



Why semantics matter

Accessible design and development

Content

Coven of Wisdom - HER February '24 edition

Date

2024



Contents

1. Introduction
2. Affordances in design
3. Visual vs audio UI
4. Page and component semantics
5. Automated testing

Introduction



Hello, I'm *Tim Dujardin* and I work in *Campus Ghent*.

- Frontend Developer and Lead of Accessibility XPG
- 9 years of experience
- Certified Professional in Accessibility Core Competencies
- Certified UX Designer
- Write articles for [iO Tech Hub](#)



"1.3 billion people experience disability."

[World Report of Disability \(2011\)](#), by World Health Organization

WORLD REPORT ON DISABILITY



World Health
Organization



THE WORLD BANK

- 16% of the world's population
- 1 in every 6 of us

This number is growing because of an increase in non-communicable diseases* and people living longer.

*Cancers, cardiovascular disease, diabetes and chronic lung illnesses.

"80% of the disabilities are not visible."

[What is a hidden disability?](#), by Hidden Disabilities Sunflower



- Epilepsy
- Post-traumatic stress disorder
- Autism
- Dyslexia/Dyscalculia
- ADHD
- Etc.

Affordances in design

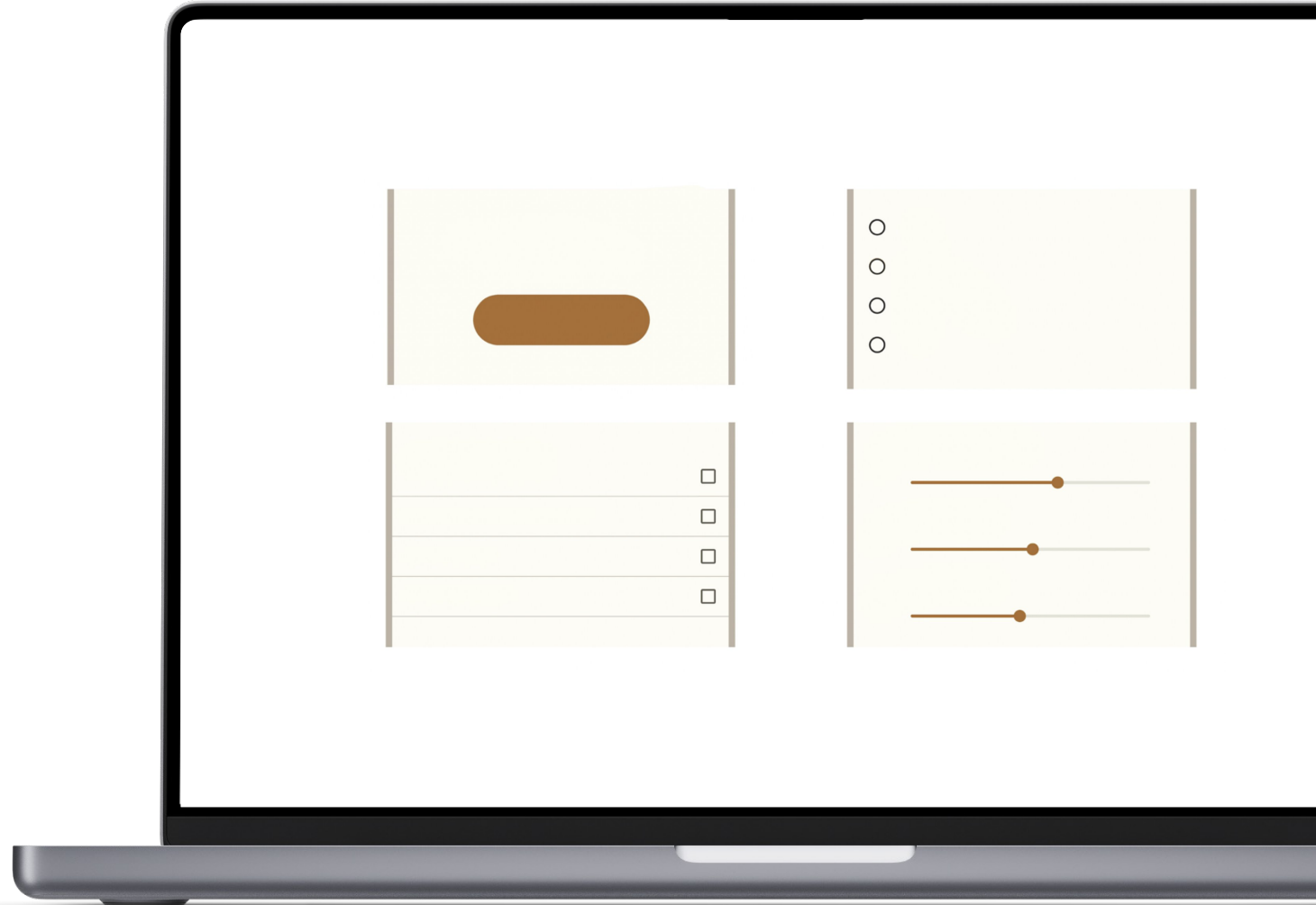


“An affordance is a *relationship* between the *properties of an object* and the *capabilities of the agent* that determine just how the object could possibly be used.”

Don Norman (Professor and UX researcher)

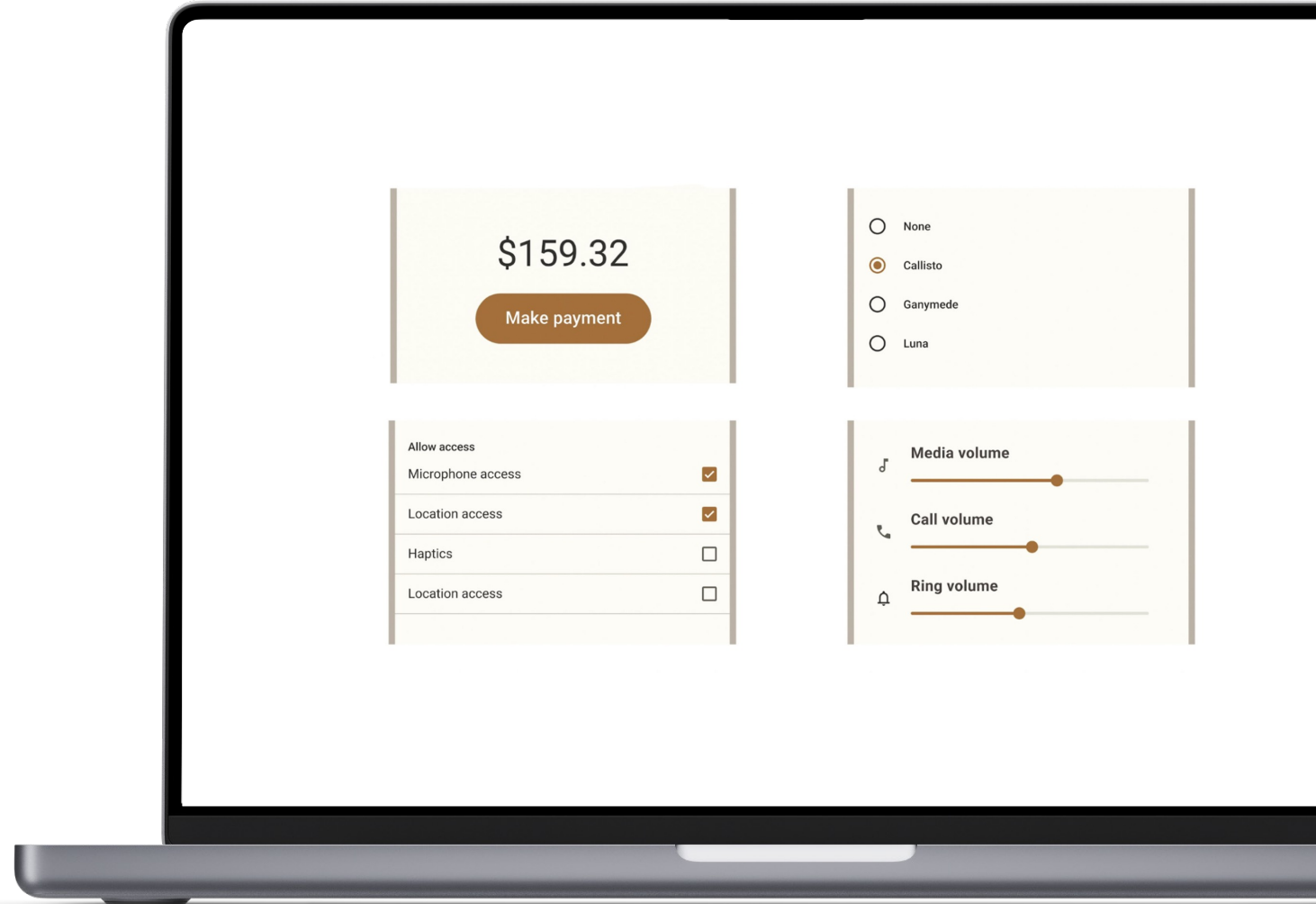
Shape, color, copy, patterns and iconography

Cues which give a hint *how users may interact with something*, no matter physical or digital.



Shape, color, copy, patterns and iconography

Cues which give a hint *how users may interact with something*, no matter physical or digital.



Shape, color, copy, patterns and iconography

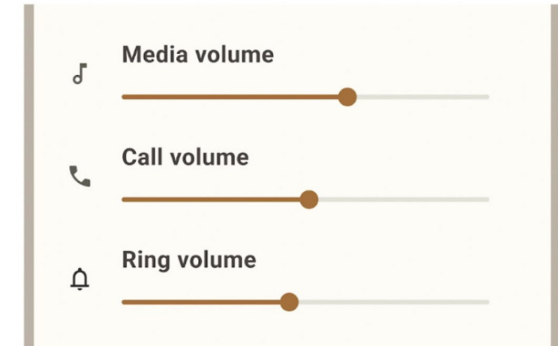
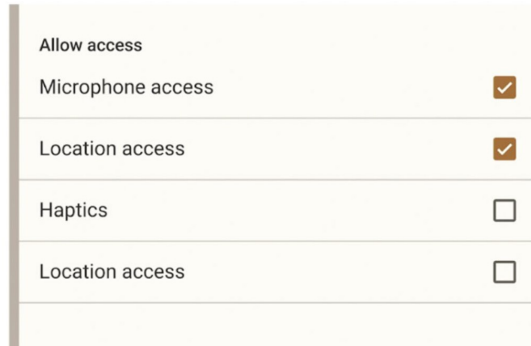
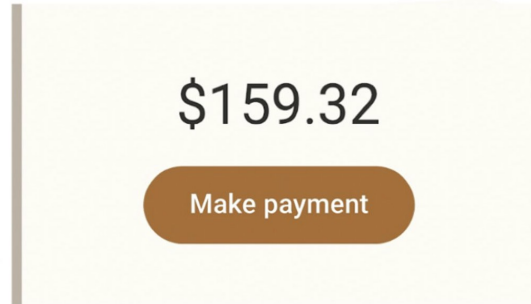
Cues which give a hint *how users may interact with something*, no matter physical or digital.



Visual vs audio UI



Visual vs audio UI



Audio UI

Audio UI focuses on *semantics*.

- *Name*
 - How can we refer to this thing?
- *Role*
 - What kind of thing is it?
- *State*
 - Does it have a state?
- *Value*
 - Does it have a value?

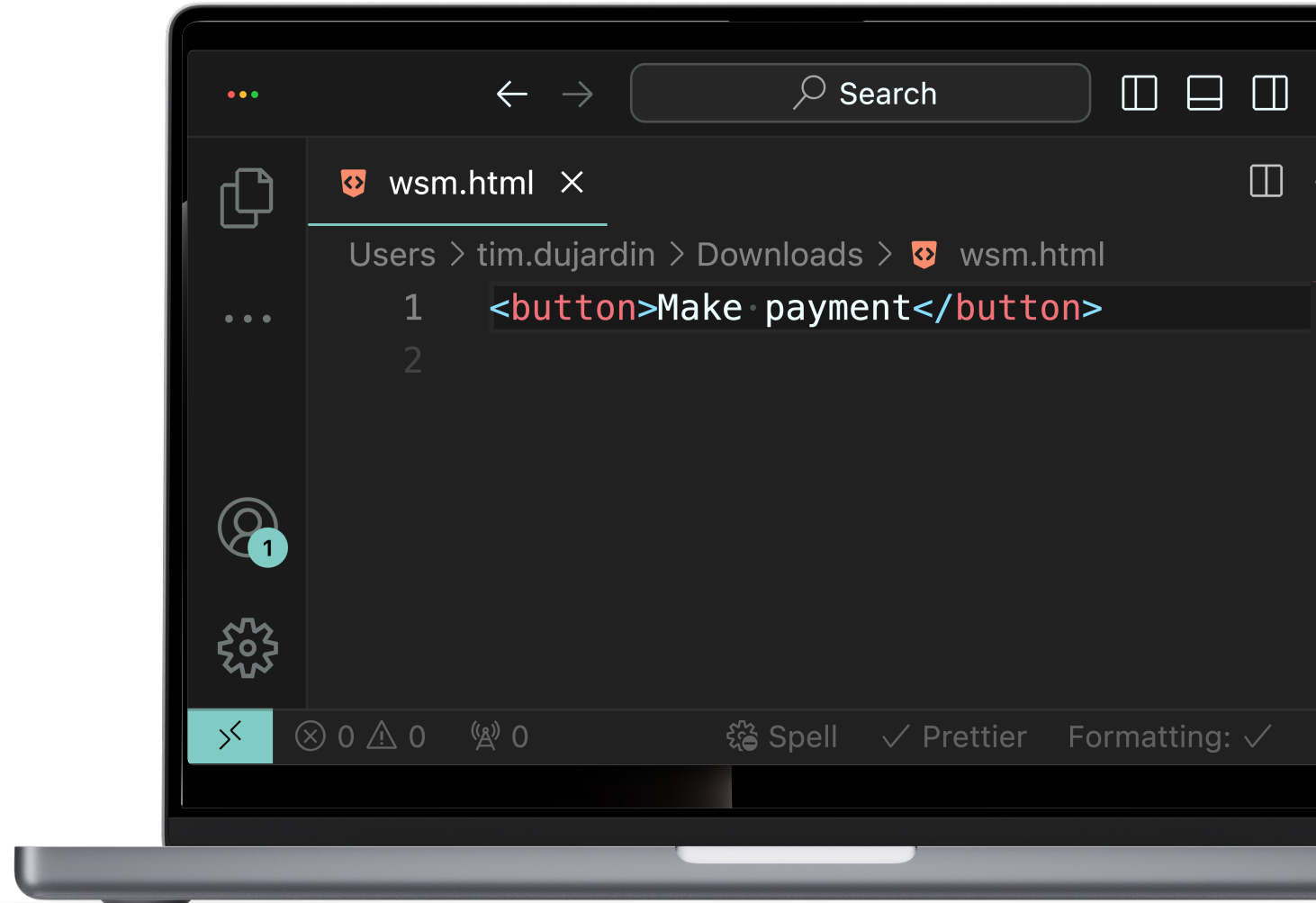
A *button* component

Name: “Make payment”

-> *How can we refer to this thing?*

Role: “Button”

-> *What kind of thing is it?*



A *checkbox* component

Name: "Haptics"

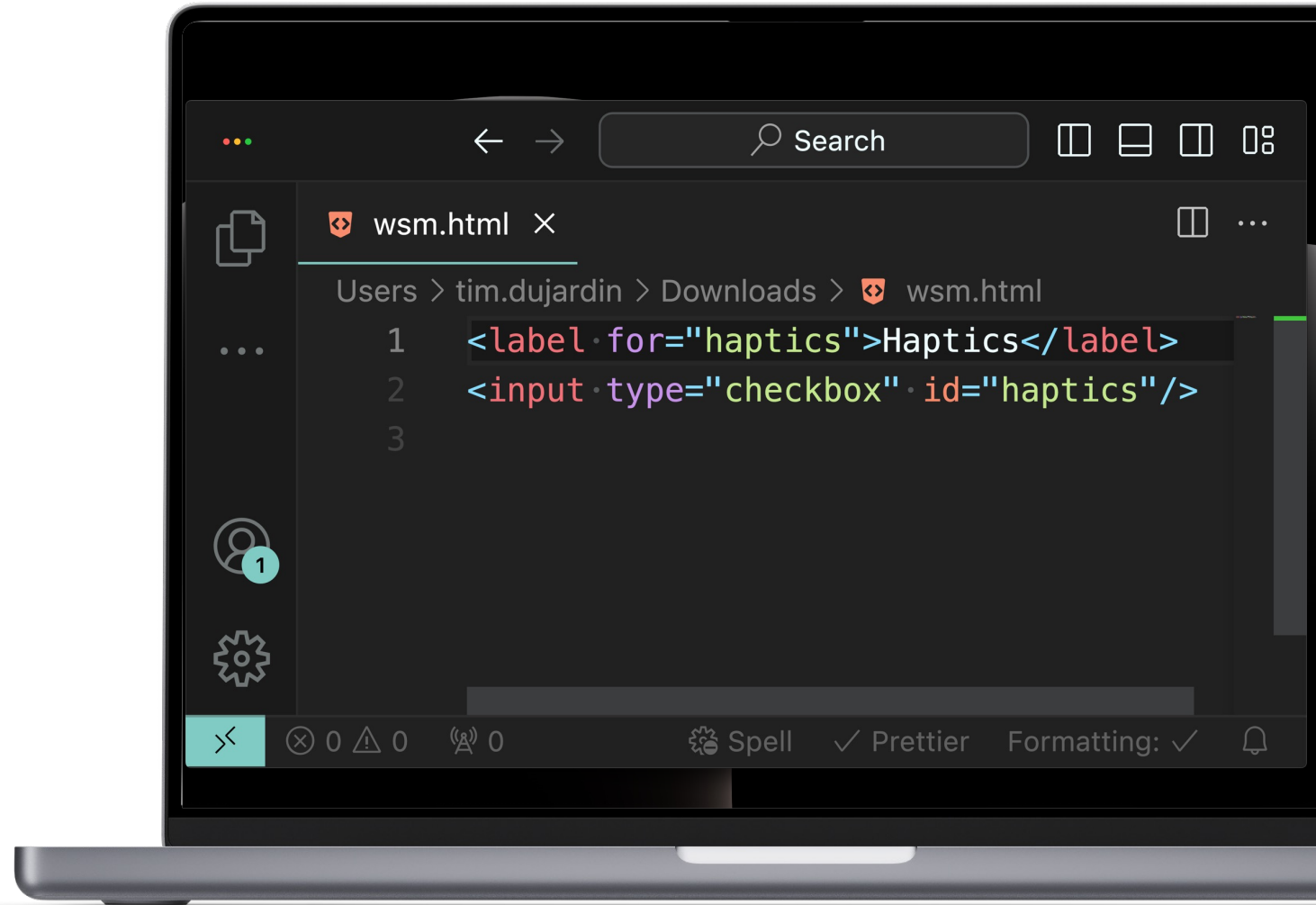
-> *How can we refer to this thing?*

Role: "Checkbox"

-> *What kind of thing is it?*

State: "Checked: false"

-> *Does it have a state?*



A *range slider* component

Name: “Media volume”

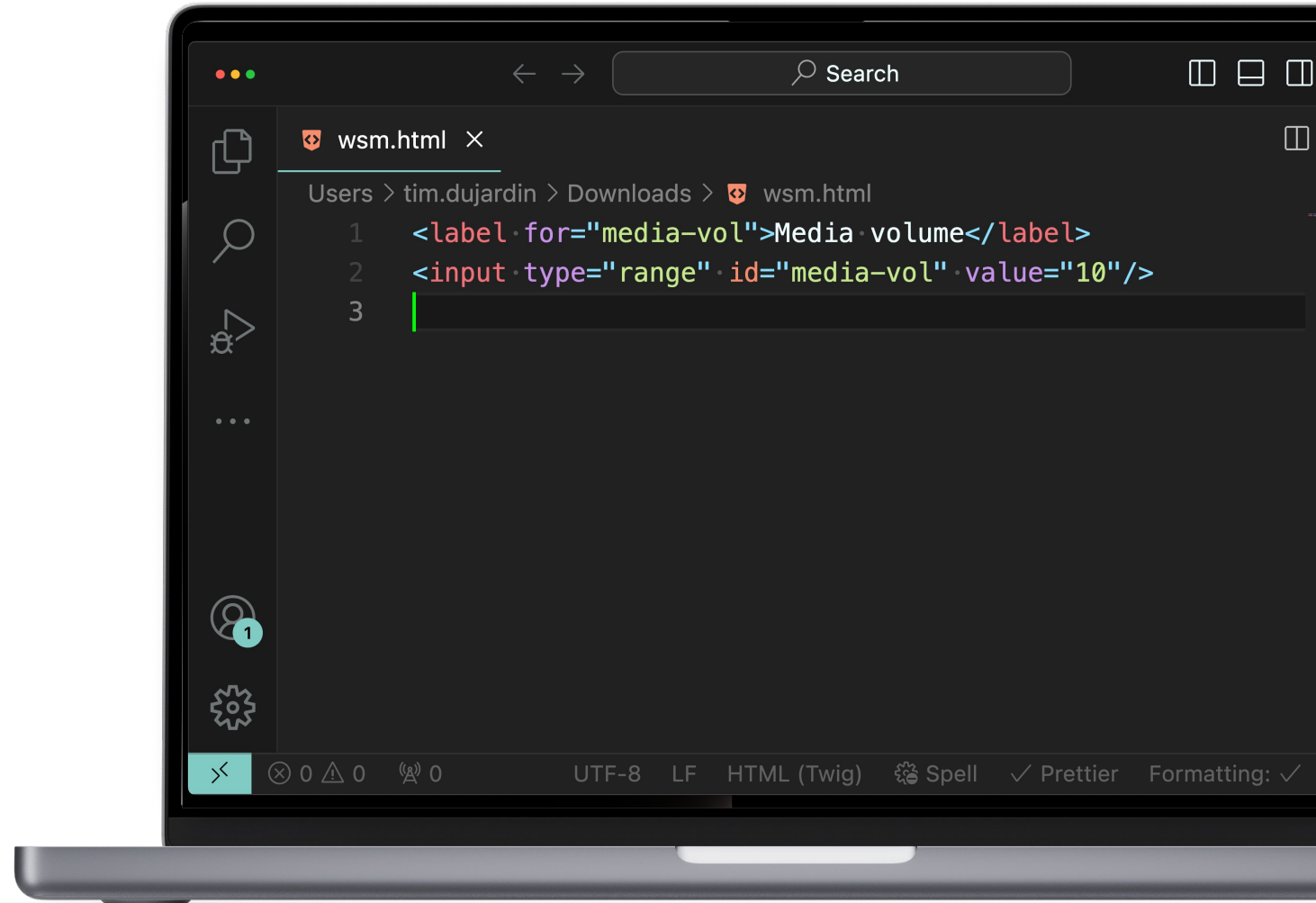
-> *How can we refer to this thing?*

Role: “Slider”

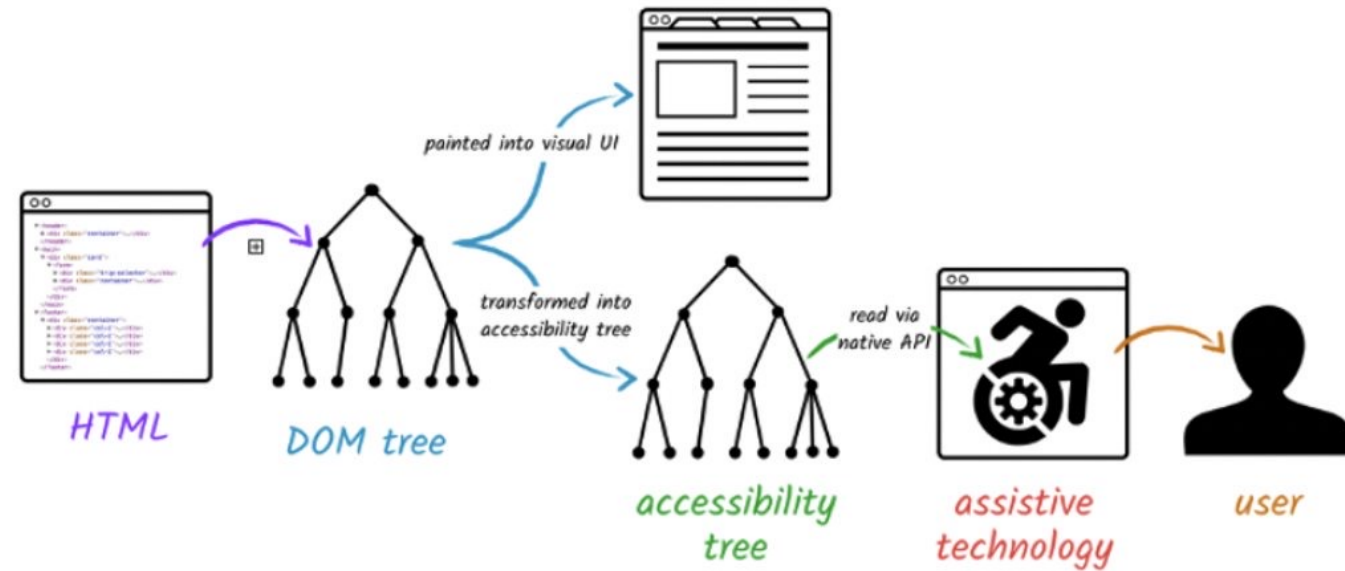
-> *What kind of thing is it?*

Value: “10”

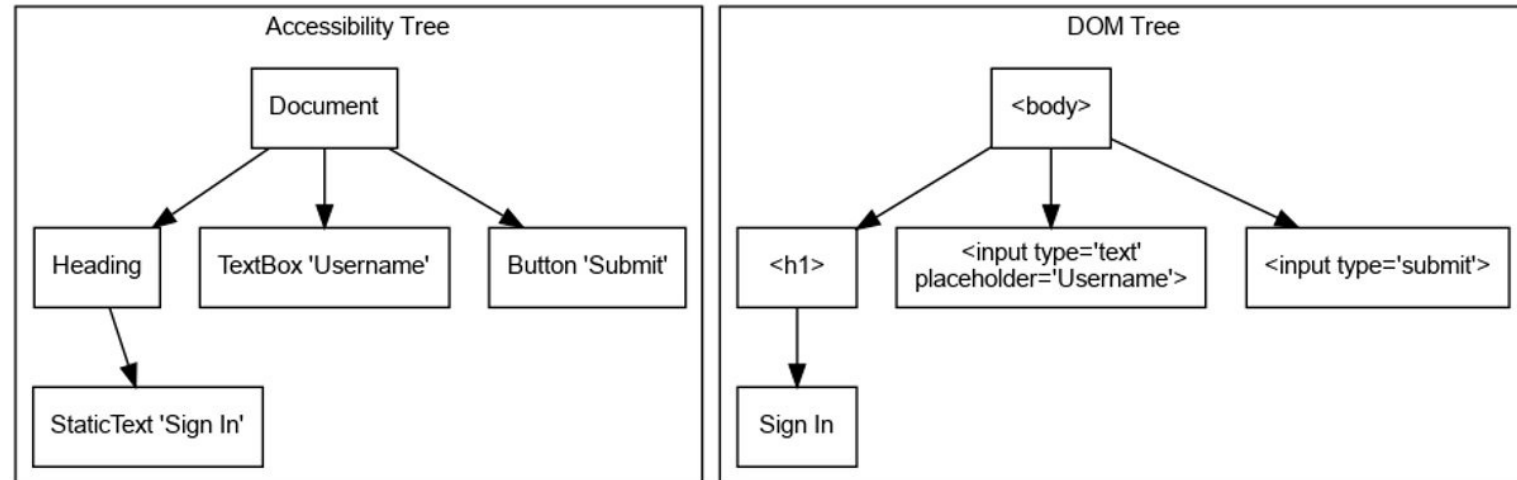
-> *Does it have a value?*



DOM vs Accessibility tree



DOM vs Accessibility tree



Page and component semantics



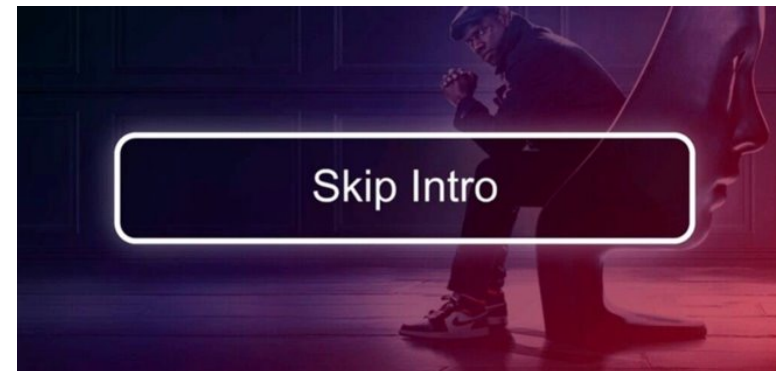
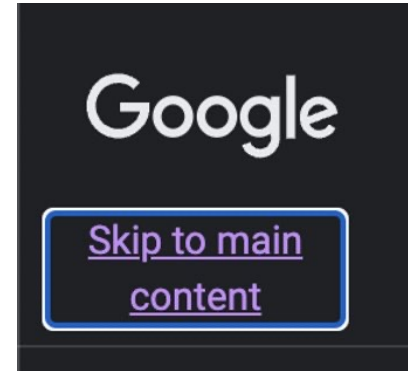
Page and component semantics

- *Page semantics*
 - Landmarks
 - Headings
- *Component semantics*
 - Images
 - Buttons
 - Links
 - Forms

Page semantics

Page semantics

- *Why?*
 - More efficient navigation
 - Better orientation
 - Better SEO
- *How?*
 - Landmarks
 - Headings



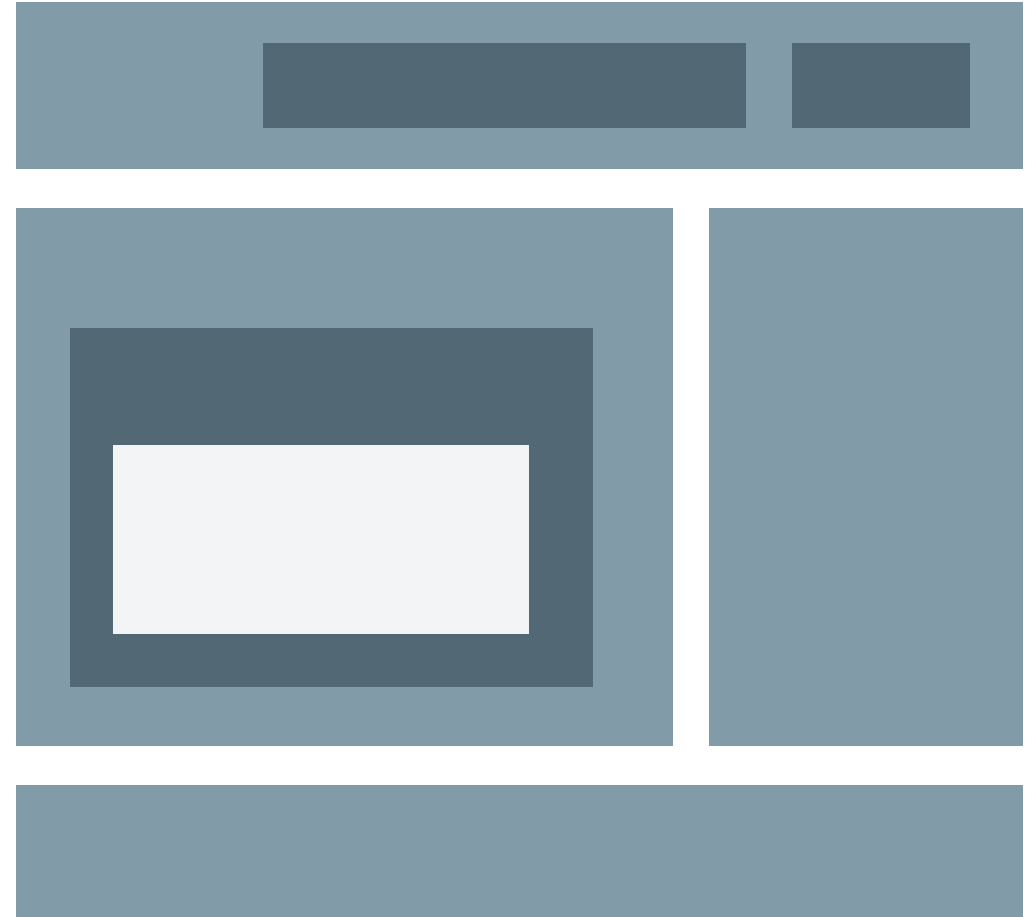
Example of “skip links” in a non-web and web environment. (Google and Netflix)

PAGE SEMANTICS

Landmarks

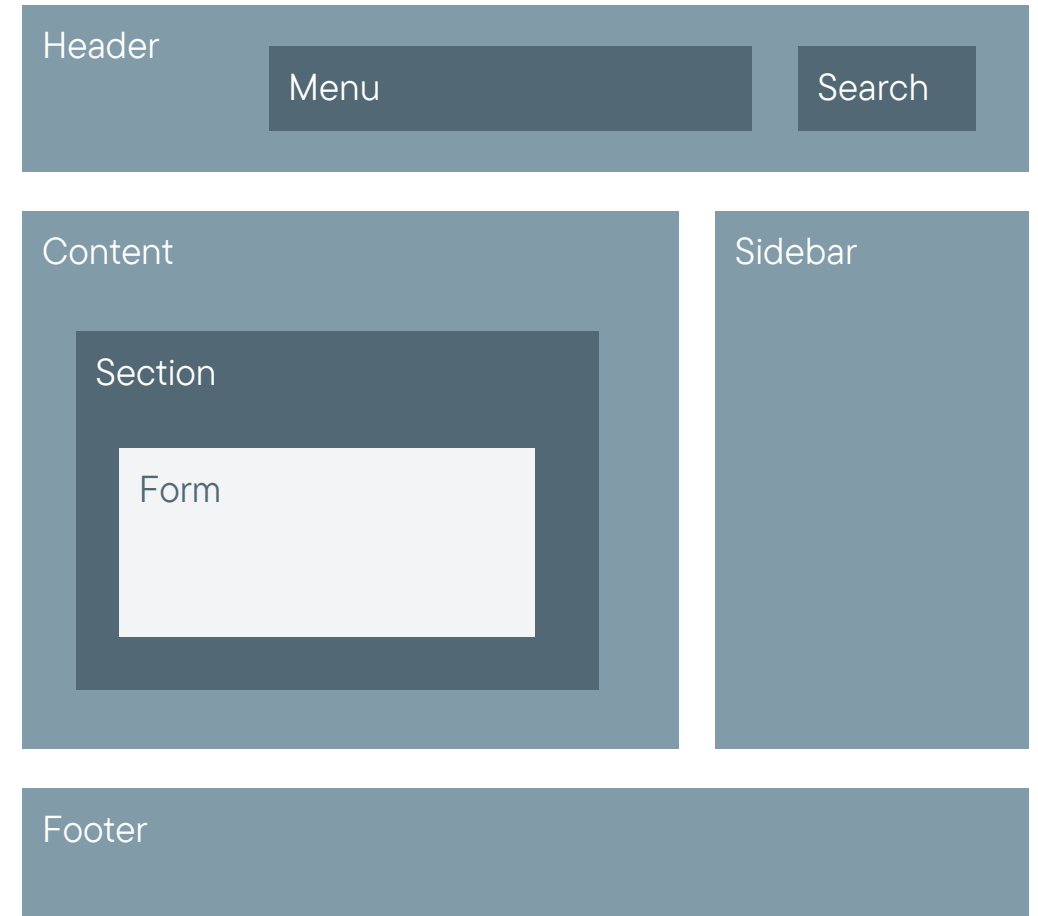
Landmarks

With landmarks, users of assistive technology can *jump to sections of a web page* (e.g., screen reader users).



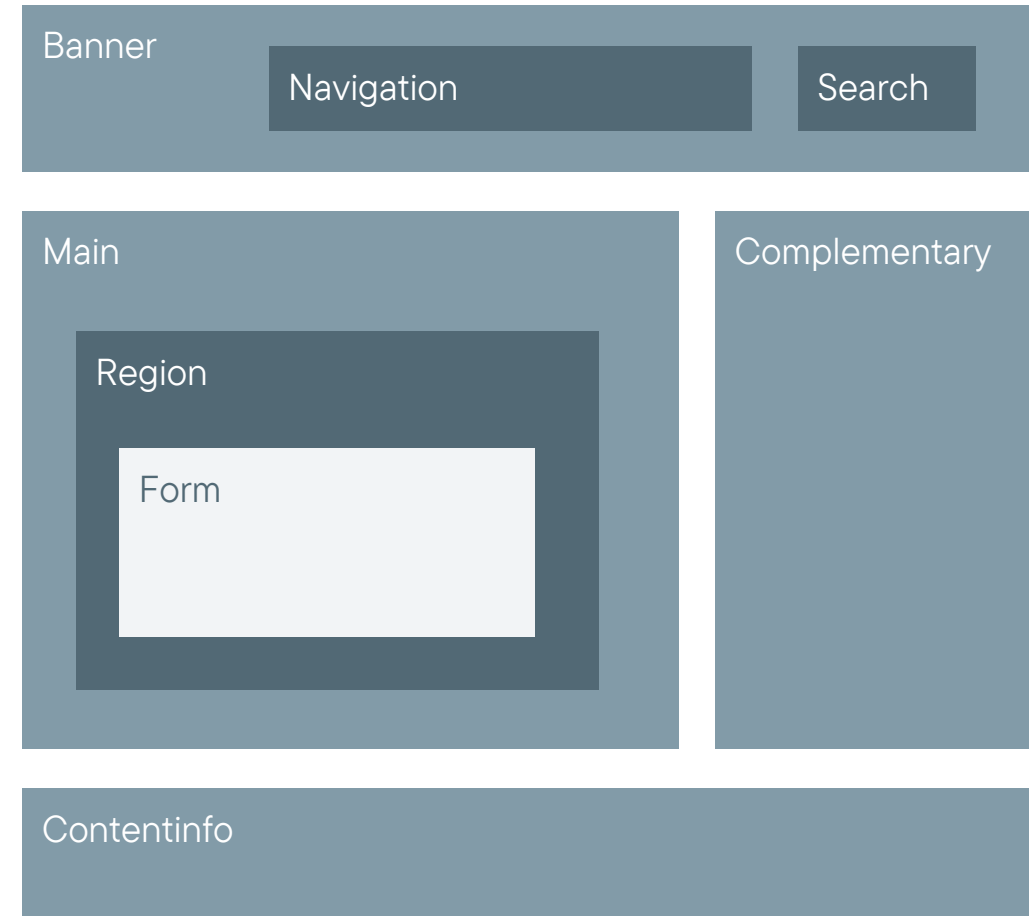
Landmarks

With landmarks, users of assistive technology can *jump to sections of a web page* (e.g., screen reader users).



Landmarks

- Navigation: `<nav>`
- Search: `<search>` **NEW!**
- Main: `<main>`
- Banner: `<header>`
- Complementary: `<aside>`
- Contentinfo: `<footer>`
- Region: `<section>`
- Form: `<form>`



The `<search>` element

[<search>: The generic search element](#), by MDN Web Docs.

Browser compatibility

[Report problems with this compatibility data on GitHub](#)

	Desktop					Mobile					
	Chrome	Edge	Firefox	Opera	Safari	Chrome Android	Firefox for Android	Opera Android	Safari on iOS	Samsung Internet	WebView Android
<code>search</code>	✓ 118	✓ 118	✓ 118	✓ 104	✓ 17	✓ 118	✓ 118	✓ 79	✓ 17	✗ No	✓ 118

Tip: you can click/tap on a cell for more information.

✓ Full support ✗ No support

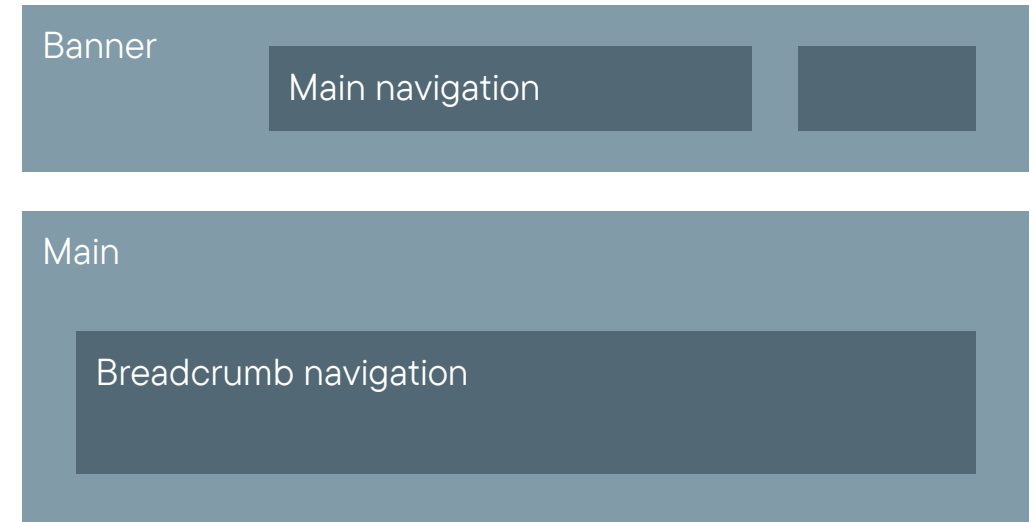
- Represents the ‘search’ landmark
- Previously: `<form role="search">`
- Full support since end of 2023 🚀
- [The Search Element](#), by Scott O’Hara

Multiple Landmarks

Provide a *textual distinction* between multiple navigation landmarks, by naming them.

Primary: `<nav aria-label="Main">`

Secondary: `<nav aria-label="Breadcrumb">`



PAGE SEMANTICS

Headings

Headings

Screen reader users can navigate a page via headings.

Visual structure is especially helpful for *users with cognitive disabilities*.

- *Why?*
 - Short topic title
- *How?*
 - Correct sequence: `<h1>` - `<h6>`
 - `<h1>` text matches `<title>` text
 - Limit to a single `<h1>`

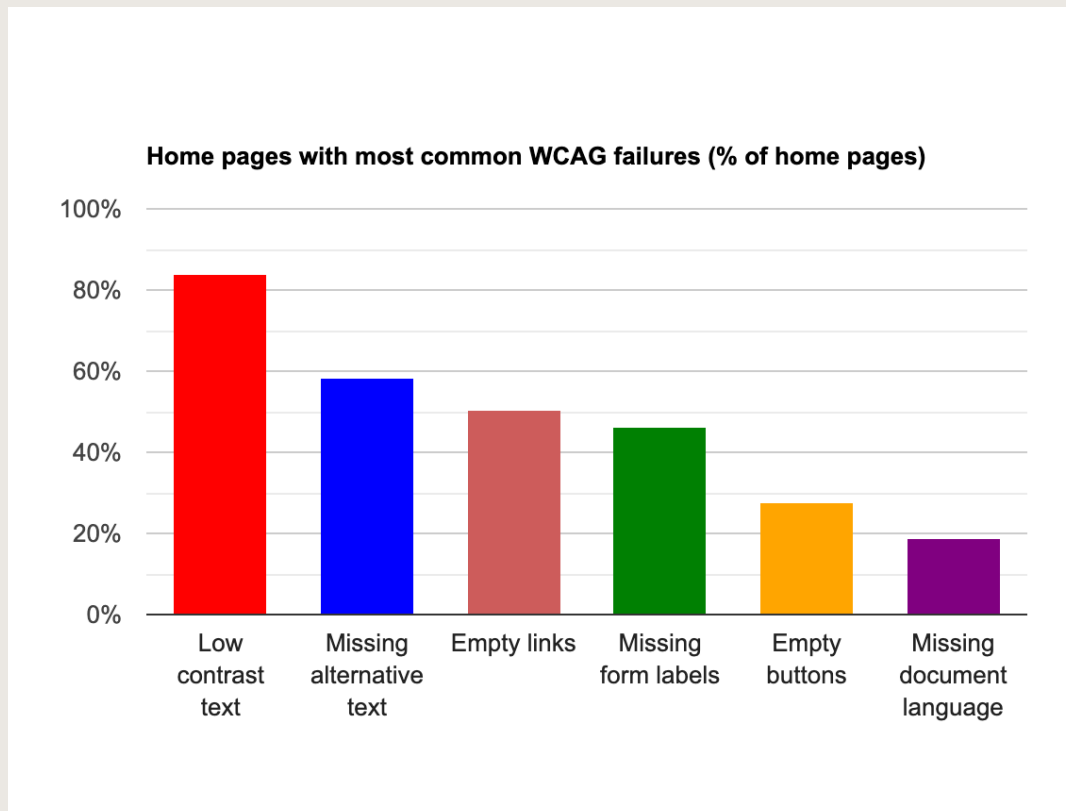
Component semantics

Component semantics

- Images
- Buttons
- Links
- Forms

The WebAIM Million report

[The WebAIM Million](#), by WebAIM (Web Accessibility In Mind).

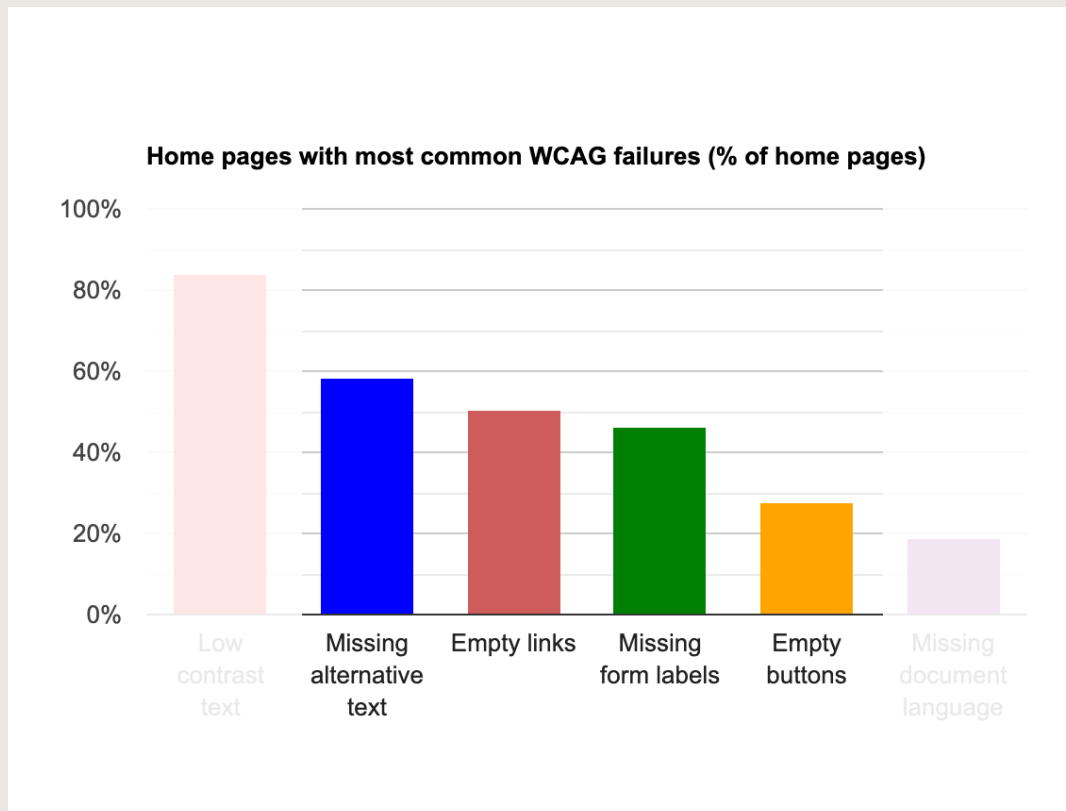


The 2023 report on the accessibility of the top 1,000,000 home pages and domains from these 3 lists combined:

- [The Majestic Millions list](#)
- [The Alexa Top 1,000,000 web sites](#)
- [The DomCop top 10 million domains](#)

The WebAIM Million report

[The WebAIM Million](#), by WebAIM (Web Accessibility In Mind).



The 2023 report on the accessibility of the top 1,000,000 home pages and domains from these 3 lists combined:

- [The Majestic Millions list](#)
- [The Alexa Top 1,000,000 web sites](#)
- [The DomCop top 10 million domains](#)

COMPONENT SEMANTICS

Images

Images

- *Types*
 - Decorative images
 - Informative images
 - Functional images
- *Alt attribute?*
 - ``
 - ``
 - ``

Gratis verzending vanaf 20,- Bezorging dezelfde dag, 's avonds of in het weekend* Gratis retourneren

Select Ontdek nu de 4 voordelen

bol.

Waar ben je naar op zoek?



Inloggen



Categorieën ▾

Cadeaus & Inspiratie ▾

Aanbiedingen ▾

Zakelijk

Cadeaukaart

Bestelstatus

Klantenservice

NL ▾

Elektronica-acties

Drogisterijdeals

Outlet

Galaxy S24 Series

Solden op=op >

Vul je voorraad aan
met onze
Drogisterijdeals



lenor

Biodermal

Pampers

L'OR

finish

GARNIER

Decorative images

How it's currently implemented on

www.bol.com/drogisterijdeals.

Vul je voorraad aan
met onze
Drogisterijdeals



alt="Drogisterijdeals-3840_content_stack.jpg"

× Drogisterijdeals-3840_content_stack.jpg image

Decorative images

How it should be.

Vul je voorraad aan
met onze
Drogisterijdeals



`alt=""`

×

Decorative images

Why the alt attribute is **always** required on ``.

Vul je voorraad aan
met onze
Drogisterijdeals



No alt?

× To get missing image descriptions, open the context menu., Unlabelled image

or

× Drogisterijdeals-3840_content_stack.jpg image

bol. Inloggen ♥ 🛒

Categorieën ▾ Cadeaus & Inspiratie ▾ Aanbiedingen ▾ Zakelijk Cadeaukaart Bestelstatus Klantenservice NL ▾

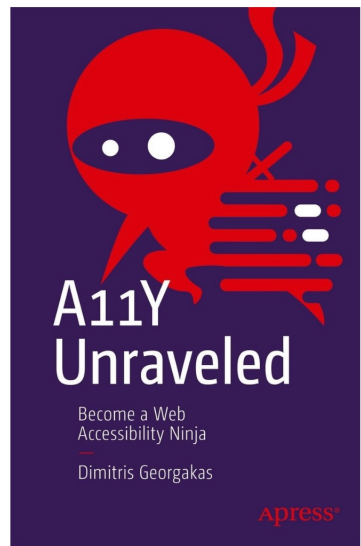
Elektronica-acties Drogerijdeals Outlet Galaxy S24 Series **Solden** op=op >

[< Terug](#) > [Boeken](#) > [Computers & Informatica](#) > [Computertechnologie](#) > [Mens-computerinteractie](#)

A11Y Unraveled EBOOK i

Become a Web Accessibility Ninja

Auteur: [Dimitris Georgakas](#) | Taal: Engels | [Schrijf een review](#) | [Delen](#)



Kies je bindwijze (2)

- E-book** 53,98
- Paperback 47,99

53,98

Direct beschikbaar
Verkoop door bol.com

Ebook ♥

- ✓ E-book is direct beschikbaar na aankoop
- ✓ E-books lezen is voordelig
- ✓ Dag en nacht klantenservice
- ✓ Veilig betalen

Anderen bekeken ook



Vergelijk met andere artikelen

Informative images

How it's currently implemented on

www.bol.com/a11y-unraveled.

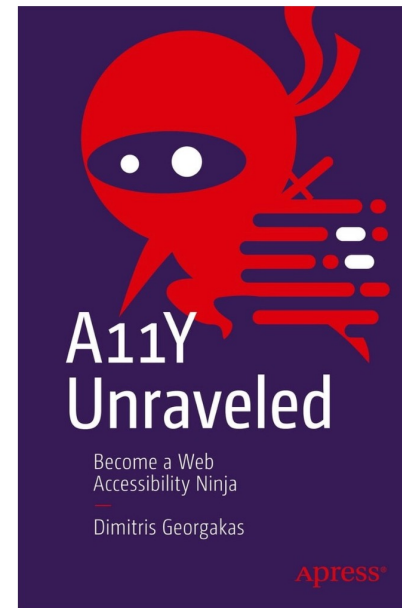
× A11Y Unraveled image

[< Terug](#) [🏠](#) > [Boeken](#) > [Computers & Informatica](#) > [Computertechnologie](#) > [Mens-computerinteractie](#)

A11Y Unraveled EBOOK i

Become a Web Accessibility Ninja

Auteur: [Dimitris Georgakas](#) | Taal: Engels | [Schrijf een review](#) | [Delen](#)



Kies je bindwijze

E-book
53,98

P

53,98

Direct beschikbaar

Verkoop door bol

Ebook

- ✓ E-book is direct beschikbaar
- ✓ E-books lezen
- ✓ Dag en nacht
- ✓ Veilig betalen

Anderen bekeken



Vergelijk met andere artikelen

alt="A11Y Unraveled"

Informative images

How it should be.

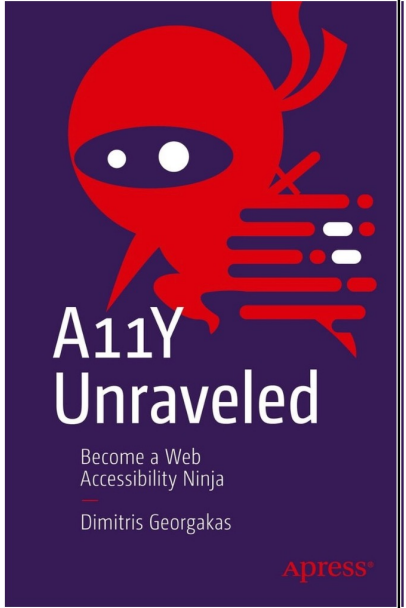
× Dimitris, Georgakas. A11Y Unraveled: Become a Web Accessibility Ninja. Apress, 2023 image

[How to Cite a Book in MLA, Scribbr.](#)

[< Terug](#) [🏠](#) > [Boeken](#) > [Computers & Informatica](#) > [Computertechnologie](#) > [Mens-computerinteractie](#)

A11Y Unraveled EBOOK i
Become a Web Accessibility Ninja

Auteur: [Dimitris Georgakas](#) | Taal: Engels | [Schrijf een review](#) | [🔗 Delen](#)




Kies je bindwijze

E-book P
53,98


53,98

Direct beschikbaar
Verkoop door bol

 Ebook

- ✓ E-book is direct beschikbaar
- ✓ E-books lezen
- ✓ Dag en nacht
- ✓ Veilig betalen

Anderen bekeken



Wireframing Ess

Vergelijk met andere artikelen

alt="Dimitris, Georgakas. A11Y Unraveled: Become a Web Accessibility Ninja. Apress, 2023"

[Elektronica-acties](#)[Drogisterijdeals](#)[Outlet](#)[Galaxy S24 Series](#)[Solden](#) op=op >

SOLDEN

op=op

Laatste week

Scoor alle deals

Tot 20% korting*

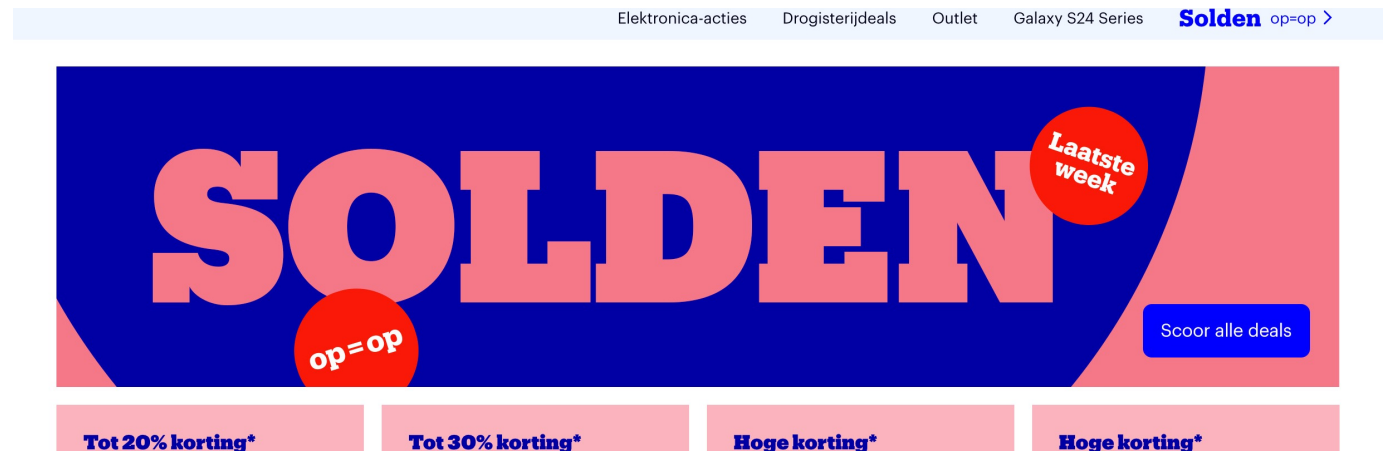
Tot 30% korting*

Hoge korting*

Hoge korting*

Functional images

How it's currently implemented on the homepage of www.bol.com.



alt=""



Functional images

How it should be.



alt="Laatste week solden, op is op!"

× link, Laatste week solden, op is op!

COMPONENT SEMANTICS

Buttons and links

Buttons and links

Links take the user to a *new location*.

Buttons *trigger some action*, such as showing hidden content on the page.

- The button element: `<button>`
- The input element: `<input>`
- The anchor element: `<a href>`

The button element

An *interactive element* activated by a user with a mouse, keyboard, finger, voice command, or other assistive technology.

- `<button>`
 - Standard button: trigger actions/behaviors within current page
 - Acts as `<button type="submit">` within a form
- `<button type="button">`
 - The button has no default behavior
- `<button type="submit">`
 - The button will trigger a form submit
- `<button type="reset">`
 - The button will reset the form values

The input element

Interactive *controls for web-based forms* to accept data from the user.

- `<input type="button">`
 - Theoretically a button, but not preferred
- `<input type="reset">`
 - The input will reset the form values
- `<input type="submit">`
 - The button will trigger a form submit

The anchor element

A *hyperlink* to web pages, files, email addresses, *locations in the same page*, or anything else a URL can address.

- ``
 - Routing throughout the website or application
- ``
 - Scroll-to behavior to certain content

Please be careful!

The 'button' role is not a sufficient replacement for a `<button>` element!



× I'm a button, button

- Don't use `<div role="button">`
- Don't use ``
- Don't use ``

Don't use

`<div role="button">`

The default button pattern has more built-in features than you think!

- *A div element has no semantic meaning*
 - You need `role="button"` (affordances)
- *Not included in tab sequence*
 - You need `tabindex="0"`
- *No built-in button event listeners*
 - Enter and space
- *No native button styling*
 - Each browser has its own default button styling

Don't use

```
<a role="button">
```

```
<a href="#" role="button">
```

The default button pattern has more built-in features than you think!

- *An anchor element has role 'link' by default*
 - You need `role="button"` (affordances)
- *Without href not included in tab sequence*
 - You need `tabindex="0"`
- *No built-in button event listeners*
 - Space doesn't work for links, it triggers a page down (scroll)
- *No native button styling*
 - A link is not styled like a button, it's just underlined

COMPONENT SEMANTICS

Forms

Form semantics

Accessible forms require a combination of good UX with respect to relevant WCAG criteria.

- Labelling controls
- Grouping controls
- Form instructions
- Validating input
- User notifications
- Multi-page forms
- Time limits (security)
- And so much more ...

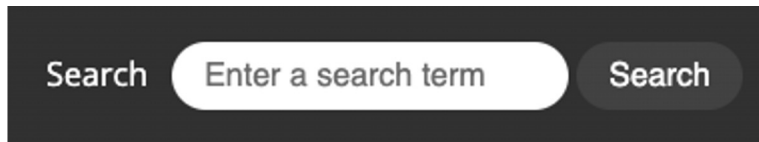
Form semantics

Accessible forms require a combination of good UX with respect to relevant WCAG criteria.

- Labelling controls
- Grouping controls
- ~~Form instructions~~
- ~~Validating input~~
- ~~User notifications~~
- ~~Multi-page forms~~
- ~~Time limits (security)~~
- ~~And so much more ...~~

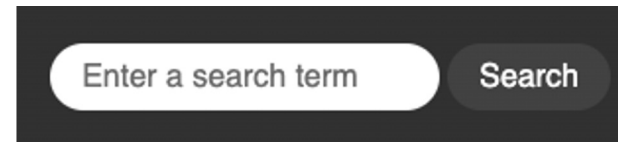
Labelling controls

- Identify a form control
 - Provide a `<label>`
 - Other mechanisms such as WAI-ARIA, title attribute, etc.
- Associate label and form control
- If visually hiding a label, provide context
 - For example: search form



Search Search

A dark grey rectangular container containing a search form. On the left is the text "Search". In the center is a white rounded rectangular input field containing the text "Enter a search term". On the right is a dark grey rounded rectangular button containing the text "Search".



Search

A dark grey rectangular container containing a search form. The text "Search" is visually hidden. The input field contains "Enter a search term" and the button contains "Search".

Example of context related label hiding (visually)

Incorrect control labelling

```
<select id="phone_ext-..." name>  
  <option value="BE">Belgium</option>  
  <option value="BZ">Belize</option>  
  ...  
</select>
```

Achternaam*

Telefoonnummer

Belgium ▾ +32

× Belgium (België), menu pop-up collapsed, button

Correct control labelling

```
<label for="message">Bericht*</label>  
<textarea id="message" name="message" required />
```

Bericht*

Ik schrijf mij in voor de nieuwsbrief van iO.

× Bericht*, required, edit text

Grouping controls

Shipping Address:	Billing Address:
Name: <input type="text"/>	Name: <input type="text"/>
Street: <input type="text"/>	Street: <input type="text"/>
Number: <input type="text"/>	Number: <input type="text"/>
City: <input type="text"/>	City: <input type="text"/>
ZIP code: <input type="text"/>	ZIP code: <input type="text"/>

- Group related controls inside a `<fieldset>`
 - Describe the group with a `<legend>`
- Easier to digest larger forms
 - UX related: [Hick's Law](#)
- Same applies for large dropdowns (`<select>`)
 - Use `<optgroup>` to group related `<option>` elements.

Automated testing



AUTOMATED TESTING

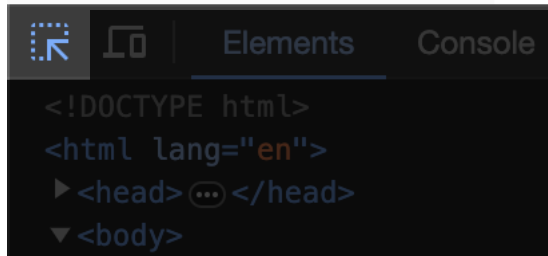
DevTools

DevTools

- Web inspector
- Accessibility tree view
- Accessibility tab

Web inspector

Activate the element selection toggle and hover over the element.



h2.text-h3.w-full.leading-[1.125] 351.17 x 28.69

Color #FFFFFF

Font 28.6914px TTCommonsPro, ui-sans-ser...

ACCESSIBILITY

Contrast **Aa** 2.7 ⓘ

Name Here it is all for one

Role heading

Keyboard-focusable

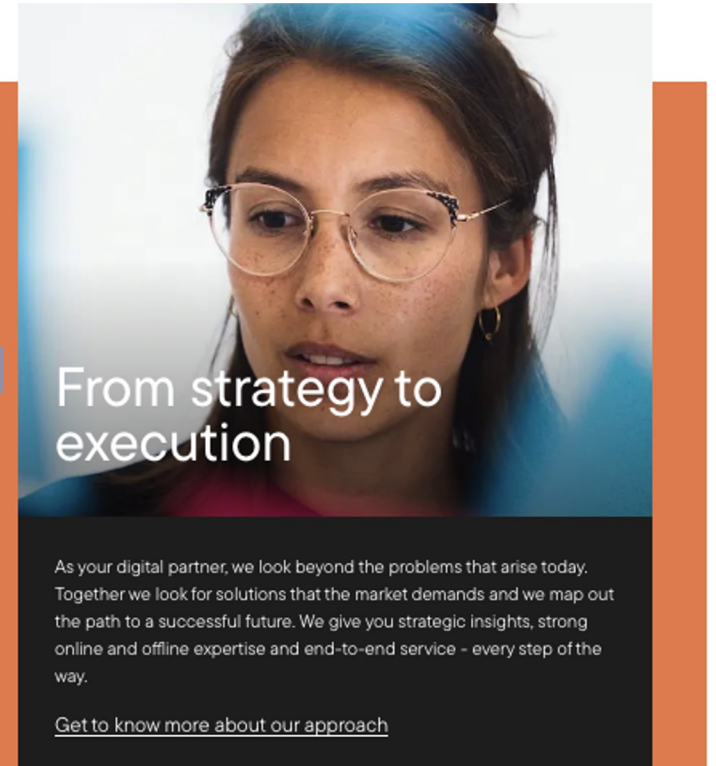
Here it is all for one

— From strategy to execution

Digital lead, end-to-end

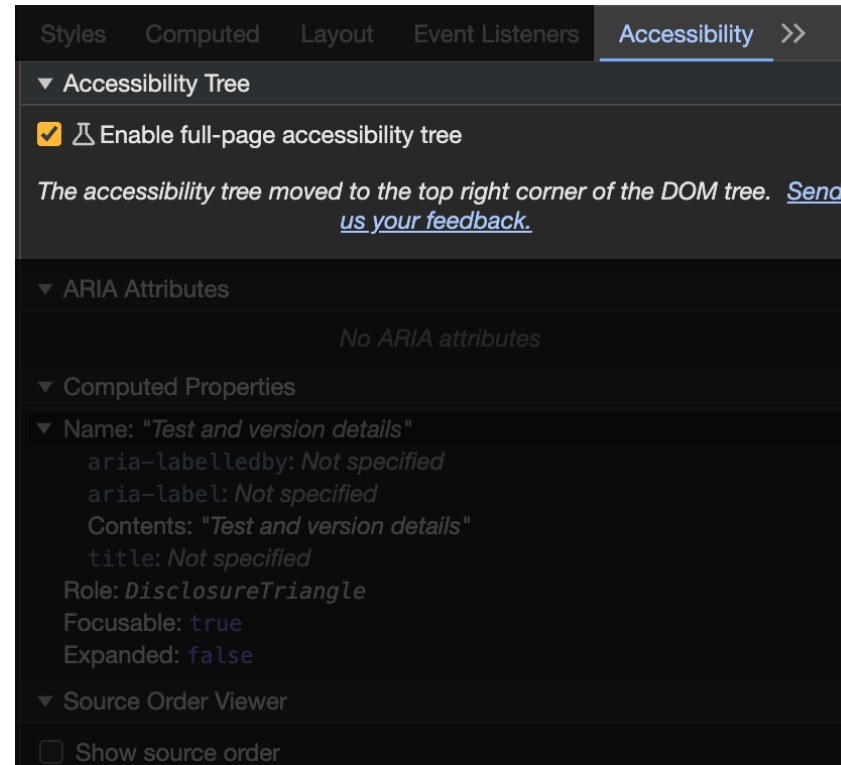
A breeding ground for talent

Every campus an inspiring home



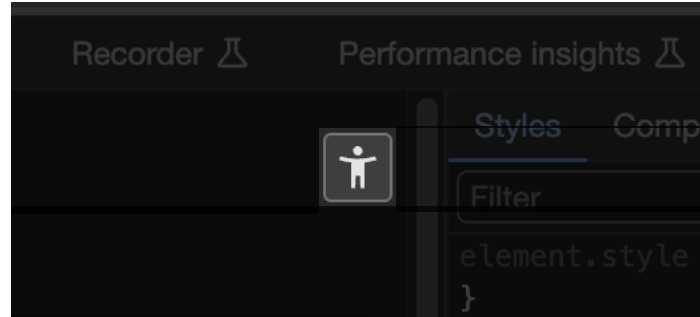
Accessibility tree view

Activate the “*Enable full-page accessibility tree checkbox*” in the Accessibility tab.



Accessibility tree view

Activate the “*Enable full-page accessibility tree checkbox*” in the Accessibility tab.



```

</div>
<span class="relative" data-visible="true"></span>
  <div id="parallax-video" class="absolute inset-0 overflow-hidden" style="translate: none; rotate: none; scale: none; transform: translate(0px, 0px);"></div>
</section>
</div>
</header>
<dialog class="lg:hidden ExpandingSearch_dialog__7ABE"></dialog>
<aside class="bg-white mobile-navigation MobileNav_root_Nk5ox bg-white" aria-hidden="true"></aside>
<div class="flex flex-1 flex-col"></div> flex
<footer class="Footer_lightLogo_gvqZ7 py-8 themed-bottom-hero-container">
  <div class="container">
    <div>
      <div class="io-grid"> grid
        <div class="relative col-span-full mb-8 flex h-16 w-24 items-center justify-start xl:col-span-1 xl:my-auto"> flex
          <a aria-label="i0 logo" href="/nl"></a> == $0
        </div>
        <div class="col-span-full lg:col-span-8 lg:mr-12 xl:col-span-8 xl:my-auto"></div>
        <div class="col-span-full lg:col-span-4 xl:col-span-3"></div>
      </div>
      <div class="io-grid pt-4 lg:flex lg:justify-between lg:pt-10 xl:pt-4"></div> flex
    </div>
  </div>
</div>
<div class="flex items-center gap-5 bg-primary-blue px-6 text-sm text-white shadow-3xl sticky bottom-0 z-20 lg:hidden"></div>
</div>
<div id="modal-portal"></div>
<script id="_NEXT_DATA_" type="application/json"></script>
<script id="google-analytics" data-nscript="afterInteractive"></script>
<script async src="https://cdn.jsdelivr.net/npm/search-insights@2.6.0/dist/search-insights.min.js"></script>
<next-route-announcer></next-route-announcer>

```

Styles Computed Layout Event Listeners Accessibility >>

▼ Accessibility Tree

Enable full-page accessibility tree

The accessibility tree moved to the top right corner of the DOM tree. [Send us your feedback.](#)

▼ ARIA Attributes

aria-label: i0 logo

▼ Computed Properties

▼ Name: "i0 logo"

aria-labelledby: Not specified
aria-label: "i0 logo"
Contents: Not specified
title: Not specified

Role: link
Focusable: true

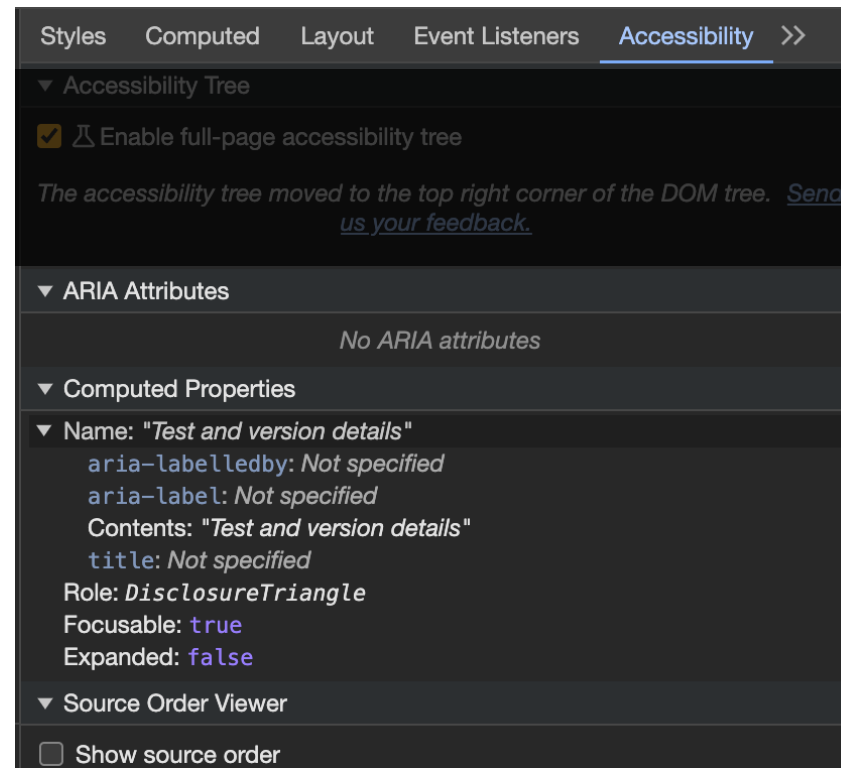
▼ Source Order Viewer

Show source order

html.lenis.lenis-smooth body div#_next div.flex.min-h-screen.flex-col.theme-pink. footer.Footer_lightLogo_gvqZ7.py-8.themed-bottom-hero-container div.container div div.io-grid

Accessibility tab

The *Accessibility tab* itself also provides relevant semantic information about the current selected element.



AUTOMATED TESTING

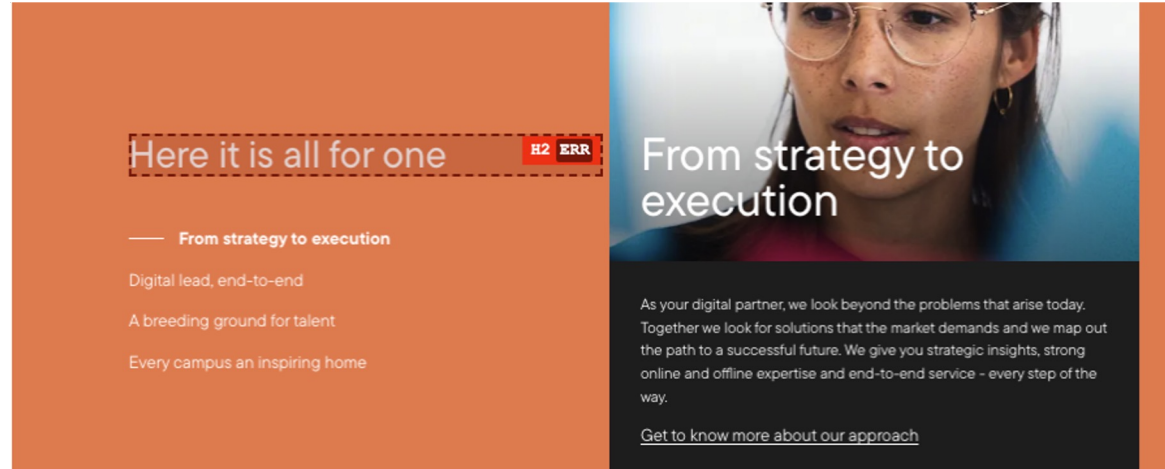
Extensions

Extensions

- TPGi: [ARC Toolkit](#)
- Deque: [Axe DevTools \(Pro\)](#)
- Chris Pederick: [Web Developer](#)



ARC Toolkit extension



ARC Toolkit

Version: 5.5.3

Results by messages

[View by elements](#)

[Get help fixing these errors](#)

Run tests All topics

Only Show

Errors Alerts Best Practices

Highlight Other tools 👤

Topic

Topic	Errors	Alerts	Best Practices
Total	42	48	9
Audio / video / multimedia	-	-	-
Content adaptability	-	-	-
Contrast	6	22	0
Custom widgets	-	-	-
Errors / status	1	0	0
Order & focus	-	-	-
Images	0	4	0
Keyboard	-	-	-
Interactive controls	32	1	0
Page navigation & language	0	4	0

1 Error(s) Insufficient large text contrast

Description: There is insufficient color contrast between the foreground and background of large text content.

WCAG 2.1 Success Criterion: [AA 1.4.3 Contrast \(Minimum\)](#)

`<h2 class="text-h3 w-full leading-[1.125]"></h2>`

`/html/body/div[1]/div/div/main/section[7]/div[2]/div/h2`

background-color: #ed7f53 | background-color: rgb(237, 127, 83) | contrast ratio: 2.71:1 | font-size: 34.5625 | font-weight: 500 | foreground-color: #ffffff | foreground-color: rgb(255, 255, 255)

5 Error(s) Insufficient normal text contrast

3 Error(s) Duplicate ID used

32 Error(s) No image role

1 Error(s) Required field not programmatically declared

1 Alert(s) Italic used

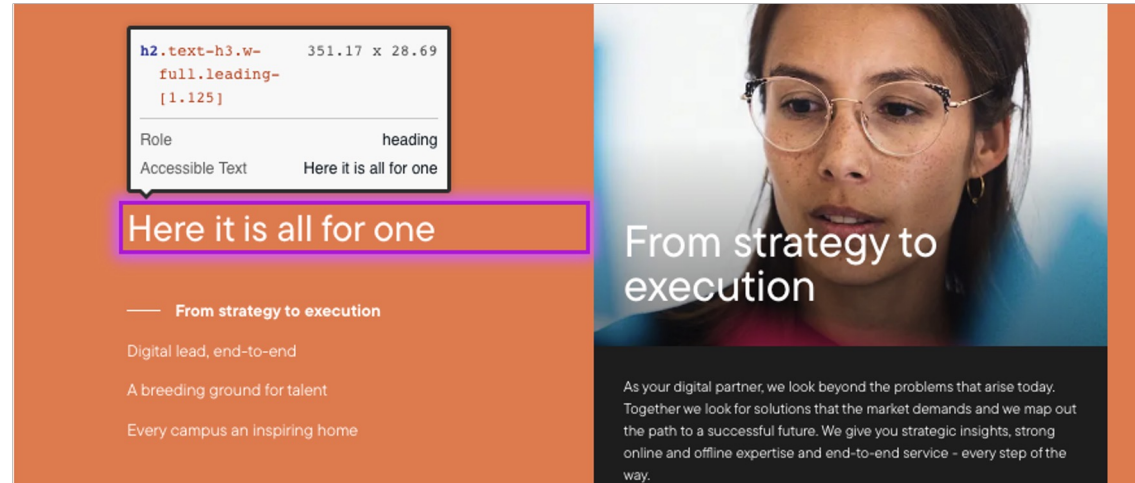
22 Alert(s) Unable to determine text contrast against image background

6 Alert(s) Duplicate ID found

1 Alert(s) Italic used

2 Alert(s) Special characters used

Axe DevTools extension



DevTools axe-core 4.7.0 Sign up / Sign in

Overview Guided Tests

Test Name SAVE TEST

Test URL RE-RUN SCAN

https://www.lodigital.com/en

TOTAL ISSUES 12

AUTOMATIC ISSUES 12

GUIDED ISSUES 0

Critical 3 Serious 6

Moderate 0 Minor 3

Best Practices: OFF WCAG 2.1 AA

Issues: Total Issues 12

Elements must meet minimum color contrast ratio thresholds 6

HIGHLIGHT SHARE ISSUE 1 of 6

Ensures the contrast between foreground and background colors meets WCAG 2 AA minimum contrast ratio thresholds

more information

Element Location: .text-h3

<h2 class="text-h3 w-full leading-[1.125]">Here it is all for one</h2>

To solve this problem, you need to fix the following:

Element has insufficient color contrast of 2.7 (foreground color: #ffffff, background color: #ed7f53, font size: 22.1pt (29.5309px), font weight: normal). Expected contrast ratio of 3:1

Related Node

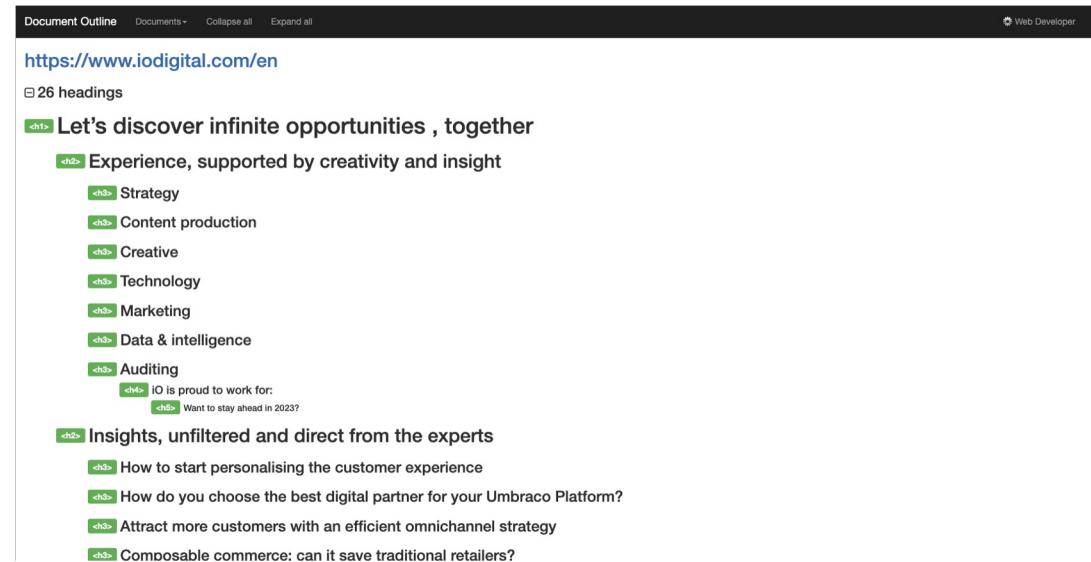
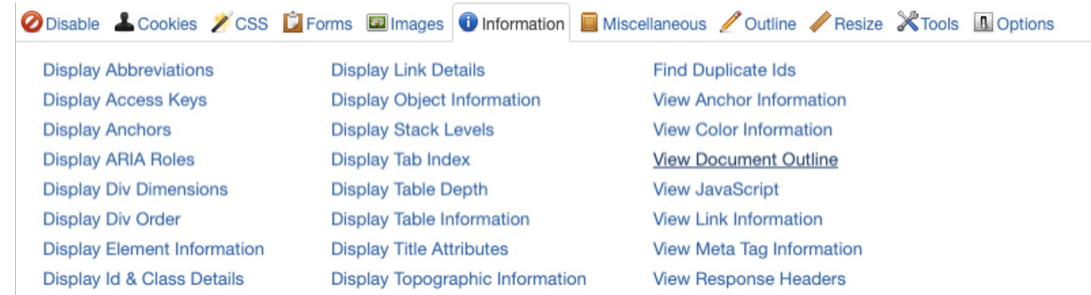
<div class="themed-block hidden md:sticky md:top-[5%] md:col-span-full md:row-start-2 md:block md:h-[90vh]">


Found: Automatically Impact: serious cat:color wcag2aa wcag143 ACT TTV5 TT13.c Found on: 15/05/2023 at 9:36 AM

IDs used in ARIA and labels must be unique 3

id attribute value must be unique 3

Web Developer extension



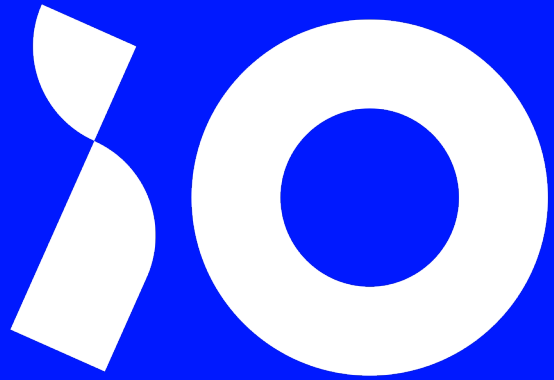


“Accessibility is not a checklist,
it is a *mind shift*.”

Questions?

- Mail: tim.dujardin@iodigital.com
- LinkedIn: <https://www.linkedin.com/in/timdujardin/>
- Twitter: <https://twitter.com/timdujardin>





Thank you for your attention!

Tim Dujardin

tim.dujardin@iodigital.com