets not loaded
6. Use a several browsers, old and new.
7. Self-voicing browsers include "pwwebspeak".
8. Use a spell checker. A person reading a page with a speech synthesizer may not be able to decipher the synthesizer's best guess for a word with a spelling error.

If, after completing these tests and adjusting your design accordingly, you find that your page is still not accessible, you must create an alternative page [p. 8] that is accessible.

1.11 Browser Support

1. [Checkpoint 13.1] If W3C technologies are used (e.g. HTML, XML, SMIL, MathML, etc.), use the latest W3C specification whenever possible. [Priority 2] . The latest W3C specifications are available online.

---

2 HTML topics

The following sections list some techniques for using HTML and CSS to design accessible documents and some techniques for avoiding HTML accessibility traps. The sections are organized by topic (and mirror the organization of the HTML 4.0 specification, [HTML40] [p. 42]).

2.1 Document structure and metadata

As discussed above, authors should use structural markup wherever possible (and use it as intended by the authors of W3C specifications). Structural elements promote consistency in documents and supply information to other tools (e.g., indexing tools, search engines, programs that extract tables to databases, navigation tools that use header elements, and automatic translation software that translates text from one language into another.

Metadata

Some structural elements provide information about the document itself. This is called "metadata" about the document (Metadata is information about data). Well-crafted metadata can provide important orientation information to users. HTML elements that provide useful information about a document include:

- TITLE: The document title. Note that the TITLE element (one time only in a document) is different from the "title" attribute, which applies to almost every HTML 4.0 element. This document makes use of the "title" attribute for many occasions that require brief descriptions of element content (e.g., "a sailboat" when an image depicts a sailboat).
- ADDRESS: Can be used to provide information about the author of the page.
- LINK: Can be used to indicate alternative documents (different structure, different language, different target device, etc.).
- The META element can be used to describe metadata about a document. Many page authors use the META element to send users from one page to another automatically (usually after a time delay). This can be disorienting to some users.

Section headers

Sections should be introduced with the HTML header elements (H1-H6). Other markup may complement these elements to improve presentation (e.g., the HR element to create a horizontal dividing line), but visual presentation is not sufficient to identify document sections.

[Checkpoint 5.1] Nest headings properly. [Priority 2] Since some users skim through a document by navigating its headings, it is important to nest headings correctly, i.e., to follow an H1 with an H2, not and H3, and so on. Headings should not be used for other purposes (such as formatting text in a larger font size) since this may disorient users; use style sheets [p. 31] for text formatting.

2.2 Language information

[Checkpoint 6.1] Clearly identify changes in the (natural) language of a document's text. [Priority 1] If you use a number of different languages on a page, make sure that any changes in language are clearly identified by using the "lang" attribute:

Example.

```
<P>And with a certain <SPAN lang="fr">je ne sais quoi</SPAN>,
she entered both the room, and his life, forever. <Q>My name
is Natasha,</Q> she said. <Q lang="it">Piacere,</Q>
he replied in impeccable Italian, locking the door.
```

End example.

[Checkpoint 6.2] Identify the primary (natural) language of a document. [Priority 3]

2.3 Text markup

As mentioned above, structural elements add information to a page that may be used by browsers, search engines, and other software. Authors are encouraged to use structural elements and attributes [p. 4] whenever possible. Below we discuss how to further improve accessibility by careful use of attributes with these elements.

Emphasis

The proper HTML elements should be used to mark up emphasis: EM and STRONG. The B and I elements should not be used; they are used to create a visual presentation effect. The EM and STRONG elements were designed to indicate structural emphasis that may be rendered in a variety of ways (font style changes, speech inflection changes, etc.)

Acronyms and abbreviations

[Checkpoint 6.3] Specify the expansion of abbreviations and acronyms. [Priority 2] Mark up abbreviations and acronyms with ABBR and ACRONYM and use "title" to indicate the expansion:

Example.

```
<P>Welcome to the <ACRONYM title="World Wide Web">WWW</ACRONYM>!
```

End example.

Quotations

[Checkpoint 5.3] Mark up quotations. Do not use quotation markup for formatting effects such as indentation. [Priority 2] See the language example [p. 14] above for an illustration of the Q element.

Example.

```
<BLOCKQUOTE cite="http://www.shakespeare.com/loveslabourlost">
  <P>Remuneration! O! that's the Latin word for three farthings.
     --- William Shakespeare (Love's Labor Lost).
  </P>
</BLOCKQUOTE>
```

End example.

Text markup rather than images

[Checkpoint 5.5] Where possible, use a markup language to mark up content rather than using images. [Priority 2]

2.4 Lists

[Checkpoint 5.2] Encode list structure and list items properly. [Priority 2] The HTML list elements DL, UL, and OL (available in HTML 3.2 and HTML 4.0) should only be used to create lists, not for formatting effects such as indentation.

When possible, use ordered (numbered) lists to help navigation. Non-visual users often "get lost" in lists, especially those with several layers of embedding and those that do not indicate the specific level of indentation for each item. In addition, it is often difficult for non-visual users to know where the list itself begins and ends and where each list item starts. Finally, if a list entry wraps to the next line, it may appear to be two separate items in the list.

Example.

Instead of nesting bulleted lists like this:

- writing tools
  - pens
    - highlighters
      - red
      - green
      - blue
    - ball-point
      - green
      - purple
      - mauve
  - pencils
    - soft lead
    - #2 lead
- erasers

which might be read by a screen reader (stripping bullets and indentation) as:

```
writing tools
pens
highlighters
red
green
blue
ball-point
green
purple
mauve
pencils
#2 lead
soft lead
erasers
```

Use ordered lists (or make sure to put distinguishing information at the beginning of each list item):

1. writing tools
    1. pens
        1. highlighters
            1. red
            2. green
            3. blue
        2. ball-point
            1. green
            2. purple
            3. mauve
    1. pencils
        1. soft lead
        2. #2 lead
2. erasers

End example.

Use style sheets to change list bullets

To change the "bullet" style of unordered list items, use style sheets. This way, if images are not loaded, the browser will draw a default bullet.

Example.

```
<HEAD>
<TITLE>Using style sheets to change bullets</TITLE>
<STYLE type="text/css">
   UL { list-style: url(star.gif) }
</STYLE>
</HEAD>
<BODY>
<UL>
   <LI>Audrey
   <LI>Laurie
   <LI>Alice
</UL>
```

End example.

Avoid using images as bullets in definition lists. However, if this method is used, be sure to provide alt-text [p. 6] for the images.

Deprecated example.

```
<DL>
   <DD><IMG src="star.gif" alt="Item">Audrey
   <DD><IMG src="star.gif" alt="Item">Laurie
   <DD><IMG src="star.gif" alt="Item">Alice
</DL>
```

Authors should avoid list styles where bullets provide additional (visual) information. However, if this is done, be sure to provide alt-text describing meaning of the bullet:

Deprecated example.

```
<DL>
<DD><IMG src="red.gif" alt="New:">Roth IRA</DD>
<DD><IMG src="yellow.gif" alt="Old:">401(k)</DD>
</DL>
```

Here is a better way to change list bullet styles (using style sheets). To further ensure that users understand differences between list items indicated visually, authors should provide a label before or after the list item phrase:

Example.

```
<HEAD>
<TITLE>Bullet styles example</TITLE>
<STYLE type="text/css">
   .newtxt { font-weight: bold;
             color: red;
             background-color: yellow }
   .newbullet { list-style : url(yellow.gif) }
</STYLE>
</HEAD>
<BODY>
<UL>
   <LI class="newbullet">Roth IRA <SPAN class="newtext">New</SPAN></LI>
   <LI> 401(k)</LI>
</UL>
</BODY>
```

End example.

2.5 Tables

Authors may make tables more accessible in a number of ways:

- Provide a caption via the CAPTION element.
- [Checkpoint 7.5] Provide summaries for tables. [Priority 3] Summaries are especially useful for non-visual readers.
- [Checkpoint 7.3] For data tables, identify headers for rows and columns. [Priority 1] Future browsers and assistive technologies will be able to automatically translate tables into linear sequences if data is labeled appropriately.
- [Checkpoint 7.4] For data tables that have more than one row and/or more than one column of header cells, use markup to associate data cells and header cells. [Priority 1] Identify structural groups of rows (THEAD for repeated table headers, TFOOT for repeated table footers, and TBODY for other groups of rows) and

groups of columns (COLGROUP and COL). Label table elements with the"scope", "headers", and "axis" attributes so that future browsers and assistive technologies will be able to select data from a table by filtering on categories. This markup will also help browsers translate tables into linear sequences automatically (also called table "serialization"). A linear sequence is usually generated by reading a row left to right and proceeding each cell with the label of its column.

- [Checkpoint 7.6] Provide abbreviations for header labels. [Priority 3] Provide terse substitutes for header labels with the "abbr" attribute on TH. These will be particularly useful for future speaking technologies that can read row and column labels for each cell. Abbreviations cut down on repetition and reading time.
- [Checkpoint 7.2] If a table is used for layout, do not use any structural markup for the purpose of visual formatting. [Priority 2]

Most of the above elements and attributes are only available in HTML 4.0.

This markup will allow accessible browsers and other user agents to restructure tables for non-visual media.

For information about table headers, see the table header algorithm and discussion in the HTML 4.0 Recommendation.

The following example shows how to associate data cells with their corresponding headers by means of the "headers" attribute. The "headers" attribute specifies a list of header cells (row and column labels) associated with the current data cell. This requires each header cell to have an "id" attribute.

Example.

```
<TABLE border="1"
       summary="This table charts the number of
                cups of coffee consumed by each senator,
                the type of coffee (decaf or regular),
                and whether taken with sugar.">
  <CAPTION>Cups of coffee consumed by each senator</CAPTION>
  <TR>
      <TH id="t1">Name</TH>
      <TH id="t2">Cups</TH>
      <TH id="t3" abbr="Type">Type of  Coffee</TH>
      <TH id="t4">Sugar?</TH>
  <TR>
      <TD headers="t1">T. Sexton</TD>
      <TD headers="t2">10</TD>
      <TD headers="t3">Espresso</TD>
      <TD headers="t4">No</TD>
  <TR>
      <TD headers="t1">J. Dinnen</TD>
      <TD headers="t2">5</TD>
      <TD headers="t3">Decaf</TD>
     <TD headers="t4">Yes</TD>
</TABLE>
```

End example.

A speech synthesizer might render this tables as follows:

```
Caption: Cups of coffee consumed by each senator
Summary: This table charts the number of cups of coffee
         consumed by each senator, the type of coffee
        (decaf or regular), and whether taken with sugar.
Name: T. Sexton, Cups: 10, Type: Espresso, Sugar: No
Name: J. Dinnen, Cups: 5, Type: Decaf, Sugar: Yes
```

A visual user agent might render this table as follows:

Cups of coffee consumed by each senator

Name	Cups	Type of Coffee	Sugar?
T. Sexton	10	Espresso	No
J. Dinnen	5	Decaf	Yes

The next example associates the same header and data cells as before, but this time uses the "scope" attribute rather than"headers." "Scope" must have one of the following values: row, col, rowgroup or colgroup. Scope specifies the set of data cells to be associated with the current header cell. This method is particularly useful for simple tables. It should be noted that the spoken rendering of this table would be identical to that of the previous example. A choice between the "headers" and "scope" attributes is dependent on the complexity of the table. It does not affect the output so long as the relationships between header and data cells are made clear in the markup.

Example.

```
<TABLE border="1"
       summary="This table charts ...">
   <CAPTION>Cups of coffee consumed by each senator</CAPTION>
   <TR>
        <TH scope="col">Name</TH>
        <TH scope="col">Cups</TH>
        <TH scope="col" abbr="Type">Type of Coffee</TH>
        <TH scope="col">Sugar?</TH>
  <TR>
        <TD>T. Sexton</TD>  <TD>10</TD>
        <TD>Espresso</TD>   <TD>No</TD>
  <TR>
        <TD>J. Dinnen</TD>  <TD>5</TD>
        <TD>Decaf</TD>       <TD>Yes</TD>
</TABLE>
```

End example.

The following example shows how to create categories within a table using the "axis" attribute.

Example.

```
<TABLE border="1">
  <CAPTION>Travel Expense Report</CAPTION>
  <TR>
       <TH></TH>
       <TH id="a2" axis="expenses">Meals
       <TH id="a3" axis="expenses">Hotels
       <TH id="a4" axis="expenses">Transport
       <TD>subtotals</TD>
  <TR>
       <TH id="a6" axis="location">San Jose
       <TH> <TH> <TH> <TD>
  <TR>
      <TD id="a7" axis="date">25-Aug-97
      <TD headers="a6 a7 a2">37.74
      <TD headers="a6 a7 a3">112.00
      <TD headers="a6 a7 a4">45.00
      <TD>
  <TR>
      <TD id="a8" axis="date">26-Aug-97
      <TD headers="a6 a8 a2">27.28
```

```
        <TD headers="a6 a8 a3">112.00
        <TD headers="a6 a8 a4">45.00
        <TD>
    <TR>
        <TD>subtotals
        <TD>65.02
        <TD>224.00
        <TD>90.00
        <TD>379.02
    <TR>
        <TH id="a10" axis="location">Seattle
        <TH> <TH> <TH> <TD>
    <TR>
        <TD id="a11" axis="date">27-Aug-97
        <TD headers="a10 a11 a2">96.25
        <TD headers="a10 a11 a3">109.00
        <TD headers="a10 a11 a4">36.00
        <TD>
    <TR>
        <TD id="a12" axis="date">28-Aug-97
        <TD headers="a10 a12 a2">35.00
        <TD headers="a10 a12 a3">109.00
        <TD headers="a10 a12 a4">36.00
        <TD>
    <TR>
        <TD>subtotals
        <TD>131.25
        <TD>218.00
        <TD>72.00
        <TD>421.25
    <TR>
        <TH>Totals
        <TD>196.27
        <TD>442.00
        <TD>162.00
        <TD>800.27
  </TABLE>
```

End example.

This table lists travel expenses at two locations: San Jose and Seattle, by date, and category (meals, hotels, and transport). The following image shows how a visual user agent might render it.

Cups of coffee consumed by each senator

Name	Cups	Type of Coffee	Sugar?
T. Sexton	10	Espresso	No
J. Dinnen	5	Decaf	Yes

Wrapped text in tables

One source of problems for screen readers that do not interpret the source HTML is wrapped text in table cells. They read across the page, reading sentences on the same row from different columns as one sentence.

For example, if a table is rendered like this on the screen:

```
There is a 30% chance of              Classes at the University of Wisconsin
rain showers this morning, but they   will resume on September 3rd.
should stop before the weekend.
```

This might be read by a screen reader as:

```
There is a 30% chance of Classes at the University of Wisconsin
rain showers this morning, but they will resume on September 3rd.
should stop before the weekend.
```

Screen readers that read the source HTML will recognize the structure of each cell, but for older screen readers, authors should minimize the risk of word wrapping by limiting the amount of text in each cell. Also, the longest chunks of text should all be in the last column (rightmost for left-to-right tables). This way, if they wrap, they will still be read coherently.

Authors should test tables for wrapping with a browser window dimension of "640x480".

Quicktest! To get a better understanding of how a screen reader would read a table, run a piece of paper down the page and read your table line by line.

Backwards compatibility issues for tables

Rows of a TFOOT element will appear before the BODY of the document in an HTML3.2 browser.

Avoid tables for layout

[Checkpoint 7.1] Avoid using tables for layout. [Priority 2]

2.6 Links

Users who are blind often jump from link to link when skimming a page or looking for information. When they do this, only the text of the link (the "link text") is read.

"Auditory users," people who are **blind**, **have difficulty seeing**, or who are **using devices with small or no displays** are unable to scan the page quickly with their eyes and often use a list of links to get an overview of a page or to quickly find a link. When links are not descriptive enough, do not make sense when read out of context, or are not unique, the auditory user must stop to read the text surrounding each link to identify it.

[Checkpoint 15.1] Wherever possible, make link phrases as terse as possible yet as meaningful as possible when read on their own or in succession. [Priority 2] Therefore, it is important that link text make sense when read without surrounding text. For example, authors should not use "click here" as link text several times on the same page; this requires a user browsing the page with a screen reader to step through each link and read the surrounding text to determine the purpose of the link. Instead, link text should carry sufficient information, as in"download this document in ASCII text," "view the full version in HTML," or "for the text version select this link."

When an image is used as the content of a link, specify alt-text [p. 6] for the image that makes sense in context.

Quicktest! To choose alt-text in this case, think of what you would say in words rather than an image in this context.

Example.

```
<A href="routes.html">
   <IMG src="topo.html"
        alt="Current routes at Boulders Climbing Gym">
</A>
```

End example.

If more than one link on a page shares the same link text, all those links should point to the same resource. Such consistency will help page design as well as accessibility. Link text should be terse but complete. [p. 21]

"Navigation bars" (sets of links that appear on every page in a site) are usually the first thing someone encounters on a page. For speech users, this means taking the time to read through x number of links on every page before reaching the unique content of a page. Therefore, grouping links will allow a user with a user agent that can navigate by elements, to jump over the group. This is similar to how people with vision skip reading the links when they see the same set on each page. Since this type of mechanism is not available today, providing a link that skips over the links, or using a tabindex at a link just before the content begins are strategies that work today.

Example.

```
<TITLE>How to use our site</TITLE>

<BODY>
  <SPAN class="nav">
    <a href="home.html">Home</a>
    <a href="search.html">Search</a>
    <a href="new.html">New and highlighted</a>
    <a href="sitemap.html">Site map</a>
  </SPAN>
  <H1><a name="how" tabindex=1>How to use our site</a></H1>
<!-- content of page -->
</BODY>
```

End example.

[Checkpoint 15.10] Group related links, identify the group (for user agents), and provide a mechanism to bypass the group (until user agents provide this mechanism). [Priority 3]

[Checkpoint 13.3] Indicate what type of resource you are linking to, especially when linking to resources that are not W3C technologies. [Priority 3]

2.7 Images and image maps

Images may be inserted by two elements in HTML:

IMG
: Available in HTML 4.0, 3.2, 2.0

OBJECT
: Available in HTML 4.0.

Images include those that carry out simple animations (e.g., a"gif" image).

Alternative text for images

[Checkpoint 1.1] Provide text equivalents for all images [Priority 1] When using IMG, specify alt-text with the "alt" attribute.

Example.

```
<IMG src="magnifyingglass.gif" alt="Search">
```

End example.
When using OBJECT, specify alt-text [p. 6]
in the body of the OBJECT element:
Example.

```
<OBJECT data="magnifyingglass.gif" type="image/gif">
   Search
</OBJECT>
```

End example.
Additionally, use the "title" attribute:
Example.

```
<OBJECT classid="Duke.class" title="Hello!"
        width="50" height="50">
     Duke waves hello!
</OBJECT>
```

End example.

Brief descriptions for images

When using IMG, specify a brief description [p. 7] of the image with the "title" attribute:
Example.

```
<IMG src="bell.gif" alt="Return to home page"
     title="Cow logo shaped like a bell">
```

End example.

Long descriptions for images

[Checkpoint 2.1] Provide a long description of each graphic, script, or applet that conveys important information. [Priority 1] When using IMG, specify a long description [p. 7] of the image with the "longdesc" attribute:
Example.

```
<IMG src="97sales.gif" alt="Sales for 1997"
     title="Sales pie chart"
     longdesc="sales97.html">
```

In sales97.html:

A chart showing how sales in 1997 progressed. The chart
is a bar-chart showing percentage increases in sales
by month. Sales in January were up 10% from December 1996,
sales in February dropped 3%, ..

End example.
For browsers that don’t support "longdesc", provide a description link as well next to the graphic:
Example.

```
<IMG src="97sales.gif" alt="Sales for 1997" longdesc="sales.html">
<A href="sales.html" title="Description of 1997 sales figures">[D]</A>
```

End example.
When using OBJECT, provide a long description in the body of the element:
Example.

```
<OBJECT data="97sales.gif" type="image/gif">
       Sales in 1997 were down subsequent to our
       anticipated purchase ...
</OBJECT>
```

End example.
Or, provide a link to a long description within the body of the element:
Example.

```
<OBJECT data="97sales.gif" type="image/gif">
       Chart of our Sales in 1997.
       A <A href="desc.html">textual description</A> is available.
 </OBJECT>
```

End example.

Ascii art

[Checkpoint 1.6] Replace ASCII art with an image or describe the ASCII art and offer a means (e.g., a link) to skip over it. [Priority 1] or [Priority 2] depending on the importance of the information (e.g., an important chart).

Avoid ascii art (character illustrations) and use real images instead since it is easier to supply alt-text [p. 6] and long descriptions [p. 7] for images. The priority of this checkpoint depends on the importance of the information (e.g., an important chart).

However, if ascii art must be used provide a link to jump over the ASCII art, as follows.

Example.

```
<P>
<a href="#post-art">skip over ASCII art</a>
<!-- ASCII art goes here -->
<a name="post-art">caption for ASCII art</a>
```

End example.
ASCII art may also be marked up as follows:
Example.

```
<P>
<OBJECT data="cow.txt" type="text/x-ascii-art" title="drawing of a cow">
include cow ascii art from guidelines
</OBJECT>
```

End example.
Another option is to use a SPAN or an ABBR element with "title".
Example.

```
<P><SPAN class="smile" title="smiley in ascii art">:-)</SPAN>
```

End example.
If the description of (important) ASCII art is long, provide a description [p. 7] in addition to alt-text.

Another way to replace ascii art is to use human language substitutes. For example, <wink> might substitute for the emoticon <SPAN title="wink smiley">;-)</SPAN>, the word"therefore" could replace arrows consisting of dashes and greater than signs (e.g., -->), and the word "great" for the uncommon abbreviation "gr8".

Mathematical equations in images

Image maps

An image map is an image that has "active regions". When the user selects one of the regions, some action takes place -- a link may be followed, information sent to a server, etc. To make an image map accessible, authors must ensure that each action associated with a visual region may be activated without a pointing device.

Image maps are created with the MAP element (available in HTML 4.0 and 3.2). HTML allows two types of image maps: client-side (the user's browser processes a URI) and server-side (the server processes click coordinates). For all image maps, authors must supply alt-text [p. 6] (described below), and should provide brief descriptions [p. 7] where needed (see the section on brief descriptions for images [p. 23]), and long descriptions [p. 7] where needed (see the section on long descriptions for images [p. 23]).

Authors should either avoid server-side image maps (because they require a specific input device - a mouse) or provide the same functionality or information in an alternative accessible format. One way to achieve this is to provide a textual link for each active region so that each link is navigable with the keyboard [p. 8] . If you must use a server-side image map, please consult the section on server-side image maps [p. 26]

Client-side image maps

The active regions of a client-side image map are defined within the MAP element and may be created with two elements:

AREA
: Available in HTML 4.0, 3.2

A
: Available in HTML 4.0.

Provide text equivalents [p. 6] for image maps since they convey visual information.

[Checkpoint 1.3] Provide a text equivalent for each active region of an image map. [Priority 1] If AREA is used, use the"alt" attribute:

Example.

```
<IMG src="welcome.gif" alt="Image map of areas in the library"
     usemap="#map1">
<MAP name="map1">
  <AREA shape="rect" coords="0,0,30,30"
        href="reference.html" alt="Reference">
  <AREA shape="rect" coords="34,34,100,100"
        href="media.html" alt="Audio visual lab">
</MAP>
```

End example.

The same idea, but use OBJECT instead of IMG to insert the image to provide more information about the image:

Example.

```
<OBJECT data="welcome.gif" type="image/gif" usemap="#map1">
    There are several areas in the library including
    the <A href="reference.html">Reference</A> section and the
    <A href="media.html">Audio Visual Lab</A>.
</OBJECT>
<MAP name="map1">
  <AREA shape="rect" coords="0,0,30,30"
        href="reference.html" alt="Reference">
  <AREA shape="rect" coords="34,34,100,100"
        href="media.html" alt="Audio visual lab">
</MAP>
```

End example.

[Checkpoint 1.4] Provide redundant textual links for each active region of an image map. [Priority 2] if client-side image maps are used, [Priority 1] if server-side [p. 26] image maps are used. In addition to providing alt-text, provide redundant textual links. If the A element is used instead of AREA, the author may describe the active regions and provide redundant links at the same time:

Example.

```
<OBJECT data="navbar1.gif" type="image/gif" usemap="#map1">
<MAP name="map1">
  <P>Navigate the site.
  <A href="guide.html" shape="rect"
     coords="0,0,118,28">[Access Guide]</A>
  <A href="shortcut.html" shape="rect"
     coords="118,0,184,28">[Go]</A>
  <A href="search.html" shape="circle"
     coords="184.200,60">[Search]</A>
  <A href="top10.html" shape="poly"
     coords="276,0,373,28,50,50">[Top Ten]</A>
</MAP>
</OBJECT>
```

End example.

Note that in the previous example the MAP element is the content of the OBJECT element so that the alternative links will only be displayed if the image map (navbar1.gif) is not.

Note also that links have been separated by brackets ([]). This is to prevent screen readers from reading several adjacent links as a single link.

[Checkpoint 12.3] Include non-link, printable characters (surrounded by spaces) between links that occur consecutively. [Priority 3] Authors should make sure they include printable characters (such as brackets or a vertical bar (|)) surrounded by spaces between adjacent links.

Server-side image maps

When a server-side image map must be used, authors should provide an alternative list of image map choices. There are three techniques:

- If an alternative list of links follows the image map, authors should indicate the existence and location of the alternative list. If IMG is used to insert the image, provide this information in the"alt" attribute. If OBJECT is used, provide it in the "title" attribute.

Example.

```
<IMG src="welcome.gif" alt="Links to this image map follow immediately"
     usemap="#map1" title="Welcome insignia" >
<MAP name="map1">
  <AREA shape="rect" coords="0,0,30,30"
        href="reference.html" alt="Reference">
  <AREA shape="rect" coords="34,34,100,100"
        href="media.html" alt="Audio visual lab">
</MAP>

<P><A href="reference.html">[Reference]</A>
   <A href="media.html">[Audio Visual Lab]</A>
```

End example.

- A more straightforward solution, although newer and less backwards compatible, is to include the alternative links within the body of an OBJECT element (see the previous example illustrating links in the OBJECT element [p. 26]).
- One final possibility is to create an alternative page [p. 8] that is accessible.

[Checkpoint 1.5] Use individual button controls in a form rather than simulating a set of buttons with an image map. [Priority 2]

2.8 Applets and other objects

Applets may be inserted by two elements in HTML:

APPLET
: Available in HTML 4.0 (deprecated), 3.2.

OBJECT
: Available in HTML 4.0.

Other objects, such as those requiring a plug-in, should also use the OBJECT element. However, for backwards compatibility with Netscape browsers, use the proprietary EMBED element within the OBJECT element as follows:

Example.

```
<OBJECT classid="clsid:A12BCD3F-GH4I-56JK-xyz"
codebase="http://site.com/content.cab" width=100 height=80>
<PARAM name="Movie" value="moviename.swf">
    <EMBED src="moviename.swf" width=100 height=80
    pluginspage="http://www.macromedia.com/shockwave/download/">
    </EMBED>

    <NOEMBED>
        <IMG src="moviename.gif" width=100 height=80>
    </NOEMBED>

</OBJECT>
```

End example.

For more information see, Flash OBJECT and EMBED Tag Syntax from Macromedia.

Audio and Video produced by dynamic objects

There are several checkpoints that authors should use to ensure that audio or visual information presented by a dynamic object is accessible:

1. See also checkpoint 1.2.
2. Provide a long description if necessary. See the section on long descriptions for images [p. 23] .
3. [Checkpoint 2.1] Provide a long description of each graphic, script, or applet that conveys important information. [Priority 1]
4. See also checkpoint 10.1.
5. [Checkpoint 8.5] For applets and programmatic objects, when possible provide an alternative function or presentation in a format other than an applet. [Priority 2]

Alternative text and descriptions for applets and programmatic objects

[Checkpoint 1.2] Provide text equivalents for all applets and other programmatic objects. [Priority 1] If OBJECT is used, provide alt-text [p. 6] as the content of the element:

Example.

```
<OBJECT classid="java:Press.class" width="500" height="500"
        title="Java applet: how temperature affects pressure">
      As temperature increases, the molecules in the balloon...
</OBJECT>
```

End example.

A more complex example takes advantage of the fact the OBJECT elements may be embedded to provide for alternative representations of information:

Example.

```
<OBJECT title="How temperature affects pressure"
        classid="java:Press.class" width="500" height="500">
   <OBJECT data="Pressure.mpeg" type="video/mpeg">
      <OBJECT data="Pressure.gif" type="image/gif">
         As temperature increases, the molecules in the balloon...
      </OBJECT>
   </OBJECT>
</OBJECT>
```

End example.

See also checkpoint 1.2. If APPLET is used, provide alt-text [p. 6] with the "alt" attribute and content in the APPLET element. This enables them to transform gracefully for those user agents that only support one of the two mechanisms ("alt" or content).

Deprecated example.

```
<APPLET code="Press.class" width="500" height="500"
        alt="Java applet: how temperature affects pressure">
      As temperature increases, the molecules in the balloon...
</APPLET>
```

Directly accessible applets

[Checkpoint 10.1] Where possible, make programmatic elements, such as scripts and applets, directly accessible or compatible with assistive technologies [Priority 1] if information or functionality is important, and not presented elsewhere, otherwise [Priority 2]. If an applet requires user interaction (e.g., the ability to manipulate a physics

experiment) that cannot be duplicated in an alternative format, make the applet directly accessible.

For more information about accessible applets, please see:

- Java Accessibility -- Trace R&D Center
- IBM Guidelines for Writing Accessible Applications Using 100% Pure Java -- IBM Special Needs Systems

2.9 Audio and video

Audio and video should be accompanied by *text transcripts*, textual descriptions or equivalents of auditory or visual events. When these transcripts are presented synchronously with a video presentation they are called "captions" and are used by people who cannot hear the audio track of the video material. Full audio transcripts include spoken dialogue as well as any other significant sounds including on-screen and off-screen sounds, music, laughter, applause, etc. The following two examples show captions, a text transcript, and auditory descriptions.

Example.

Captions for a scene from "E.T." The phone rings three times, then is answered.

[phone rings]
[ring]
[ring]
Hello?"

End example.

Example.

Here's an example of a transcript of a clip from "The Lion King" (available at the WGBH/NCAM Descriptive Video Service site).

Simba: Yeah!
Describer: Simba races outside, followed by his parents. Sarabi smiles and nudges Simba gently toward his father. The two sit side-by-side, watching the golden sunrise.
Mufasa: Look Simba, everything the light touches is our kingdom.
Simba: Wow.

End example.

Audio information

[Checkpoint 3.1] For stand-alone audio files, provide a textual transcript of all words (spoken or sung) and all significant sounds. [Priority 1]

[Checkpoint 3.2] For audio associated with video, synchronize the textual transcript with the video. [Priority 1]

Some media formats, such as QuickTime 3.0, allow captions and video descriptions to be added to the multimedia clip.

Until the format you are using supports alternative tracks, two versions of the movie could be made available, one with captions and descriptive video, and one without. Future technologies, on the other hand, will allow separate audio/visual files to be combined with text files via a synchronization file to create captioned audio and movies. It will also allow the user to choose from multiple sets of captions to match their reading

skills. For more information see the SMIL 1.0 ([SMIL] [p. 42]) specification.

[Checkpoint 3.3] Where sounds are played automatically, provide visual notification and transcripts. [Priority 1] or [Priority 2] depending on the importance of the sound.

This can be provided in the form of a text phrase on the page that links to a text transcript or description of the sound file. The link to the transcript should appear in a highly visible location such as at the top of the page. However, if a script is automatically loading a sound, it should also be able to automatically load a visual indication that the sound is currently being played and provide a description or transcript of the sound.

Note. Some controversy surrounds this technique because the browser should load the visual form of the information instead of the auditory form if the user preferences are set to do so. However, strategies must also work with today's browsers.

For more information, please consult NCAM's discussions of captioning and audio description on the Web

Visual information and motion

Video descriptions are used primarily by people who are blind to follow the action and other non-auditory information in video material. The description provides narration of the key visual elements without interfering with the audio or dialogue of a movie. Key visual elements include actions, settings, body language, graphics, and displayed text.

[Checkpoint 2.3] For movies, provide auditory descriptions that are synchronized with the original audio. [Priority 1] For movies, provide auditory descriptions that are synchronized with the original audio. See the section on audio information [p. 29] for more information about multimedia formats.

[Checkpoint 2.4] Provide a text version of the auditory description that is collated with the text transcript (captions) of the primary audio track. [Priority 2] This text transcript, in conjunction with the full audio transcript described above, allows access by people with both visual and hearing disabilities. This also provides everyone with the ability to index and search for information contained in audio/visual materials.

[Checkpoint 9.4] Avoid movement in pages, but if it must be used, provide a mechanism to allow users to freeze motion or updates in applets and scripts or use style sheets and scripting to create movement. [Priority 2]

However, if necessary to include an applets that involves motion or updates, authors should provide a mechanism for freezing this motion. In an example of motion control created by Mark Novak, if the user presses the escape key while the Java marquee has focus, the text will be displayed statically. Authors should use animated gifs to create motion that may be suspended by the browser for people that have trouble with it.

[Checkpoint 2.2] For short animations such as "animated gifs," provide a text equivalent [p. 22] and a long description if needed. [Priority 1] Depending on the context, either a brief description [p. 7] or a long description should be provided for visual information that is necessary to understanding the page. For example for an ad that displays text like a marquee, the text should be provided in the text equivalent, unless there is a lot of text. For a looping image of cloud cover over the United States, if the image is in the context of a weather status report, where the information is presented in text, a less verbose description of the image is necessary. However, if the image appears on in a pedagogical setting, elaborating on cloud formations in relation to land mass, ought to be described.

See also the section on text style [p. 32] for controlling blinking.

2.10 Style and style sheets

[Checkpoint 5.4] Use style sheets to control layout and presentation. [Priority 2] CSS1 ([[CSS1] [p. 42]) and CSS2 ([[CSS2] [p. 42]) allow authors to duplicate almost every HTML 4.0 presentation feature and offer more power with less cost. However, until most users have browsers that support style sheets, not every presentation idiom may be expressed satisfactorily with style sheets. In the following sections, we show how style sheets may be used to create accessible pages. We also provide examples of how to use HTML 4.0 features (e.g., tables, bitmap text) more accessibly when they must be used.

See also the section on text markup [p. 15] .

General style sheet techniques

- [Checkpoint 8.4] For pages that use style sheets or presentation markup, ensure that the contents of each page are ordered and structured. [Priority 1]
- [Checkpoint 5.6] Use relative rather than absolute units in markup language attribute values and style sheet property values. [Priority 2]

Text formatting

Authors should use style sheets for text formatting rather than converting text to images. For example, stylized text on a colored background can be created with style sheets instead of as an image. This provides flexibility for people to view the text in a form that is most readable to them including magnified, in a particular color combination such as white on black, or in a particular font.

However, if you must use a bitmap to create a text effect (special font, transformation, shadows, etc.) it must be accessible.

When bitmapped text is used in a way that makes a page inaccessible, authors must supply alternative pages [p. 8] .

To make a bitmap representing text accessible, it must have alt-text [p. 6] that is the same text represented by the image.

Example.

In this example, the inserted image shows the large red characters "Example", reflected by the alt-text.

```
<P>This is an
   <IMG src="BigRedExample.gif" alt="Example"> of what we mean.
</P>
```

End example.

This is true of Drop Caps (large first letter of a paragraph) as well. However, we recommend using style sheets to create the effect, as the following example illustrates.

Example.

```
<HEAD>
<TITLE>Drop caps</TITLE>
<STYLE type="text/css">
      .dropcap { font-size : 120%; font-family : Helvetica }
</STYLE>
</HEAD>
<BODY>
<P><SPAN class="dropcap">O</SPAN>nce upon a time...
</BODY>
```

Note. As of the writing of this document, the CSS pseudo-element ':first-letter', which allows authors to refer to the first letter of a chunk of text, is not widely supported.

Text style

Authors should use style sheets instead of deprecated presentation elements and attributes [p. 6] that control visual presentation.

- [Checkpoint 9.3] Avoid any blinking or updating of the screen that causes flicker. [Priority 1] Blinking may cause seizures in some users and is annoying to many other users. They should also provide a mechanism for freezing motion. If style sheets are used to create an effect (e.g., 'text-decoration: blink'), users may cancel the effect through style sheets as well.
  Note. Do not use the BLINK and MARQUEE elements. These elements are not part of any W3C specification for HTML (i.e., they are non-standard elements).
- Indentation: Use the CSS 'text-indent' property to indent text. Do not use the BLOCKQUOTE or any other structural element to indent text.
- Spacing: Authors should achieve spacing effects with the CSS 'word-spacing' and 'white-space' properties rather than by putting actual spaces between letters and using the PRE element.

Fonts

Instead of using deprecated presentation elements and attributes [p. 6] , use the many CSS properties to control font characteristics: 'font-family', 'font-size', 'font-size-adjust', 'font-stretch', 'font-style', 'font-variant', and 'font-weight'.

Colors

Use these CSS properties to specify colors:

- 'color', for foreground text color.
- 'background-color', for background colors.
- 'border-color', for border colors.
- For link colors, see the :link, :visited, and :active pseudo-classes.

[Checkpoint 4.1] Don't use color to convey information unless the information is also clear from the content and/or markup. [Priority 1] For example, in this document, examples appear in a different color than the rest of the text. However, that is not enough to identify them as examples, so we precede each one with the word "Example." or "Deprecated example."

Quicktest! To test whether your page passes the text, examine it with a monochrome monitor or colors turned off.

[Checkpoint 4.2] Use foreground and background color combinations that provide sufficient contrast when viewed by someone with color deficits or when viewed on a black and white screen. [Priority 2]

Quicktest! To test whether color contrast is sufficient to be read by people with color deficiencies or by those with low resolution monitors, print pages on a black and white printer (with backgrounds and colors appearing in grayscale).

For more information about colors and contrasts, please consult The Lighthouse

Layout, positioning, layering, and alignment

Layout, positioning, layering, and alignment should be done through style sheets (notably by using CSS floats and absolute positioning).

When laying out tabular information, authors should use tables that are designed for accessibility (see the section on tables [p. 17] . Do not use PRE to create a tabular layout of text.

[Checkpoint 12.5] Provide a linear text alternative (on the current page or some other) for *all* tables that lay out text in parallel, word-wrapped columns. [Priority 2] However, until user agents and screen readers are able to handle text presented side-by-side, all tables that lay out text in parallel, word-wrapped columns require a linear text alternative (on the current page or some other). See also the section on tables [p. 17] for additional information on table accessibility.

Provide text equivalents for all images, including invisible or transparent images.

If authors cannot use style sheets and must use invisible or transparent images to lay out images on the page, they must supply"null" (alt=) or "white space" (alt=" ") alt-text, whichever the context requires.

Deprecated example.

In this example, an image is used to create a carefully defined space between words or graphics. "White space" alt-text is used to prevent the words from running together when the image is not loaded:

```
my poem requires a big space<IMG src="10pttab.gif" alt="   ">here
```

In this next example, an image is used to force a graphic to appear in a certain position:

```
<IMG src="spacer.gif" alt="spacer">
<IMG src="colorfulwheel.gif" alt="The wheel of fortune">
```

Rules and borders

Rules and borders may convey the notion of "separation" to visually enabled users but that meaning cannot be inferred out of a visual context.

While authors may use HR to create a horizontal rule, they should do so in a way that also conveys the structure in a non-visual way (e.g., by using DIV in conjunction with the "class" attribute).

Example.

```
<DIV class="navigation-bar">
   <HR title="navigation-bar">
   <A rel="Next" href="next.html">[Next page]</A>
   <A rel="Previous" href="previous.html">[Prevous page]</A>
   <A rel="First" href="first.html">[First page]</A>
</DIV>
```

End example.

When using graphics (e.g., horizontal rules) as section separators, authors should provide a brief description [p. 7] of what the graphic represents to the visually enabled user via the "title" attribute. Hence, in the previous example, we specified title="navigation-bar".

Example.

In this example, a red line is used to separate Chapter 7 from Chapter 8:

```
<IMG src="redline.gif" alt="redline graphic"
     title="End of Chapter 7 - Visual Displays">
<H1>Chapter 8 - Auditory and Tactile Displays</H1>
```

We recommend using style sheets to accomplish such styling of the line:

```
<HEAD>
<TITLE>Redline with style sheets</TITLE>
<STYLE type="text/css">
     HR.redline { color : red }
</STYLE>
</HEAD>
<BODY>
<HR class="redline" title="End of Chapter 7 - Visual Displays">
<H1>Chapter 8 - Auditory and Tactile Displays</H1>
</BODY>
```

End example.

Guidelines for good CSS style sheets

Use a minimal number of style sheet for your site

If you have more than one, use the same "class" name for the same concept in all of the style sheets.

Use linked style sheets rather than embedded styles, and avoid inline style sheets.

Authors should not write "!important" rules. Users should where necessary.

Always use the "em" unit to set font sizes.

Example.

Use:

```
H1 { font-size: 2em }
```

rather than:

```
H1 { font-size: 12pt }
```

End example.

Use relative length units and percentages:

Example.

```
BODY { margin-left: 15%; margin-right: 10%}
```

End example.

Only use absolute length units when the physical characteristics of the output medium are known.

Example.

```
.businesscard { font-size: 8pt }
```

End example.

Always specify a fallback generic font:

Example.

```
BODY { font-family: "Gill Sans", sans-serif }
```

End example.

Use numbers, not names, for colors:
Example.

```
H1 {color: #808000}
H1 {color: rgb(50%,50%,0%)}
```

End example.

2.11 Frames

For visually enabled users, frames may organize a page into different zones. For non-visual users, relationships between the content in frames (e.g., one frame has a table of contents, another the contents themselves) must be conveyed through other means.

Frames as implemented today are problematic for several reasons:

- Without scripting, they tend to break the "previous page" functionality offered by browsers.
- It is impossible to refer to the "current state" of a frameset with a URI; once a frameset changes contents, the original URI no longer applies.
- Opening a frame in a new browser window can disorient or simply annoy users.

In the following sections, we discuss how to make frames more accessible. We also provide an alternative to frames [p. 38] that uses HTML 4.0 and CSS and addresses many of the limitations of today's frame implementations.

Title frames for easy orientation

[Checkpoint 14.1] Title each frame so that users can keep track of frames by title. [Priority 1]
Example.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Frameset//EN">
<HTML>
<HEAD>
<TITLE>A simple frameset document</TITLE>
</HEAD>
<FRAMESET cols="10%, 90%"
          title="Our library of electronic documents">
    <FRAME src="nav.html" title="Navigation bar">
    <FRAME src="doc.html" title="Documents">
    <NOFRAMES>
       <A href="lib.html" title="Library link">
             Select to go to the electronic library</A>
    </NOFRAMES>
</FRAMESET>
```

End example.

Long descriptions of frames

[Checkpoint 14.2] Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone. [Priority 2]
Example.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Frameset//EN">
<HTML>
  <HEAD>
    <TITLE>Today’s news</TITLE>
  </HEAD>

  <FRAMESET COLS="10%,*,10%">

  <FRAMESET ROWS="20%,*">
    <FRAME SRC="promo.html" NAME="promo" title="promotions">
    <FRAME SRC="sitenavbar.html" NAME="navbar"
       title="Sitewide navigation bar" longdesc="frameset-desc.html#navbar">
  </FRAMESET>

  <FRAME SRC="story.html" NAME="story" title="Selected story - main content"
     longdesc="frameset-desc.html#story">

  <FRAMESET ROWS="*,20%">
    <FRAME SRC="headlines.html" NAME="index" title="Index of other
      national headlines" longdesc="frameset-desc.html#headlines">
    <FRAME SRC="ad.html" NAME="adspace" title="Advertising">
  </FRAMESET>

  <NOFRAMES>
    <p><a href="noframes.html">No frames version</a></p>
    <p><a href="frameset-desc.html">Descriptions of frames.</a></p>
  </NOFRAMES>

  </FRAMESET>
</HTML>
```

frameset-desc.html might say something like: #Navbar - this frame provides links to the major sections of the site: World News, National News, Local News, Technological News, and Entertainment News. #Story - this frame displays the currently selected story. #Index - this frame provides links to the day’s headline stories within this section.

End example.

Note that if the a frame’s contents change, the long descriptions will no longer apply. Also, links to a frame’s longdesc ("d-links") ought to be provided with other alternative contents in the NOFRAMES element of a FRAMESET.

Invisible d-links

Ensure documents are readable without frames

Example.

In this example, if the user reads "top.html":

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Frameset//EN">
<HTML>
<HEAD>
<TITLE>This is top.html</TITLE>
</HEAD>
<FRAMESET cols="50%, 50%" title="Our big document">
    <FRAME src="main.html" title="Where the content is displayed">
    <FRAME src="table_of_contents.html" title="Table of Contents">
    <NOFRAMES>
        <A href="table_of_contents.html">Table of Contents.</A>
     <!-- other navigational links that are available in main.html
```

```
          are available here also. -->
     </NOFRAMES>
</FRAMESET>
</HTML>
```

and the user agent is not displaying frames, the user will have access (via a link) to a non-frames version of the same information.

End example.

Always make the source of a frame an HTML document

Authors must provide descriptions of frames so that their contents and the relationships between frames make sense. Note that as the contents of a frame change, so must change any description. This is not possible if an IMG is inserted directly into a frame, as in this deprecated example:

Deprecated example.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Frameset//EN">
<HTML>
<HEAD>
<TITLE>A bad frameset document</TITLE>
</HEAD>
<FRAMESET cols="100%" title="Do not do this">
   <FRAME name="badframe"
          src="apples.gif" title="Apples">
</FRAMESET>
</HTML>
```

Note that if, for example, a link causes a new image to be inserted into the frame:

```
  <P>Visit a beautiful grove of
  <A target="badframe" href="oranges.gif" title="Oranges">oranges</A>
```

the initial title of the frame ("Apples") will no longer match the current content of the frame ("Oranges").

[Checkpoint 8.2] Ensure that descriptions of dynamic content are updated when the dynamic content changes. [Priority 1] To solve this problem, authors should always make the source ("src") of a frame an HTML file. Images may be inserted into the HTML file and their descriptions will evolve correctly.

Example.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Frameset//EN">
<HTML>
<HEAD>
<TITLE>A bad frameset document</TITLE>
</HEAD>
<FRAMESET cols="100%" title="Do not do this">
<FRAME name="goodframe" src="apples.html" title="Apples">
</FRAMESET>
</HTML>

   <!-- In apples.html -->
   <P><IMG src="apples.gif" alt="Apples">
```

End example.

Avoid opening a new window as the target of a frame

[Checkpoint 12.1] Do not cause pop-ups or other windows to appear and do not change the current window without informing the user. [Priority 2] For example, authors should avoid specifying a new window as the target of a frame with target="_blank".

Alternatives to frames

One of the most common uses of frames is to split the user's browser window into two parts: a navigation window and a content window. As an alternative to frames, we encourage you to try the following:

1. Create one document for the navigation mechanism (call it "nav.html"). A separate document means that the navigation mechanism may be shared by more than one document.
2. In each document requiring the navigation mechanism, include it at the bottom of the document with the following (or similar) OBJECT markup:
   Example.

   ```
   <OBJECT data="nav.html">
   Go to the <A href="nav.html"<table of contents</A>
   </OBJECT>
   ```

   Putting the navigation mechanism at the end of the document means that when style sheets are turned off, users have access to the document's important information first.
3. Use style sheets to position the navigation mechanism where you want on the screen. For example, the following CSS rule floats the navigation bar to the left of the page and makes it take up 25% of the available horizontal space:

   ```
   OBJECT { float: left; width: 25% }
   ```

   The following CSS rule attaches the navigation mechanism to the bottom-left corner of the page of the page and keeps it there even if the user scrolls down the page:

   ```
   OBJECT { position: fixed; left: 0; bottom: 0 }
   ```

Note. Navigation mechanisms or other content may be inserted in a document by means of server-side includes.

2.12 Forms

Make controls keyboard accessible

[Checkpoint 11.2] Create a logical tab order through links, form controls, and objects. [Priority 3]

[Checkpoint 11.3] Provide keyboard shortcuts to links, including those in client-side image maps, form controls, and groups of form controls. [Priority 3] See the section on keyboard access [p. 8] for more information.

Group form controls

[Checkpoint 14.3] Group form controls. [Priority 2] for radio buttons and checkboxes, [Priority 3] for other controls. Authors should group form controls into semantic units with the FIELDSET element and label those units with the LEGEND element (both available in HTML 4.0):

Example.

```
<FORM action="http://somesite.com/adduser" method="post">
   <FIELDSET>
   <LEGEND>Personal information</LEGEND>
   <LABEL for="firstname">First name: </LABEL>
   <INPUT type="text" id="firstname" tabindex="1">
   <LABEL for="lastname">Last name: </LABEL>
   <INPUT type="text" id="lastname" tabindex="2">
   ...more personal information...
   </FIELDSET>
   <FIELDSET>
   <LEGEND>Medical History</LEGEND>
   ...medical history information...
   </FIELDSET>
</FORM>
```

End example.

Label form controls explicitly

[Checkpoint 14.4] Associate labels explicitly with their controls. [Priority 2] An example of LABEL used with "for" in HTML 4.0 is given in the previous section.

[Checkpoint 12.4] For all form controls with implicitly associated labels, ensure that the label is properly positioned. [Priority 2]

Group menu options

[Checkpoint 14.5] Divide long lists of choices into manageable groups. [Priority 2] For long lists of selections (which are hard to remember), authors should group items into a hierarchy using the OPTGROUP element (available in HTML 4.0).

Example.

```
<FORM action="http://somesite.com/prog/someprog" method="post">
 <P>
 <SELECT name="ComOS">
     <OPTGROUP label="PortMaster 3">
       <OPTION label="3.7.1" value="pm3_3.7.1">PortMaster 3 with ComOS 3.7.1
       <OPTION label="3.7" value="pm3_3.7">PortMaster 3 with ComOS 3.7
       <OPTION label="3.5" value="pm3_3.5">PortMaster 3 with ComOS 3.5
     </OPTGROUP>
     <OPTGROUP label="PortMaster 2">
       <OPTION label="3.7" value="pm2_3.7">PortMaster 2 with ComOS 3.7
       <OPTION label="3.5" value="pm2_3.5">PortMaster 2 with ComOS 3.5
     </OPTGROUP>
     <OPTGROUP label="IRX">
       <OPTION label="3.7R" value="IRX_3.7R">IRX with ComOS 3.7R
       <OPTION label="3.5R" value="IRX_3.5R">IRX with ComOS 3.5R
     </OPTGROUP>
 </SELECT>
</FORM>
```

End example.

Techniques for specific controls

[Checkpoint 12.2] Include default, place-holding characters in edit boxes and text areas. [Priority 3]

Example.

```
<FORM action="http://somesite.com/prog/text-read" method="post">
     <P>
     <TEXTAREA name=yourname rows="20" cols="80">
     Please enter your name here.
     </TEXTAREA>
     <INPUT type="submit" value="Send"><INPUT type="reset">
     </P>
</FORM>
```

End example.

Provide alt-text [p. 6] for images used as "submit" buttons:

Example.

```
<FORM action="http://somesite.com/prog/text-read" method="post">
<P>
<INPUT type="image" name=submit src="button.gif" alt="Submit">
</FORM>
```

End example.

See also checkpoint 1.5.

Also see the section on keyboard access [p. 8] since this applies to form controls.

Backwards compatibility issues for forms

The BUTTON element does not appear and <INPUT type="button"> will appear as a text input field in HTML3.2 browsers.

2.13 Scripts

Authors must ensure that pages are accessible with scripts turned off or in browsers that don’t support scripts.

Alternative presentation of scripts

[Checkpoint 8.3] For scripts that present important information or functionality, provide an alternative, equivalent presentation or mechanism. [Priority 1] One way to accomplish this is with the NOSCRIPT element (available in HTML 4.0). The content of this element is rendered with scripts are not enabled.

Example.

```
<SCRIPT type="text/tcl">
 ...some Tcl script to show a billboard of sports scores...
</SCRIPT>
<NOSCRIPT>
   <P>Results from yesterday's games:</P>
   <DL>
      <DT>Bulls 91,  Sonics 80.
      <DD><A href="bullsonic.html">Bulls vs. Sonics game highlights</A>
      ...more scores...
   </DL>
</NOSCRIPT>
```

End example.

Device-independent event handlers

[Checkpoint 11.4] For scripts, specify logical event handlers rather than device-dependent event handlers. [Priority 2]

An event handler is a script that is invoked when a certain event occurs (e.g, the mouse moves, a key is pressed, the document is loaded, etc.). In HTML 4.0, event handlers are attached to elements via script attributes [p. 5] (the attributes beginning with "on", as in "onkeyup").

Some event handlers, when invoked, produce purely decorative effects such as highlighting an image or changing the color of an element's text. Other event handlers produce much more substantial effects, such as carrying out a calculation, providing important information to the user, or submitting a form. For event handlers that do more than just change the presentation of an element, authors should do the following:

1. Use application-level event triggers rather than user interaction-level triggers. In HTML 4.0, application-level event attributes are "onfocus", "onblur" (the opposite of "onfocus"), and "onselect". Note that these attributes are also device-independent.
2. Otherwise, if you must use device-dependent attributes, provide redundant input mechanisms (i.e., specify two handlers for the same element):
   - Use "onmousedown" with "onkeydown".
   - Use "onmouseup" with "onkeyup"
   - Use "onclick" with "onkeypress"

   Note that there is no keyboard equivalent to double-clicking ("ondblclick") in HTML 4.0.
3. Do not write event handlers that rely on mouse coordinates since this prevents device-independent input.

---

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The original draft of this document is based on "The Unified Web Site Accessibility Guidelines" ([UWSAG] [p. 43]) compiled by the Trace R & D Center at the University of Wisconsin. That document includes a list of additional contributors.

4 References

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[CSS2]
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http://www.w3.org/TR/1998/REC-CSS2-19980512.

[DOM1]
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http://www.w3.org/TR/1999/REC-rdf-syntax-19990222.

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"Synchronized Multimedia Integration Language (SMIL) 1.0 Specification", P. Hoschka, editor. The SMIL 1.0 Recommendation is available at:
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"Authoring Tool Accessibility Guidelines", J. Treviranus, J. Richards, I. Jacobs, C. McCathieNevile, eds. The latest Working Draft of these guidelines for designing accessible authoring tools is available at:
http://www.w3.org/TR/WD-WAI-AUTOOLS/

[WAI-USERAGENT]
"User Agent Accessibility Guidelines", J. Gunderson and I. Jacobs, eds. The latest Working Draft of these guidelines for designing accessible user agents is available at:
http://www.w3.org/TR/WD-WAI-USERAGENT/

[UWSAG]
"The Unified Web Site Accessibility Guidelines", G. Vanderheiden, W. Chisholm, eds. The Unified Web Site Guidelines were compiled by the Trace R & D Center at the University of Wisconsin under funding from the National Institute on Disability and Rehabilitation Research (NIDRR), U.S. Dept. of Education. This document is available at:
http://www.tracecenter.org/docs/html_guidelines/version8.htm

[XML]
"Extensible Markup Language (XML) 1.0.", T. Bray, J. Paoli, C.M. Sperberg-McQueen, eds. The XML 1.0 Recommendation is available at:
http://www.w3.org/TR/1998/REC-xml-19980210

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5 Index of elements and attributes

5.1 Elements

This index lists all elements in HTML 4.0 and whether they are defined in earlier versions of HTML. Elements that are deprecated in HTML 4.0 ([HTML40] [p. 42]) are followed by an asterisk (*). Elements that are obsolete in HTML 4.0 or don't exist in a W3C specification of HTML (2.0, 3.2, 4.0) do not appear in this table. An entry of "N/A" means that an element is not discussed in this document.

Name	Also defined in	Related HTML topics
A	2.0, 3.2	Keyboard access [p. 8] , Links [p. 21]
ABBR		Acronyms and abbreviations [p. 14]
ACRONYM		Acronyms and abbreviations [p. 14]
ADDRESS	2.0, 3.2	Metadata [p. 13]
APPLET*	3.2	Applets and other objects [p. 27]
AREA	3.2	Keyboard access [p. 8] , Images and image maps [p. 22] ,
B	2.0, 3.2	Text style [p. 32] , Emphasis [p. 14]
BASE	2.0, 3.2	Links [p. 21]
BASEFONT*	3.2	Fonts [p. 32]
BDO		N/A
BIG	3.2	Text style [p. 32]

BLOCKQUOTE	2.0, 3.2	Quotations [p. 15] , Text style [p. 32]
BODY	2.0, 3.2	N/A
BR	2.0, 3.2	Layout, positioning, and alignment [p. 33]
BUTTON		Keyboard access [p. 8] , Server-side image maps [p. 26] , Forms [p. 38]
CAPTION	3.2	Tables [p. 17]
CENTER*	3.2	Layout, positioning, and alignment [p. 33]
CITE	2.0, 3.2	N/A
CODE	2.0, 3.2	N/A
COL		Tables [p. 17]
COLGROUP		Tables [p. 17]
DD	2.0, 3.2	Lists [p. 15]
DEL		N/A
DFN	3.2	N/A
DIR*	2.0, 3.2	N/A
DIV	3.2	N/A
DL	2.0, 3.2	Lists [p. 15]
DT	2.0, 3.2	Lists [p. 15]
EM	2.0, 3.2	Emphasis [p. 14] , Text style [p. 32]
FIELDSET		Grouping form controls [p. 38]
FONT*	3.2	Fonts [p. 32]
FORM	2.0, 3.2	Forms [p. 38]
FRAME		Frames [p. 35]
FRAMESET		Frames [p. 35]
H1-H6	2.0, 3.2	Section headers [p. 14]
HEAD	2.0, 3.2	N/A
HR	2.0, 3.2	Rules and border [p. 33] , Section headers [p. 14]
HTML	2.0, 3.2	N/A
I	2.0, 3.2	Text style [p. 32] , Emphasis [p. 14]
IFRAME		Frames [p. 35]
IMG	2.0, 3.2	List bullets [p. 16] ,

INPUT	2.0, 3.2	Images and image maps [p. 22] , Keyboard access [p. 8] , Layout, positioning, and alignment [p. 33] , Rules and borders [p. 33]
INS		N/A
ISINDEX*	2.0, 3.2	N/A
KBD	2.0, 3.2	N/A
LABEL		Keyboard access [p. 8] , Form labels [p. 39]
LEGEND		Keyboard access [p. 8] ,
LI	2.0, 3.2	Lists [p. 15]
LINK	2.0, 3.2	Links [p. 21] , Metadata [p. 13]
MAP	3.2	Images and image maps [p. 22]
MENU*	2.0, 3.2	N/A
META	2.0, 3.2	Metadata [p. 13]
NOFRAMES		Frames [p. 35]
NOSCRIPT		Scripts [p. 40]
OBJECT		Keyboard access [p. 8] , Images and image maps [p. 22] , Applets and other objects [p. 27]
OL	2.0, 3.2	Lists [p. 15]
OPTGROUP		Forms [p. 38]
OPTION	2.0, 3.2	Forms [p. 38]
P	2.0, 3.2	N/A
PARAM	3.2	N/A
PRE	2.0, 3.2	Layout, positioning, and alignment [p. 33] , Text style [p. 32]
Q		Quotations [p. 15]
S		Text style [p. 32]
SAMP	2.0, 3.2	N/A
SCRIPT	3.2 (place-holder)	Scripts [p. 40]
SELECT	2.0, 3.2	Keyboard access [p. 8] , Forms [p. 38]
SMALL	3.2	Text style [p. 32]
SPAN		N/A

STRIKE*	3.2	Text style [p. 32]
STRONG	2.0, 3.2	Emphasis [p. 14] , Text style [p. 32]
STYLE	3.2 (place-holder)	Keyboard access [p. 31] ,
SUB	3.2	N/A
SUP	3.2	N/A
TABLE	3.2	Tables [p. 17]
TBODY		Tables [p. 17]
TD	3.2	Tables [p. 17]
TEXTAREA	2.0, 3.2	Keyboard access [p. 8] , Forms [p. 38]
TFOOT		Tables [p. 17]
TD	3.2	Tables [p. 17]
TD	3.2	Tables [p. 17]
THEAD		Tables [p. 17]
TITLE	2.0, 3.2	Metadata [p. 13]
TR	3.2	Tables [p. 17]
TT	2.0, 3.2	Text style [p. 32]
U	3.2	Text style [p. 32]
UL	2.0, 3.2	Lists [p. 15]
VAR	2.0, 3.2	N/A

5.2 Attributes

This index lists some attributes in HTML 4.0 that affect accessibility and what elements they apply to. Elements that are deprecated in HTML 4.0 ([HTML40] [p. 42]) are followed by an asterisk (*). Elements that are obsolete in HTML 4.0 or don't exist in a W3C specification of HTML (2.0, 3.2, 4.0) do not appear in this table. Attributes that apply to most elements of HTML 4.0 are indicated as such; please consult the HTML 4.0 specification for the exact list of elements with this attribute.

Attributes that affect presentation [p. 6] , most of which are deprecated in HTML 4.0, are not are not listed in this table. Authors should use style sheets instead of these attributes.

Attributes that associate scripts with events [p. 5] are not are not listed in this table. Please see the section on device-independent event handlers [p. 41] for more detail.

Name	Applies to elements	Related HTML topics
abbr	TD, TH	
accesskey	A, AREA, BUTTON, INPUT, LABEL, LEGEND, TEXTAREA	
alt	APPLET*, AREA, IMG, INPUT	
axis	TD, TH	
class	Most elements	
for	LABEL	
headers	TD, TH	
hreflang	A, LINK	
id	Most elements	
lang	Most elements	
longdesc	IMG, FRAME, IFRAME	
name	FRAME (and others)	
scope	TD, TH	
style	Most elements	
summary	TABLE	
tabindex	A, AREA, BUTTON, INPUT, OBJECT, SELECT, TEXTAREA	
title	Most elements	
usemap	IMG, INPUT, OBJECT	