Who is Accessibility for?

Let's say that you're walking to the bus stop to get home. Suddenly, however, you slip and fall on some ice and you break your dominant arm.

Or, few years into your career, you start to get brutal eyestrain from the bright screens and the fluorescent lights in your office, and it's making it hard to look at screens at all.

In both of these cases, you have an **accessibility need** that means it is more difficult for you to use a lot of technology than the average person - and you might benefit from practices that make technology more accessible.

Universal design

"**Universal Design (UD)** is the design and composition of an environment so that it can be **accessed, understood and used to the greatest extent possible by all people** regardless of their age, size, ability or disability."

"This is not a special requirement, for the benefit of only a minority of the population. It is a fundamental condition of good design."
(From Centre for Excellence in Universal Design)

The goal of accessible design is to make sure your technology can be used by as many people as possible, to the greatest extent possible.

Examples

From Statistics Canada

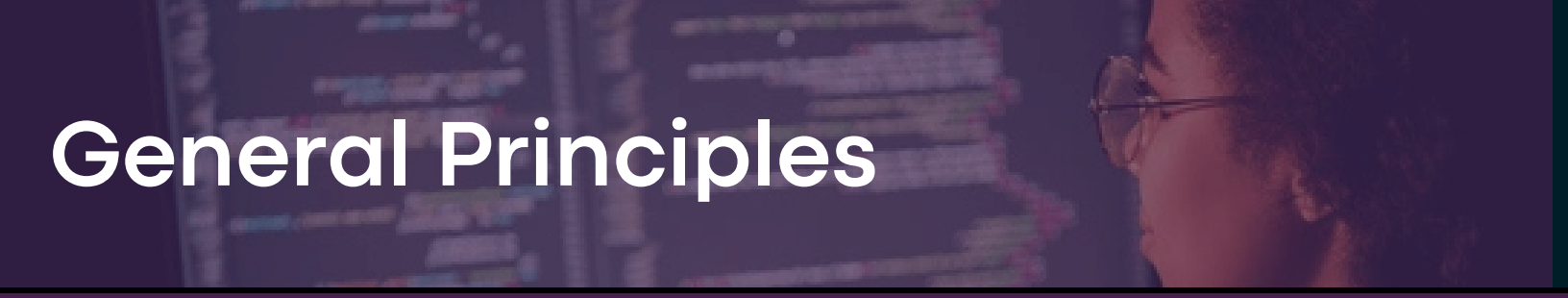
- Blind people or people with low vision
  - 2M Canadians have a vision-related disability
- Deaf or hard-of-hearing people
  - 1.6M Canadians have a hearing-related disability
- People with motor disabilities
  - 3.1M Canadians have a mobility-related disability
  - 1.5M Canadians have a dexterity-related disability

The List Goes On

- People who get eye strain from bright screens
- People in very loud (or very quiet) environments who can't use audio
- People using small phones or smartwatches
- People who have difficulty focusing on audio
- People with temporarily injured arms or hands
- Older people with worse eyesight/hearing

Conclusion

- Accessibility is for everyone!



General Principles

Consultation

- If you are building accessibility technology, consult with the people you are building it for
- If you are building any technology at all, consult with people who have accessibility needs to understand ways it could be more usable

Design with accessibility in mind

- Basic principle of software design: the earlier in the planning stages accessibility is considered, the easier it is to incorporate accessibility testing tools into your testing process and budget time to implement accessibility features

Extensibility and modifiability

- When users can develop their own extensions and modifications to technology, they can add their own accessibility features
- Open-source tech can be more easily modified to add new features than closed-source
- Extensions for existing tech may be a good starting point for projects

---

Terminology

Accessible design is for everyone, but it is often especially relevant in conversations about disability.

- Person-first language: “person with a disability”
  - Some prefer this because it emphasizes that their identity is not defined by disability.
- Condition-first language, e.g. “disabled person”
  - Some prefer this because they feel person-first language minimizes the impact of disability on their life.
  - Some prefer this because they feel person-first language is overly pathologizing in their case.
- If looking for specific terms to use, try the UN Geneva’s Disability-Inclusive Language Guidelines

When talking about any minority group, language tends to be very important. The language we use can convey particular impressions and biases about the people we’re talking about, which can both spread incorrect impressions about people and make them feel unwelcome or misunderstood.

Whenever possible, do your research and consult with people on what terminology is best to use, with the understanding that different people may have different preferences.

Making Tech Accessible

Here is a summary for some ideas for accessibility-related tech projects, feel free to use these in your own brainstorming!

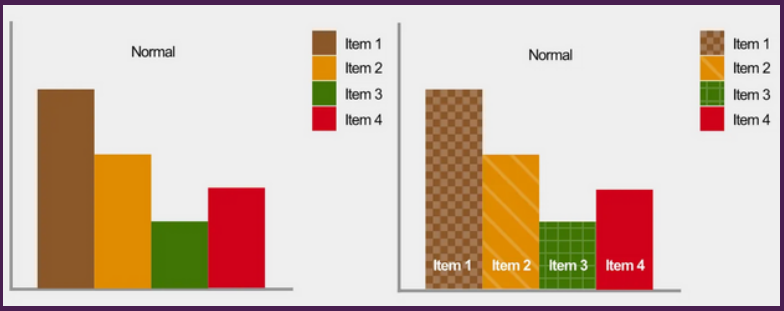
More details on each topic are provided on the following pages if you're interested.

Category	Summary	Project Ideas
Colour and size	• Around 1/20 people are colourblind in some manner. • Extended exposure to bright lights can cause eye strain and trigger migraines. • Small UI can be difficult for users to read.	• Extension/mod that adds the ColorADD Code to existing software • Build something that darkens downloaded PDFs, videos, images, or other media.
Audio & video	• Audio content may not be accessible to Deaf or hard-of-hearing people. • Many people have difficulty following audio/video content without text transcriptions.	• Extension/mod that uses AI speech-to-text to add transcripts to videos • Program that watches for flashing elements on screen that could cause seizures
Understandability	• A user may not be familiar with tech and common design paradigms. • The primary language of your content may be a second (or third, etc) language for a user.	• Web extension that identifies and auto-fills HTML input elements based on labels attached to them • Eye-tracking program that marks your place on a webpage/PDF
Operability	• Users of screen readers, voice control, and other accessibility tech often cannot use a mouse • Time requirements may be difficult to meet for some users	• Mod for a video game that makes it easier to play for someone who can only use a keyboard • Program or web extension that lets users stop/pause any moving content
Screen readers & voice control	• They may be used by people with vision impairments, people who have difficulty reading print, people who want to reduce eye strain	• Extension that uses AI to generate and automatically add image alt text or ARIA roles • Extension for an open-source screen reader making it compatible with a specialized piece of software
Voice control accessibility	• Used by people with motor issues, people with arm/hand injuries • Uses speech-to-text AI to recognize voice commands and translate them into keyboard input or programmed commands	• Extension for an open-source voice control tool like Talon to make it compatible with a specialized piece of software

Recommendations

Colour and Size

Convey information with symbols/text alongside colour



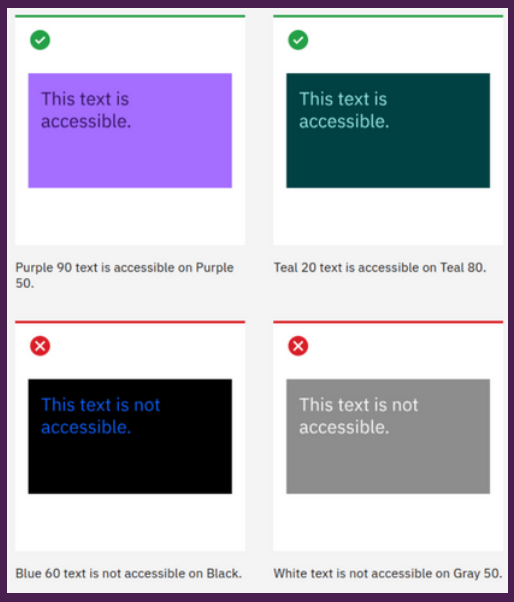
Use a colourblind-safe palette

- Colouring for Colourblindness has a palette viewer and links to lots of premade accessible palettes
- Color Contrast Checker lets you check text contrast against simple backgrounds
- Let's Get Color Blind (Chrome, Firefox) lets you view your own webpage with various filters simulating types of colourblindness

Test your UI on different screen sizes and magnifications

- Ensure UI/text can be resized without loss of content/functionality
- If your program can be used on mobile devices, ensure it is usable on small screens

From IBM's Design Language



Audio and Video

Avoid visual elements that could cause seizures

- Ensure nothing on-screen flashes **more than 3 times per second** (from WCAG guideline 2.3)

Transcripts and text alternatives for non-text content

- Have an option to add transcripts to any audio/video content.
- If non-text content (e.g. background audio) is intended to create a particular experience, use text to provide a description of the content.

Recommendations

Understandability

Make text content understandable

- Leverage those ENGL 199 skills (write clearly and understandably)
  - There are many resources online for clear writing; here is a guide for clear communication by IEEE.
- Ensure unusual words/phrases (e.g. idioms and jargon) and acronyms are identified/defined when they must be used
- If text requires advanced reading ability, provide supplemental content or a version that is understandable at a lower reading level

Help users correct mistakes

- Identify and provide clear explanations (and suggestions, if possible) if invalid input is entered
- Avoid requiring redundant information - use auto-population or allow automatic selection of the information when possible

Make content appear/operate predictably

- In general, software should operate in a way that is predictable and intuitive for that type of software
- Behaviour of particular elements should not change depending on context
- Navigation elements should appear in a consistent pattern where they are used
- The WCAG has detailed guidelines for predictable operation of webpages

Organize content

- Sensibly use titles, headers, and labels to clearly identify/organize content
- Clearly identify links and their purposes
- Use navigation elements to clearly identify a user's location among different pages/interfaces

---

Operability

Keyboard navigability

- All functionality should be operable by keyboard (without a mouse)
  - This is not to discourage mouse functionality - generally the more ways a user can interact with your interface, the better
- The user should be able to move keyboard focus to and from any element necessary to operate the program

Timing

- Time limits on entering content should be extendable or adjustable
- Content that automatically scrolls/updates should be able to be paused, or stopped

Recommendations

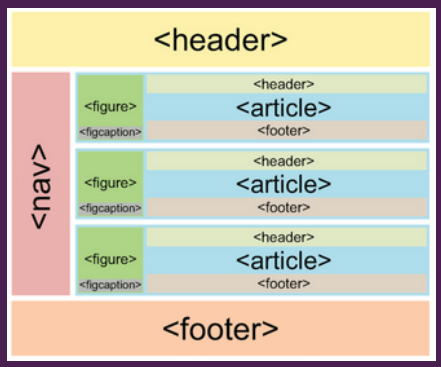
Screenreader Accessibility

Keyboard navigability

- Screen readers allow users to select elements using keyboard shortcuts.

Use HTML tags meaningfully

- Screen readers use HTML to understand the hierarchy of a webpage and convey that information comprehensively.



<img alt="Two people speak into a microphone at an event" src="https://www.ualberta.ca/media-library/indigenous-excellence/indigenous-excellence-homepage-1636x780.jpg">

Use ARIA roles and alt text

- ARIA roles are used to provide additional context to screen reader users where it is not immediately apparent from the HTML tag
  - An ARIA role can be added to any HTML element using role="aria role", where the role is one of a set of roles in the ARIA specification.
  - More information on ARIA roles and how to use them
- Alt text is used to convey the contents of an image on a webpage to screen reader users

Other resources on designing for screen readers

- Designing for Users of Screen Readers - Govt. of Canada (concise)
- Designing for Screen Reader Compatibility - WebAIM (more in-depth)
  - Has lots of specific information on how screen readers handle particular web elements

Recommendations

Voice Control Accessibility

What is voice control?

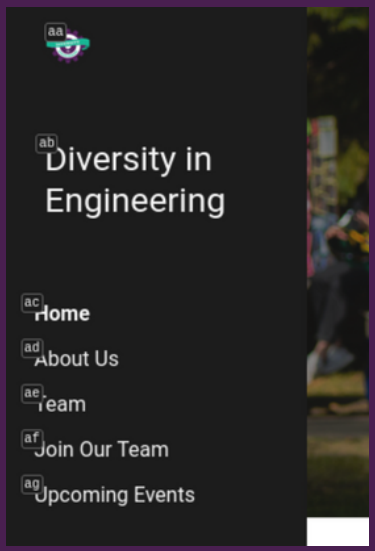
- Software that allows a user to control a computer without use of a keyboard/mouse, using only voice commands
- Notably **distinct from dictation software**
- May be supplemented by eye trackers (to move the mouse) or foot pedals (to use as key input)
- There is not much standardization between different voice control systems, information on mutual functionality, or information on how to design for voice control accessibility
- Native mobile voice control software, e.g. iOS Voice Control and Android Voice Control
- Native desktop voice control software, e.g. Mac Voice Control and Windows Speech Recognition
- Open-source/community-developed voice control software, e.g. Talon and Caster

Keyboard navigability

- Most voice control software allows the mouse to be moved, but it can be difficult and hard to do as accurately as with a mouse.
  - Some software uses a mouse grid to move the mouse to predetermined points on the screen, and some software integrates with eye tracking
- However, voice commands can easily be associated with keyboard shortcuts.
- Making your interface completely navigable by keyboard makes it a lot easier to use with voice control.

Use HTML elements meaningfully

- Tools like Rango or Vimium allow voice control users to select items on webpages easily using keyboard shortcuts (easy to associate with voice phrases).
  - These tools add keyboard navigability to interfaces that do not have it built-in (i.e. nearly all webpages).
- These tools identify selectable items on a page by looking for selectable HTML elements (e.g. button and input fields).



Other Resources

Web Accessibility Initiative

- The Web Accessibility Initiative develops standards and provides guidelines and support materials to make webpages accessible for a variety of users
- Much of this presentation summarizes information from the WCAG guidelines - check out **WCAG 2 at a Glance** for more comprehensive information and detailed standards.
- Resources they provide:
  - Multiple tutorials for developers looking to make webpages accessible
  - A comprehensive list of web accessibility evaluation tools
  - A guide to contacting organizations who maintain inaccessible websites
  - And more...

Govt. of Canada's Digital Accessibility Toolkit

- The Government of Canada has some helpful resources in their **Digital Accessibility Toolkit**
- Courses on web accessibility and more general EDI concepts
- Practical how-tos for accessible...
  - Virtual events
  - Documents (e.g. PDFs, MS Office)
  - Online courses
  - Emails
  - and more...

Centre for Excellence in Universal Design

- The **Centre for Excellence in Universal Design (CEUD)** was established by the National Disability Authority in Ireland to develop standards, provide education, and monitor compliance on universal design
- Resources they provide:
- Information on the Universal Design philosophy
- Techniques and information for developers on web accessibility (much of which references WCAG)
- Training on ARIA roles, accessibility testing, and more