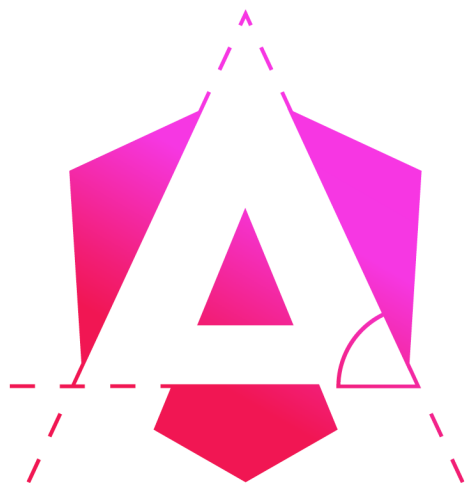




ANGULAR
ARCHITECTS

Material:

<https://LXT.dev/>

Accessibility in Angular

Alexander Thalhammer | @LX_T

About this workshop

Every participant should

- understand the ***importance*** of accessibility
- know how to ***measure*** the accessibility
- know how to ***improve*** the accessibility
- become an **accessibility evangelist**
- have ***fun*** along the way 😊

My goals

Timetable (approx.)

- 09:00 Input / Theorie
- 10:00 Tools / A11y Tests
- 10:30 ☕ Pause
- 11:00 Live Coding / Praxis
- 12:00 Q&A

Workshop

What does accessibility (A11y) mean?

- What would you say?

What does web accessibility (A11y) mean?

- What does **Google** say?
- "An accessible site is one whose content can be accessed regardless of any user's impairments and whose functionality can also be operated by the most diverse range of users possible."
-- <https://web.dev/articles/what-is-accessibility>

What does web accessibility (A11y) mean?

- What does **ChatGPT** say?
- "Web accessibility means designing and developing websites and applications so they can be used by everyone, including people with disabilities."
-- ChatGPT

Why A11y?

- "Web accessibility is important because it **ensures that everyone, including people with disabilities, can access, navigate, and interact with websites and applications**, promoting inclusivity, equal opportunity, compliance with legal standards, and improved user experience for all"
-- ChatGPT

Why?



About me ...

Hi, it's me → [@LX_T](https://twitter.com/LX_T)  <https://alex.thalhammer.name/>

- **Alexander Thalhammer** from Graz, Austria (est. 1983)
 - **Angular Software Tree** GmbH (est. 2019)
- Web Dev for 24 years (I've come a long way baby)
- 2011 - 2017 WordPress Dev (Web, PHP & jQuery)
- Since 2017 **Angular Dev** (Web, TS, Rx - NG 4.0.0)
- Since 2020 **Angular Evangelist, Coach & Consultant**
 - Member of **Angular Architects** <https://www.angulararchitects.io/>

About me



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Some numbers

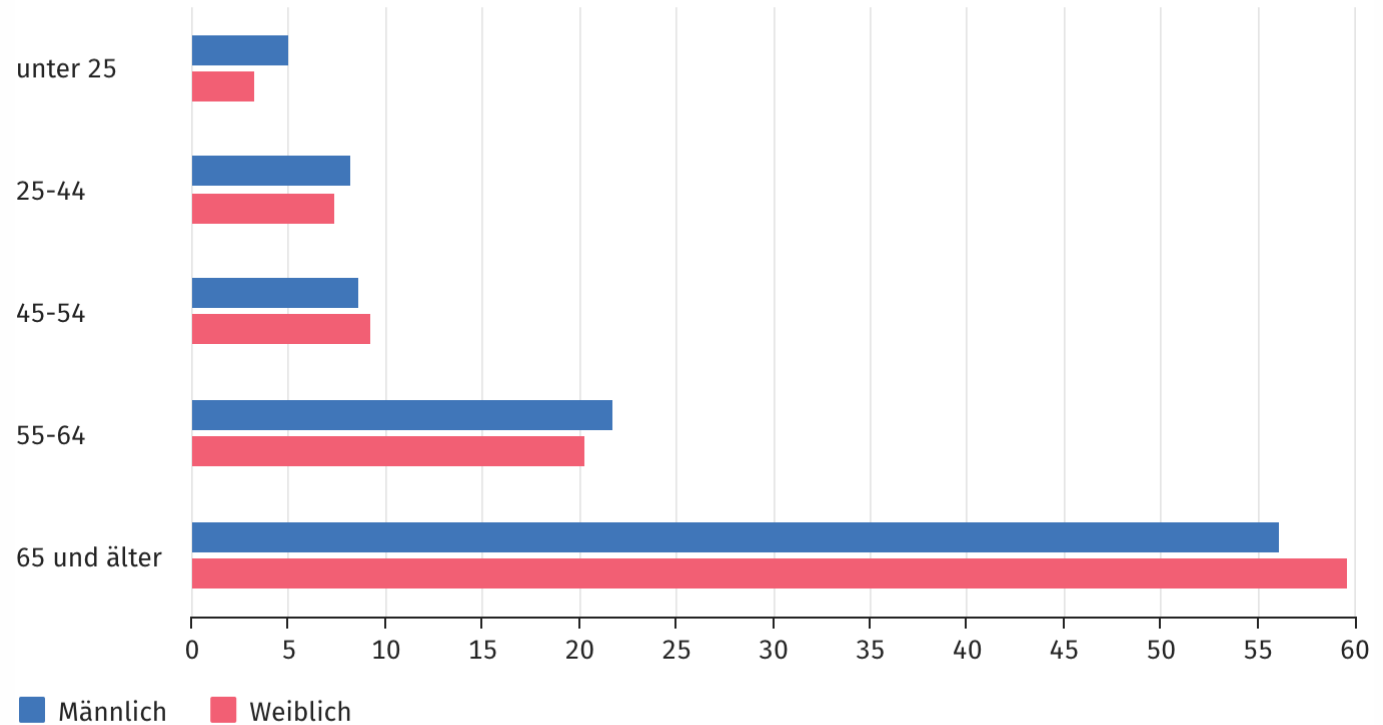
Germany

- 7,8 Mio. (9,4%) severely disabled
- > 10 Mio. (12,7%) officially recognized disab.
- (Statistisches Bundesamt, 2021)
- 18,7 Mio (22 %) aged ≥ 65 (2022)

Germany

Schwerbehinderte Menschen nach Alter 2021

Anteil an allen Schwerbehinderten je Geschlecht in %



Personen mit Signierung des Geschlechts "divers" und "ohne Angabe" (§ 22 Absatz 3 PStG) werden ab dem Berichtsjahr 2021 aus Gründen der statistischen Geheimhaltung per Zufallsprinzip dem männlichen oder weiblichen Geschlecht zugeordnet.

Austria

- 1,34 Mio. (18,4%) permanently disabled
 - 1 Mio. (14,1%) problems with mobility
 - 216k (3,0%) problems with vision
 - 157k (2,1%) problems with hearing
 - 60k (0,8%) mental illness / learning disabilities
- (Statistik Austria, 2015)

Types of disabilities

Classic disabilities

- Mobility (14,1% AT)
- Vision (3,0% AT)
- Hearing (2,1% AT)
- Mental / learning disabilities (0,8% AT)

Other disabilities

- Dementia (2% DE)
- Non-native speakers (20% DE / 24% AT)
- Reading/spelling weakness (12% DE / 10% AT)
- Parents (just 1 hand 😊)

Legal basis

European Accessibility Act 2025 (EAA)



- EU directive from April 2019 (!)
 - Europäisches Gesetz zur Barrierefreiheit (EGB)
- regulations for the accessible use of certain products and services such as
 - terminals
 - ticket machines in public transport systems
 - payment terminals and cash machines
 - products
 - computers
 - mobile phones
 - services
 - e-commerce (online shops, everything that creates contracts)
 - e-books

Barrierefreiheitsstärkungsgesetz (BFSG)

Accessibility Strengthening Act



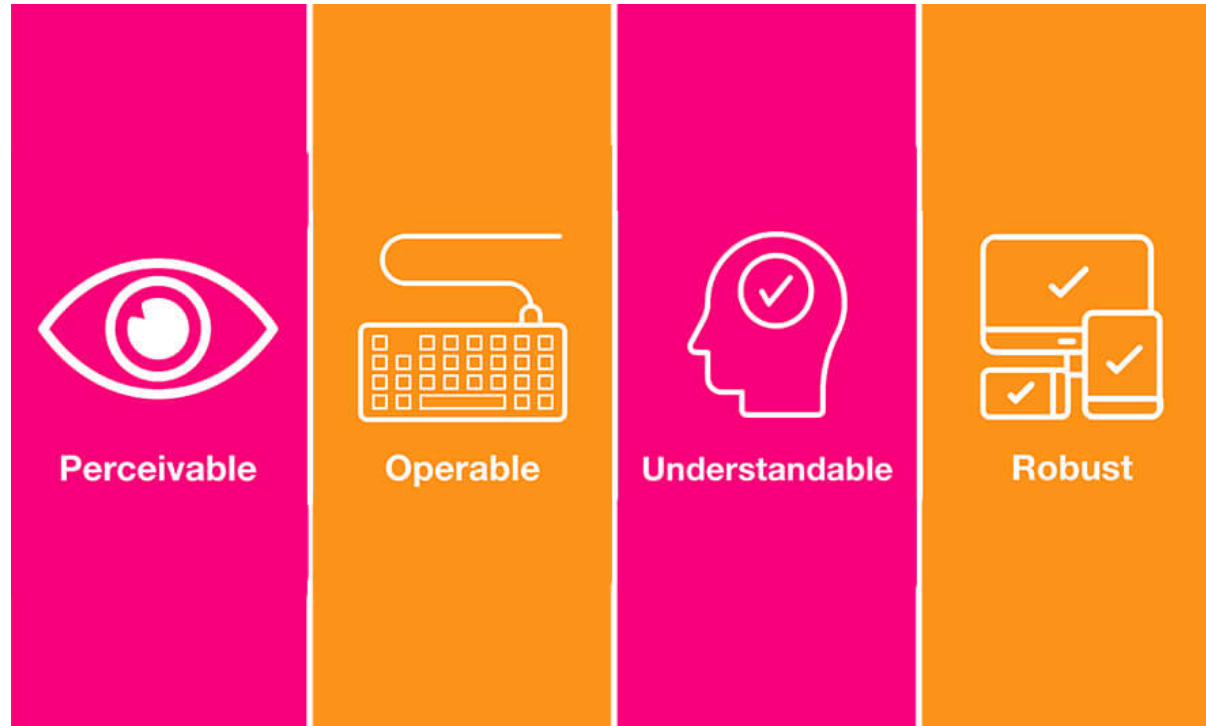
- DE – July 2022 national application of the EAA
- All private web services must be accessible too
 - Starting from June 28th 2025 all new products & services
 - immediately applicable for online services like shops
 - up to 5 years for migration of existing products
 - up to 15 years for migration of ticket machines / terminals
- Includes online services like banking & shops
- Small bus. (<10 emp. or <2 M. € sales) excluded
- <https://www.digitalmanufaktur.com/blog/barrierefreiheitsstarkungsgesetz-2025-was-onlineshops-jetzt-tun-mussen>

WCAG 2.2

The 4 Principles

- Perceivable
 - Information and user interface components must be presentable to users in ways they can *perceive*
- Operable
 - User interface components and navigation must be *operable* with a variety of tools
- Understandable
 - Information and the operation of the user interface must be *understandable*
- Robust
 - Content must be *robust* enough that it can be interpreted by a wide variety of user agents, including assistive technologies

The 4 Principles



<https://www.periscope.com/news/covid-19-accessibility-and-e-comm/>

The 3 Levels Of Conformity

- A
 - Minimum level, addressing basic accessibility features
- AA
 - Addresses common and significant barriers, benefiting a wider range of users
- AAA
 - Highest level, includes all Level A and AA criteria, providing the most comprehensive accessibility

often-used in laws **(EAA)**

The WCAG 2.2 – Quick Reference

<https://www.w3.org/WAI/WCAG22/quickref/?versions=2.2>

WCAG 2.2

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ARIA

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WAI ARIA

- Adds HTML-attributes to elements
 - improving accessibility for dynamic web content
 - especially for people with disabilities
- The attributes help assistive technologies
 - like screen readers, Braille, ...
 - understand and navigate web content more effectively
- Defining roles, states, properties
 - relationships of elements
 - allowing Devs to create accessible & inclusive web apps

NG ARIA [attr]

- ARIA attributes enable modifying
 - an element's states and properties as defined in the A11y tree
 - <https://developer.mozilla.org/en-US/docs/Web/Accessibility/ARIA/Attributes>
- When binding to ARIA attributes in Angular, you must use the "attr." prefix

```
<!-- Use attr. when binding to an ARIA attribute -->  
<button [attr.aria-label]="myActionLabel">...</button>
```

```
<!-- Static ARIA attributes require no extra -->  
<button aria-label="Close">...</button>
```


ARIA Attribute – Example

```
<button  
  type="button"  
  aria-label="Toggle navigation menu"  
  [attr.aria-expanded]="isMenuOpen() ? 'true' : 'false'"  
  (click)="onToggleNav()">  
  <i class="icon-menu"></i>  
</button>
```

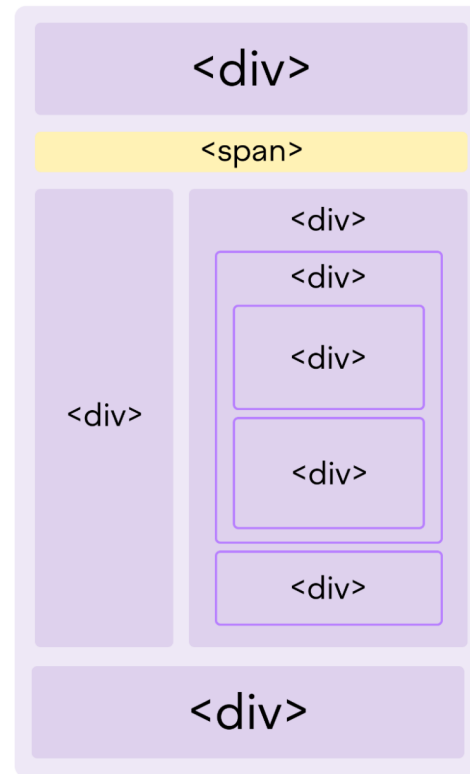
A11y Best Practices

A11y – Best Practices

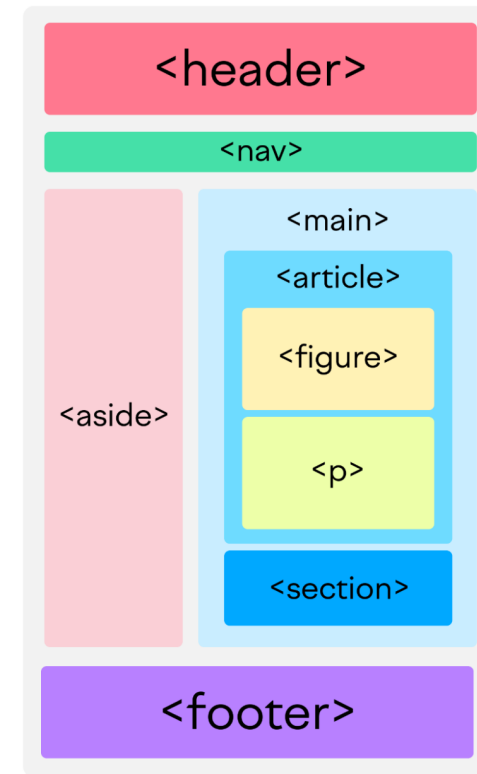
1. Semantic HTML & Structure
2. Keyboard A11y & Navigable
3. Color & Contrast
4. Text Alts
5. Media
6. Tables
7. Forms
8. Font Size
9. Tap Targets
10. Language

Semantic HTML

Non-Semantic HTML



Semantic HTML



#1 Semantic

Semantic HTML

```
<div class="wrapper">  
  <aside class="sidebar">  
    <app-sidebar />  
  </aside>  
  
  <main class="main-panel">  
    <app-navbar />  
  
    <article class="content">  
      <router-outlet />  
    </article>  
  
    <app-footer />  
  </main>  
</div>
```

#1 Semantic

Keyboard A11y & Navigable

- [WCAG 2.1, 2.4](#)
- navigation with keyboard etc. must be possible
- use correct focus and tab order [tabindex]
 - avoid [tabindex] > 0
 - can only be "0" (adds focus border/outline) or "-1" (avoid focus)
- focus must be clearly visible and recognizable
 - use ":focus" to show outline (like ":hover"), avoid "outline: none"
 - must be at least 2px, should be at least 3px (hint: color contrast!)
- use skip links to skip navigations
- a vs. button

Keyboard A11y & Navigable

```
<a routerLink="/home">  
  <span class="simple-text logo-mini logo-image-small">  
    <img ngSrc="/assets/angular_gradient_68x68.png" width="34"  
height="34" alt="Back to home" />  
  </span>  
  
  <span class="simple-text logo-normal">NG a11y</span>  
</a>
```

Color & Contrast

- [WCAG 1.4.1](#), [1.4.3](#), [1.4.6](#)
- avoid color as the only visual means of
 - conveying information, indicating an action, prompting a response or distinguishing a visual element
 - **links in text with text-decoration: none (just don't!)**
- use a contrast ratio of at least 4.5:1 for text & images of text (3:1 for headings)
 - <https://www.whocanuse.com/>

Text Alts



- [WCAG 1.1](#)
- use descriptive text [alt] for images & icons
 - can be alt="" / role="none" (no desc / just decorative)
 - icons/image without purpose [aria-hidden]
- <https://alttext.ai/>

Text Alts



```
<img  
  class="full-width"  
  width="2596"  
  height="1890"  
  ngSrc="/assets/img/photos/grimming_from_glaeserkoppe.jpg"  
  alt="Snowy mountain landscape with ski tracks in the  
  foreground. Peaks and ridges extend under a blue sky with  
  scattered clouds."  
  priority  
>
```

4 Text Alts

Media (Audio & Video)



- [WCAG 1.2](#)
- audio-only content
 - text transcript [1.2.1](#)
 - and captions for prerecorded [1.2.2](#)
- video-only content
 - alt text or alternative content [1.2.1](#)
- prerecorded video content
 - text transcript or audio description [1.2.3](#)
- AA
 - captions for live audio content [1.2.4](#)
 - audio description for prerecorded video content [1.2.5](#)

Tables



- [WCAG 1.3.1](#), [2.4.6](#)
- use header and footer, use col or row
 - `<thead>` & `<tbody>`
 - `<th role="columnheader">` or `<th role="rowheader">`
 - if not using native `<table>` use ARIA table, row, columnheader, rowheader
- use caption & summary (or description)
 - `<caption>` identifies topic and is useful in most situations
 - `<summary>` provides orientation or navigation hints

Tables



```
<table>
  <caption style="text-align: left">
    Availability of holiday accommodation<br />
    <span style="font-size: 0.75em; display: block">
      Column one has the location and size of accommodation, other
      columns show the type and number of properties available
    </span>
  </caption>
  <thead>
    <tr>
      <td></td>
      <th id="stud" scope="col">Studio</th>
      <th id="apt" scope="col"><abbr title="Apartment">Apt</abbr></th>
      <th id="chal" scope="col">Chalet</th>
      <th id="villa" scope="col">Villa</th>
    </tr>
  </thead>
  <tbody>
    [...]
  </tbody>
  <summary>This is an example of an HTML table</summary>
</table>
```

Tables



```
<p id="tableDescription">
```

Column one has the location and size of accommodation, other columns show the type and number of properties available.

```
</p>
```

```
<table aria-describedby="tableDescription">
```

Forms



- [WCAG 1.3.1](#), [3.3](#)
- use form elements labels & descriptions
 - `<label for="!!!">`
 - grouping with `<fieldset>` & `<legend>`
 - `[aria-describedby]` & `[aria-required]`
- use good feedback
 - recognizable, understandable & helping
 - `[aria-invalid]` & `[aria-live]`

Forms



7 Forms

```
<label for="from">From (*)</label>
<input
  autocomplete="false"
  type="text"
  name="from"
  id="from"
  class="form-control"
  required
  [minlength]="minLength"
  [maxlength]="maxLength"
  [pattern]="pattern"
  [attr.aria-invalid]="
    flightSearchForm.controls['from']?.dirty && flightSearchForm.controls['from'].invalid
  "
  [attr.aria-describedby]="
    flightSearchForm.controls['from']?.dirty &&
    flightSearchForm.controls['from'].errors
    ? 'from_errors'
    : null
  "
  [(ngModel)]="from"
/>
@if (flightSearchForm.controls['from'] && flightSearchForm.controls['from'].dirty) {
  <app-flight-validation-errors
    id="from_errors"
    [errors]="flightSearchForm.controls['from'].errors"
    fieldLabel="From"
  />
}
```


Font Size

- [WCAG 1.4.4](#)
- text can be resized up to 200%
 - without loss of content or functionality
 - except for captions and images of text
- `html { font-size: 100% }` (and then rem)
- for most browsers that will be 16px
- use rem not px (browsers make it work)
- <https://www.youtube.com/watch?v=rg3zgQ3xBRc>

Tap Targets (pinky finger)

- [WCAG 2.5.5](#), [2.5.8](#)
- size of the target for pointer inputs is at least 24x24 (better 44x44) CSS pixels
- use padding if element (e.g. icon) is too small

Accessible Language

- [WCAG 3.1](#)
- use [lang]
- make text readable & understandable
 - unusual words
 - abbreviations
 - reading level (complexity)
 - pronunciation (dialect)

Angular Router A11y

Unique page titles

- Add unique page titles to your routes
 - dynamic titles can be set via inject(Title)

```
export const appRoutes: Route[] = [  
  {  
    path: 'home',  
    component: HomeComponent,  
    title: 'Home - NG Ally'  
  },  
]
```

```
effect(() => this.pageTitleStrategy.setTitle(this.id()  
  !== undefined ? `Page #${this.id()}` : 'Page'));
```

Global page title suffix

```
export class PageTitleStrategy extends TitleStrategy {  
  private readonly title = inject(Title);  
  
  updateTitle(routerState: RouterStateSnapshot): void {  
    this.setTitle(this.buildTitle(routerState));  
  }  
  
  setTitle(pageTitle?: string): void {  
    if (pageTitle) {  
      this.title.setTitle(`${pageTitle} - Demo`);  
    } else {  
      this.title.setTitle('Demo like a pro');  
    }  
  }  
}
```

Active link identification

- The *RouterLinkActive* directive provides the *ariaCurrentWhenActive* input for aria-current

```
<nav>
  <a routerLink="home"
      routerLinkActive="active-page"
      ariaCurrentWhenActive="page">
    Home
  </a>
  <a routerLink="about"
      routerLinkActive="active-page"
      ariaCurrentWhenActive="page">
    About
  </a>
</nav>
```

Angular Material & CDK

Angular Material

- [Angular Material](#) library is a suite of reusable UI components that aims to be fully accessible
- If you're building your own Design System, you can copy what Angular Material is doing
- or even fork Angular Material 😊

Angular CDK

- [Angular CDK](#) includes the [a11y package](#) that provides tools to support various areas of accessibility

- *LiveAnnouncer* is used to announce messages for screen-reader users using an aria-live region

```
this.liveAnnouncer.announce('Flights loading error');
```

- *cdkTrapFocus* directive traps Tab focus in an element

```
<div class="gdpr-dialog" cdkTrapFocus>  
  <!-- Yay, focus won't leave this element! -->  
</div>
```

A11y Tools

A11y – Evaluation Tools

- NG Lint
 - [@angular-eslint/template/accessibility](https://github.com/angular-eslint/template/accessibility)
 - [eslint-plugin-jsx-a11y](https://github.com/angular-eslint/eslint-plugin-jsx-a11y)
- Tools
 - [Lighthouse](https://developers.google.com/web/tools/lighthouse) Chrome DevTools
 - [WAVE](https://www.wave.tools/) Website for testing properties / Chrome Ext.
 - [Accessibility Insights](https://chrome.google.com/webstore/detail/accessibility-insights/lkdnkpmfioimkphkpkpobfnkpfkfnkpk) Chrome Extension

A11y – Testing Tools

- [axe-core](#) JS plugin
 - [axe DevTools](#) Chrome Extension
- [jest-axe](#)
- [vitest-axe](#)
- [WICK-A11Y \(Cypress\)](#)
- [@axe-core/playwright](#)
- [@axe-core/puppeteer](#)
- [StoryBook](#) Addon

A11y – Screenreader

- [NVDA](#) (Windows, free, okay)
- [Narrator](#) (Windows, built-in, bad)
- Jaws (Windows, paid, better)
- [Voice Over](#) (Mac / iOS, Mac: Cmd + F5)
- [TalkBack](#) (Android)
- [Orca](#) (Linux)

A11y – Other Tools

- [whocanuse.com](https://www.whocanuse.com) Website for color contrasts
- [HeadingsMap](#) Chrome extension
- ChatGPT and others 😊

Angular ESLint A11y Config

– [@angular-eslint/template/accessibility](https://github.com/angular-eslint/template/accessibility)

– just 1 addition in your .eslintrc.json

```
{  
  "files": ["*.html"],  
  "extends": ["plugin:@angular-eslint/template/accessibility"],  
}
```

– or in your flat config (eslint.config.js)

```
{  
  files: ['**/*.html'],  
  extends: [...angular.configs.templateAccessibility],  
}
```


The background is an abstract composition. The upper portion features a bright purple sky with soft, white, cloud-like textures. Below the sky, a series of dark, angular lines converge towards the center, creating a sense of depth and perspective. The lower portion of the image is dominated by a red floor with a complex, repeating geometric pattern of lines and squares, resembling a modern architectural design or a tiled floor.

Ready for takeoff
(after the break at 11:00)

Live Coding

Q & A

Conclusions

Why A11y?

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver
Hear	 Deaf	 Ear infection	 Bartender
Speak	 Non-verbal	 Laryngitis	 Heavy accent

Why?

Inclusive
A Microsoft Design Toolkit

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Conclusions

Play with
A11y Tools

Apply to
WCAG 2.2
level A & AA

Use A11y
in Angular

Be ready for
EAA 2025

Follow my 10
best practices

Promote A11y
in your teams