

# Accessibility

Arnav Gupta

April 19, 2024

## Contents

<b>1</b>	<b>Types of Disabilities</b>	<b>1</b>
<b>2</b>	<b>Accessibility Approaches</b>	<b>1</b>
<b>3</b>	<b>Implementing Web Accessibility</b>	<b>4</b>

## 1 Types of Disabilities

UI Accessibility is developing content to be as accessibly as possible, no matter an individual's physical and cognitive abilities and how they access a UI.

Parallel with physical accessibility, access to UIs is considered a human right.

People vary in physical and mental capabilities (can be permanent, temporary, or situational). People have a range of ability dimensions like age, gender, cognitive, physical, culture, language, lived experience, emotional, and spiritual.

Temporary and Situational disabilities are sick/injured, driving a car, underwater diving, using an ATM, etc.

## 2 Accessibility Approaches

For those walking, as speed and difficulty increased, time to complete tasks and error rate increased. People read more slowly and answer questions more slowly while walking .

To address situational walking impairment, address reduced dexterity and motor control and reduced cognitive ability. Increase size of elements and visual cues and widget targets.

With higher age, motor coordination is reduced, visual and hearing impairments, and cognitive effects like loss of memory.

For age-related impairments, keep infor simple (cognitive), high contrast colours and large text/icons (vision), and large widget and button sizes (motor).

10 to 20% of the population is estimated to have a long term disability.

Modern OS support for accessibility is:

- control cursor from keyboard (motor)
- adjust acceleration, tracking, precision (motor)
- speech dictation (visual/motor)
- magnify portions of the screen, adjust element sizes or font size, provide full voice dictation (visual)
- captions/subtitles (audio)

For visual impairments:

- zoom screen or specific area, increase font size
- high contrast colours, dark mode, remove animations
- screen reader, voice input
- real world magnifier

For hearing impairments:

- show audio alerts visually (vibrate to flashlight alarm)
- realtime audio processing to filter background noise and amplify the voice of another person
- monitor audio for certain sounds and send alert (ex. baby crying)

For motor impairments:

- sticky keys, slow keys, filter keys
- reduce key repeat rate

- eye tracking, voice input
- physical switched and puffers
- brain-computer interfaces (BCI)

For cognitive impairments:

- word prediction, grammar and spell check
- text-to-speech
- augmenting text with icons and pictures
- slow down interface
  - avoid sudden state changes
  - reduce or remove unnecessary animations (ex. flickering)
  - eliminate time sensitive actions

Laws and programs designed to benefit vulnerable groups often end up benefiting all of society (curbcut effect).

Closed captions benefit more than just those with hearing impairments. Helps with watching in silence, noisy environments, learning a 2nd language, watching foreign language content, and data mining video content.

Legal obligations in Canada:

- Accessible Canada Act
  - government and federally regulated organizations
  - expected to use Web Content Accessibility Guidelines (WCAG)
  - fines up to \$250k
- Accessibility for Ontarians with Disabilities Act (since 2005)
  - applies to all Ontario government websites
  - applies to Ontario public and private entities (50+ employees)
  - must adhere to Web Content Accessibility Guidelines (WCAG) 2.0
  - fines up to \$100k

Legal obligations elsewhere:

- US Disabilities and Rehabilitation Act (section 508)
  - any organization doing business with federal agency or receives federal funding
- Americans with Disabilities Act (ADA)
  - non-profits, business, local and state governments
- European Union Web Accessibility Directive
  - all government websites
  - any organizations financed through public contracts

### 3 Implementing Web Accessibility

**Accessibilty tree:** the browser generates an accessibility tree from the DOM with accessibility-related info for most HTML elements like name, description, role, state

Can access accessibility tree from the DevTools accessibility tab.

Web Content Accessibility Guidelines:

- include alt text for info imgs
- use headings correctly
- give links unique and descriptive names
- use colour with care
- use tables for tabular data, not layout
- use ARIA roles and landmarks when necessary
- make dynamic content accessible
- make all content accessible using keyboard
- design forms for accessibility

Semantic HTML is using semantic elements that clearly describe the content meaning like article, aside, details, etc. Avoid using div and span for everything.

For Preact, avoid div for component root if semantic element possible. Use Fragment instead of div if root has no semantic purpose. Some components

could have different semantic roles, so use “as Element” pattern to set component root element.

Add link at the top of the page so screen readers can skip to content. Can use CSS to hide until focused.

ARIA (Accessible Rich Internet Applications) attributes are a specification to add semantics to elements.

ARIA roles (use only if not possible to use an HTML element): toolbar, tooltip, feed, math, presentation, note

ARIA states and properties (use only for attributes not supported on HTML element): aria-required, aria-checked, aria-disabled

ARIA attributes only change the the accessibility tree.

Colour blindness:

- dichromacy is 1 type of cone missing
  - protanopia: missing red cones
  - deuteranopia: missing gree cones
  - tritanopia: missing blue cones (and blue sensitive rods)
- monochromacy is 2 or 3 types of cones missing

Human ability to discriminate colours depends on context.

Colour contrast is ratio of perceived luminance for 2 colours, such as white on white (1.0), red on white (4.0), and black on white (21.0). Can be checked in DevTools.

WCAG colour contrast guidelines are minimum (level AA) at least 4.5 and enhanced (level AAA) at least 7.0.

Basic ally testing methods:

- disconnect mouse and try to use the app
  - tab and shift+tab to focus elements
  - enter to activate element
  - arrow keys when needed (menu dropdown)
- test with a screen reader

