

# BUILDING EMPATHY

## (AND ACCESSIBLE APPS)

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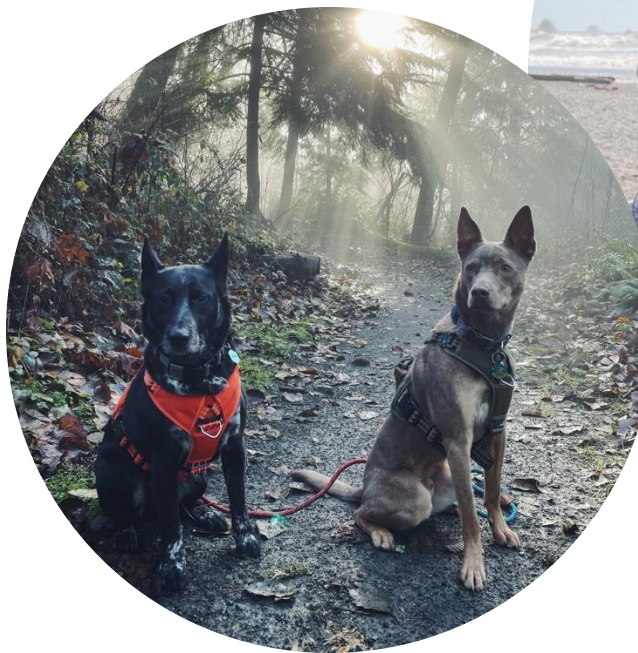
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Hi 🖐️

I'm **Isabela Moreira**

@isabelacmor



# GOALS

- What does “disabled” mean?
- What does “accessible” mean?
- Accessibility in design
- Accessibility in engineering

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# WHAT DOES “DISABLED” MEAN?

**HAVING A *PHYSICAL* OR *MENTAL*  
IMPAIRMENT THAT SUBSTANTIALLY LIMITS  
ONE OR MORE MAJOR LIFE ACTIVITY**



# 90%

of disabilities are invisible

United Educators: <https://www.edurisksolutions.org/blogs/?Id=2147485070>



# 1,000,000,000

people experience some form of disability

The World Bank: <https://www.worldbank.org/en/topic/disability>

# WHAT DOES “ACCESSIBLE” MEAN?



# Categories of disabilities

## Permanent

- **Will not** change over time
- **Are not** dependent on a situation or environment

# Categories of disabilities



## Permanent

- **Will not** change over time
- **Are not** dependent on a situation or environment

## Example:

Person without an arm

# Categories of disabilities

## Permanent

- **Will not** change over time
- **Are not** dependent on a situation or environment

## Example:

Person without an arm

## Temporary

- **Will / may** change or improve over time
- **Are not** dependent on a situation or environment

# Categories of disabilities



## Permanent

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- **Are not** dependent on a situation or environment

### Example:

Person without an arm

## Temporary

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### Example:

Person in a cast or brace

# Categories of disabilities

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Person without an arm

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### Example:

Person in a cast or brace

## Situational

- Not really a disability, but **need similar accommodations**

# Categories of disabilities

## Permanent

- **Will not** change over time
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Person without an arm

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### Example:

Person in a cast or brace

## Situational

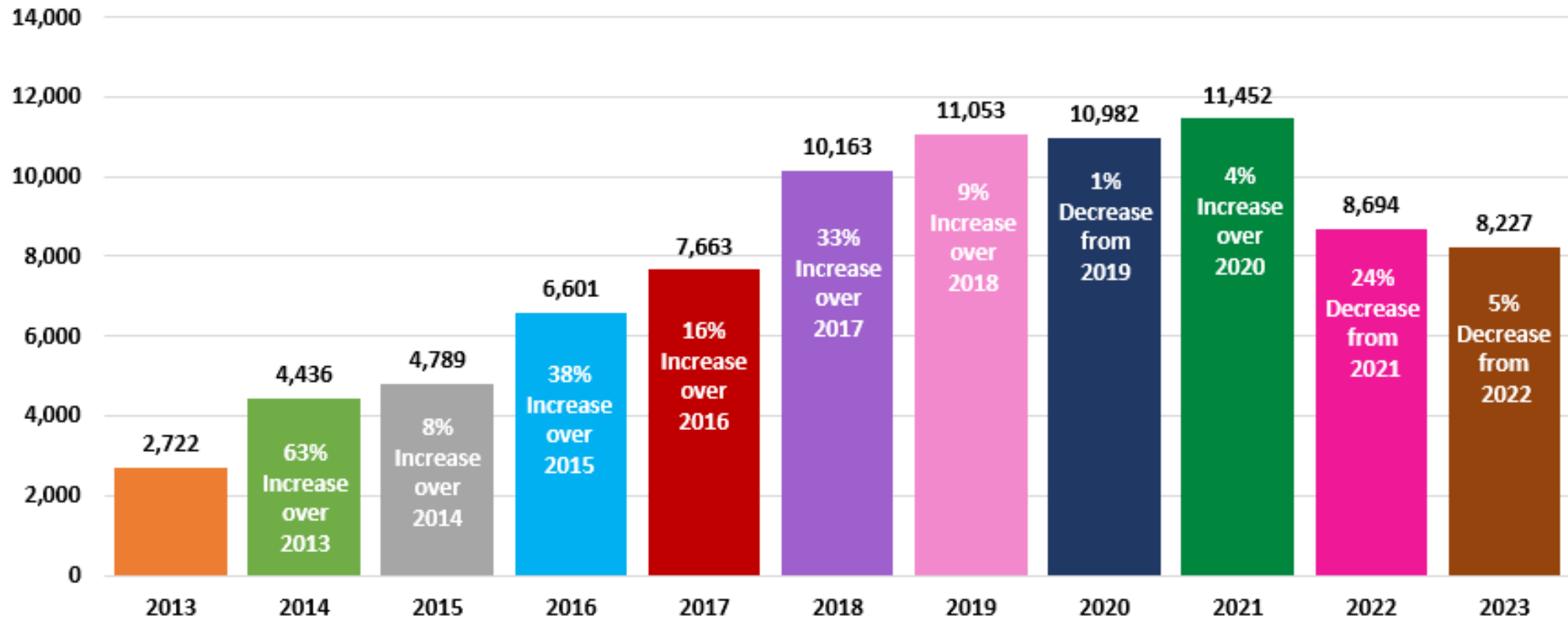
- Not really a disability, but **need similar accommodations**

### Example:

Parent carrying a child in one arm

# The problem today

Total Number of ADA Title III Federal Lawsuits Filed Each Year  
January 1, 2013 - December 31, 2023



[Plaintiffs Filed More than 8,200 ADA Title III Federal Lawsuits in 2023 | ADA Title III](#)

Isabela Moreira | @isabelacmor

JSConfBP 2024

# The problem today

In June 2017 a Florida federal trial court [ruled in favor](#) of the blind plaintiff, finding Winn-Dixie's inaccessible website violated the ADA, holding Winn-Dixie responsible for third party content on its website, and ordering, among other things, that the website be brought into conformance with the Web Content Accessibility Guidelines (WCAG) 2.0 Level AA by December 1, 2017.

[As the Winn-Dixie Saga Finally Concludes in Florida, 181 Advocacy Groups Urge DOJ to Issue Website Accessibility Regulations | ADA Title III](#)



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In April 2021, the Eleventh Circuit Court of Appeals [overturned](#) the trial court's verdict, finding that (1) the retailer did not violate the ADA because its website is not a place of public accommodation, and (2) the website did not pose an "intangible barrier" to his access to the goods, services, privileges, or advantages of Winn-Dixie's physical stores.

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• + HOW DO WE DO THIS? • +

# HOW DO WE DO THIS?

- Start with design
- Follow semantic coding conventions
- Polish remaining accessibility concerns



# Start with design

## Things to consider

- Auditory
- Cognitive
- Neurological
- Physical
- Speech
- Visual

# Start with design

Accessible design can be aesthetic!

**UX Movement**  
@uxmovement

☀️ The midpoint of the Aesthetic—Accessibility spectrum is where you want your interface to be. Design for AA conformance of the WCAG.

**AAA** **AA** **none**

**Sign Up** **Sign Up** **Sign Up**

First name  
Abraham

Last name  
Lincoln

Email  
honestabe@gmail.com

Password

Sign up

6:25 AM · Nov 25, 2019 · Twitter Web App

ux movement™

# Start with design



❌ Not accessible, not aesthetic



✅ Accessible! Aesthetic!



# Start with design

## Core principles

- Low vision and color blindness
- Contrast ratios
- Minimizing distractions

# Start with design

**Designing for low vision**



# Start with design

## Designing for low vision

WCAG = Web Content Accessibility Guidelines

**Level A** (minimum level of compliance)

**Level AA**

**Level AAA** (maximum level of compliance)

# Start with design

## Designing for low vision

### **Level AA:**

4.5:1, excluding large text\* (3:1), decorative text, branding text

### **Level AAA**

7:1, excluding large text\* (4.5:1), decorative text, branding text

\* Large text is >18pt or >14pt bold

# Start with design

## Designing for low vision

- Never rely on color alone to convey meaning

The screenshot displays the WhoCanUse.com website. The main interface is a purple rectangle with the text "The quick brown fox jumps over the lazy dog" in white. Below this, there's a color picker showing a purple square (#663399) and a white square (#FFFFFF). To the right of the color picker, there's a "TEXT SIZE" input set to 20 px and a "STYLES" checkbox for "Bold".

Below the main interface, there's a "PERMALINK" field with the URL: <http://whocanuse.com/?b=663399&c=FFFFFF&f=20&s=>. There are also "Tweet" and "Star" buttons.

On the right side, there's a section titled "Who can use this color combination?". It shows the "CONTRAST RATIO" as 8.41:1 and the "WCAG GRADING" as AAA. Below this, there's a table with columns: "POPULATION", "VISION TYPE", and "SIMULATION".

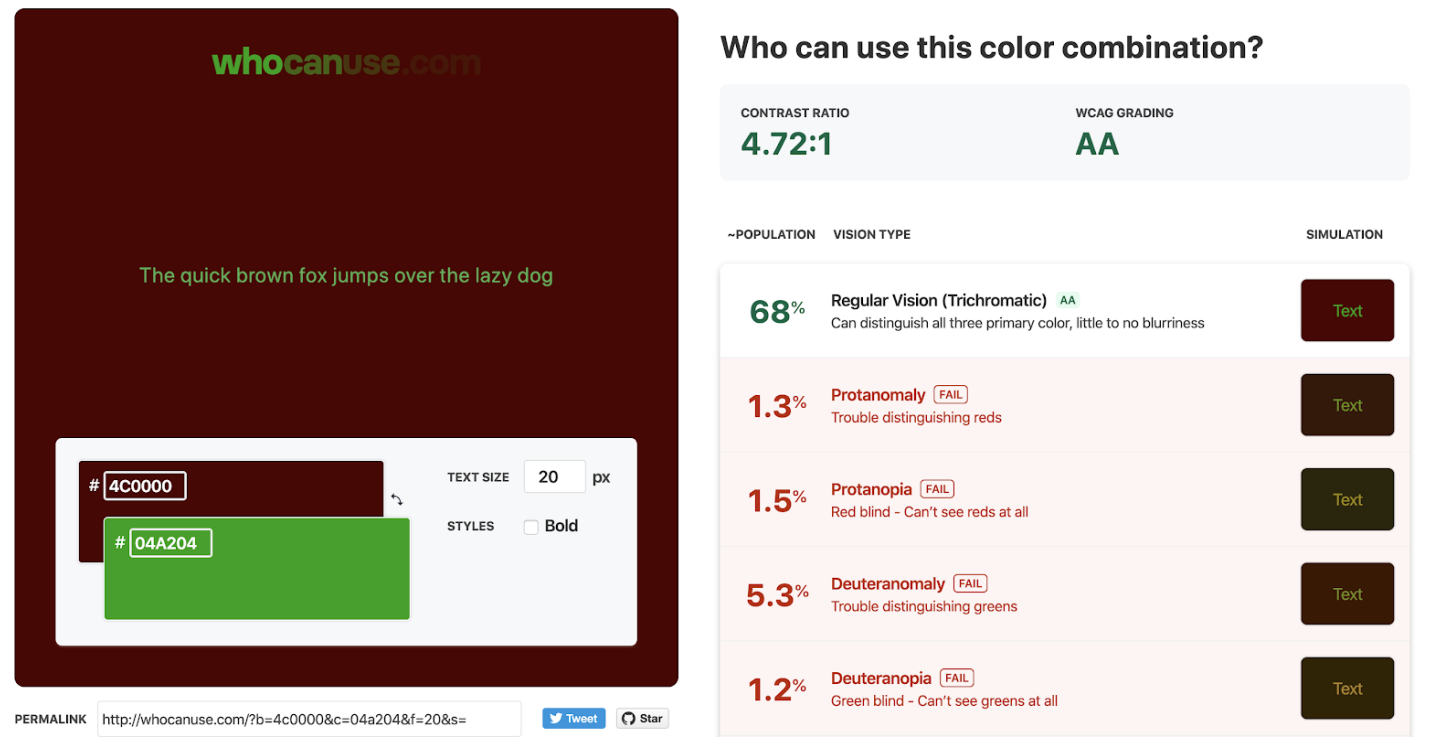
POPULATION	VISION TYPE	SIMULATION
68%	Regular Vision (Trichromatic) AAA Can distinguish all three primary color, little to no blurriness	Text
1.3%	Protanomaly AAA Trouble distinguishing reds	Text
1.5%	Protanopia AAA Red blind - Can't see reds at all	Text
5.3%	Deuteranomaly AAA Trouble distinguishing greens	Text
1.2%	Deuteranopia AAA Green blind - Can't see greens at all	Text

WhoCanUse: <https://whocanuse.com/>

# Start with design

## Designing for low vision

- Never rely on color alone to convey meaning



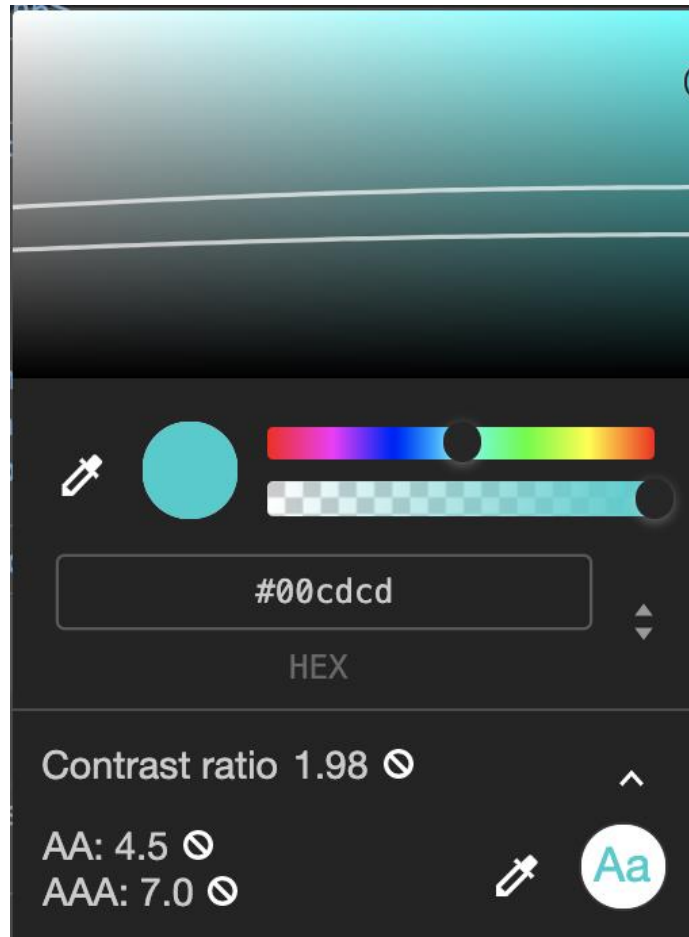
The screenshot displays the WhoCanUse.com interface. On the left, a dark red square represents the background color (#4C0000) and a green square represents the text color (#04A204). The text "The quick brown fox jumps over the lazy dog" is visible in green on the red background. Below the color swatches, there are input fields for text size (20 px) and styles (Bold). At the bottom, a permalink is provided: <http://whocanuse.com/?b=4c0000&c=04a204&f=20&s=>. On the right, a section titled "Who can use this color combination?" provides accessibility metrics. It shows a contrast ratio of 4.72:1 and a WCAG grading of AA. Below this, a table lists the percentage of the population that can use the combination, categorized by vision type and simulation.

~POPULATION	VISION TYPE	SIMULATION
68%	Regular Vision (Trichromatic) <b>AA</b> Can distinguish all three primary color, little to no blurriness	Text
1.3%	Protanomaly <b>FAIL</b> Trouble distinguishing reds	Text
1.5%	Protanopia <b>FAIL</b> Red blind - Can't see reds at all	Text
5.3%	Deuteranomaly <b>FAIL</b> Trouble distinguishing greens	Text
1.2%	Deuteranopia <b>FAIL</b> Green blind - Can't see greens at all	Text

WhoCanUse: <https://whocanuse.com/>

# Start with design

## Designing for low vision



# Start with design

Designing for low vision

**“Designing Accessible Color Systems”, Stripe**

<https://stripe.com/en-no/blog/accessible-color-systems>



# Follow semantic coding conventions

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# Follow semantic coding conventions

```
<div>  
  <span class="header">This is a header</span>  
  <span class="description">This is a description</span>  
  <div>Click me</div>  
</div>
```

# Follow semantic coding conventions

```
<div>
  <h1 class="header">This is a header</h1>
  <p class="description">This is a description</p>
  <a href="https://isabela.dev">Visit my website</div>
</div>
```

# Follow semantic coding conventions

## Alt text

```

```

# Follow semantic coding conventions

## Alt text

```

```

- Text should be functional
- Data-heavy images should provide alt content
- Every `img` needs an `alt` tag
  - But the `alt` tag can be an empty string is appropriate

# Follow semantic coding conventions

## Headings

`<h1>...</h1>`

`<h2>...</h2>`

`...`

`<h6>...</h6>`

# Follow semantic coding conventions

## Headings

`<h1>...</h1>`

`<h2>...</h2>`

...

`<h6>...</h6>`

- Heading levels should be hierarchical
- Every page should have at least one heading
- Every text that looks like a heading should be one
- Don't use headings just for styling or sizing (use CSS 🤖)

# Follow semantic coding conventions

## Links vs buttons

```
<a href="https://google.com">Visit my website</a>
```

vs

```
<button onClick={deleteItem}>Delete this item</button>
```

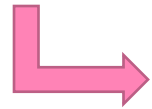


# Follow semantic coding conventions

## Links vs buttons

```
<a href="https://google.com">Visit my website</a>
```

vs



*Navigating somewhere*

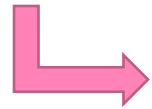
```
<button onClick={deleteItem}>Delete this item</button>
```

# Follow semantic coding conventions

## Links vs buttons

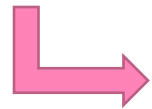
```
<a href="https://google.com">Visit my website</a>
```

vs



*Navigating somewhere*

```
<button onClick={deleteItem}>Delete this item</button>
```



*Performing an action on the same page*

# Follow semantic coding conventions

## Links vs buttons

❌ `<a href="https://google.com">Read more</a>` in the docs

✅ `<a href="https://google.com">Read more  
 <span class="visually-hidden">in the docs</span></a>`  
in the docs

# Follow semantic coding conventions

## Links vs buttons

```
<a href="https://google.com">Read more  
  <span class="visually-hidden">in the docs</span></a>  
in the docs
```

```
.visually-hidden {  
  position: absolute !important;  
  height: 1px;  
  width: 1px;  
  overflow: hidden;  
  clip: rect(1px 1px 1px 1px) /* IE6, IE7 */;  
  clip: rect(1px, 1px, 1px, 1px);  
  white-space: nowrap;  
}
```

# Testing accessibility

Nothing replaces manual testing!

# Testing accessibility

Nothing replaces manual testing!

## **Windows:**

- [Complete guide to Narrator - Microsoft Support](#)
- [JAWS® – Freedom Scientific](#)
- [NV Access | About NVDA](#)

## **Mac:**

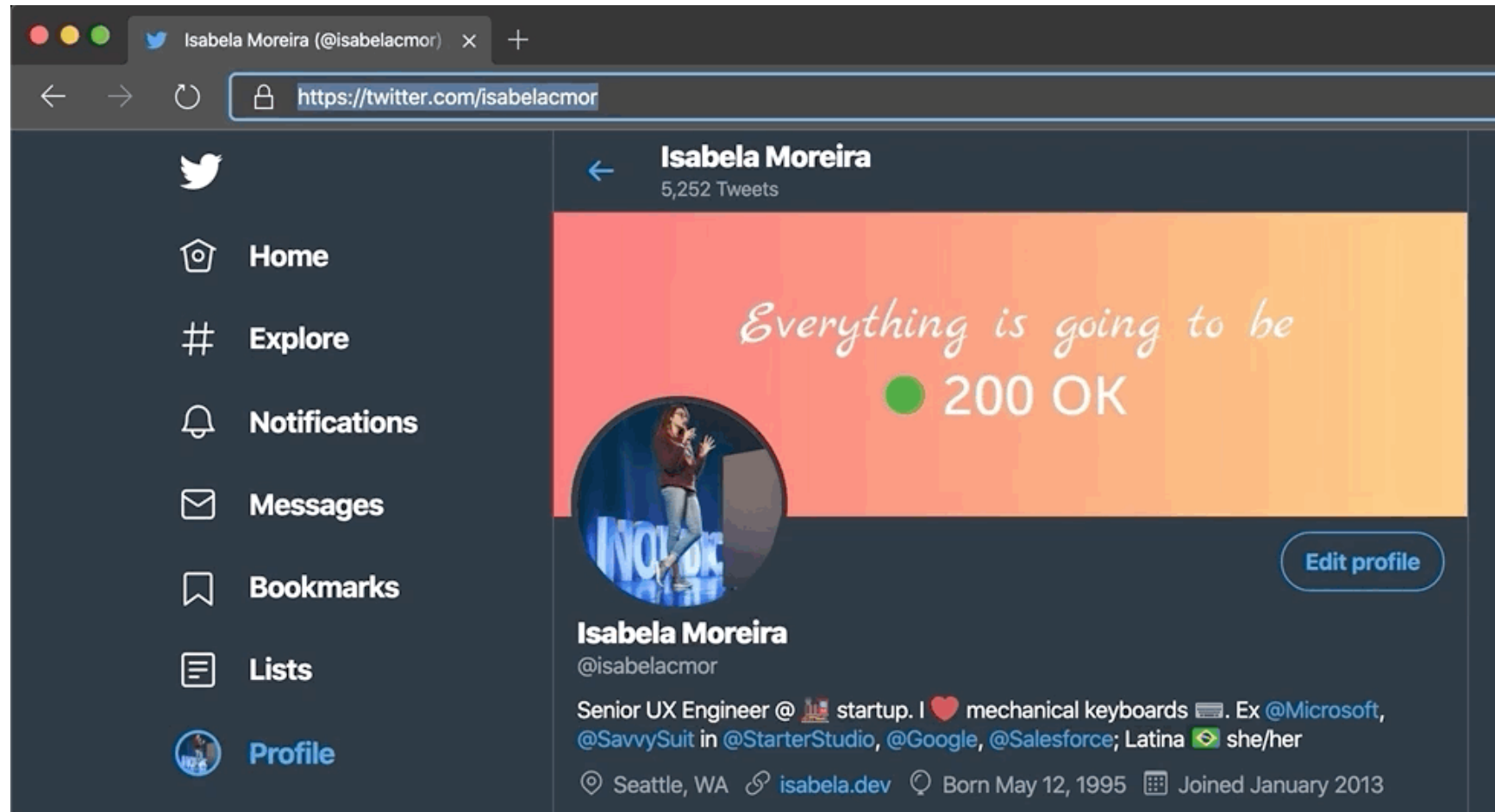
- [VoiceOver User Guide for Mac - Apple Support](#)

# Testing accessibility

- Keyboard focus should be visible
- Keyboard focus should follow logical order
- Tab *into* and *away from* all interactive elements

# Testing accessibility

## Keyboard navigation





# Testing accessibility

## Visual focus

### Accessible vs Non-Accessible focus states

#### Not accessible

[Go to my Twitter](#)

#### Accessible

[Go to my Twitter](#) [Go to my Twitter](#)

❌ 

```
.a:focus {  
    outline: 0 /* or none */;  
}
```

✅ 

```
.a:focus {  
    outline: 0 /* or none */;  
    box-shadow: 0 0 0 2px #32dede;  
}
```

# Testing accessibility

## Lost focus

The screenshot displays the European Commission website with the following elements:

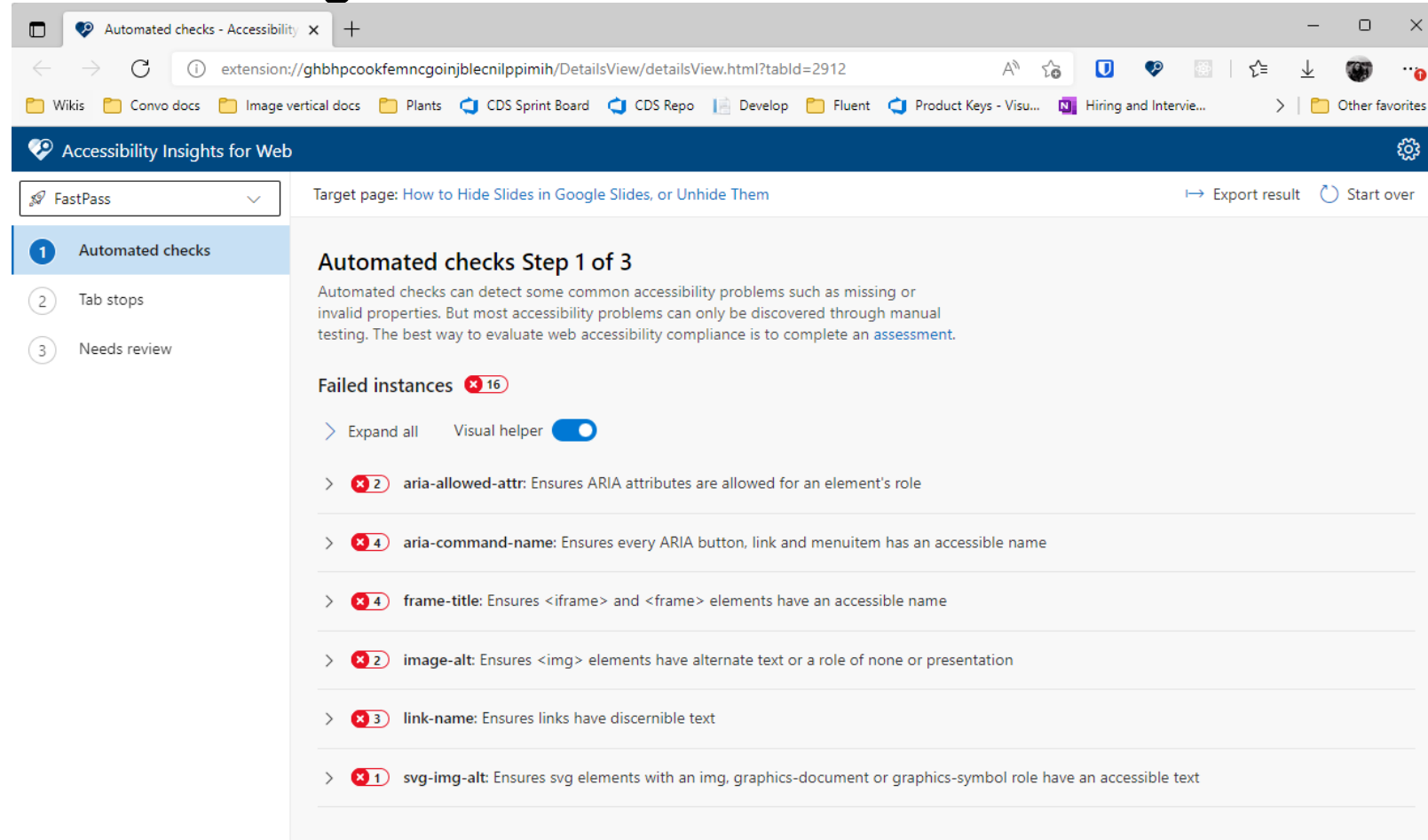
- Header:** "An official EU website" and "How do you know? ▾".
- Navigation:** "English" and "Search" links.
- Hero Section:** "Shaping Europe's digital future" with a "Menu" icon.
- Breadcrumbs:** "Home > Policies > Web Accessibility".
- Section Title:** "Web Accessibility".
- Text:** "What is web accessibility? Web accessibility allows everyone, including people with disabilities, to perceive, understand, navigate and interact with the Internet."

The browser's developer console on the right shows the following state:

- Elements Panel:** The selected element is `body.language-en.ec1-typography.path-node.page-node-type-cnt-description`.
- Console:** The message "Console was cleared" is displayed, followed by `undefined`, indicating a loss of focus or an error in the testing process.

# Testing accessibility

## Semi-automated testing



# Testing accessibility

## Fully automated testing

- Playwright provides powerful tooling for automated e2e testing, including axe-core's accessibility testing engine

```
import { test, expect } from '@playwright/test';
import AxeBuilder from '@axe-core/playwright';

test.describe('homepage', () => {
  test('should not have any automatically detectable accessibility issues', async ({ page }) => {
    await page.goto('https://your-site.com/');

    const accessibilityScanResults = await new AxeBuilder({ page }).analyze();

    expect(accessibilityScanResults.violations).toEqual([]);
  });
});
```

**WHEN WE DON'T PRIORITIZE  
ACCESSIBILITY, WE TAKE  
AWAY THE AGENCY OF  
DISABLED USERS.**



# THANK YOU

Isabela Moreira  
@isabelacmor

# Resources

- <https://a11yproject.com/>
- <https://usecontrast.com/>
- <http://wave.webaim.org/extension/>
- <https://khan.github.io/tota11y/>
- <https://whocanuse.com/>
- <https://color.a11y.com/>
- <http://khroma.co/train/>
- <https://stripe.com/en-no/blog/accessible-color-systems>
- <https://www.figma.com/c/plugin/733159460536249875>
- <https://www.figma.com/c/plugin/733343906244951586>
- <https://colorable.jxnblk.com/00ffa2/004466>
- <https://webaim.org/techniques/keyboard/>
- <https://chrome.google.com/webstore/detail/web-developer/bfbameneiokkgbdmiekhjnmfkcnldhbm?hl=en-US>
- <https://medium.com/storybookjs/instant-accessibility-qa-linting-in-storybook-4a474b0f5347>
- <https://github.com/nickcolley/jest-axe>
- <https://github.com/paypal/AATT>
- <https://github.com/pa11y/pa11y>
- <https://accessibilityinsights.io/>