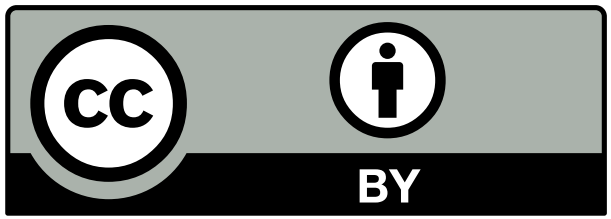
Web Accessibility

Péter Jeszenszky

Faculty of Informatics, University of Debrecen

October 27, 2025

Terms of Use



What is Web Accessibility?

"Web accessibility means that websites, tools, and technologies are designed and developed so that people with disabilities can use them."

- See: Introduction to Web Accessibility (WAI)
- Remember that "Web for all" is one of the four design principles of the W3C.
  - See: Our mission – Our design principles (W3C)
- Recommended video: Web Accessibility Perspectives (WAI)

Web Accessibility vs Accessibility

- Web accessibility is a special case (or subset) of the broader concept of accessibility.
- For a formal definition of accessibility, see, for example:
  - Convention on the Rights of Persons with Disabilities (CRPD)
    - See: Article 9 – Accessibility
- The common abbreviation for accessibility is **a11y**.

Disability (1)

- According to WHO statistics, 1.3 billion people experience significant disability, which represents 16% of the world's population.
  - See: Disability (WHO)
- Disability statistics:
  - UN Disability Statistics (United Nations Statistics Division)
  - Population with disability (Eurostat)

Disability (2)

Recommended terminology:

- The United Nations Disability-Inclusive Communications Guidelines

Disability (3)

The content of this slide is communicated only orally in the lecture.

Disability (4)

Major types of disabilities that can affect computer literacy:

- Visual disabilities:
  - Low vision
  - Blindness
  - Color blindness
- Cognitive and learning disabilities:
  - ADHD
  - Autism
  - Dyslexia
- Motor (physical) disabilities:
  - Amputation
  - Parkinson's disease
  - Paralysis
- Hearing disabilities:
  - Partial or total hearing loss

Disability (5)

The content of this slide is communicated only orally in the lecture.

Disability (6)

Disability simulators:

- NoCoffee Vision Simulator (written in: JavaScript; license: MIT License) https://github.com/eeejay/NoCoffee
  - Firefox and Google Chrome extension.
- Web Disability Simulator (written in: JavaScript; license: ISC License) https://github.com/Metamatrix/web-disability-simulator
  - Google Chrome extension.

Web Accessibility for the Benefit of All

- All users can benefit from web accessibility.
- Example scenarios in which accessibility is helpful:
  - Small screen use
  - Wrong light conditions
  - Noisy or quiet environments
  - Bad network conditions or limited bandwidth
  - Temporary disabilities
  - Reduced physical and mental capabilities due to aging

European Accessibility Act (EAA) (1)

- Directive (EU) 2019/882 of the European Parliament and of the Council of 17 April 2019
  - Products and services in the EU—including computers, operating systems, smartphones, ATMs, commercial and public sector websites—must be accessible to people with disabilities.
- EU Member States had to incorporate the EAA into their national law by June 28, 2022.
- EU Member States must ensure that covered products and services comply with the EAA by June 28, 2025.
- See also: European accessibility act

European Accessibility Act (EAA) (2)

- EN 301 549, “Accessibility requirements for ICT products and services”, is the standard that products and services must comply with under the EAA.
  - It is based on WCAG 2.1 Level AA.
  - See: EN 301 549 V3.2.1

Web Accessibility Initiative (WAI) (1)

- The W3C played a key role in popularizing web accessibility.
- W3C remains the leading force in web accessibility efforts.
- Within the W3C, web accessibility-related activities are carried out under the Web Accessibility Initiative (WAI).
- The WAI is not a working group; it is an effort that encompasses multiple working groups.

Web Accessibility Initiative (WAI) (2)

- W3C develops web accessibility standards through the WAI.
- WAI standards include:
  - Web Content Accessibility Guidelines (WCAG)
  - Authoring Tool Accessibility Guidelines (ATAG)
  - Accessible Rich Internet Applications (WAI-ARIA)
  - WebVTT

Web Content Accessibility Guidelines (WCAG) (1)

- The Web Content Accessibility Guidelines (WCAG) are the primary international standard for web accessibility.
- Current standard: Web Content Accessibility Guidelines (WCAG) 2.2 (W3C Recommendation, 12 December 2024)
  - ISO also ratified WCAG 2.2 as an international standard.
    - See: ISO/IEC 40500:2025: Information technology — W3C Web Content Accessibility Guidelines (WCAG) 2.2
- The European Union's current web accessibility regulation is also based on the WCAG.

Web Content Accessibility Guidelines (WCAG) (2)

- The WCAG defines principles and guidelines for creating web content that is accessible to a wide range of users.
- For each guideline, the standard provides testable success criteria.
- It also specifies three levels of conformance: A (lowest), AA, and AAA (highest).
    - The conformance level of web pages can be shown explicitly by using the official conformance logos: Adding WCAG Conformance Logos (W3C).

WCAG Success Criteria: Contrast (1)

Example for success criteria:

- Contrast (Minimum) (level AA):
  "*The visual presentation of text and images of text has a contrast ratio of at least 4.5:1 [...]*"
- Contrast (Enhanced) (level: AAA):
  "*The visual presentation of text and images of text has a contrast ratio of at least 7:1 [...]*"

WCAG Success Criteria: Contrast (2)

Measuring the contrast ratio:

- The contrast ratio of two colors is defined as $(L_1 + 0.05)/(L_2 + 0.05)$, where
  - L_1 is the relative luminance of the lighter of the colors, and
  - L_2 is the relative luminance of the darker of the colors.

WCAG Success Criteria: Contrast (3)

	Color	Contrast ratio	Conformance level
The five boxing wizards jump quickly	#FFFFFF (i.e., white)	12.95	AAA
The five boxing wizards jump quickly	#D3D3D3 (i.e., lightgray)	8.65	AAA
The five boxing wizards jump quickly	#A9A9A9 (i.e., darkgray)	5.51	AA
The five boxing wizards jump quickly	#808080 (i.e., gray)	3.28	–
The five boxing wizards jump quickly	#000000 (i.e., black)	1.62	–

WCAG Success Criteria: Contrast (4)

Tools for determining the contrast ratio of the foreground and the background color in HTML:

- WebAIM Contrast Checker
- Use the Accessibility picker in DevTools:
  - Firefox: Accessibility picker
- Use a browser extension, e.g., WAVE (see later)

Screen Readers (1)

The content of this slide is communicated only orally in the lecture.

Screen Readers (2)

Non-free software:

- Narrator (platform: Windows; license: non-free)
  - Narrator is a screen reader developed by Microsoft and shipped built-in with Windows.
  - It can be activated by pressing ctrl + Win + ⇝.
  - Documentation: Complete guide to Narrator
- VoiceOver (platform: iOS, macOS; license: non-free)
  https://www.apple.com/accessibility/features/
  - VoiceOver is a screen reader developed by Apple and shipped built-in with their devices.
- JAWS (Job Access With Speech) (platform: Windows; license: non-free)
  https://www.freedomscientific.com/products/software/jaws/

Screen Readers (3)

Free and open-source software:

- NVDA (platform: Windows; written in: Python; license: GPLv2)
  https://www.nvaccess.org/ https://github.com/nvaccess/nvda
  - NVDA (NonVisual Desktop Access) is a free, open-source screen reader for Windows.
- Orca (platform: Unix-like; written in: Python; license: LGPLv2.1)
  https://orca.gnome.org/ https://gitlab.gnome.org/GNOME/orca/
  - A free and open-source screen reader developed as part of the GNOME project.

Screen Readers (4)

Free and open-source software:

- TalkBack (platform: Android; written in: Java; license: Apache License 2.0) https://github.com/google/talkback
  - TalkBack is the default screen reader for the Android operating system, developed by Google as part of the Android Accessibility Suite.

Accessibility Support in Browsers

- Firefox: Accessibility features in Firefox - Make Firefox and web content work for all users
- Google Chrome: Google Accessibility – Products and Features
- Microsoft Edge: Accessibility features in Microsoft Edge

Developer Support in Browsers

- Firefox: Accessibility Inspector
- Google Chrome: Accessibility features reference (Chrome DevTools)
- Microsoft Edge: Accessibility-testing features (Microsoft DevTools)

Accessibility in Visual Studio Code

- See: Visual Studio Code documentation – Accessibility

Accessibility Checkers (1)

The content of this slide is communicated only orally in the lecture.

Accessibility Checkers (2)

- WAVE Web Accessibility Evaluation Tools https://wave.webaim.org/
  - Online tool
  - Browser extensions for Firefox, Google Chrome, and Microsoft Edge: https://wave.webaim.org/extension/
    - They are available for free; however, they are not free and open source software.
- axe: https://www.deque.com/axe/
  - A suite of accessibility testing tools built on the free and open-source accessibility testing engine axe-core:
    - axe-core (written in: JavaScript; license: Mozilla Public License 2.0) https://github.com/dequelabs/axe-core
  - Visual Studio Code extension: axe Accessibility Linter

Accessibility Checkers (3)

- Examples for a WAVE report:
  - https://wave.webaim.org/report#/https://www.w3.org/
  - https://wave.webaim.org/report#/https://sqlite.org/

Creating Accessible Web Pages: Proper Use of Elements

The content of this slide is communicated only orally in the lecture.

- Related success criteria:
  - Info and Relationships
  - Name, Role, Value

Creating Accessible Web Pages: Multimedia Content

The content of this slide is communicated only orally in the lecture.

- Related success criteria:
  - Text Alternatives
  - Captions (Prerecorded)
  - Audio Description (Prerecorded)

Creating Accessible Web Pages: Proper Use of Style

The content of this slide is communicated only orally in the lecture.

- Related success criterion: Use of Color

Further Resources

- Web Accessibility Initiative (WAI) – Tutorials
- Accessibility (MDN)
- Articles about Web Accessibility (WebAIM)
- AccessibleEU