Design, Code, Test, Comply:
Web Accessibility Demystified

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iSchool, University of Toronto
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Agenda

- Understanding disability as a constraint
Agenda

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- Identifying constraints in digital access
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- Identifying **constraints** in digital access
- Recognizing how **assistive technologies** enable access
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- Learning how accessibility **standards** enable access
- Reviewing **WCAG 2.0** – the global accessibility standard
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- Identifying **constraints** in digital access
- Recognizing how **assistive technologies** enable access
- Learning how accessibility **standards** enable access
- Reviewing **WCAG 2.0** – the global accessibility standard
- Roles and responsibilities in accessibility **compliance**
  - Designers
  - Developers
  - Content admins
  - Testers
Assumptions we make

- All users see colors in the same way
- All users read the text as displayed
- All users see their screen
- All users use a mouse
- All users can hear
- All users can understand easily
What is disability?

- Disability is pervasive
- Disability is mismatch
- Disability is individual
- Disability is goal-specific
- Disability is contextual
- Disability is complex
- Disability is temporal
Disability is Pervasive

Total population
7.58 billion

People with Disabilities
1.4 billion

World

1 in 7 people in the world have a disability, that's 1 billion people!

Ontario

13.6 million

1 in 7 people in Ontario have a disability,

By 2036, that number will rise to 1 in 5 as the population ages.

1.85 million
Accessibility impacts 1+ billion people with disabilities

**VISUAL**
- Colorblind
- Low vision
- Blind

**HEARING**
- Hard of hearing
- Deaf

**COGNITIVE**
- Dyslexia
- Seizure
- Learning disabilities
- Autism

**SPEECH**
- Speech impediment
- Unable to speak

**MOBILITY**
- Arthritis
- Quadriplegia
- Spinal cord injury

**NEURAL**
- Bipolar
- Anxiety
- PTSD
- OCD
- Depression

Episodic disabilities present different barriers at different times.

- Parkinson’s Disease
  - Parkinson’s affects cognition, speech, and mobility
- ALS
  - ALS affects mobility and speech
Disability is Mismatch

- Disability is not the same as impairment.
- Impairment is what a person has, such as deafness.
- Disability is socially constructed.
- It is the mismatch between a person’s abilities and what constraints the context places on them.
- Disability is the constraint experienced in achieving a goal in a given context.
Disability is Individual

John

Anna
Disability is Goal-specific

John ✔

Anna ❌

Disability
Disability is Contextual

Website. X

Website ✔
Disability is Complex

Maria Carmen, blind web consultant on a wheelchair

Zain Nadella, son of Microsoft CEO, Satya Nadella

Haben Girma, first Deaf-Blind graduate of Harvard Law School
## Disability is Temporal

<table>
<thead>
<tr>
<th></th>
<th>Permanent</th>
<th>Temporary</th>
<th>Situational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceive</td>
<td>Blind</td>
<td>Cataract surgery</td>
<td>Driving</td>
</tr>
<tr>
<td>Operate</td>
<td>Quadriplegic</td>
<td>Sprained hand</td>
<td>Baby in arms</td>
</tr>
<tr>
<td>Understand</td>
<td>Cognitive impairment</td>
<td>Concussion</td>
<td>Lack of sleep</td>
</tr>
</tbody>
</table>
Smell a website?

iSmell by DigiScents—1999-2001
## Interaction Modalities

<table>
<thead>
<tr>
<th>Modality</th>
<th>Input device</th>
<th>Output device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Mouse</td>
<td>Screen</td>
</tr>
<tr>
<td>Audio</td>
<td>Microphone</td>
<td>Speakers</td>
</tr>
<tr>
<td>Tactile</td>
<td>Mouse/keyboard</td>
<td>Refreshable Braille display</td>
</tr>
</tbody>
</table>
Constraints in Digital Access

Vision
- Blindness → mouse, screen, content
- Low vision → screen, content
- Color blindness → content

Dexterity
- Quadriplegia → mouse, keyboard, content
- MS / ALS → mouse, keyboard, content

Hearing
- Deaf → content
- Hard of hearing → content

Cognition
- Learning disabilities → content
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Assistive Technology

- Screen Reader – JAWS, VoiceOver, NVDA
- Screen Magnifier – ZoomText, Kurtzweil 3000
- Text Reader – Read & Write Gold, ReadSpeaker
- Speech input software – Dragon Naturally Speaking
- Puff-and-Sip
- Eye tracking
- Push Switch
- Sign language translator
Constraints in Digital Access

Vision
Blindness → mouse, screen, **content**
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Color blindness → **content**

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Hearing
Deaf → **content**
Hard of hearing → **content**

Cognition
Learning disabilities → **content**
Content Accessibility Standards

- **Global**
  - Web Content Accessibility Guidelines (WCAG)

- **Regional**
  - Europe: EN 301 549 (based on WCAG)
  - USA: Section 508 (based on WCAG)
  - Germany: BITV 2 (based on WCAG)
  - Standards of some other governments are listed in this blog post

All roads lead to Rome … All standards lead to WCAG!

WCAG 2.0

**PERCEIVABLE**
- text alternatives
- captions and other alternatives
- presented in different ways
- see and hear content

**OPERABLE**
- Keyboard only operation
- enough time
- seizures:
- navigate and find content

**UNDERSTANDABLE**
- Make text readable and understandable
- Content should appear and operate predictably
- avoid and correct mistakes

**ROBUST**
- maximize compatibility with other technologies.

Disability → Constraints → ATs → Standards
## Roles in Website Development & Deployment

<table>
<thead>
<tr>
<th>DESIGNER</th>
<th>DEVELOPER</th>
<th>CONTENT ADMIN</th>
<th>TESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure colour alone is not used to convey any information.</td>
<td>Ensure all controls are reachable using keyboard alone and visual focus follows the tab.</td>
<td>Use Headings to define the content structure – use heading tags and not just style.</td>
<td>Use automated tools for first level testing.</td>
</tr>
<tr>
<td>Ensure adequate colour contrast between foreground and background.</td>
<td>Ensure controls and form fields have associated labels.</td>
<td>Assign alt-text to images and non-text content.</td>
<td>Use manual testing steps for further testing.</td>
</tr>
<tr>
<td>Ensure Interface is designed for different viewport sizes.</td>
<td>Include a ‘Skip to Main Content’ link</td>
<td>Caption videos and provide transcript for audios.</td>
<td>If possible, conduct user testing with Assistive Technology users to check the page functionally.</td>
</tr>
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</table>

Disability → Constraints → ATs → Standards → Compliance
Ensure colour alone is not used to convey any information.

Ensure adequate colour contrast between foreground and background.

Ensure Interface is designed for different viewport sizes.

W3C Tips on Designing for Web Accessibility

NoCoffee Visual Simulator for Chrome

Online Contrast Checker

WebAIM Contrast Checker
Ensure all controls are reachable using keyboard alone and visual focus follows the tab.

Ensure controls and form fields have associated labels.

Include a ‘Skip to Main Content’ link

W3C Tips on Developing for Web Accessibility

Check these websites:

Webaim.org

Wikipedia.Org

Wordpress.com
Roles in Website Development & Deployment

CONTENT ADMIN

- Use Headings to define the content structure – use heading tags and not just style.
- Assign alt-text to images and non-text content.
- Caption videos and provide transcript for audios.

**W3C Tips on Writing for Web Accessibility**

Video player accessibility and video accessibility are two different things. The developer is expected to provide an accessible video player. The content administrator is expected to provide accessible videos.

- In an accessible video player, Controls can be accessed using only keyboard
- Controls display a visible keyboard focus.
- Video volume can be modified independent of the system volume.
- Volume level is announced while changing.

Accessible videos have
- Captions with adequate colour contrast.
- Audio description for significant visual scenes and actions.
- A readily findable transcript.
TESTER

Use automated tools for first level testing.

Use manual testing steps for further testing.

If possible, conduct user testing with Assistive Technology users to check the page functionally.

Automated Accessibility Testing Online Tools

- Wave from WebAIM
- Tenon from Tenon.io
- aChecker from IDRC

Manual Checking:

- Keyboard accessibility
- Appropriate visual focus
- Semantically correct markups
- Predictable and consistent navigation
- User control of audio and video content
- Unique link texts on a page.
Accessibility Regulations - Canada

Ontario: AODA, 2005
Accessibility for Ontarians with Disabilities Act

Accessibility Regulations - Global

- Germany: Federal Disabled Equalization Law (BGG)
- USA: Rehabilitation Act, 1973; ADA, 1990
- For more regulations, see this post

- Ontario: Accessibility for Ontarians with Disabilities Act, 2005
- Manitoba: Accessibility for Manitobans Act, 2013
- Nova Scotia: Accessibility Act, 2017
- Federal: Canadians with Disabilities Act (2018?)

Disability → Constraints → ATs → Standards → Compliance
About me

- Working with IDRC since 2005
- PhD from iSchool
- Post-doc + other projects with Mitacs
- Teaching in OCAD University
- COU mention
- Evaluator of WCAG 2.0 before release - 2008
- Member, AODA Education Standards Committee
- Inclusive Design (MDes)
  - Student research projects
- Member, IAAP Competencies Development & Review Committee
Organic accessibility resources page: http://sambhavi.com/a11y

sambhavic@gmail.com