User Agent Accessibility Guidelines 1.0

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Abstract

This document provides guidelines to user agent developers for making their products accessible to people with disabilities. User agents include graphical desktop browsers, multimedia players, plug-ins, voice browsers, and other assistive technologies used to access Web content. Developers must ensure that user agent functionalities are accessible to users with disabilities and that user agents communicate with other user agents to provide additional functionalities necessary for full access to the Web. These guidelines explain how following certain good design principles will make the Web accessible to users with disabilities and will benefit all users. While these guidelines primarily address the accessibility of general-purpose graphical user agents, the principles presented apply to other types of user agents as well.

Status of this document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. The latest status of this document series is maintained at the W3C.

This Working Draft follows the Austin face to face meeting of the Working Group and accounts for a number of resolutions to issues raised during Last Call.

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.

Please send comments about this document to the public mailing list: w3c-wai-ua@w3.org. Mailing list archives are available on the Web.

This document has been produced as part of the Web Accessibility Initiative. The goals of the WAI UA Working Group are described in the WAI UA charter. A list of the UA Working Group participants is available.

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

Table of Contents

Abstract 1
Status of this document 1
1. Introduction 4
1.1 Benefits of Accessible Design 4
1.2 Principles of Accessible Design 5
1.3 How the Guidelines are Organized 7
1.4 Related Resources 7
1.5 Document conventions 8
1.6 Priorities 8
1.7 Conformance 8
2. User Agent Accessibility Guidelines 11
1. Support input and output device-independence 11
2. Ensure user access to all content 12
3. Allow the user to turn off rendering or behavior that may reduce accessibility 13
4. Ensure user control over styles 14
5. Observe system conventions and standard interfaces 16
6. Implement accessible specifications 17
7. Provide navigation mechanisms 18
8. Orient the user 19
9. Notify the user of content and viewport changes 21
10. Allow configuration and customization 21
11. Provide accessible product documentation and help 23
3. Appendix: Glossary 24
4. Acknowledgments 31
5. References 32

An appendix to this document [UA-CHECKLIST] lists all checkpoints for convenient reference.

1. Introduction

This introduction (section 1) provides context for understanding the guidelines listed in section 2 . In different sections, the introduction explains:

- The importance and benefits of accessible user agent design ,
- The principles of accessible user agent design behind the guidelines,
- A description of how each guideline is organized and presented,
- A list of related resources to help developers implement the guidelines,
- Some of the editorial conventions used in this document ,
- How requirements in this document are prioritized,
- How people make claims that software conforms to these guidelines and details about the applicability of some requirements to some user agents.

1.1 Benefits of Accessible Design

For those unfamiliar with accessibility issues pertaining to user agent design, consider that many users with disabilities may be accessing the Web in contexts very different from your own:

- They may not be able to see, hear, move, or may not be able to process some types of information easily or at all.
- They may have difficulty reading or comprehending text.
- They may not have or be able to use a keyboard or mouse.

User agents must be designed to take into account the diverse requirements of users with disabilities. This document specifies requirements that user agent developers must satisfy to ensure accessibility of the user agent.

Software that follows the guidelines in this document will not only benefit users with disabilities, it will be more flexible, manageable, extensible, and beneficial to all users. Many users browse the Web with requirements similar to those of users with disabilities. For instance:

- They may have a text-only screen, a small screen, or a slow Internet connection (e.g., via a mobile phone browser). These users will benefit from the same features that provide access to people with low vision or blindness.
- They may not speak or understand fluently the language in which content is written or spoken. These users will benefit from the same features that provide access to people who cannot hear the auditory track of a presentation and require captions .
- They may be in a situation where their eyes, ears, or hands are busy or interfered with (e.g., driving to work, working in a noisy environment, etc.). These users will benefit from the same features that provide access to people who cannot use a mouse or keyboard due to a visual or physical disability.

The guidelines in this document describe some basic principles of accessible design. As the previous examples illustrate, accessible design generally benefits all users.

1.2 Principles of Accessible Design

This document is organized according to several principles that, if followed, will improve the design of any type of user agent:

Ensure that the user interface is accessible.

The user must have access to all the functionalities offered by the user agent through its user interface . Since some users cannot use some parts of the the user interface, it needs to be adaptable to their particular needs.

One requirement is that users be able to operate the user interface with a variety of input devices (mouse, keyboard, speech input, etc.) and output devices (graphical display, speech output, etc.). Redundant input and output methods (accomplished through the standard input and output Application Programming Interfaces (APIs) supported by the user agent) help users operate controls of the user agent as well as those included as part of content.

Another requirement is that users have two operational approaches to the the user interface:

- Contextual access (e.g,. through cascading menus, through help systems, etc.) may help users with cognitive disabilities and any users unfamiliar with the tool.
- Direct access (e.g., through keyboard or voice shortcuts) helps some users with physical disabilities and speeds up use by experienced users. Such access can be vital for users with physical disabilities who have little or no manual dexterity, and increased tendency to push unwanted buttons or keys.

In order for people to use the user agent at all, the installation procedure (and any subsequent software update procedures) must be accessible according to the guidelines of this document, including device-independent access and accessible documentation of the installation procedure.

This document includes a number of user interface requirements (they are marked as such), but the general topic of user interface design for computer software exceeds the scope of this document. The Techniques Document [UA-TECHNIQUES] includes some references to general software accessibility guidelines.

Ensure that the user has access to content.

User agents must ensure access to content:

- By ensuring access to all text, video, sound, and other content, including alternative equivalents for content (e.g., "alt" attribute values in HTML, external long descriptions, etc.) and relationships among content (e.g., table cells and

their headers).
- By allowing users to control content rendering parameters (text size, colors, synthesized speech rate and volume, etc.).
- By allowing users to navigate the content (e.g., with scrollbars, navigation of active elements , structured views, etc.).
- By making Web content and user agent information available to assistive technology through standard APIs .

Help orient the user.

User agents can help the user remain oriented in a page or site by supplying context, including:

- Browsing context. This includes information about the number of frames, the title of the current frame, whether loading for a page or video clip has finished or stalled, etc., Graphical clues about browsing context such as frames, proportional scroll bars, a visually highlighted selection, etc. help some, but not all users, so the context information must be available in a device-independent manner.
- Element context. This includes information about specific elements (e.g., the dimensions of a table, the length of an audio clip, the structure of a form, etc.) and surrounding information. For instance, users with blindness who navigate by jumping from link to link on a page or presentation benefit from nearby information that will help them decide quickly whether to follow the link, as well as metadata about the link: whether it has been visited, the type of the target resource, the length of an audio or video clip that will be started, whether the link involves a fee, etc.

The user agent should also minimize the chances the user will become disoriented. User agents should:

- For changes to the content or viewport that the user does not initiate, allow the user to request notification when these changes occur. (e.g., when a viewport opens, a script is executed, etc.).
- Allow the user to return to known states. The "back" feature is a valuable "undo" tool for returning to a known state.

Follow operating system standards and conventions and use open specifications.

Following platform and operating system standards and guidelines promotes accessibility, usability, and predictability. So that desktop browsers can make information available to assistive technologies , they must communicate information about content and the user interface through standard interfaces. Even when a user agent implements a feature natively, it should make relevant information available through standard interfaces. This will benefit assistive technologies, scripting tools, and automated test engines. It will also promote modularity and software reuse.

1.3 How the Guidelines are Organized

The eleven guidelines in this document state general principles for the development of accessible user agents. Each guideline includes:

- The guideline number.
- The statement of the guideline.
- The rationale behind the guideline and some groups of users who benefit from it.
- A list of checkpoint definitions.

Each checkpoint definition includes:

- The checkpoint number.
- The statement of the checkpoint.
- The priority of the checkpoint.
- Optional informative notes, clarifying examples, and cross references to related guidelines or checkpoints.
- A link to a corresponding section of the Techniques Document [UA-TECHNIQUES] , where the checkpoint is examined in detail, including information about implementation and examples.

Each checkpoint is intended to be specific enough so that someone reviewing a user agent may verify that the checkpoint has been satisfied. **Note.** The checkpoints have been designed to be verifiable, although some may be difficult to verify without documentation from vendors about what features and APIs they support.

An appendix to this document [UA-CHECKLIST] lists all checkpoints for convenient reference.

1.4 Related Resources

A separate document, entitled "Techniques for User Agent Accessibility Guidelines 1.0" [UA-TECHNIQUES] , provides suggestions and examples of how each checkpoint might be satisfied. It also includes references to other accessibility resources (such as platform-specific software accessibility guidelines) that provide additional information on how a user agent may satisfy each checkpoint. Readers are strongly encouraged to become familiar with the Techniques Document. Note that the Techniques provided are informative examples only, and other strategies may be used to meet the checkpoint as well as, or in place of, those listed. The Techniques Document is expected to be updated more frequently than the current guidelines.

"User Agent Accessibility Guidelines 1.0" is part of a series of accessibility guidelines published by the Web Accessibility Initiative (WAI) . The series also includes "Web Content Accessibility Guidelines 1.0" [WAI-WEBCONTENT] and "Authoring Tool Accessibility Guidelines 1.0" [WAI-AUTOOLS] .

1.5 Document conventions

The following editorial conventions are used throughout this document:

- HTML element names are in uppercase letters (e.g., H1, BLOCKQUOTE, TABLE, etc.)
- HTML attribute names are quoted in lowercase letters (e.g., "alt", "title", "class", etc.)

1.6 Priorities

Each checkpoint in this document is assigned a priority that indicates its importance for users with disabilities.

[Priority 1]
: This checkpoint **must** be satisfied by user agents, otherwise one or more groups of users with disabilities will find it impossible to access the Web. Satisfying this checkpoint is a basic requirement for enabling some people to access the Web.

[Priority 2]
: This checkpoint **should** be satisfied by user agents, otherwise one or more groups of users with disabilities will find it difficult to access the Web. Satisfying this checkpoint will remove significant barriers to Web access for some people.

[Priority 3]
: This checkpoint **may** be satisfied by user agents to make it easier for one or more groups of users with disabilities to access information. Satisfying this checkpoint will improve access to the Web for some people.

1.7 Conformance

The terms "must", "should", and "may" (and related terms) are used in this document in accordance with RFC 2119 [RFC2119] .

User agents must satisfy all the applicable checkpoints for a chosen conformance level .

Conformance levels

This section defines three levels of conformance to this document.

- **Conformance Level "A"**: all Priority 1 checkpoints are satisfied
- **Conformance Level "Double-A"**: all Priority 1 and 2 checkpoints are satisfied
- **Conformance Level "Triple-A"**: all Priority 1, 2, and 3 checkpoints are satisfied

Note. Conformance levels are spelled out in text (e.g., "Double-A" rather than "AA") so they may be understood when rendered as speech.

Claims of conformance to this document must use one of the following two forms.

Form 1: Specify:

- The guidelines title: "User Agent Accessibility Guidelines 1.0"
- The guidelines URI: http://www.w3.org/WAI/UA/WD-WAI-USERAGENT-19991220
- The conformance level satisfied: "A", "Double-A", or "Triple-A".
- The version number and operating system of the software covered by the claim.
- The date of the claim.
- A list consisting of checkpoints that have been satisfied and those that are considered not applicable . The appendix list of checkpoints [UA-CHECKLIST] may be used for this purpose.

Example of Form 1:

> This product conforms to W3C's "User Agent Accessibility Guidelines 1.0", available at http://www.w3.org/WAI/UA/WD-WAI-USERAGENT-19991220, level Double-A.

Form 2: Include, on product packaging or documentation, one of three icons provided by W3C. For Web documentation, link the icon to the appropriate W3C explanation of the claim.

Note. *In the event this document becomes a W3C Recommendation, information about the icons and how to use them will be available at the W3C Web site. At that time the Working Group will also indicate how claims of conformance can deliver completed list of checkpoints.*

Checkpoint applicability

Not every checkpoint or guideline is applicable to every user agent. Generally, a user agent must adhere to checkpoints that ensure accessibility of functionalities that it offers to users and it must implement required functionalities natively . If the user agent supports keyboard input, it must support accessible keyboard input. If the user agent supports images, it must ensure access to each image or an alternative equivalent supplied by the author. If a user agent supports style sheets, it must implement the accessibility features of the style sheet language. If the user agent supports frames, it must ensure access to frame alternatives supplied by the author. In short, if a user agent offers a functionality, it must ensure that people with disabilities have access to that functionality or an equivalent alternative.

Not all user agents support every content type, markup language feature, input or output device interface, etc. When a content type, feature, or device interface is not supported, checkpoints with requirements related to it do not apply to the user agent. Thus, if a user agent supports style sheets at all, all checkpoints related to style sheet accessibility apply. If a user agent does not support style sheets at all, the checkpoints do not apply.

The applicability of checkpoints related to markup language features is determined similarly. If a user agent supports tables, it must support the accessibility features of the language related to tables (or images, or frames, or video, or links, etc.). The Techniques Document includes information about the accessibility features of W3C languages such as HTML, CSS, and SMIL.

To summarize, a checkpoint applies to a user agent unless:

- The checkpoint refers solely to an unsupported input or output device interface. Note that if the device interface is supported at all, it must be supported accessibly.
- The checkpoint includes requirements about a content type (script, image, video, sound, applet, etc.) that the user agent either does not recognize or recognizes but does not support natively .
- The checkpoint requires control of properties of an embedded object (e.g., video or animation rate) that may not be controlled or accessed by the user agent.
- The checkpoint requires technologies that are unsupported by the user agent (e.g., markup language, synchronized multimedia, metadata description language, etc.).
- The checkpoint refers to communication with other software but no communication is possible on the system housing the user agent (e.g,. a kiosk with no interface).

2. User Agent Accessibility Guidelines

Guideline 1. Support input and output device-independence

Ensure that the user can interact with the user agent (and the content it renders) through all of the input and output APIs used by the user agent.

Since people use a variety of devices for input and output, user agent developers must ensure redundancy in the user interface . Messages and alerts to the user must not rely on auditory or graphical cues alone; text, beeps, flashes, and other techniques used together will make these alerts accessible. Text messages are very accessible since they may be used by people with graphical displays, speech synthesizers, or Braille devices.

People who can't or don't use a mouse must be able to operate the user interface with the keyboard, through voice input, a head wand, touch screen, or other device. *Keyboard operation* of all functionalities offered through the user interface is one of the most important aspects of user agent accessibility on almost every platform. The keyboard is available to most users, it is widely supported, and hooks provided for the keyboard can be used for other types of input.

In addition to ensuring device-independent access to all functionalities, developers must use the standard APIs of the operating system for supported devices. This allows assistive technologies to operate the user agent programmatically by simulating events from the mouse, keyboard, pen, or other input device. For instance, when standard APIs are used, some users who may not be able to enter text easily through a standard physical keyboard can still use voice input or an on-screen keyboard to operate the user agent.

Checkpoints for user interface accessibility:

1.1 Ensure that every functionality offered through the user interface is available through every input device API used by the user agent. User agents are not required to reimplement low-level functionalities (e.g., for character input or pointer motion) that are inherently bound to a particular API and most naturally accomplished with that API. [Priority 1]

> **Note.** The device-independence required by this checkpoint applies to functionalities described by the other checkpoints in this document (e.g., installation, documentation, user agent user interface configuration, etc.). This checkpoint does not require user agents to use all operating system input device APIs , only to make the software accessible through those they do use.

1.2 Use the standard input and output device APIs of the operating system. [Priority 1]

> For example, do not bypass standard APIs to manipulate the memory associated with rendered content, since screen review utilities monitor rendering through the APIs .

1.3 Ensure that the user can interact with all active elements in a device-independent manner. [Priority 1]

For example, users who are blind or have physical disabilities must be able to activate text links, the links in a client-side image map, and form controls without a pointing device. **Note.** This checkpoint is an important special case of checkpoint 1.1.

1.4 Ensure that every functionality offered through the user interface is available through the standard keyboard API . [Priority 1]

Note. This checkpoint is an important special case of checkpoint 1.1. The comment about low-level functionalities in checkpoint 1.1 applies to this checkpoint as well. Refer also to checkpoint 10.7.

1.5 Ensure that all messages to the user (e.g., informational messages, warnings, errors, etc.) are available through all output device APIs used by the user agent. Do not bypass the standard output APIs when rendering information (e.g., for reasons of speed, efficiency, etc.). [Priority 1]

For instance, ensure that information about how much content has been viewed is available through output device APIs. Proportional navigation bars may provide this information graphically , but the information must be available (e.g., as text) to users relying on synthesized speech or Braille output.

Guideline 2. Ensure user access to all content

Ensure that users have access to all content, notably author-supplied alternative equivalents for content such as text equivalents and auditory descriptions.

Just as people use a variety of devices for user interface input and output, they require that content be available in different modes -- auditory (synthesized and prerecorded), tactile (Braille), graphical , or a mix of some of these. Authors and user agents share responsibility for ensuring redundant modes. Web content providers supply alternative equivalents for content , such as text equivalents for images or video, according to the conventions of the markup language they are using (refer to the Techniques Document [UA-TECHNIQUES] for details). User agents must ensure that users have access to this content, as well as any alternatives generated by the user agent itself. User agents should allow users to specify whether primary content should be rendered, alternative equivalents, or both.

Access to content requires more than mode redundancy. For dynamic presentations such as synchronized multimedia presentations created with SMIL 1.0 [SMIL] , users with cognitive or physical disabilities may not be able to interact with a presentation within the time delays assumed by the author. To make the presentation accessible to these users, user agents rendering synchronized presentations must either provide access to content in a time-independent manner or allow users to control the playback rate of the presentation.

Ensuring access to alternative equivalents benefits all users since some users may not have access to some content due to a technological limitation (e.g., their mobile browser cannot display graphics) or simply a configuration preference (e.g., they have a slow Internet connection and prefer not to download images).

Checkpoints for content accessibility:

2.1 Ensure that the user has access to all content, including alternative equivalents for content . [Priority 1]

> **Note.** Although it is not a requirement that alternative equivalents be available at the same time as primary content, some users may benefit from simultaneous access. For instance, users with low vision may want to view images (even imperfectly) but require a text equivalent for the image; the text may be rendered with a large font or as speech.

2.2 For presentations that require user interaction within a specified time interval, allow the user to control the time interval (e.g., by allowing the user to pause and restart the presentation, to slow it down, etc.). [Priority 1]

2.3 When no text equivalent has been supplied for an object, make available author-supplied information to help identify the object (e.g., object type, file name, etc.). [Priority 2]

2.4 When a text equivalent for content is explicitly empty (i.e., an empty string), render nothing. [Priority 3]

Checkpoints for user interface accessibility:

2.5 If more than one alternative equivalent is available for content, allow the user to choose from among the alternatives. This includes the choice of viewing no alternatives. [Priority 1]

> For example, if a multimedia presentation has several captions (or subtitles) available (e.g., with different levels of detail, for different reading levels, in different languages, etc.) allow the user to choose from among them.

2.6 Allow the user to specify that captions and auditory descriptions be rendered at the same time as the associated auditory and visual tracks. [Priority 1]

> **Note.** Respect synchronization cues during rendering.

2.7 For author-identified but unsupported natural languages, allow the user to request notification of language changes in content. [Priority 3]

Guideline 3. Allow the user to turn off rendering or behavior that may reduce accessibility

Ensure that the user may turn off rendering or behavior specified by the author that may reduce accessibility by obscuring content or disorienting the user.

Some content or behavior specified by the author may make the user agent unusable or may obscure information. For instance, flashing content may trigger seizures in people with photosensitive epilepsy. Blinking can affect screen reader

users, since screen readers (in conjunction with speech synthesizers or Braille displays) may repeat the text every time it blinks. Noisy background images or sounds make make it impossible for users to see or hear other content. Some color combinations may affect users with some visual disabilities.

Dynamically changing Web content, scripts that open viewports , automatically redirect or refresh pages, or cause similar changes unanticipated by the user may disorient some users with cognitive disabilities and may cause problems for some assistive technologies .

Users may need to turn off these effects in order to have access to content. A user agent must provide on/off control even when it hands off content (e.g., a sound file) to the operating system or a helper application for rendering; the user is aware of the content type and thus can choose not to render it. Please also refer to guideline 4 and guideline 10.

Checkpoints for content accessibility:

3.1 Allow the user to turn on and off rendering of background images. [Priority 1]
3.2 Allow the user to turn on and off rendering of background audio. [Priority 1]
3.3 Allow the user to turn on and off rendering of video. [Priority 1]
3.4 Allow the user to turn on and off rendering of audio. [Priority 1]
3.5 Allow the user to turn on and off animated or blinking text. [Priority 1]
3.6 Allow the user to turn on and off animations and blinking images. [Priority 1]
3.7 Allow the user to turn on and off support for scripts and applets. [Priority 1]
Note. This is particularly important for scripts that cause the screen to flicker, since people with photosensitive epilepsy can have seizures triggered by flickering or flashing particularly in the 4 to 59 flashes per second (Hertz) range.
3.8 Allow the user to turn on and off rendering of images. [Priority 3]
3.9 For automatic content changes specified by the author (e.g., content refresh and page forwards), allow the user to slow the rate of change. [Priority 3]
For example, allow the user to slow content refresh to once per 10 minutes. Or, allow the user to stop automatic refresh, but indicate that content needs refreshing and allow the user to refresh the content by activating a button or link.

Guideline 4. Ensure user control over styles

Ensure that the user can select preferred styles (colors, text size, synthesized speech characteristics, etc.) from choices offered by the user agent. The user must be able to override author-specified styles and user agent defaults.

Providing access to content (refer to guideline 2) includes enabling users to control its presentation. Users with low vision may require larger text than the default size specified by the author or the user agent. Users with color deficiencies may need to impose or prevent certain color combinations. Users with motor or cognitive disabilities may need to control the rate of a multimedia presentation.

User agents must also allow users to control the style of the user interface elements, such as selection and content focus styles (e.g., to ensure adequate color contrast).

Note. The checkpoints in this guideline apply to all content, including alternative equivalents .

Refer also to guideline 10.

Checkpoints for fonts and colors:

4.1 Allow the user to control font family. [Priority 1]
4.2 Allow the user to control the size of text. [Priority 1]
For example, allow the user to specify a font family and style directly through the user agent user interface . Or, allow the user to give preferences through a user style sheet. Or allow the user to magnify text.
4.3 Allow the user to control foreground color. [Priority 1]
4.4 Allow the user to control background color. [Priority 1]

Checkpoints for multimedia.

4.5 Allow the user to slow the presentation rate of audio, video, and animations. [Priority 1]
4.6 Allow the user to start, stop, pause, advance, and rewind audio, video, and animations. [Priority 2]
4.7 Allow the user to control the audio volume. [Priority 2]
4.8 Allow the user to control the position of captions on graphical displays. [Priority 1]

Checkpoints for synthesized speech:

4.9 Allow the user to control synthesized speech playback rate. [Priority 1]
4.10 Allow the user to control synthesized speech volume. [Priority 1]
4.11 Allow the user to control synthesized speech pitch, gender, and other articulation characteristics. [Priority 2]

Checkpoints for user interface accessibility:

4.12 Allow the user to select from available author and user style sheets or ignore them. [Priority 1]
Note. The browser's default style sheet is always present but may be overridden.
4.13 Allow the user to control how the selection is highlighted (e.g., foreground and background color). [Priority 1]
4.14 Allow the user to control how the content focus is highlighted (e.g., foreground and background color). [Priority 1]
4.15 Allow the user to control user agent-initiated spawned viewports . [Priority 2]
For example, in HTML, allow the user to control the process of opening a document in a new target frame or a viewport created by author-supplied

scripts. In SMIL 1.0, allow the user to control viewports created with the "new" value of the "show" attribute. Control may involve prompting the user to confirm or cancel the viewport creation. Users may also want to control the size or position of the viewport and to be able to close the viewport (e.g., with the "back" functionality).

Guideline 5. Observe system conventions and standard interfaces

Communicate with other software (e.g., assistive technologies, the operating system, plug-ins) through applicable interfaces. Observe conventions for the user agent user interface, documentation, installation, etc.

Part of user agent accessibility involves communication within the user's "accessibility environment." This includes:

- exchanging information about content and user agent user interface controls between the user agent and assistive technologies ,
- using standard communication channels for this exchange,
- following system conventions for user agent user interface design, documentation , and installation, and
- incorporating system-level user preferences (e.g., flags for high-contrast colors and "show" sounds for people with hearing disabilities) into the user agent.

Using interoperable APIs and following system conventions increases predictability for users and for developers of assistive technologies .

Checkpoints for content accessibility:

5.1 Provide programmatic read and write access to content by conforming to W3C Document Object Model (DOM) specifications and exporting interfaces defined by those specifications. [Priority 1]

For example, refer to DOM Levels 1 and 2 ([DOM1] , [DOM2]). User agents should export these interfaces using available operating system conventions.

Checkpoints for user interface accessibility:

5.2 Provide programmatic read and write access to user agent user interface controls using standard APIs (e.g., platform-independent APIs, standard APIs for the operating system, and conventions for programming languages, plug-ins, virtual machine environments, etc.) [Priority 1]

For example, ensure that assistive technologies have access to information about the current input configuration so that they can trigger functionalities through keyboard events, mouse events, etc.

5.3 Implement selection , content focus , and user interface focus mechanisms and make them available to users and through APIs . [Priority 1]
Refer also to checkpoint 7.1 and checkpoint 5.2. **Note.** This checkpoint is an important special case of checkpoint 5.2.
5.4 Provide programmatic notification of changes to content and user interface controls (including selection , content focus , and user interface focus). [Priority 1]
Refer also to checkpoint 5.2.
5.5 Ensure that programmatic exchanges proceed in a timely manner. [Priority 2]
This is important for synchronous alternative renderings and simulation of events.
5.6 Follow operating system conventions and accessibility settings. In particular, follow conventions for user interface design, default keyboard configuration, product installation, and documentation . [Priority 2]
Refer also to checkpoint 10.5.

Guideline 6. Implement accessible specifications

Implement open specifications such as W3C Recommendations. Implement the accessibility features of any specification.

Developers should implement open and accessible specifications. Conformance to open specifications promotes interoperability and accessibility by making it easier to design assistive technologies (also discussed in guideline 5). W3C specifications (e.g., HTML 4.0 [HTML40] , CSS 1 [CSS1] , CSS 2 [CSS2] , MathML [MATHML] , SMIL 1.0 [SMIL] , etc.) promote accessibility for the following reasons:

- W3C specifications include "built-in" accessibility features.
- W3C specifications undergo early review to ensure that accessibility issues are considered during the design phase.
- W3C specifications are developed in an open, industry consensus process.

Checkpoints for content accessibility:

6.1 Implement the accessibility features of supported specifications (markup languages, style sheet languages, metadata languages, graphics formats, etc.). [Priority 1]
Note. The Techniques Document [UA-TECHNIQUES] addresses the accessibility features of W3C specifications.
6.2 Conform to W3C specifications when they are appropriate for a task. [Priority 2]
For instance, for markup, implement HTML 4.0 [HTML40] or XML 1.0 [XML] . For style sheets, implement CSS ([CSS1] , [CSS2]). For mathematics, implement MathML [MATHML] . For synchronized multimedia, implement SMIL 1.0 [SMIL] . For access to the structure of HTML or XML documents, implement the DOM ([DOM1] , [DOM2]). [-Tcontent-access--api]
Note. For reasons of backward compatibility, user agents should continue to support deprecated features of specifications. The current guidelines refer to some deprecated language features that do not necessarily promote

accessibility but are widely deployed.

Guideline 7. Provide navigation mechanisms

Provide access to content through a variety of navigation mechanisms: direct navigation, sequential navigation, searches, structured navigation, etc.

Providing a variety of navigation mechanisms helps users with disabilities (and all users) access content more quickly. Content navigation is particularly important to users who access content serially (e.g., as synthesized speech or single-line refreshable Braille).

Sequential navigation (e.g., line scrolling, page scrolling, sequential navigation through active elements, etc.) means advancing (or rewinding) through rendered content in well-defined steps (line by line, screen by screen, link by link, etc.). Sequential navigation can provide context, but require more time to reach the target information. Sequential navigation is important to users who cannot scan a page for context and benefits all users unfamiliar with a page. Sequential access may be based on element type (e.g., links only), content structure (e.g., navigate from header to header), or other criteria.

Direct navigation (go to a particular link or paragraph, search for instances of this string, etc.) is faster than sequential navigation, but generally requires familiarity with the content. Direct navigation is important to users with some physical disabilities and benefits all "power users." Selecting text or structured content with the pointing device is another form of direct navigation. Searching on text is one important variant of direct navigation.

Structured navigation mechanisms such as navigation of headers, tables, lists, etc. offer both context and speed. For information about navigation of the Document Object Model, refer to checkpoint 5.1.

User agents should allow users to configure navigation mechanisms (e.g., to allow navigation of links only, or links and headers, or tables and forms, etc.). Refer also to guideline 10..

Checkpoints for user interface accessibility:

7.1 Allow the user to navigate viewports (including frames). [Priority 1]
Note. For example, when all frames of a frameset are displayed side-by-side, allow the user to navigate among them with the keyboard. Or, when frames are accessed or viewed one at a time (e.g., by a text browser or speech synthesizer), provide a list of links to other frames. Navigating into a viewport makes it the current viewport .

7.2 For user agents that offer a browsing history mechanism, when the user returns to a previous viewport, restore the point of regard in the viewport . [Priority 1]
For example, when users navigate "back" and "forth" among viewports, they should find the viewport position where they last left it.

7.3 Allow the user to navigate all active elements . [Priority 1]

Note. This checkpoint is an important special case of checkpoint 7.6.

7.4 Allow the user to navigate just among all active elements . [Priority 2]

Note. In checkpoint 7.3, navigation may include non-active elements in addition to active elements.

7.5 Allow the user to search for rendered text content, including text equivalents of visual and auditory content. [Priority 2]

Note. Use operating system conventions for marking the result of a search (e.g., selection or content focus).

7.6 Allow the user to navigate according to structure. [Priority 2]

For example, allow the user to navigate familiar elements of a document: paragraphs, tables and table cells, headers, lists, etc. **Note.** Use operating system conventions to indicate navigation progress (e.g., selection or content focus).

7.7 Allow the user to configure structured navigation. [Priority 3]

For example, allow the user to navigate only paragraphs, or only headers and paragraphs, etc.

Guideline 8. Orient the user

Provide information to the user about content and viewport structure and metadata to help the user understand browsing context.

All users require clues to help them understand their "location" when browsing. Graphical user agents provide clues such as proportional scroll bars to indicate how much content has been viewed. A highlighted selection or content focus (either visually or aurally) distinguishes the selected or focused content from other content. User agent history allows users to track and undo their browsing path. HTML 4.0 includes THEAD and TBODY elements ([HTML40] , section 11.2.3) that allow authors to create table headers and footers so that user agents can scroll table content while keeping table head and foot visible on the screen.

Orientation mechanisms such as these are especially important to users who view content through serial means such as speech or Braille (current tactile technology is limited in the amount of information that can be displayed). For instance, these users cannot "scan" a graphically displayed table with their eyes for information about a table cell’s headers, neighboring cells, etc. User agents must provide other means for users to understand table cell relationships, frame relationships (what relationship does the graphical layout convey?), form context (have I filled out the form completely?), link information (have I already visited this link?), etc.

User agents must make orientation information available in an output device-independent manner. Refer also to guideline 1.

Checkpoints for content accessibility:

8.1 Convey the author-specified purpose of each table and the relationships among the table cells and headers. [Priority 1]

For example, provide information about table headers, how headers relate to cells, table summary information, cell position information, table dimensions, etc. Refer to Refer also to checkpoint 5.1. **Note.** This checkpoint is an important special case of checkpoint 2.1.

8.2 Indicate whether a link has been marked up to indicate that following it will involve a fee. [Priority 2]

Note. This checkpoint is an important special case of checkpoint 8.3. "Common Markup for micropayment per-fee-links" [MICROPAYMENT] describes how authors may mark up micropayment information in an interoperable manner. This information may be provided through the standard user interface provided the interface is accessible. Thus, any prompt asking the user to confirm payment must be accessible.

8.3 Provide information to help the user decide whether to follow a link. [Priority 3]

Note. Useful information includes: whether the link has already been visited, whether it designates an internal or external anchor, the type of the target resource, the length and size of an audio or video clip that will be started, and the expected natural language of target resource.

Checkpoints for user interface accessibility:

8.4 Provide a mechanism for highlighting and identifying (through a standard interface where available) the current viewport , selection , and content focus . [Priority 1]

Note. This includes highlighting and identifying frames. Refer also to checkpoint 9.1.

8.5 Provide a "outline" view of content, built from structural elements (e.g., frames, headers, lists, forms, tables, etc.) [Priority 2]

For example, for each frame in a frameset, provide a table of contents composed of headers where each entry in the table of contents links to the header in the document. **Note.** The outline view doesn't have to be navigable, but if it is, it may satisfy checkpoint 7.6.

8.6 Allow the user to configure the outline view. [Priority 3]

For example, allow the user to control the level of detail of the outline. Refer also to checkpoint 8.5. Refer also to checkpoint 5.2.

8.7 Allow the user to configure what information about links to present. [Priority 3]

Note. Using color as the only distinguishing factor between visited and unvisited links does not suffice since color may not be perceivable by all users or rendered by all devices. Refer also to checkpoint 8.3.

8.8 Provide a mechanism for highlighting and identifying (through a standard interface where available) active elements. [Priority 3]

Note. User agents may satisfy this checkpoint by implementing the appropriate style sheet mechanisms, such as link highlighting.

8.9 Maintain consistent user agent behavior and default configurations between software releases. Consistency is less important than accessibility and adoption of operating system conventions. [Priority 3]

In particular, make changes conservatively to the layout of user interface controls, behavior of existing functionalities, and default keyboard configuration.

Guideline 9. Notify the user of content and viewport changes

Alert users, in an output device-independent fashion, of changes to content or viewports.

For people with visual disabilities or certain types of learning disability, it is important that the point of regard remain as stable as possible. Unexpected changes may cause users to lose track of how many viewports are open, which is the current viewport, etc. User agents should notify the user of content and viewport changes caused by dynamic content, or allow users to turn off scripts entirely (refer to checkpoint 3.7).

User agents must ensure that notifications are available in an output device-independent manner. Refer also to guideline 1.

Checkpoints for user interface accessibility:

9.1 Provide information about user agent-initiated content and viewport changes through the user interface and through APIs [Priority 1]

For example, inform the users when a script causes a popup menu to appear.

9.2 Ensure that when the selection or content focus changes, it is in a viewport after the change. [Priority 2]

9.3 Prompt the user to confirm any form submission triggered indirectly, that is by any means other than the user activating an explicit form submit control. [Priority 2]

For example, do not submit a form automatically when a menu option is selected, when all fields of a form have been filled out, or when a mouseover event occurs.

9.4 Allow the user to configure notification preferences for common types of content and viewport changes. [Priority 3]

For example, allow the user to choose to be notified (or not) that a script has been executed, that a new viewport has been opened, that a pulldown menu has been opened, that a new frame has received focus , etc.

9.5 When loading content (e.g., document, video clip, audio clip, etc.) indicate what portion of the content has loaded and whether loading has stalled. [Priority 3]

9.6 Indicate the relative position of the viewport in content (e.g., the percentage of an audio or video clip that has been played, the percentage of a Web page that has been viewed, etc.). [Priority 3]

Note. The user agent may calculate the percentage according to content focus position, selection position, or viewport position, depending on how the user has been browsing.

Guideline 10. Allow configuration and customization

Allow users to configure the user agent so that frequently performed tasks are made convenient, and to save their preferences.

Web users have a wide range of capabilities and must be able to configure the user agent according to their preferences for styles, graphical user interface configuration, keyboard configuration, etc.

Refer also to checkpoint 8.9.

Checkpoints for user interface accessibility:

10.1 Provide information directly to the user and through APIs about current user preferences for input configurations (e.g., keyboard or voice bindings). [Priority 1]
10.2 Provide information directly to the user and through APIs about current author-specified input configurations (e.g., keyboard bindings specified in content such as by "accesskey" in HTML 4.0). [Priority 2]
10.3 Allow the user to change and control the input configuration . Allow the user to configure the user agent so that some functionalities may be activated with a single command (e.g., single key, single voice command, etc.). [Priority 2]

For voice-activated browsers, allow the user to modify what voice commands activate functionalities Similarly, allow the user to modify the graphical user agent user interface for quick access to commonly used functionalities (e.g., through buttons).

10.4 Use operating system conventions to indicate the input configuration . [Priority 2]

For example, on some operating systems, if a functionality is available from a menu, the letter of the key that will activate that functionality is underlined. **Note.** This checkpoint is an important special case of checkpoint 5.6.

10.5 Avoid default input configurations that interfere with operating system conventions. [Priority 2]

For example, the default configuration should not include "Alt-F4" or "Control-Alt-Delete" on operating systems where that combination has special meaning to the operating system. In particular, default configurations should not interfere with the mobility access keyboard modifiers reserved for the operating system. Refer also to guideline 5.

10.6 Allow the user to configure the user agent in named profiles that may be shared on systems with distinct user accounts. [Priority 2]

Users must be able to select from among available profiles or no profile (i.e., the user agent default settings).

10.7 Provide default input configurations for frequently performed tasks. [Priority 3]

Make the most frequently operations easy to access and operable through a single command. In particular, provide convenient mappings to functionalities that promote accessibility such as navigation of links. Functionalities include being able to show, hide, resize and move graphical viewports created by the user agent.

10.8 Allow the user to configure the arrangement of graphical user agent user interface controls. [Priority 3]

Guideline 11. Provide accessible product documentation and help

Ensure that the user can learn about software features from documentation, notably those that relate to accessibility.

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 (CD-ROM, diskette, over the Web), by fax, or by telephone.

Some people cannot use printed documents. Vendors should provide accessible electronic documentation for users with visual disabilities, learning disabilities, or physical disabilities. Alternative hardcopy formats may also benefit some users.

Since users who are not disabled are generally unaware of software features designed specifically for accessibility, those features should be clearly documented. This will allow users with disabilities to learn about the software more easily.

Documentation of keyboard access is very important to users with visual disabilities and some types of physical disabilities and must be readily available. Without this documentation, a user with a disability (or multiple disabilities) may not think that a particular task can be performed. Or the user may try to use a very inefficient technique to perform a task, such as using a pointing device (like a mouse), or using an assistive technology's mouse emulation keystrokes.

Refer also to checkpoint 5.6.

Checkpoints for user interface accessibility:

11.1 Provide a version of the product documentation that conforms to the Web Content Accessibility Guidelines. [Priority 1]

User agents may provide documentation in many formats, but at least one must conform to the Web Content Accessibility Guidelines [WAI-WEBCONTENT] . Alternative equivalents for content , navigation mechanisms, and illustrations will all help make the documentation accessible.

11.2 Document all user agent features that promote accessibility. [Priority 1]

For example, review the documentation or help system to ensure that it includes information about the functionalities addressed by the checkpoints of this document.

11.3 Document the default input configuration (e.g., default keyboard bindings). [Priority 1]

11.4 In a dedicated section, document all features of the user agent that promote accessibility. [Priority 2]

For example, list all pertinent features in a chapter entitled "Accessibility Features". Note that this is a more specific requirement than checkpoint 11.2.

3. Appendix: Glossary

Active element

Active elements have associated behaviors that may be ***activated*** (or "triggered") either through user interaction or through scripts. Which elements are active depends on the document language and whether the features are supported by the user agent. In HTML documents, for example, active elements include links, image maps, form controls, element instances with a value for the "longdesc" attribute, and element instances with associated scripts (event handlers) explicitly associated with them (e.g., through the various "on" attributes).

An active element's behavior may be triggered through any number of mechanisms, including the mouse, keyboard, an API, etc. The effect of activation depends on the element. For instance, when a link is activated, the user agent generally retrieves the linked resource. When a form control is activated, it may change state (e.g., check boxes) or may take user input (e.g., a text field). Activating an element with a script assigned for that particular activation mechanism (e.g., mouse down event, key press event, etc.) causes the script to be executed.

Most systems use the content focus to designate the active element the user wishes to trigger.

Alternative Equivalents for Content

Since rendered content in some forms is not always accessible to users with disabilities, authors must supply alternative equivalents for content. In the context of this document, the equivalent must fulfill essentially the same function for the person with a disability (at least insofar as is feasible, given the nature of the disability and the state of technology), as the "primary" content does for the person without any disability. For example, the text "The Full Moon" might convey the same information as an image of a full moon when presented to users. Note that equivalent information focuses on fulfilling the same function. If the image is part of a link and understanding the image is crucial to guessing the link target, an equivalent must also give users an idea of the link target. User agents must make the alternative equivalent content available to users or software that require it (in place of and/or in addition to the "primary" content). Alternative representations include ***text equivalents*** (long and short, synchronized and unsynchronized) and non-text equivalents (e.g., captions , auditory descriptions , a visual track that shows sign language translation of a written text, etc.).

The Techniques Document [UA-TECHNIQUES] describes the different mechanisms authors use to supply alternative equivalents for content. Please also consult the Web Content Accessibility Guidelines [WAI-WEBCONTENT] and the associated Techniques document [WAI-WEBCONTENT-TECHS] .

Application Programming Interface (API)

An application programming interface (API) defines how communication may take place between applications.

Assistive Technology

In the context of this document, an assistive technology is a user agent that relies on one or more other user agents to help people with disabilities interact with a computer. For example, screen reader software is an assistive technology because it relies on browsers or other application software to enable Web access, notably for people with visual and learning disabilities.

Examples of assistive technologies that are important in the context of this document include the following:

- screen magnifiers, which are used by people with visual disabilities to enlarge and change colors on the screen to improve the visual readability of text and images.
- screen readers, which are used by people who are blind or have reading disabilities to read textual information through synthesized speech or Braille displays.
- alternative keyboards, which are used by people with certain physical disabilities to simulate the keyboard.
- alternative pointing devices, which are used by people with certain physical disabilities to simulate mouse pointing and button activations."

Beyond this document, an assistive technology consists of software or hardware that has been specifically designed to assist people with disabilities in carrying out daily activities, e.g., wheelchairs, reading machines, devices for grasping, alternative computer keyboards or pointing devices, etc.)

Auditory Description

An auditory description is either a prerecorded human voice or a synthesized voice (recorded or generated on the fly) describing the key visual elements of a presentation. The auditory description is synchronized with the auditory track of the presentation, usually during natural pauses in the auditory track. Auditory descriptions include information about actions, body language, graphics, and scene changes.

Author Styles

Style property values that originate in documents, their associated style sheets, or come from a server are called author styles.

Captions

Captions (or sometimes "closed captions") are text transcripts that are synchronized with other auditory or visual tracks. They convey information about spoken words and non-spoken sounds such as sound effects. Captions benefit people who are deaf and hard-of-hearing, and anyone who cannot hear the audio (e.g., when in a crowded room). Captions are generally rendered graphically above, below, or superimposed over video. **Note.** Other terms including the word "caption" may have different meanings in this document. For instance, a "table caption" is a title for the table, often positioned graphically above or below the table. In this document, the intended meaning of "caption" will be clear from context.

Configure

To set user preferences. This may be done through the user agent's user interface , through configuration files, by scripts, etc.

Control

In the context of this document, "user control" of the user agent interface, behavior, styles, etc. means that the user can choose preferred behavior from a set of options. For instance, control of colors means that the user can choose from available colors, within the limits offered by the operating system or user agent.

The term "control" also means "user interface component" or "form component" in this document. Which meaning is intended will be apparent from context.

Device-independence

The ability to make use of software via any input or output device API provided by the operating system and used by the user agent. User agents should follow operating system conventions and use standard APIs for device input and output.

Documentation

Documentation includes **all** product documentation, notably installation instructions, the help system, and all product manuals.

Documents, Elements, and Attributes

A document may be seen as a hierarchy of elements. ***Element*** types are defined by a language specification (e.g., HTML 4.0 or an XML application). Elements may include content (that may be rendered) and make have ***attributes*** that take values (and may also be rendered).

Events and scripting, Event Handler

When certain events occur (loading or unloading events, mouse press or hover events, keyboard events, etc.), user agents often perform some task (e.g., execute a script). For instance, in most user agents, when a mouse button is released over a link, the link is activated and the linked resource retrieved. User agents may also execute author-defined scripts when certain events occur. The script bound to a particular event is called an ***event handler***. **Note.** The interaction of HTML, style sheets, the Document Object Model ([DOM1] , [DOM2]), and scripting is commonly referred to as "Dynamic HTML" or DHTML. However, as there is no W3C specification that formally defines DHTML, this document will only refer to event handlers and scripts.

Focus, ***Content focus***, ***User interface focus***, ***Current focus***

The term "focus" refers to two identifying mechanisms of user agents:

1. The "content focus" designates an active element in a document. A viewport has at most one content focus.
2. The "user interface focus" designates a control of the user interface that will respond to user input (e.g., a radio button, text box, menu, etc.).

The term "focus" encompasses both types of focus. Where one is meant specifically in this document, it is identified.

When several viewports co-exist, each may have a content and user interface focus. At all times, only one content focus **or** one user interface focus is active, called the current focus. The current focus responds to user input. The current

may be toggled between content focus and user interface focus through the keyboard, pointing device, etc. Both the content and user interface focus may be highlighted .

Graphical

In this document, the term "graphical" refers to information (text, graphics, colors, etc.) rendered for visual consumption.

Highlight

Any mechanism used to emphasize selected or focused content. For example, graphical highlight mechanisms include dotted boxes, underlining, and reverse video. Synthesized speech highlight mechanisms include altered voice pitch or volume.

Input Configuration

Every user agent functionality available to the user is mapped to some user interface mechanism such as menus, buttons, keyboard shortcuts, voice commands. The default input configuration is the mapping the user finds after installation of the software; it must be part of the user agent documentation .

Native support

A user agent supports a feature natively if it does not require another piece of software (e.g., plug-in or external program) for support. Operating system features adopted as part of the user agent are considered native. However, since the user agent is responsible for the accessibility of native features, it is also considered responsible for the accessibility of adopted operating system features.

Natural Language

Spoken, written, or signed human languages such as French, Japanese, and American Sign Language. The natural language of content may be indicated in markup (e.g., by the "lang" attribute in HTML 4.0 ([HTML40] section 8.1), the HTML 4.0 "hreflang" attribute for links ([HTML40] , section 12.1.5), or by the HTTP Content-Language header ([RFC2616] , section 14.12).

Point of Regard

The "point of regard" is the position of the viewport in content. Since users may be viewing content with browsers that render graphically , as speech, as Braille, etc., what is meant precisely by "the point of regard" may vary. It may, depending on the user agent and browsing context, refer to a two dimensional area (e.g., for graphical rendering) or a single point (e.g., for aural rendering or voice browsing). User agents should not change the point of regard unexpectedly as this can disorient users.

Properties, Values, and Defaults

A user agent renders a document by applying formatting algorithms and style information to the document’s elements. Formatting depends on a number of factors, including where the document is rendered: on screen, on paper, through speakers, on a Braille device, on a mobile device, etc. Style information (e.g., fonts, colors, voice inflection, etc.) may come from the elements themselves (e.g., certain style attributes in HTML), from style sheets, or from user agent settings. For the purposes of these guidelines, each formatting or style option is governed by a ***property*** and each property may take one value from a set of

legal values. (The term "property" in this document has the meaning ascribed in CSS 2 ([CSS2] , section 3). A reference to "styles" in this document means a set of style-related properties.

The value given to a property by a user agent when it is installed is called the property's ***default value***.

Recognize

A user agent is said to recognize markup, content types, or rendering effects when it can identify (through built-in mechanisms, Document Type Definitions (DTDs) style sheets, headers, etc) the information. For instance, HTML 3.2 user agents may not recognize the new elements or attributes of HTML 4.0. Similarly, a user agent may recognize blinking content specified by elements or attributes, but may not recognize that an applet is blinking. The Techniques Document [UA-TECHNIQUES] lists some markup known to affect accessibility.

Rendered content

An element's rendered content is that which a user agent renders for the element. This may be what appears between the element's start and end tags, the value of an attribute (c.f. the "alt", "title", and "longdesc" attributes in HTML), or external data (e.g., the IMG element in HTML). Content may be rendered to a graphical display, to an auditory display (to a speaker as speech and non-speech sounds) or to a tactile display (Braille and haptic displays). Refer also to the description of alternative equivalents for content.

Selection, ***Current Selection***

The "selection" generally identifies a range of content (text, images, etc.) in a document. The selection may be structured (based on the document tree) or unstructured (e.g., text-based). Content may be selected through user interaction, scripts, etc. The selection may be used for a variety of purposes: for cut and paste operations, to designate a specific element in a document, to identify what a screen reader should read, etc.

The selection may be set by the user (e.g., by a pointing device or the keyboard) or through an application programming interface (API). A viewport has at most one selection (though the selection may be rendered graphically as discontinuous text fragments). When several viewports co-exist, each may have a selection, but only one is active, called the current selection.

On the screen, the selection may be highlighted using colors, fonts, graphics, or other assistive technologies may provide alternative presentation of the selection through speech, enlargement, or refreshable Braille display.

Text transcript

A text transcript is a text equivalent of audio information (e.g., an audio clip). It provides text for both spoken words and non-spoken sounds such as sound effects. Text transcripts make presentations accessible to people who are deaf-blind (they may be rendered as Braille) and to people who cannot play movies, animations, etc. Transcripts may be generated on the fly (e.g., by speech-to-text converters). Refer also to captions .

Spawned Viewport

Viewports that are created by the user agent. This refers to viewports that display content and does not include, for example, messages or prompts to the

user.

Standard Device Application Programming Interfaces

Operating systems are designed to be used by default with devices such as pointing devices, keyboards, voice input, etc. The operating system (or windowing system) provides "standard APIs " for these devices. On desktop computers today, the standard input APIs are for the mouse and keyboard. For touch screen devices or mobile devices, standard input APIs may include stylus, buttons, voice, etc. The display and sound card are considered standard ouput devices for a graphical desktop computer environment and each has a standard API.

User-initiated, User Agent-initiated

User-initiated actions result from user input to the user agent. User Agent-initiated actions result from scripts, operating system conditions, or built-in user agent behavior.

User Agent

A user agent is an application that retrieves and renders Web resources, including text, graphics, sounds, video, images, and other objects. A user agent may require additional user agents that handle some types of content. For instance, a browser may run a separate program or plug-in to render sound or video. User agents include graphical desktop browsers, multimedia players, text browsers, voice browsers, and assistive technologies such as screen readers, screen magnifiers, speech synthesizers, onscreen keyboards, and voice input software.

User Interface

For the purposes of this document, "user interface" includes both:

1. the "***user agent user interface***", i.e., the controls and mechanisms offered by the user agent for user interaction, such as menus, buttons, keyboard access, etc.
2. the "***content user interface***", i.e., the active elements that are part of content, such as form controls, links, applets, etc. that are implemented natively .

The document distinguishes them only where required for clarity.

User Styles

Style property values that come from user interface settings, user style sheets, or other user interactions are called user styles.

Views, Viewports, and Current View

User agents may handle different types of source information: documents, sound objects, video objects, etc. The user perceives the information through a ***viewport***, which may be a window, frame, a piece of paper, a speaker, a virtual magnifying glass, etc. A viewport may contain another viewport (e.g., nested frames).

User agents may render the same content in a variety of ways; each rendering is called a ***view***. For instance, a user agent may allow users to view an entire document or just a list of the document's headers. These are two different views of the document.

The view is *how* source information is rendered and the viewport is *where* it is

rendered. The viewport that contains both the current focus and the current selection is called the ***current viewport***. The current viewport is generally highlighted when several viewports co-exist.

Generally, viewports give users access to all rendered information, though not always at once. For example, a video player shows a certain number of frames per second, but allows the user to rewind and fast forward. A graphical browser viewport generally features scrollbars or some other paging mechanism that allows the user to bring the rendered content into the viewport.

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