W3C

Techniques for User Agent Accessibility Guidelines

W3C Working Draft 31-Mar-1999

This version:
http://www.w3.org/TR/1999/WAI-USERAGENT-19990331/wai-useragent-tech
(plain text, postscript, pdf, gzip tar file of HTML, zip archive of HTML)
Latest version:
http://www.w3.org/TR/WAI-USERAGENT/wai-useragent-tech
Previous version:
http://www.w3.org/TR/1998/WD-WAI-USERAGENT-19981112/wai-useragent-tech
Latest "User Agent Accessibility Guidelines":
http://www.w3.org/TR/WAI-USERAGENT

Editors:
Jon Gunderson <jongund@uiuc.edu>
Ian Jacobs <ij@w3.org>

Copyright © 1999 W3C (MIT, INRIA, Keio), All Rights Reserved. W3C liability, trademark, document use and software licensing rules apply.

Abstract

This document describes techniques that user agent developers may use to satisfy the checkpoints listed in "User Agent Accessibility Guidelines." Techniques relate to the accessibility of user interfaces, content rendering, program interfaces, and accessibility features of languages such as HTML, CSS and SMIL. Like "User Agent Accessibility Guidelines", the current document emphasizes the accessibility of interoperability between two important classes of user agents - graphical desktop browsers and dependent assistive technologies (including screen readers, screen magnifiers, and voice input software). However, it is meant to be applicable to user agents in general, including text and voice browsers, and multimedia players.

While "User Agent Accessibility Guidelines" has been designed to be a stable document of principles, the current document will continue to evolve as technologies change and user agent manufacturers discover more effective techniques for designing accessible user agents.

This document is part of a series of accessibility documents published by the W3C 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 User Agent (UA) Working Group.

Although the organization of this document has begun to stabilize, the Working Group has not yet filled in the details of all the techniques. This draft does not distinguish those techniques that mainstream user agents are expected to implement natively from those that may be satisfied by providing information through an interface.

Please send comments about this document to the public mailing list: w3c-wai-ua@w3.org.

This document has been produced as part of the Web Accessibility Initiative and intends to improve user agent accessibility for all users. The goals of the WAI UA Working Group are discussed in the WAI UA charter. A list of the current Working Group members is available.

A list of current W3C Recommendations and other technical documents can be found at http://www.w3.org/TR.

Table of Contents

1 Guidelines, Checkpoints, and Techniques 4
2 The User Agent and the Operating System 4
3 The User Agent and the Document 5
3.1 Identification 5
3.2 Rendering alternative representations of content 6
3.3 Styles and formatting 7
4 Functionality offered by the User Agent to allow the User to work with the Document 9
4.1 Access to all functionality 9
4.2 Selection and focus 9
4.3 Navigation 9
4.4 Searching 11
4.5 Querying 12
4.6 Activation 13
5 The User Agent and the User 13
5.1 Accessible user interface 13
5.2 Visibility of accessibility features 13
5.3 Configuration 14
5.4 Notification of events and changes 16
6 The User Agent and Assistive Technologies 17
7 Support for accessibility features of certain languages 17
7.1 HTML 17
7.2 CSS 18
7.3 SMIL 18
7.4 MathML 18
8 Appendix: Accessibility features of some operating systems 18
8.1 Microsoft Windows 95, Windows 98, and Window NT 4.0 . . . 20
8.2 Apple Macintosh Operating System 20
8.3 AccessX, X Keyboard Extension (XKB), and the X Window System 21
8.4 DOS (Disk Operating System) 21
9 Acknowledgments 22
10 References 22

1 Guidelines, Checkpoints, and Techniques

The guidelines documents have been organized to address readers seeking abstract principles of accessible user agent design and readers seeking concrete solutions. The guidelines documents define three terms for different levels of abstraction:

Guideline
: A guideline is a general principle of accessible design. A guideline addresses the question "What accessibility issues should I be aware of?"

Checkpoint
: A checkpoint is a specific way of satisfying one or more guidelines. While checkpoints describe verifiable actions that may be carried out by the user agent developer, implementation details are described elsewhere. A checkpoint answers the question "What should I do to improve accessibility?"

Technique
: A technique is an implementation of one or more checkpoints in a given language (e.g., HTML, XML, CSS, DOM, ...). A technique answers the question "How do I do that in HTML or SMIL or CSS...?"

The current document contains techniques, according to different interfaces between the user agent and the operating system, the document, the user, and other software. Note that each technique in this document is numbered according to its number in the guidelines document.

2 The User Agent and the Operating System

[Checkpoint 7.2.4] Follow operating system conventions and accessibility settings in user interface design, configuration (including configuration profiles), product installation, and documentation. [Priority 2]

The operating system application programming interfaces (APIs) that support accessibility are designed to provide a bridge between the standard user interface supported by the operating system and alternative user interfaces developed by third-party assistive technology vendors to provide access to persons with disabilities. Applications supporting these APIs are therefore generally more compatible with third-party assistive technology.

The WAI Working Group strongly recommends using and supporting APIs that improve accessibility and compatibility with 3rd party assistive technology. Third-party assistive technology can use the accessibility information provided by the APIs to provide an alternative user interface for various disabilities.

The following is an informative list of currently public APIs that support accessibility:

- Microsoft Active Accessibility in Windows 95/NT versions. Information on active accessibility can be found at the Microsoft WWW site on Active Accessibility.
- Sun Microsystems Java Accessibility API in Java Code. Information on Java Accessibility API can be found at Java Accessibility Utilities.

Many major operating systems have built-in accessibility features for improving the usability of the standard operating system by persons with disabilities. When designing software that runs above an underlying operating system, developers should ensure that the application:

1. Makes use of operating system level features. See the appendix of accessibility features [p. 18] for some comment operating systems.
2. Inherits operating system settings related to accessibility. Pertinent settings include font and color information as well as other pieces of information discussed in this document.

[Checkpoint 4.1.1] Ensure that the software may be installed in a device-independent manner using any supported input and output devices. [Priority 1]

Ensure that software may be installed, when possible, according to the conventions of the operating system.

3 The User Agent and the Document

3.1 Identification

In order for the user agent to satisfy many of the techniques in this document (related to rendering, notification, navigation, etc.), it must be able to identify certain types of information in addition to recognizing object types such as images, video, sound, and elements of the document language.

Sources of alternative representations of information

User agents must be able to recognize sources of alternative representations of content.

In HTML

- For the IMG element: The "alt", "title", and "longdesc" attributes
- For the OBJECT element: The content of the element and the "title" attribute.
- For the APPLET element: The "alt" attribute and the content of the element.
- For the AREA element: The "alt" attribute.
- For the INPUT element: The "alt" attribute.
- For the ACRONYM and ABBR elements: The "title" attribute may be used for the acronym or abbreviation expansion.
- For the TABLE element, the "summary" attribute
- For frames, the NOFRAMES element and the "longdesc" attribute on FRAME and IFRAME.
- For scripts, the NOSCRIPT element.

In SMIL

The "alt", "title", "longdesc", and "abstract" attributes. *To be completed.*.

Sources of blinking text and animation

User agents that recognize the following sources of blinking text and animations must enable users to freeze that text.

In HTML

- The BLINK element. **Note.** The BLINK element is not defined by a W3C specification.
- The MARQUEE element. **Note.** The MARQUEE element is not defined by a W3C specification.

In CSS

- The 'blink' value of the 'text-decoration' property.

In GIF animated images.

To be completed.

Sources of event handlers

Certain elements of the document language may have associated event handlers that are triggered when certain events occur. User agents must be able to identify those elements with event handlers statically associated (i.e., associated in the document source, not in a script).

In HTML

All of the attributes beginning with the prefix "on": "onblur", "onchange", "onclick", "ondblclick", "onkeydown", "onkeypress", "onkeyup", "onload", "onmousedown", "onmousemove", "onmouseout", "onmouseover", "onmouseup", "onreset", "onselect", "onsubmit", and "onunload".

Information about the document

User agents must be able to compute the following information about a document:

- Has the document been fully loaded?
- What is the size in bytes of the document?
- How many active components are in the document?
- Where is the point of regard?

3.2 Rendering alternative representations of content

Alternative representations of information for images, video, applets

See the section on sources of alternative information [p. 5]

[Checkpoint 5.2.1] Ensure that the user has access to alternative representations of content (e.g., the value of "alt" in HTML or SMIL, the resource designated by "longdesc", or the content of OBJECT in HTML 4.0, the "summary" attribute for tables in HTML, etc.). [Priority 1]

[Checkpoint 5.2.2] When no alternative text representation has been specified, indicate what type of object is present. [Priority 2]

[Checkpoint 5.2.3] When alternative text has been specified explicitly as empty (i.e., an empty string), render nothing. [Priority 3]

Textual equivalents for audio and video

[Checkpoint 5.2.5] Allow the user to specify that captions for audio be rendered at the same time as the audio. [Priority 2]

Scenario-video showing professor writing complex equations and graphs on the overhead and discussing them but not describing what he/she actually wrote on the overhead. Without description this would be inaccessible to people with visual impairments. This could be generalize to any video presentation of visually rich or complex information where the visually presented information is critical to the understanding of the presentation.

[Checkpoint 5.2.8] Allow the user to specify that captions or descriptions for video be rendered at the same time as the video. [Priority 1]

[Checkpoint 5.1.10] Allow the user to control the position of captions. [Priority 1]

Audio equivalents for video

[Checkpoint 5.2.9] Allow the user to specify that audio descriptions of video be rendered at the same time as the video. [Priority 2]

Alternative representations for scripts

In HTML, content of NOSCRIPT.

Alternative representations for frames

1. In HTML, content of NOFRAMES.
2. Otherwise, list of frames. Use "title" as name of frame, otherwise "name".

Alternative representations for tables

In HTML, "summary" attribute. Also, the "abbr" attribute for headers (see the section on table cells and headers).

Generated content

Generated content specified through style sheets can help orient the user. For instance, if, through style sheets, the user can insert the word "Link" before every link, this text may be used by a speech synthesizer or Braille devices. See the section on the support for CSS2 accessibility features [p. 18] below.

3.3 Styles and formatting

Tables

Properly constructed data tables generally have distinct TH head cells and TD data cells. The TD cell content gains gain implicit identification from TH cells in the same column and/or row.

For layout tables, a user agent can assist the reader by indicating that no relationship between cells should be expected. Authors should not use TH cells just for their formatting purpose in layout tables is discouraged, as those TH cells imply that some TD cells should gain meaning from the TH cell content.

[Checkpoint 5.4.1] Provide access to the contents of a specific table cell. [Priority 1]

When a table is "read" from the screen, the contents of multiline cells may become intermingled. For example, consider the following table:

```
This is the top left cell    This is the top right cell
table                        of the of the table.

This is the bottom left      This is the bottom right
cell of the table.           cell of the  table.
```

If read directly from the screen, this table might be rendered as "This is the top left cell This is the top right cell", which would be confusing to the user.

A user agent should provide a means of determining the contents of cells as discrete from neighboring cells, regardless of the size and formatting of the cells. This information is made available through the DOM ([DOM1 [p. 22]]).

[Checkpoint 5.4.2] Provide access to header information for a specific table cell. [Priority 1]

The contents of a cell in a data table are generally only comprehensible in context (i.e., with associated header information, row/column position, neighboring cell information etc.). User agents should provide users with header information and other contextual agent. Techniques include:

- Provide this information through an API.
- Ignore table markup entirely. This may assist some screen readers.
- Render cells as blocks. This may assist some screen readers. Using this strategy, the user agent might render individual cells with the relevant top and side headers attached.
- Allow navigation and querying of cell/header information. When the point of regard is on an individual cell, the user would be able to use a keyboard command to receive the top and left header information for that cell. The user agent should appropriately account for headers that span multiple cells.
- Allow users to read one table column or row at a time, which may help them identify headers.

Since not all tables are designed with the header information, a conforming user agent should provide, as an option, a "best guess" of the header information for a cell. Possible strategies include:

- Consider the top and left-most cells of a column or row to be header information.
- Consider upper and left-most cells which have formatting markup to be header information.

The user may choose the form and amount of this information, possibly announcing the row heads only once and then the column head or its abbreviation ("abbr") to announce the cell content.

Frames

Possible solutions:

- Provide info through an API.
- Frames as blocks.
- Frameset as list of links to individual frames (based on frame name).
- NOFRAMES content (when?)

Links

[Checkpoint 5.3.6] Provide a mechanism (e.g., through style sheets) to distinguish visited links from unvisited links. [Priority 3]

[Checkpoint 5.3.7] Allow the user to specify (e.g., through style sheets) that images used in links must have borders. [Priority 3]

Forms

[Checkpoint 5.5.5] Provide the user with access to any label explicitly associated with a form control. [Priority 2]

Audio and video

Highlighting

[Checkpoint 6.1.1] Provide a mechanism for highlighting and identifying (through a standard interface where available) the current view. [Priority 1]

[Checkpoint 6.1.2] Provide a mechanism for highlighting and identifying (through a standard interface where available) the user selection. [Priority 1]

[Checkpoint 6.1.3] Provide a mechanism for highlighting and identifying (through a standard interface where available) the current focus. [Priority 1]

Document

[Checkpoint 6.2.2] Allow the user to view a document outline constructed from its structural elements (e.g., from header and list elements). [Priority 2]

4 Functionality offered by the User Agent to allow the User to work with the Document

4.1 Access to all functionality

In general, this requirement may be met by providing keyboard access to all functionality and by exposing that functionality to third party technology.

4.2 Selection and focus

[Checkpoint 6.1.4] Ensure that when the selection changes, it is in the viewport after the change. [Priority 2]

[Checkpoint 6.1.5] Ensure that when the focus changes, it is in the viewport after the change. [Priority 2]

[Checkpoint 6.1.7] Keep track of the user's point of regard in each view and restore it when the user returns to the view. [Priority 1]

4.3 Navigation

There are different ways a user may want to navigate while browsing the Web, including:

- By changing the position of the viewport (e.g., by scrolling down the page).
- By shifting focus and/or selection from one active component to the next of the same type (e.g., from link to link).
- By navigating among documents.

Document navigation

[Checkpoint 6.1.6] Allow the user to navigate views (notably those with frame viewports). Navigating into a view makes it the current view. [Priority 1]

[Checkpoint 6.2.3] Allow the user to navigate the document tree. [Priority 2]

Document object navigation

[Checkpoint 6.2.1] Allow the user to navigate sequentially among all active elements in the document. See also checkpoints [#Tnav-links], [#Tnav-longdesc], [#Tnav-tables], [#Tnav-form-controls], and [#Tnav-forms]. [Priority 1]

Sequential navigation includes all active elements. User agents might provide other navigation mechanisms limited to a particular type of element. For example "Find the next table" or "Find the previous form". The following checkpoints suggest some types of navigation.

[Checkpoint 5.3.1] Allow the user to navigate sequentially among links. [-Tnav-sequential] [Priority 2]

[Checkpoint 5.5.2] Allow the user to navigate among forms in a document. [-Tnav-sequential] [Priority 2]

[Checkpoint 5.5.1] Allow the user to navigate among form controls within a form. [-Tnav-sequential] [Priority 2]

[Checkpoint 6.3.1] Allow the user to navigate among elements with associated event handlers. [Priority 1]

[Checkpoint 6.2.4] Allow the user to navigate sequentially among headers. [Priority 2]

[Checkpoint 6.2.5] Allow the user to navigate sequentially among block elements (e.g., paragraphs, lists and list items, etc.) [Priority 2]

[Checkpoint 5.3.8] Allow the user to navigate among elements with associated long descriptions. [-Tnav-sequential] [Priority 2]

Table navigation

Users of non-visual rendering technologies and users with learning disabilities, when browsing a page, should be able to quickly determine the nature of a table located on a page. The able-bodied user is able to visually examine the table and extract a sense of the table contents with a quick scan of the cells. A non-visual user, or a user with difficulty translating printed material is not able to do this. Providing table summary information, when first moving the point-of-regard to a table allows the nature of a table to be easily determined.

An auditory rendering agent, when the point-of-regard moves to a table, might say, "Table: Tax tables for 1998," thus identifying the nature of the table. The user could then use keyboard commands to move the point of regard to the next logical block of information, or use a different command to "burrow" into the table.

The "burrow" command should have an opposite "pop" command, which would move the point of regard from an individual cell to the table as a whole, so that the user can leave a table from any cell within it, rather than navigating to the end.

If the user "pops" up to look over the summary information, it should be possible to "burrow" back to the same cell.

When navigating a table that contains another table, this strategy can avoid confusion. For example, if each row of a table contained five cells, but the second row contained a 4x4 table in the third cell, a user could be disoriented when the row did not end as expected. However, when the point of regard moved to the third cell of the table, a compliant browser would report that this was a table, and describe its contents. The user

would have the option of navigating to the forth cell of the parent table, or burrowing into the table within this cell.

[Checkpoint 5.4.3] Allow the user to navigate among tables in a document. [-Tnav-sequential] [Priority 2]

When rendering tabular information, the fact that it is tabular information should be apparent. For a visual user agent, such information is commonly made obvious by the border attribute. However, for a non-visual agent, such information must also be made appreciable.

As the user agent shifts the point of regard to a table, it should first provide information about the entire table. This information might be the Caption, Title, or Summary information of the table. Access to this information would allow the user to determine whether or not to examine the contents of the table, or to move the point of regard to the next block of content.

[Checkpoint 5.4.4] Allow the user to navigate among table cells of a table (notably left and right within a row and up and down within a column). [Priority 1]

In many data tables, the meaning of the contents of a cell are related to the contents of adjacent cells. For example, in a table of sales figures, the sales for the current quarter might be best understood in relation to the sales for the previous quarter, located in the adjacent cell.

In order to provide access to contextual information for individuals using non-visual browsers, or for individuals with certain types of learning disabilities, it is necessary for the user agent to allow the point of regard to be moved from cell to cell, both right/left and up/down via keyboard commands.

The most direct method of performing such navigation would be via the cursor keys, though other navigation strategies might be used.

4.4 Searching

User agents can also help users by allowing them to choose their own navigation patterns, based, for example, on element names, text, attribute values, etc.

[Checkpoint 5.3.2] Allow the user to search for a link in the current document based on its link text. [Priority 1]

[Checkpoint 5.3.3] Allow the user to search for a link based on its attribute values. [Priority 1]

[Checkpoint 5.3.4] Allow the user to move the focus to a link based on its integer (tabbing-order) position. [Priority 1]

[Checkpoint 5.5.3] Allow the user to search for a form control based on its text content. [Priority 1]

[Checkpoint 5.5.4] Allow the user to search for a form control based on its attribute values. [Priority 1]

[Checkpoint 6.2.6] Allow the user to search for content. In case of a match, move the selection to the content. [Priority 2]

[Checkpoint 5.3.9] Allow the user to search linked long description text (i.e., in another document). In case of a match, the focus should be moved to the link in the current document. [Priority 2]

[Checkpoint 5.4.5] Allow the user to search for a table cell based on its contents or header information. [Priority 2]

Users of visual browsers can easily locate cells within a table that are at the intersection of a row and column of interest. To provide equivalent access to users of non-visual browsers, equivalent means of navigation should be provided. The search

function of a browser will allow the user to locate key terms within a table, but will not allow the user to find cells that are at the intersection of rows and columns of interest.

Techniques:

- An advanced search mode might provide entries for header information, allowing the user to find information at the intersection of columns and rows using the key terms.
- A search mode might allow the user to search for key terms that are related to key header terms, allowing searches to be restricted to specific rows or headers within a table.

The header information visible in a TH cell may be abbreviated, in which case it should be user preference to see the "abbr" value if any or the full contents.

Axis information may also help the user search into confined portions of the table.

Column groups and row groups are other confining partitions of a table in which a search may be limited.

4.5 Querying

[Checkpoint 5.3.5] Provide the user with information about the number of links in a document. [Priority 2]

[Checkpoint 5.5.6] Provide the user with information about the number of forms in a document. [Priority 2]

[Checkpoint 5.5.7] Provide the user with information about the number of controls in a form. [Priority 2]

[Checkpoint 5.4.8] Allow the user to find out the number of tables in a document. [Priority 2]

Users of non-visual rendering technologies may wish, on entering a document, to determine the degree to which tables are used on the page. This information may allow the user to make guesses about the nature of the tables included (layout or data), and to relocate information that was previously browsed.

[Checkpoint 5.4.6] Allow the user to select a table cell and find out its row/column coordinates in the table. [Priority 2]

Non-visual rendering of information by a browser or an assistive technology working through a browser will generally not render more than a single cell, or a few adjacent cells at a time. Because of this, the location of a cell of interest within a large table may be difficult to determine for the users of non-visual rendering.

In order to provide equivalent access to these users, compliant browsers should provide a means of determining the row and column coordinates of the cell having the point of regard via keyboard commands. Additionally, to allow the user of a non-visual rendering technology to return to a cell, the browser should allow a means of moving the point of regard to a cell based on its row and column coordinates.

At the time the user enters a table, or while the point of regard is located within a table, the user agent should allow an assistive technology to provide information to the user regarding the dimensions (in rows and columns) of the table. This information, in combination with the summary, title, and caption, can allow the user with a disability to quickly decide whether to explore the table of skip over it.

[Checkpoint 5.4.7] Allow the user to find out the dimensions of a table. [Priority 2]

Dimensions is an appropriate term, though dimensions needn't be constants. For example a table description could read: "4 columns for 4 rows with 2 header rows. In those 2 header rows the first two columns have "colspan=2". The last two columns have a common header and two subheads. The first column, after the first two rows, contains the row headers.

Some parts of a table may have 2 dimensions, others three, others four, etc. Dimensionality higher than 2 are projected onto 2 in a table presentation.

[Checkpoint 6.1.9] When a document is loaded or when requested by the user, make available document summary information. [Priority 2]

[Checkpoint 6.1.8] Provide the user with information about the number of viewports. [Priority 2]

[Checkpoint 6.1.10] Provide the user with information about how much of the document has been viewed (i.e., where the point of regard is with respect to the beginning of the document). [Priority 2]

[Checkpoint 4.3.2] Ensure that user can find out about all keyboard bindings (e.g., through menus). [Priority 2]

4.6 Activation

[Checkpoint 4.2.3] Ensure that the user can activate the links and form controls in a document in an input device-independent manner. [Priority 1]

5 The User Agent and the User

5.1 Accessible user interface

[Checkpoint 4.2.1] Ensure that all functionalities offered by the user agent interface are available through all supported input devices. These include the installation procedure, access to documentation, and software configuration. [Priority 1]

[Checkpoint 4.2.2] Ensure that all messages to the user (e.g., warnings, errors, etc.) are available in an output device-independent manner using any supported output devices. [Priority 1]

5.2 Visibility of accessibility features

Universal design means that access to features that help accessibility should be integrated into normal menus. User agents should avoid regrouping access to accessibility features into specialized menus. Documentation includes anything that explains how to install, get help for, use, or configure the product. Users must have access to installation information, either in electronic form (diskette, over the Web), by fax, or by telephone.

[Checkpoint 4.1.3] Describe product features known to promote accessibility in a section of the product documentation. [Priority 2]

For instance, include references to accessibility features in these places:

1. Indexes. Include terms related to product accessibility in the documentation index (e.g., "accessibility", "disability" or "disabilities").
2. Tables of Contents Include terms related to product accessibility in the documentation table of contents (e.g., features that promote accessibility)
3. Include instructions on how to modify all user configurable defaults and preferences (e.g, images, video, style sheets, and scripts) as specified by the documentation.

4. Include a list of all keyboard shortcuts in the accessibility section of the documentation.

[Checkpoint 4.1.2] Ensure that all product documentation conforms to the Web Content Accessibility Guidelines ([WAI-PAGEAUTH]). [Priority 1]

Documentation created in HTML should follow the Web Content Accessibility Guidelines [p. 23] .

Electronic documentation created in open standard formats such as HTML and ASCII can often be accessed in the user's choice of application such as a word processor or browser. Accessing documentation in familiar applications is particularly important to users with disabilities who must learn the functionalities of their tools, be able to configure them for their needs, and to be compatible with assistive technology. Electronic documentation should not be provided in proprietary formats.

Users with print impairments may need or desire documentation in alternative formats such as Braille, large print, or audio tape. User agent manufacturers may provide user manuals in alternative formats. Documents in alternative format documents can be created by agencies such as Recording for the Blind and Dyslexic and the National Braille Press.

User instructions should be created in an input device-independent manner. Provide instructions for using or configuring the user agent in a manner that can be understood by a user of any input device including a mouse or keyboard. For example, "Click on the Home button on the toolbar or select "Home" from the Go menu to return to the Home page. "

[Checkpoint 4.3.3] Provide a mechanism to render the presence of a keyboard binding for an active element. [Priority 2]

5.3 Configuration

User control of style

To ensure accessibility, users must have **final control** over certain renderings.

For text and color:

[Checkpoint 5.1.1] Allow the user to control font family. [Priority 1]

[Checkpoint 5.1.2] Allow the user to control font size. [Priority 1]

[Checkpoint 5.1.3] Allow the user to control foreground color. [Priority 1]

[Checkpoint 5.1.4] Allow the user to control background color. [Priority 1]

[Checkpoint 5.1.5] Allow the user to control selection highlighting (e.g., foreground and background color). [Priority 1]

[Checkpoint 5.1.6] Allow the user to control focus highlighting (e.g., foreground and background color). [Priority 1]

For images, applets, and animations:

[Checkpoint 4.4.2] Allow the user to turn on and off rendering of background images. [Priority 1]

[Checkpoint 5.1.7] Allow the user to control animation rate. [Priority 2]

For user agents rendering audio:

[Checkpoint 5.1.11] Allow the user to control audio playback rate. [Priority 1]

[Checkpoint 5.1.12] Allow the user to start, stop, pause, and rewind audio. [Priority 2]

[Checkpoint 5.1.13] Allow the user to control audio volume. [Priority 2]

[Checkpoint 5.2.7] If a technology allows for more than one audio track for video, allow the user to choose from among tracks. [Priority 1]

[Checkpoint 5.2.4] If a technology allows for more than one caption or description track for audio, allow the user to choose from among tracks. [Priority 1]

For user agents rendering video:

[Checkpoint 5.1.8] Allow the user to control video frame rates. [Priority 1]

[Checkpoint 5.1.9] Allow the user to start, stop, pause, and rewind video. [Priority 2]

[Checkpoint 5.2.6] If a technology allows for more than one caption or description track (e.g., text, video of sign language, etc.) for video, allow the user to choose from among tracks. [Priority 1]

For user agents rendering speech:

[Checkpoint 5.1.15] Allow the user to control speech volume, pitch, gender and other articulation characteristics. [Priority 2]

[Checkpoint 5.1.14] Allow the user to control speech playback rate. [Priority 1]

User interface:

[Checkpoint 5.1.16] When new windows or user interface components are spawned, allow the user to control window size and position. [Priority 2]

User profiles

A configuration profile allows users to save their user agent settings and re-apply them easily, which is particularly valuable in an environment where several people may use the same machine.

[Checkpoint 4.1.4] Allow the user to configure the user agent in named profiles that may be shared (by other users or software). [Priority 2]

The user should be able to easily transfer their profiles between installations of the same user agent. One way to facilitate this is to follow operating system conventions for profiles where applicable.

Users should be able to switch rapidly between profiles (or the default settings). This is helpful when:

- Several people use the same machine.
- A user with a disability is being helped by able-bodied user who may not recognize the information being displayed using the user's profile.

User agents may apply a profile when the user logs in. They may also allow users to apply settings interactively, for example by allowing them to choose from a list of named profiles in a menu.

Sample profiles (based on common usage scenarios) can assist users in the initial set up of the user agent. These profiles can serve as models and may be copied and fine-tuned to mean an individual's particular needs.

Feature control

[Checkpoint 4.4.1] Allow the user to turn on and off rendering of images. [Priority 1]

[Checkpoint 4.4.3] Allow the user to turn on and off rendering of video. [Priority 1]

[Checkpoint 4.4.4] Allow the user to turn on and off rendering of sound. [Priority 1]

[Checkpoint 4.4.5] Allow the user to turn on and off rendering of captions. [Priority 1]

[Checkpoint 4.4.6] Allow the user to turn on and off animated or blinking text. [Priority 1]

[Checkpoint 4.4.7] Allow the user to turn on and off animations and blinking images. [Priority 1]

[Checkpoint 4.4.8] Allow the user to turn on and off support for scripts and applets. [Priority 1]

[Checkpoint 4.4.10] Allow the user to turn on and off support for author style sheets. [Priority 1]

[Checkpoint 4.4.9] Allow the user to turn on and off support for user style sheets. [Priority 1]

[Checkpoint 4.4.11] Allow the user to turn on and off rendering of frames. [Priority 2]

[Checkpoint 4.4.12] Allow the user to turn on and off support for spawned windows. [Priority 1]

User agents may:

- Allow users to turn of support for spawned viewports entirely
- Prompt them before spawning a viewport

For example, user agents may recognize the HTML construct `target="_blank"` and spawn the window according to the user's preference.

[Checkpoint 4.4.14] Allow the user to turn on and off automatic page refresh. [Priority 3]

Period page refresh can be achieved with the following markup in HTML:

```
<META http-equiv="refresh" content="60">
```

The user agent should allow the user to disable this type of page refresh.

[Checkpoint 4.4.13] Allow the user to turn on and off automatic page forwarding. [Priority 3]

Although no HTML specification defines this behavior formally, some user agents support the use of the META element to refresh the current page after a specified number of seconds, with the option of replacing it by a different URI. Instead of this markup, authors should use server-side redirects (with HTTP).

User agents can provide a link to another page rather than changing the page automatically.

Keyboard configuration

[Checkpoint 4.3.1] Allow the user to configure keyboard access to user agent functionalities. Configuration includes the ability to specify single keystroke commands as well as commands that require keystroke combinations. [Priority 2]

5.4 Notification of events and changes

[Checkpoint 6.1.11] Provide the user with information about document loading status (e.g., whether loading has stalled, whether enough of the page has loaded to begin navigating, whether following a link involves a fee, etc.) [Priority 3]

[Checkpoint 6.3.2] Alert the user when scripts or applets are executed. [Priority 2]

[Checkpoint 6.3.3] Provide information about document changes resulting from the execution of a script. [Priority 3]

[Checkpoint 5.5.8] Allow the user to request to be prompted before a form is submitted. [Priority 3]

6 The User Agent and Assistive Technologies

[Checkpoint 7.2.2] *For desktop graphical browsers.* Ensure that exported interfaces conform to those specified by a W3C DOM Recommendation. [Priority 1]

Use DOM Level 1 [DOM1] [p. 22] for access to HTML and XML document information. However, as the DOM specification indicates:

> The DOM Level 1 does not include mechanisms to access and modify style specified through CSS 1. Furthermore, it does not define an event model for HTML documents. This functionality is planned to be specified in a future Level of this specification.

It is important for user agents to provide access to style and scripting information in a document, so the following techniques should be used to achieve this.

[Checkpoint 7.2.1] *For desktop graphical browsers.* Export programmatic interfaces to ATs and follow operating system conventions to do so (e.g., Microsoft Active Accessibility, Sun Microsystems Java Accessibility). [Priority 1]

Use standard rather than custom controls when designing user agents. Third-party assistive technology developers are more likely able to access standard controls than custom controls. If you must use custom controls, review them for accessibility and compatibility with third-party assistive technology.

[Checkpoint 7.2.3] Use standard interfaces defined for the operating system. [Priority 1]

For instance, software should use the standard interface for keyboard events rather than working around it.

7 Support for accessibility features of certain languages

7.1 HTML

[Checkpoint 7.1.1] Support accessibility features defined by W3C Recommendations for HTML. [Priority 1]

- Support the "longdesc" attribute defined for IMG elements ([HTML 4.0] [p. 22] , section 13.2). This attribute may be used to attach additional descriptive information to images. [Priority 1]
- Support the CAPTION element ([HTML40] [p. 22] , section 11.2.2) for rich table captions. [Priority 2]
- Support the ACRONYM and ABBR elements ([HTML40] [p. 22] , section 9.2.1) for acronyms and abbreviations. [Priority 2]
- Support the "summary" attribute for TABLE ([HTML40] [p. 22] , section 11.2.1) for table summary information. [Priority 2]
- Support the NOSCRIPT element ([HTML40] [p. 22] , sections 18.3.1 and 16.4.1) for accessible alternatives to scripts. [Priority 2]
- Support the NOFRAMES element ([HTML40] [p. 22] , sections 18.3.1 and 16.4.1) for accessible alternatives to frames. [Priority 2]
- Support the "lang" attribute ([HTML40] [p. 22] , section 8.1). [Priority 2]
- Support the "tabindex" attribute ([HTML40] [p. 22] , section 17.11.1) for assigning

the order of keyboard navigation within a document. [Priority 3]

- Support the "accesskey" attribute ([HTML40] [p. 22] , section 17.11.2) for assigning keyboard commands to active components such as links, and form controls. [Priority 3]

7.2 CSS

[Checkpoint 7.1.2] Support accessibility features defined by W3C Recommendations for CSS. [Priority 1]

The following techniques apply to user agents that implement Cascading Style Sheets (see CSS, level 1 [p. 22] and CSS, level 2 [p. 22]). Cascading Style Sheets may be part of a source document or linked externally.

Stand-alone style sheets are useful for implementing *user profiles* in public access computer environments where several people use the same computer. User profiles allow for convenient customization and may be shared by a group.

- Completely implement Cascading Style Sheets, level 1 [Priority 1]
- Allow the user to turn off author styles represented by author style sheets. [Priority 1]
- Allow the user to adjust default values represented by user agent style sheets. [Priority 1]
- Support the :before and :after pseudo-elements as defined in CSS2 ([CSS2] [p. 22] , section 12.1). [Priority 1]
- Support the ’outline’ property as defined in CSS2 ([CSS2] [p. 22] , section 18.4). Outlines may be used to customize the focus display. [Priority 1]
- Allow the user to specify user styles through style sheets (see [CSS2] [p. 22] , section 6.4). [Priority 2]
- Implement the !important rule as defined in CSS2 ([CSS2] [p. 22] , section 6.4.2). These rules offer a way for users to override author styles and user agent defaults [Priority 2]
- Support aural cascading style sheets (see [CSS2] [p. 22] , chapter 19) for the auditory presentation of documents. [Priority 2]

7.3 SMIL

[Checkpoint 7.1.3] Support accessibility features defined by W3C Recommendations for SMIL. [Priority 1]

8 Appendix: Accessibility features of some operating systems

Several of the more popular mainstream operating systems now include a common suite of built-in accessibility features that are designed to assist individuals with varying abilities. Despite operating systems differences, the built-in accessibility features use a similar naming convention and offer similar functionalities, within the limits imposed by each operating system (or particular hardware platform).

The following is a list of built-in accessibility features from several platforms:

StickyKeys
: These allow users to perform a multiple simultaneous key sequence by pressing and releasing each key in sequential order. StickyKeys is designed to work with only those keys defined as modifier keys. Modifier keys are pressed in combination with other keys, to change the outcome of the second (or more) pressed keys. For example, the SHIFT key is defined as a modifier key, since it is commonly used to create upper case characters. Each operating system or hardware platform typically defines a set of keys which can act as modifier keys. The most common modifier keys include SHIFT, CONTROL, and ALTERNATE.

MouseKeys
: These allow users to move the mouse cursor and activate the mouse button(s) from the keyboard.

RepeatKeys
: These allow users to set how fast a key repeats (e.g., sometimes referred to as typematic rate) when the key is held pressed (e.g., Repeat Rate), and also allows control over how quickly the key starts to repeat after the key has been pressed (e.g., delay Until Repeat). Key repeating may also be eliminated.

SlowKeys
: These instruct the computer not to accept a key as pressed until it has been pressed and held down for a specific user adjustable length of time.

BounceKeys
: These prevent extra characters from being typed if the user bounces (e.g., tremor) on the same key when pressing or releasing it.

ToggleKeys
: These provide an audible indication for the status of keys that have a toggled state (e.g., keys that maintain status after being released). The most common toggling keys include Caps Lock, Num Lock, and Scroll Lock.

SoundSentry
: These monitor the operating system and applications for sounds, and attempt to provide a visual indication when a sound is being played. Older versions of Sound Sentry may have flashed the entire display screen for example, while newer versions of SoundSentry provide the user with a selection of options, such as flashing the active window or flashing the active window caption bar.

The next three built in accessibility features are not as commonly available as the above group of features, but are included here for definition, completeness, and future compatibility.

ShowSounds
: These are user setting or software switches that are available for the operating system and application (including user agents) APIs to read, to notify them that the user wishes audio information to also be presented in a visual format.

High Contrast
: These automatically change the display fonts and colors to choices which should provide for easier reading.

TimeOut
: These allow the built-in accessibility features to automatically turn off if the computer is unused for a specified length of time, and is intended for use when the computer is in a public setting (e.g., library). TimeOut might also be referred to as reset or automatic reset.

The next accessibility feature listed here is not considered to be a built in accessibility feature (since it only provides an alternate input channel) and is presented here only for definition, completeness, and future compatibility.

SerialKeys
: These allow a user to perform all keyboard and mouse functions from an external assistive device (such as communication aid) communicating with the computer via a serial character stream (e.g., serial port, IR port, etc.) rather than or in conjunction with, the keyboard, mouse, and other standard input devices/methods.

8.1 Microsoft Windows 95, Windows 98, and Window NT 4.0

The following accessibility features can be adjusted from the Accessibility Options Control Panel:

- StickyKeys: modifier keys include SHIFT, CONTROL, and ALTERNATE
- FilterKeys: grouping term for SlowKeys, RepeatKeys, and BounceKeys
- MouseKeys:
- ToggleKeys:
- SoundSentry:
- ShowSounds:
- Automatic reset: term used for TimeOut
- High Contrast:
- SerialKeys:

Additional accessibility features available in Windows 98:

Magnifier
: This is a windowed, screen enlargement and enhancement program used by persons with low vision to magnify an area of the visual display (e.g., by tracking the text cursor, focus, etc.). Magnifier can also invert the colors used by the system within the magnification window.

Accessibility Wizard
: This is a setup tool intended to assist a person with making choices which setting up the accessibility features on a workstation.

8.2 Apple Macintosh Operating System

The following accessibility features can be adjusted from the Easy Access Control panel (Note: Apple convention uses a space within the accessibility feature names.)

- Sticky Keys: modifier keys include the SHIFT, OPEN APPLE (COMMAND), OPTION (ALT) and CONTROL keys.
- Slow Keys:
- Mouse Keys:

The following accessibility features can be adjusted from the Keyboard Control Panel.

- Key Repeat Rate (e.g., part of RepeatKeys)
- Delay Unit Repeat (e.g., part of RepeatKeys)

The following accessibility feature can be adjusted from the Sound or Monitors and Sound Control Panel (depends upon which version of the OS).

- Adjusting the volume to off or mute causes the Macintosh to flash the title bar whenever the operating system detects a sound (e.g., SoundSentry)

Additional accessibility features available for the Macintosh OS:

CloseView
: This is a full screen, screen enlargement and enhancement program used by persons with low vision to magnify the information on the visual display, and it can also change the colors used by the system.

SerialKeys
: This is available as freeware from Apple and several other Web sites.

8.3 AccessX, X Keyboard Extension (XKB), and the X Window System

(Note: AccessX became a supported part of the X Window System X Server with the release of the X Keyboard Extension in version X11R6.1)

The following accessibility features can be adjusted from the AccessX graphical user interface X client on some DEC, SUN, and SGI operating systems. Other systems supporting XKB may require the user to manipulate the features via a command line parameter(s).

- StickyKeys: modifier keys are platform dependent, but usually include the SHIFT, CONTROL, and META keys.
- RepeatKeys:
- SlowKeys:
- BounceKeys:
- MouseKeys:
- ToggleKeys:

8.4 DOS (Disk Operating System)

The following accessibility features are available from a freeware program called AccessDOS, which is available from several Internet Web sites including IBM, Microsoft, and the Trace Center, for either PC-DOS or MS-DOS versions 3.3 or higher.

- StickyKeys: modifier keys include the SHIFT, CONTROL, and ALTERNATE keys.
- Keyboard Response Group: grouping term for SlowKeys, RepeatKeys, and BounceKeys
- MouseKeys:
- ToggleKeys:
- SoundSentry (incorrectly name ShowSounds):
- SerialKeys:
- TimeOut:

9 Acknowledgments

Many thanks to the following people who have contributed through review and comment: Paul Adelson, James Allan, Denis Anson, Kitch Barnicle, Harvey Bingham, Olivier Borius, Judy Brewer, Bryan Campbell, Kevin Carey, Wendy Chisholm, David Clark, Chetz Colwell, Wilson Craig, Nir Dagan, Daniel Dardailler, B. K. Delong, Neal Ewers, Geoff Freed, John Gardner, Al Gilman, Larry Goldberg, John Grotting, Markku Hakkinen, Earle Harrison, Chris Hasser, Kathy Hewitt, Philipp Hoschka, Masayasu Ishikawa, Phill Jenkins, Leonard Kasday, George Kerscher, Marja-Riitta Koivunen, Josh Krieger, Catherine Laws, Greg Lowney, Scott Luebking, William Loughborough, Napoleon Maou, Charles McCathieNevile, Masafumi Nakane, Mark Novak, Charles Oppermann, Mike Paciello, David Pawson, Michael Pederson, Helen Petrie, David Poehlman, Michael Pieper, Jan Richards, Hans Riesebos, Joe Roeder, Lakespur L. Roca, Greg Rosmaita, Lloyd Rutledge, Liam Quinn, T.V. Raman, Robert Savellis, Rich Schwerdtfeger, Constantine Stephanidis, Jim Thatcher, Jutta Treviranus, Claus Thogersen, Steve Tyler, Gregg Vanderheiden, Jaap van Lelieveld, Jon S. von Tetzchner, Willie Walker, Ben Weiss, Evan Wies, Chris Wilson, Henk Wittingen, and Tom Wlodkowski,

10 References

[CSS1]
"CSS, level 1 Recommendation", B. Bos, H. Wium Lie, eds. The CSS1 Recommendation is:
http://www.w3.org/TR/1999/REC-CSS1-19990111.

[CSS2]
"CSS, level 2 Recommendation", B. Bos, H. Wium Lie, C. Lilley, and I. Jacobs, eds. The CSS2 Recommendation is:
http://www.w3.org/TR/1998/REC-CSS2-19980512.

[DOM1]
"Document Object Model (DOM) Level 1 Specification", V. Apparao, S. Byrne, M. Champion, S. Isaacs, I. Jacobs, A. Le Hors, G. Nicol, J. Robie, R. Sutor, C. Wilson, and L. Wood, eds. The DOM Level 1 Recommendation is:
http://www.w3.org/TR/1998/REC-DOM-Level-1-19981001.

[HTML40]
"HTML 4.0 Recommendation", D. Raggett, A. Le Hors, and I. Jacobs, eds. The HTML 4.0 Recommendation is:
http://www.w3.org/TR/1998/REC-html40-19980424.

[HTML32]
"HTML 3.2 Recommendation", D. Raggett, ed. The HTML 3.2 Recommendation is:
http://www.w3.org/TR/REC-html32.

[MATHML]
"Mathematical Markup Language", P. Ion and R. Miner, eds. The MathML 1.0 Recommendation is:
http://www.w3.org/TR/1998/REC-MathML-19980407.

[RFC2119]
"Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997. Available at http://www.ietf.org/rfc/rfc2119.txt

[SMIL]
"Synchronized Multimedia Integration Language (SMIL) 1.0 Specification", P. Hoschka, editor. The SMIL 1.0 Recommendation is: http://www.w3.org/TR/1998/REC-smil-19980615

[WAI-AUTOOLS]
"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-PAGEAUTH]
"Web Content Accessibility Guidelines", W. Chisholm, G. Vanderheiden, and I. Jacobs, eds. The latest Working Draft of these guidelines for designing accessible Web pages and sites is available at: http://www.w3.org/TR/WD-WAI-PAGEAUTH.

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