Web Accessibility Overview

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Topics

1. Accessibility Overview

2. Keys to Web Accessibility

3. The Web: Under the Hood

4. Semantic Structure

5. Keyboard Support

6. Visual Focus Indicators

7. Logical Reading Order and Navigation

8. Presentation Alternatives

9. Color Contrast

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Disability: An Aspect of Diversity

Unique Experiences

- Those with disabilities experience the world in unique ways
  - Don't we all?

- Disability is not a single phenomenon
  - Informed by personal and socio-cultural factors

- May be permanent or temporary

- May not be visible to others (nonvisible)

- Consider in terms of barriers due to context

Common functional disability types:

- Visual (e.g., blindness, low-vision)
- Auditory (e.g., deafness, hard-of-hearing)
- Motor (e.g., paralysis, cerebral palsy, missing / damaged limbs)
- Cognitive (e.g., learning disabilities, dyslexia, traumatic brain injury)
- Seizure (e.g., epilepsy)
- Age-related impairments (e.g., decreased sensory acuity, dexterity, stamina)
- Psychiatric (e.g., Anxiety disorder, Bipolar Disorder, PTSD, Major Depressive Disorder)

The Three E's of Accessibility

In order to be considered accessible, electronic documents must have the following three characteristics:

- **Equally Integrated** – Providing similarly inclusive experience and access

- **Equally Effective** – Providing equal opportunity or outcome

- **Equivalent Ease of Use** – Providing access that is not substantially more difficult for users with a disability

Legal Technical Requirements

- Federal and state laws
  - Section 508 of the Rehabilitation Act of 1973, as amended
  - The Illinois IT Accessibility Act (IITAA)

- Web Content Accessibility Guidelines (WCAG) 2.0 Level AA
  - Level AA includes all Level A requirements

- Applied to non-web software and electronic content

- Requires support for all common operating environments and "user agents"
  - Commonly used web browsers
  - Assistive technologies (screen readers, text-to-speech, speech control, etc.)
  - Windows, MacOS, iOS, Android, etc.

Functional Modes of Interaction

The website and downloadable content must be usable by individuals with disabilities in the following modalities:

- Without vision, with limited vision, where a visual mode of operation is provided

- Without perception of color, where a visual mode of operation is provided

- Without hearing or with limited hearing, where an audible mode of operation is provided

- Without speech, where speech is used for input, control, or operation

- With limited manipulation, reach, and strength, where a manual mode of operation is provided

- With limited language, cognitive, and learning abilities; making the operation of the ICT easier for individuals with limited cognitive, language, and learning abilities

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Remember…

- Web accessibility is not just about those who are blind!

- Keep all the functional modalities of accessibility in mind when creating or reviewing web content

- Create user stories for yourself
  - See the Stories of Web Users page for suggestions (https://www.w3.org/WAI/people-use-web/user-stories/)
  - Ex: Ilya, senior staff member who is blind

The WCAG P.O.U.R. Principles

- The Web Content Accessibility Guidelines (WCAG) are divided into four principles:
    - Perceivable information and user interface
    - Operable user interface and navigation
    - Understandable information and user interface
    - Robust content and reliable interpretation

- Consider the principles from the perspective of each of the functional modalities

Keys to an Accessible Web Page

- Logical Semantic Structure (visual and programmatic)

- Keyboard Support

- Perceivable Focus Indicator

- Logical Reading Order and Navigation

- Sufficient Color Contrast

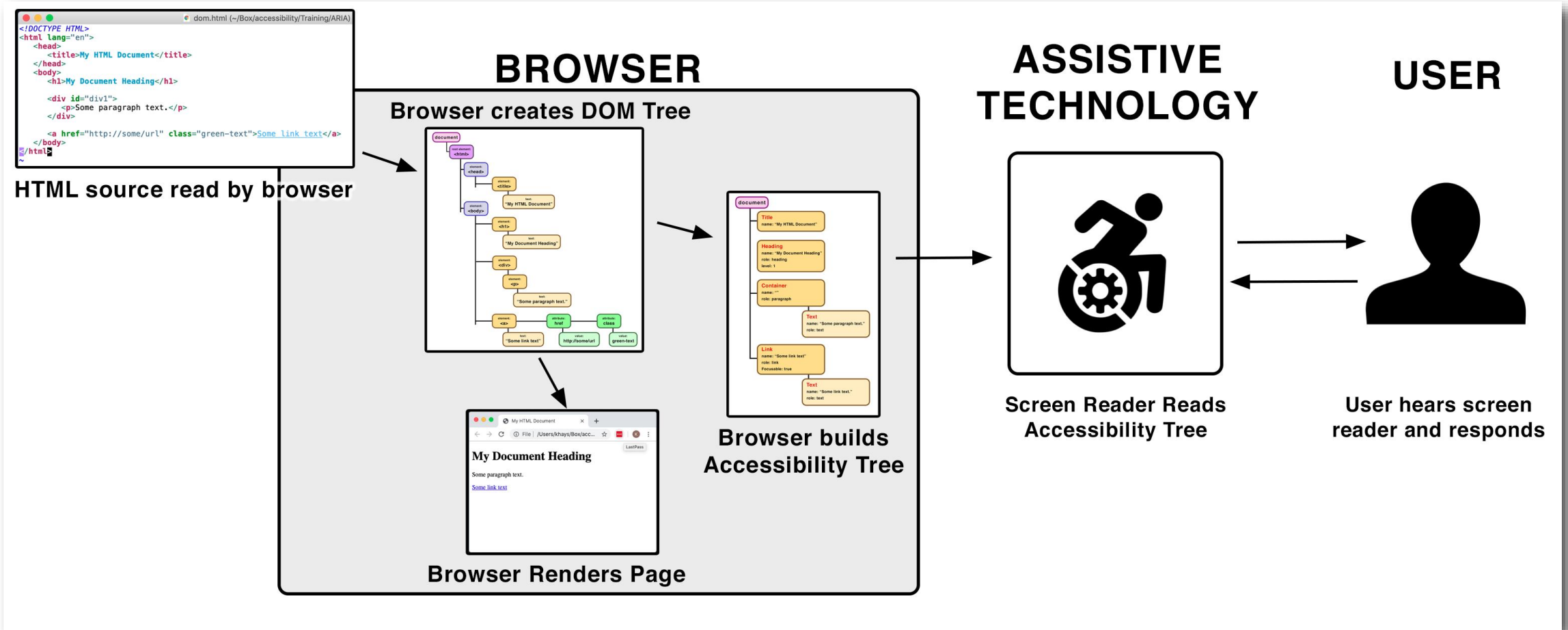- Presentation Alternatives (i.e., alt text, captions)

- Standard Coding

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How Browsers Parse Web Pages

HTML source read by browser

BROWSER

Browser creates DOM Tree

Browser builds Accessibility Tree

Browser Renders Page

ASSISTIVE TECHNOLOGY

Screen Reader Reads Accessibility Tree

USER

User hears screen reader and responds

The Page Source

My Document Heading

This is a paragraph.

this is a link

Page Render

HTML Source

dom.html (~/Box/accessibility/Training/ARIA)

```html
<!DOCTYPE HTML>
<html lang="en">
    <head>
        <title>My HTML Document</title>
    </head>
    <body>
        <h1>My Document Heading</h1>

        <div id="div1">
            <p>Some paragraph text.</p>
        </div>

        <a href="http://some/url" class="green-text">Some link text</a>
    </body>
</html>
~
```
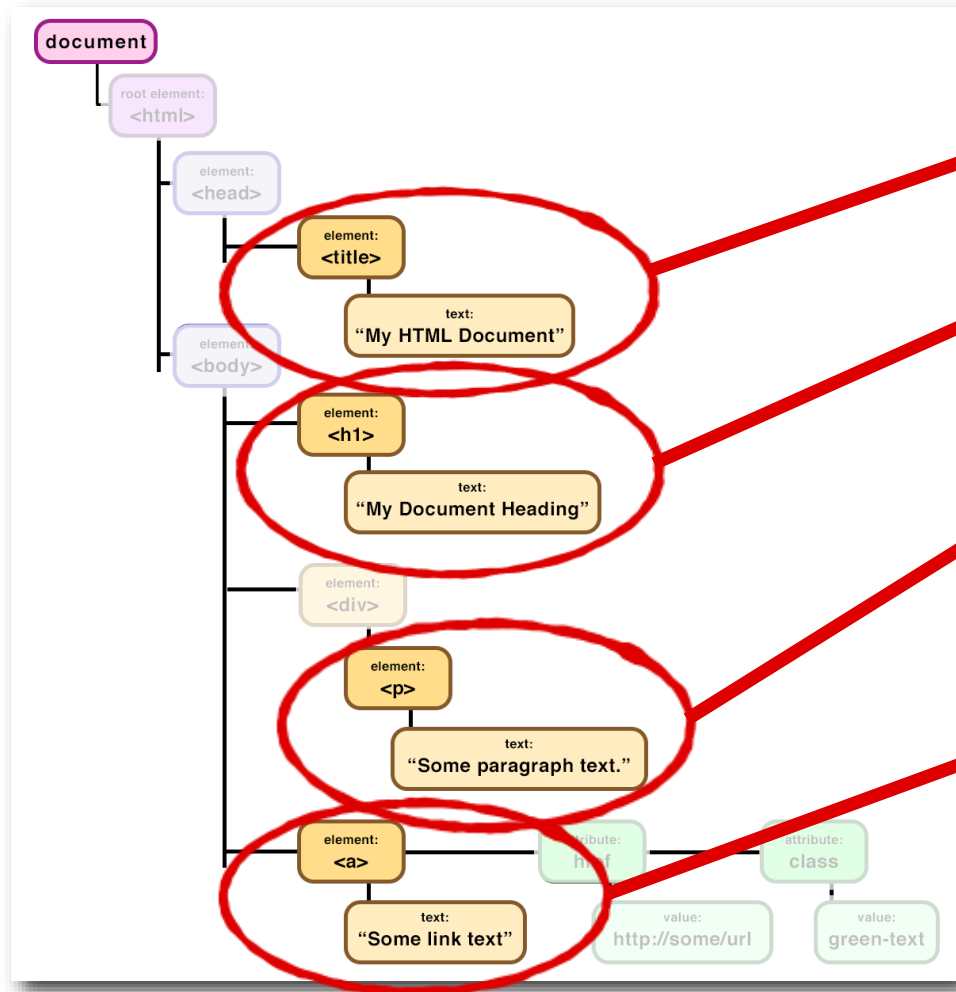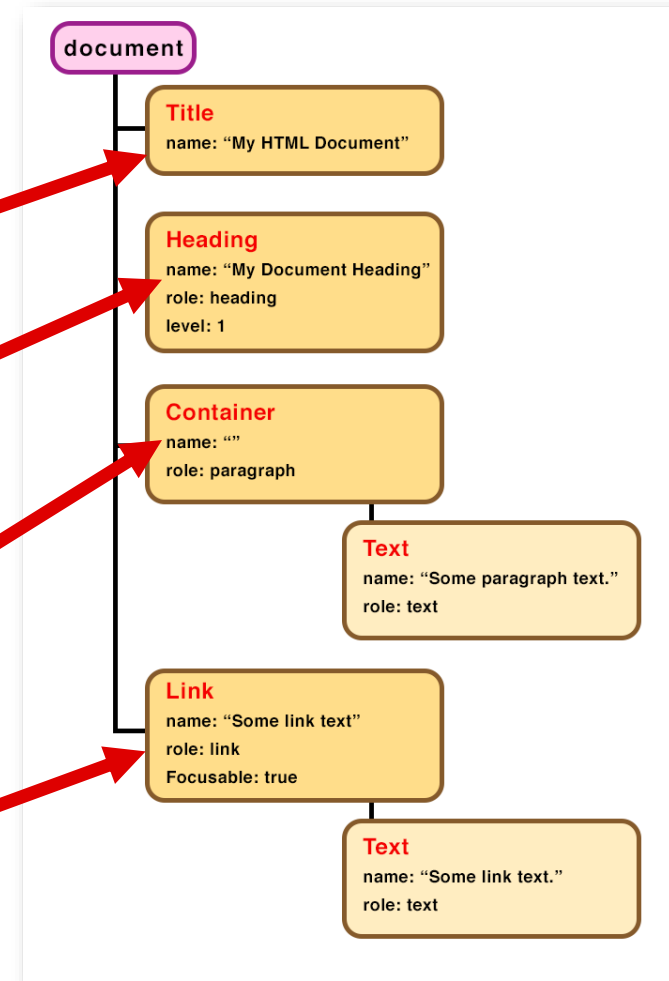
The Document Object Model (DOM)
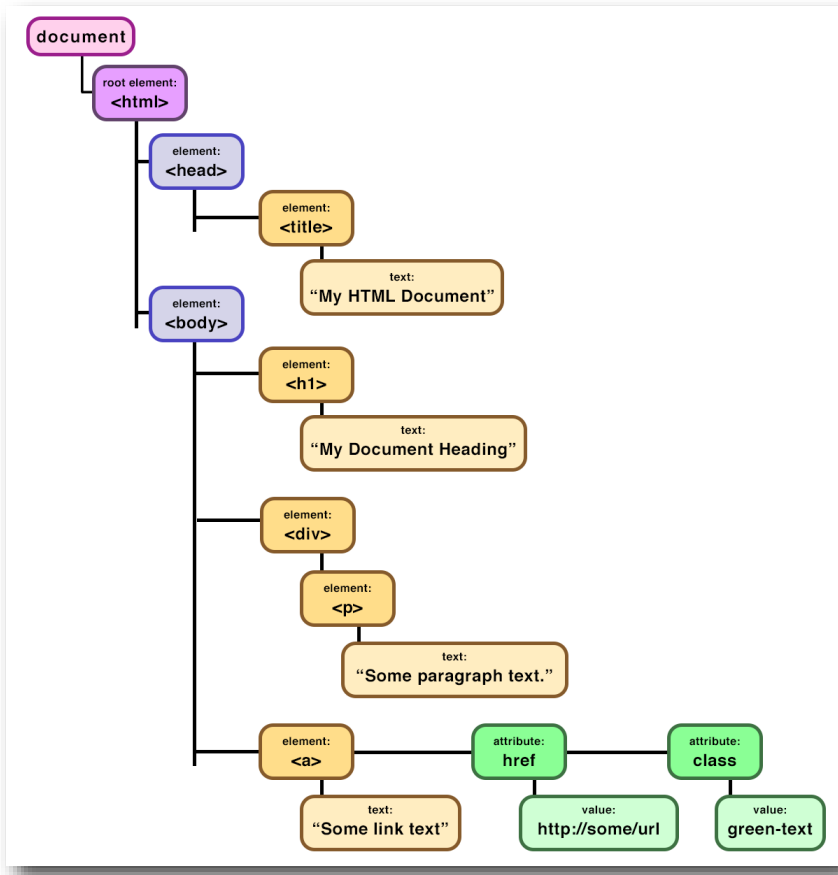
- The DOM is built from the HTML source, the compiled CSS and the effects of any JavaScript.

- The DOM is updated to reflect user interaction and the effects of any scripts.

The DOM and the Accessibility Tree

DOM

Accessibility Tree

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Visual Semantic Structure

- The purpose for regions of the page are discernable

- Headings look like headings and are used to introduce sections of content and information flow

- Links look like links and are uniquely descriptive

- Tables have identifiable row and column headings

Visual Structure

How Users Who Are Blind See The Web

- Only one element of a page at a time

- Read top-to-bottom, left-to-right
  - Reading order is order of source code in page

- Visual information structure is not perceivable
  - CSS styling and positioning is not communicated to screen readers

- Dynamic changes are invisible
  - Can be made perceivable with use of ARIA markup in the page

- Custom interactive widgets cannot be interacted with unless coded correctly (using ARIA)

Programmatic Semantic Structure

- Comes from the role page elements are given in the DOM

- Specifies how information in the page is related
    - Headings
    - Labels for form elements

- Essential for users who are blind to make sense of content
    - Also useful for screen reader navigation

- Needed by voice control and other assistive technologies

Page Regions

- Regions are defined by Landmark Roles

- Screen reader users can navigate by landmark

- Greater information structure than headings alone

- 8 roles:
  - banner
  - complementary
  - contentinfo
  - form
  - main
  - nav
  - region
  - search

Landmark Roles

HTML 5 Semantic Regions

- HTML 5 semantic regions have roles by default:

HTML 5 Element	ARIA Role	Notes
header	banner	When not inside another region
main	main	May not be inside other regions
footer	contentinfo	When not inside another region
nav	navigation	May be inside other regions
aside	complementary	May not be inside another region
section	region	Only has role when labelled

Using Landmarks

Use Only Once

- Banner
- Main
- Content Info
- Search

May Use Multiple Times *

- Nav
- Complementary
- Region
- Form

* Must have unique label via aria-label or aria-labelledby. (except form)

Headings

- H1 (Heading 1) reserved for Page Title
  - Can also be used for site branding
  - Text must match document title (<title> element)

- H2 – H6
  - Start each region with H2
  - Do not skip levels
  - Use CSS to achieve desired appearance

- Be concise: A heading is not a sentence or a paragraph

- Do not use headings for emphasis

DOCUMENT TITLE (H1)

First Section (H2)
<content>

Subheading (H3)
<content>

Another Heading (H4)
<content>

New Subheading (H3)
<content>

Second Section (H2)
<content>

Subheading (H3)
<content>

Other semantic structures

- Lists
  - Bulleted (unordered)
  - Numbered (ordered)

- Tables
  - Must have row and column headings
  - Avoid cells that span columns and rows
  - Must have a table caption (may be hidden visually)

- Iframes
  - Must be descriptively labeled (aria-label, aria-labelledby, or title attribute)

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The Most Impactful Issue

- Users who are blind and sighted users with limited mobility cannot use a mouse

- Lack of keyboard support blocks access for all but static web pages

- Other accessibility features are almost pointless if no keyboard support is present

Keyboard Support

- Ensure a user can interact using only a keyboard
  - Most effective manual accessibility check of a webpage

- If it works with a mouse, must be able to use the keyboard to do it
  - Site menus, dropdowns, etc.

- Tab and arrow keys to navigate

- Enter and space to select or activate items (links, buttons, etc.)

Keyboard Support (2 of 2)

- Tab order must be logical and efficient
    - Tabbing should go where user would expect
    - Only interactive elements should be in tab order
    - Limit number of keypresses needed to navigate through items such as menus

- Skip link to jump to main page content (bypass menu and branding)
    - Consider a skip menu (See PayPal SkipTo Plugin)

- Use defined interaction patterns for custom widgets
    - Must use W3C Accessible Rich Internet Application (ARIA) markup
    - Follow the ARIA Authoring Practices Guide

Keyboard Navigation

- Ensure that tabbing is efficient
  - 30 keypresses to tab through a menu is too much!

- Site menus should support dismissing child menus with escape
  - Focus should return to parent item

- Tab should only move focus to interactive items
  - Do not add static text to the tab order

- Tab focus should not disappear or move unexpectedly

Keyboard Navigation

- Beware of unnecessary tab stops

- Implementing a "click anywhere" pattern can have unintended consequences

- Ex. Article card allows clicking on image, title, and read more link
  - Can combine image and title into single link
  - Only Read More link is needed

Dynamic Page Elements

- Some dynamic elements can prevent access
  - Image Slide Shows that do not pause on focus
  - Dropdowns that reload or change the page as the user arrows through options
  - Pop-up (modal) dialogs that do not take and keep focus (i.e., interaction must move to and stay in the dialog window)

- Dynamic messages can be invisible to those who are blind
  - Error messages for forms

- Be aware of anything that unexpectedly changes the page or moves focus
  - Page reloads can fall into this category

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What is Visual Focus?

- Focus is the location of active interaction in the page
  - Focus should only be on interactive parts of the page
  - E.g., menus, links, buttons, form controls

- Keyboard support is not complete without visual focus indicators
  - Needed by sighted persons who cannot use a mouse

Visual Focus Requirements

- Easily perceivable

- If mouse highlights, focus should, too

- Contrast ratio of at least 3:1

- Do not rely on browser default
  - Thin dotted line in some browsers

- Focus indicator should be different than hover indicator
  - Consider: Menu item that has focus and mouse hover

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Logical Reading Order

- Remember: Users who are blind experience web pages one element at a time
  - Left to right, top to bottom
  - Called linearization

- Page will be confusing if CSS is used to change the order of page content
  - Visual layout is not perceivable
  - Order of the page source is how page will be read

- Be mindful of multi-column layouts
  - May result in important information read after less important content

Navigation

- Tab focus should follow reading order and be logical for web page

- Ensure focus does not move unexpectedly

- Ensure focus does not disappear

- Only interactive elements should take focus

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Alternative Text for Images

- Alt Text is a brief description of images that convey information

- Describe parts of image that enhance understanding
  - Description may be different if image is used in different context

- Consider how you would describe to someone on the telephone

- Limit to one or two short sentences

- Text in images should be repeated as alt text
  - Do not describe how text appears unless necessary for understanding

- Complex images may require long description in text of page (ex., graphs and flyers)
  - Use brief description for image alt text

Decorative Images

- Do not convey information or have functional purpose

- No alt text for decorative images
  - Specify decorative using empty alt tag (alt="")

- Images as only content for links are never decorative
  - Alt text should describe link purpose instead of image content

Decorative or Not?

- The following are not decorative:
    - Logos and other branding
    - Images as only content in buttons
    - Images as only content in links

- Images in links or buttons may be decorative if other link text is present

    - Hidden link text can also be supplied via ARIA (aria-label)

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Contrast Minimums

- Ensure color contrast is sufficient
  - 4.5:1 for regular text
  - 3:1 for:
    - Large text and icons
    - Link color to body text contrast
    - Focus indicators

- Rule of thumb: If you are not sure a color combination has sufficient contrast, it probably does not.

	FF5F05	13294B	C84113	F5821E	009FD4	1D58A7	1E3877	F8FAFC	FFFFFF
FF5F05	✗	✓	✗	✗	✗		○	✗	○
13294B	✓	✗	✗	✓	✓	✗		✓	✓
C84113	✗	✗					✗	✓	✓
F5821E	✗	✓	✗		✗	✗	○	✗	✗
009FD4	✗	✓	✗	✗			○	✗	○
1D58A7	✗	✗	✗	✗			✗	✓	✓
1E3877	○	✗		○	○	✗		✓	✓
F8FAFC	✗	✓	✓	✗	✗	✓	✓		✗
FFFFFF	○	✓	✓	✗	○	✓	✓	✗	

* Office of Strategic Marketing and Branding

Using Color

- Do not use light text colors on light backgrounds (and vice versa)

- Thin fonts and small text requires higher contrast

- Use more than color to provide feedback
  - Status indicators
  - Invalid form fields

- Ensure that hover and focus states are easily discernable
  - Avoid the browser default focus indicator – supply one via CSS
  - Check indicator in header, footer and other regions where background color may differ

Final Thoughts and Resources

Final Thoughts

- Use WCAG 2.0 to guide design and implementation

- Use the Accessible Rich Internet Applications (ARIA) standard to make richly interactive page elements accessible
  - Especially helpful for those who are blind

- Automated tools can help you

  - [AInspector for Firefox](https://addons.mozilla.org/en-US/firefox/addon/ainspector-wcag/) (https://addons.mozilla.org/en-US/firefox/addon/ainspector-wcag/)
  - [ANDI Accessibility Testing Tool](https://www.ssa.gov/accessibility/andi/help/install.html) (https://www.ssa.gov/accessibility/andi/help/install.html)
  - [WAVE Web Evaluation Tool](https://wave.webaim.org/) (https://wave.webaim.org/)
  - [Accessibility Bookmarklets](https://accessibility-bookmarklets.org/) (https://accessibility-bookmarklets.org/)

Resources

- [Section 508](https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/final-rule/text-of-the-standards-and-guidelines) (https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/final-rule/text-of-the-standards-and-guidelines)

- [Web Content Accessibility Guidelines](https://www.w3.org/TR/WCAG20/) (WCAG) 2.0 (https://www.w3.org/TR/WCAG20/)

- [How to Meet WCAG 2.0](https://www.w3.org/WAI/WCAG21/quickref/) (https://www.w3.org/WAI/WCAG21/quickref/)

- [What's new in WCAG 2.1](https://www.w3.org/WAI/standards-guidelines/wcag/new-in-21/) (https://www.w3.org/WAI/standards-guidelines/wcag/new-in-21/)

- [ARIA Authoring Practices Guide](https://www.w3.org/WAI/ARIA/apg/) (https://www.w3.org/WAI/ARIA/apg/)

Learn More

- [Accessibility 101](https://canvas.instructure.com/courses/1130292) – https://canvas.instructure.com/courses/1130292

- [Open Online Course in Accessibility and Inclusive Design](https://citl.illinois.edu/about-citl/news/2019/07/08/university-of-illinois-launches-open-online-course-in-accessibility-and-inclusive-design-on-coursera) – https://citl.illinois.edu/about-citl/news/2019/07/08/university-of-illinois-launches-open-online-course-in-accessibility-and-inclusive-design-on-coursera

- [Information Accessibility, Design, and Policy Certificate Program](http://iadp.ahs.illinois.edu/) – http://iadp.ahs.illinois.edu/