08/07/2023 Dean Birkett (He / Him)

Beyond visual

Designing for motor impairments

Contents

Introduction

UX Designer turned **Accessibility Consultant**.

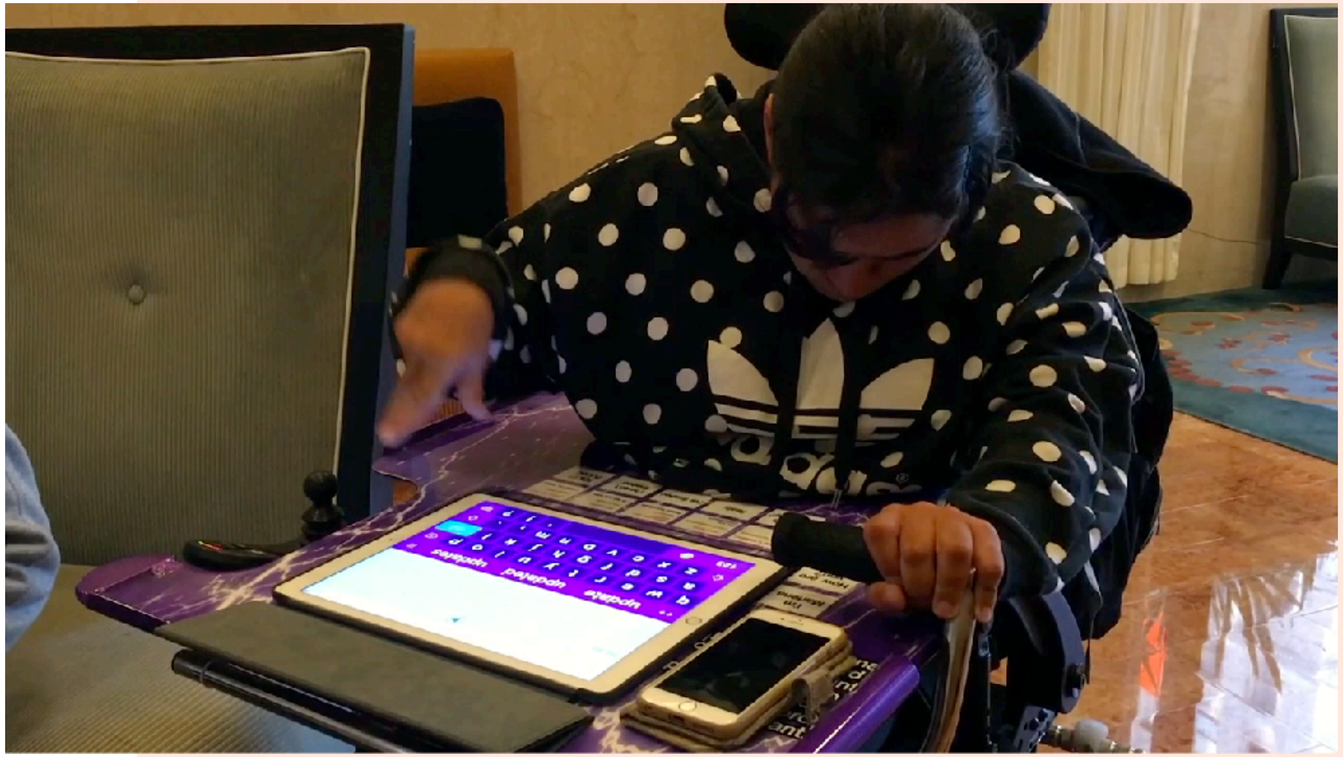
Designed apps for non-verbal people before moving into consulting for clients like KLM, Air France, Miro, Philips, eBay, Polestar and Skyscanner.

“Fine motor skills are activities in which you use the small muscles in your hands and wrists to make precise movements.”

WebMD

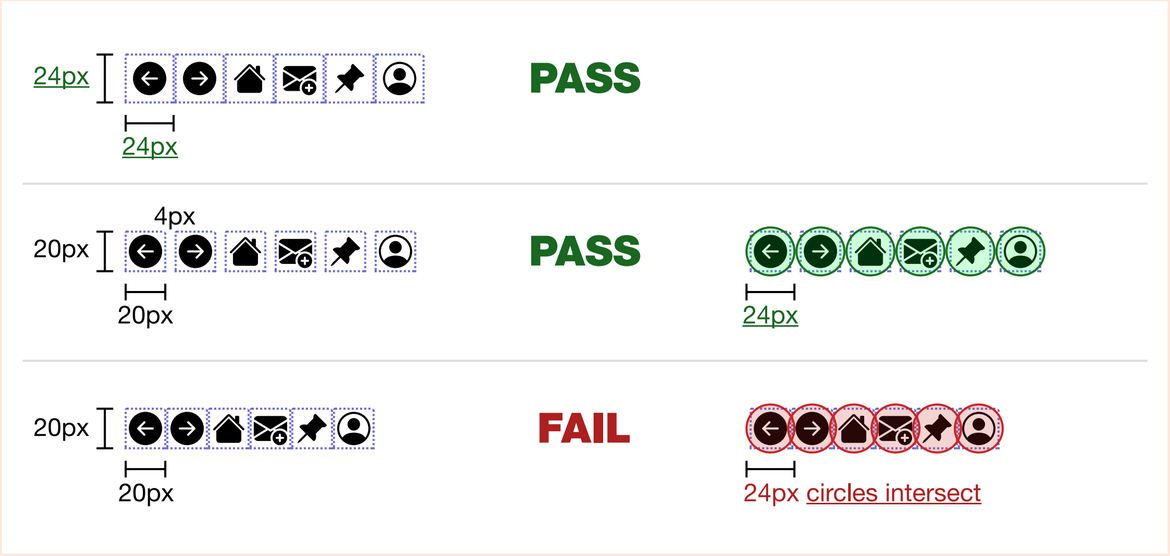
Fine motor control

- Follow device specific guidance on touch target sizes
- Test with a wide range of users
- Observe what is done



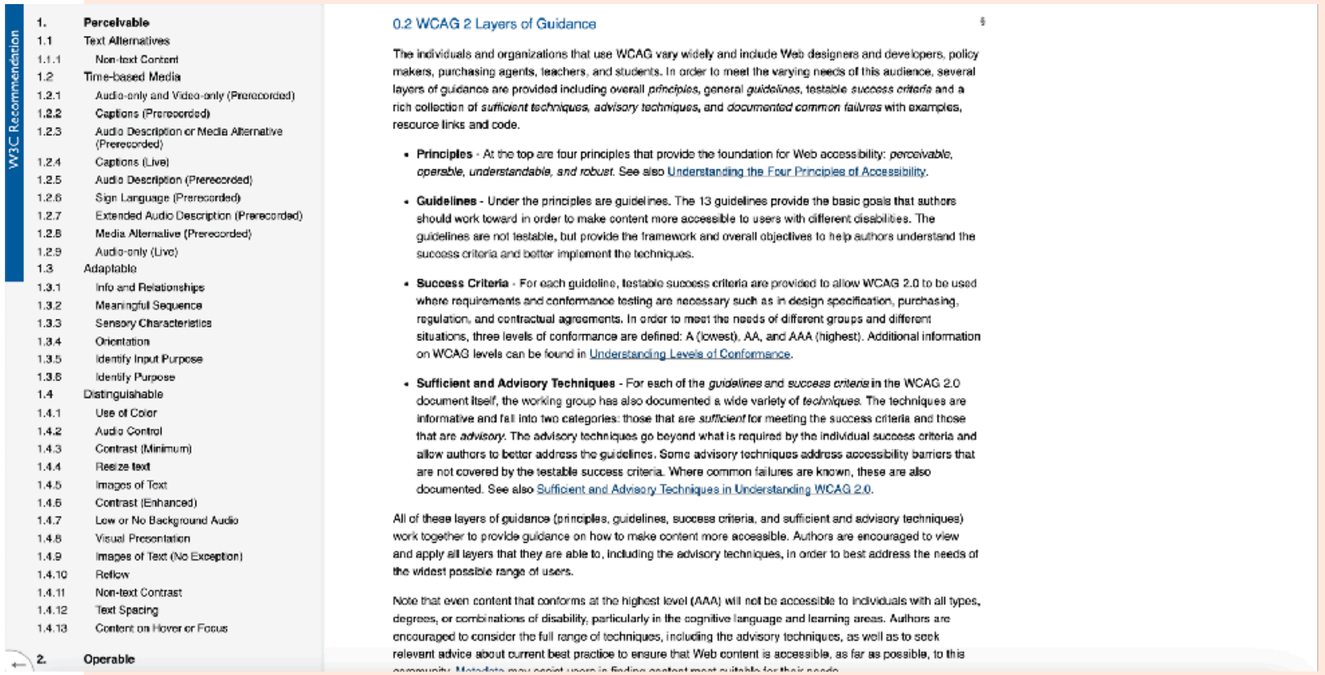
Minimum touch target sizes

- Android recommends at least **48 x 48 dp**
- Apple recommends at least **44 x 44 pt**
- A new success criterion in WCAG 2.2 (AA) requires controls to be at least **24 x 24 px**
- A current success criterion in WCAG 2.1 requires controls to be at least **44 x 44 px**. This is a AAA recommendation



WCAG

- The Web Content Accessibility Guidelines
- Currently at version 2.1, 2.2 should be out before the end of the year
- Made up of 4 principles, 13 guidelines and 78 success criteria
- Three levels of conformance, A, AA and AAA



W3C Recommendation

1. **Perceivable**
1.1 Text Alternatives
1.1.1 Non-text Content
1.2 Time-based Media
1.2.1 Audio-only and Video-only (Prerecorded)
1.2.2 Captions (Prerecorded)
1.2.3 Audio Description or Media Alternative (Prerecorded)
1.2.4 Captions (Live)
1.2.5 Audio Description (Prerecorded)
1.2.6 Sign Language (Prerecorded)
1.2.7 Extended Audio Description (Prerecorded)
1.2.8 Media Alternative (Prerecorded)
1.2.9 Audio-only (Live)
1.3 Adaptable
1.3.1 Info and Relationships
1.3.2 Meaningful Sequence
1.3.3 Sensory Characteristics
1.3.4 Orientation
1.3.5 Identify Input Purpose
1.3.6 Identify Purpose
1.4 Distinguishable
1.4.1 Use of Color
1.4.2 Audio Control
1.4.3 Contrast (Minimum)
1.4.4 Resize text
1.4.5 Images of Text
1.4.6 Contrast (Enhanced)
1.4.7 Low or No Background Audio
1.4.8 Visual Presentation
1.4.9 Images of Text (No Exception)
1.4.10 Reflow
1.4.11 Non-text Contrast
1.4.12 Text Spacing
1.4.13 Content on Hover or Focus
2. **Operable**

0.2 WCAG 2 Layers of Guidance

The individuals and organizations that use WCAG vary widely and include Web designers and developers, policy makers, purchasing agents, teachers, and students. In order to meet the varying needs of this audience, several layers of guidance are provided including overall *principles*, general *guidelines*, testable *success criteria* and a rich collection of *sufficient techniques*, *advisory techniques*, and *documented common failures* with examples, resource links and code.

- **Principles** - At the top are four principles that provide the foundation for Web accessibility: *perceivable*, *operable*, *understandable*, *and robust*. See also Understanding the Four Principles of Accessibility.
- **Guidelines** - Under the principles are guidelines. The 13 guidelines provide the basic goals that authors should work toward in order to make content more accessible to users with different disabilities. The guidelines are not testable, but provide the framework and overall objectives to help authors understand the success criteria and better implement the techniques.
- **Success Criteria** - For each guideline, testable success criteria are provided to allow WCAG 2.0 to be used where requirements and conformance testing are necessary such as in design specification, purchasing, regulation, and contractual agreements. In order to meet the needs of different groups and different situations, three levels of conformance are defined: A (lowest), AA, and AAA (highest). Additional information on WCAG levels can be found in Understanding Levels of Conformance.
- **Sufficient and Advisory Techniques** - For each of the *guidelines* and *success criteria* in the WCAG 2.0 document itself, the working group has also documented a wide variety of *techniques*. The techniques are informative and fall into two categories: those that are *sufficient* for meeting the success criteria and those that are *advisory*. The advisory techniques go beyond what is required by the individual success criteria and allow authors to better address the guidelines. Some advisory techniques address accessibility barriers that are not covered by the testable success criteria. Where common failures are known, these are also documented. See also Sufficient and Advisory Techniques in Understanding WCAG 2.0.

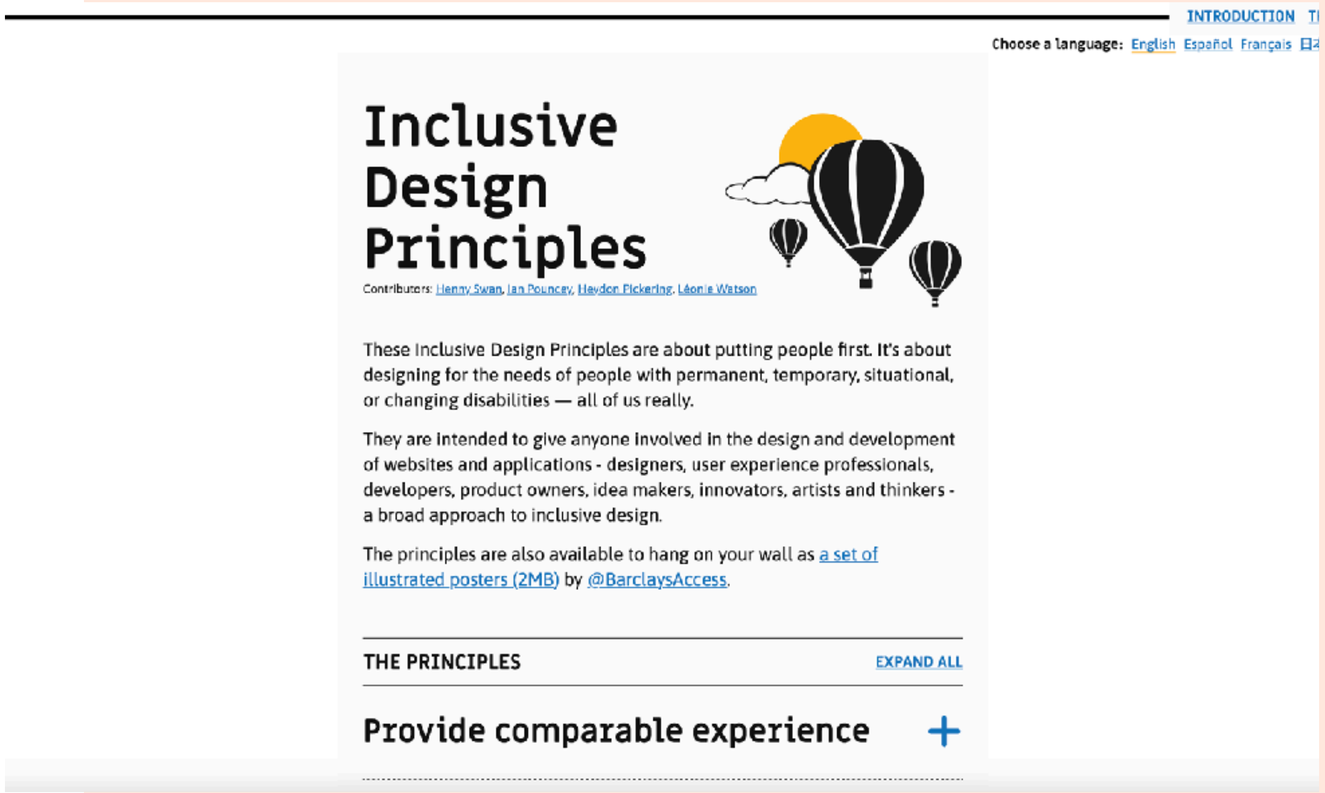
All of these layers of guidance (principles, guidelines, success criteria, and sufficient and advisory techniques) work together to provide guidance on how to make content more accessible. Authors are encouraged to view and apply all layers that they are able to, including the advisory techniques, in order to best address the needs of the widest possible range of users.

Note that even content that conforms at the highest level (AAA) will not be accessible to individuals with all types, degrees, or combinations of disability, particularly in the cognitive language and learning areas. Authors are encouraged to consider the full range of techniques, including the advisory techniques, as well as to seek relevant advice about current best practice to ensure that Web content is accessible, as far as possible, to this

WCAG 2.1: https://www.w3.org/TR/WCAG21/

Beyond WCAG

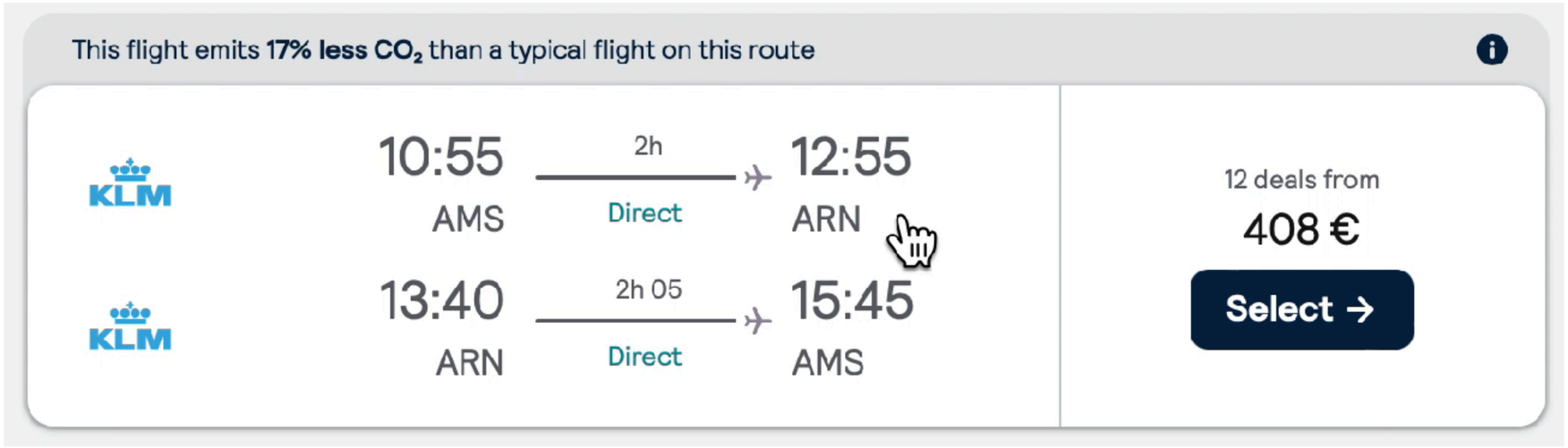
- WCAG is more of a checklist
- Passing WCAG does not mean a good user experience. **Conformance does not equal experience**
- Remember that we're designing for people



Inclusive design principles: https://inclusivedesignprinciples.org/

Beyond WCAG

- Lives in Australia
- First skydived at 21, jumping from 14,000 feet above Byron Bay
- Became the first person with cerebral palsy to base jump


This flight emits 17% less CO_2 than a typical flight on this route
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AMS
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Direct
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ARN
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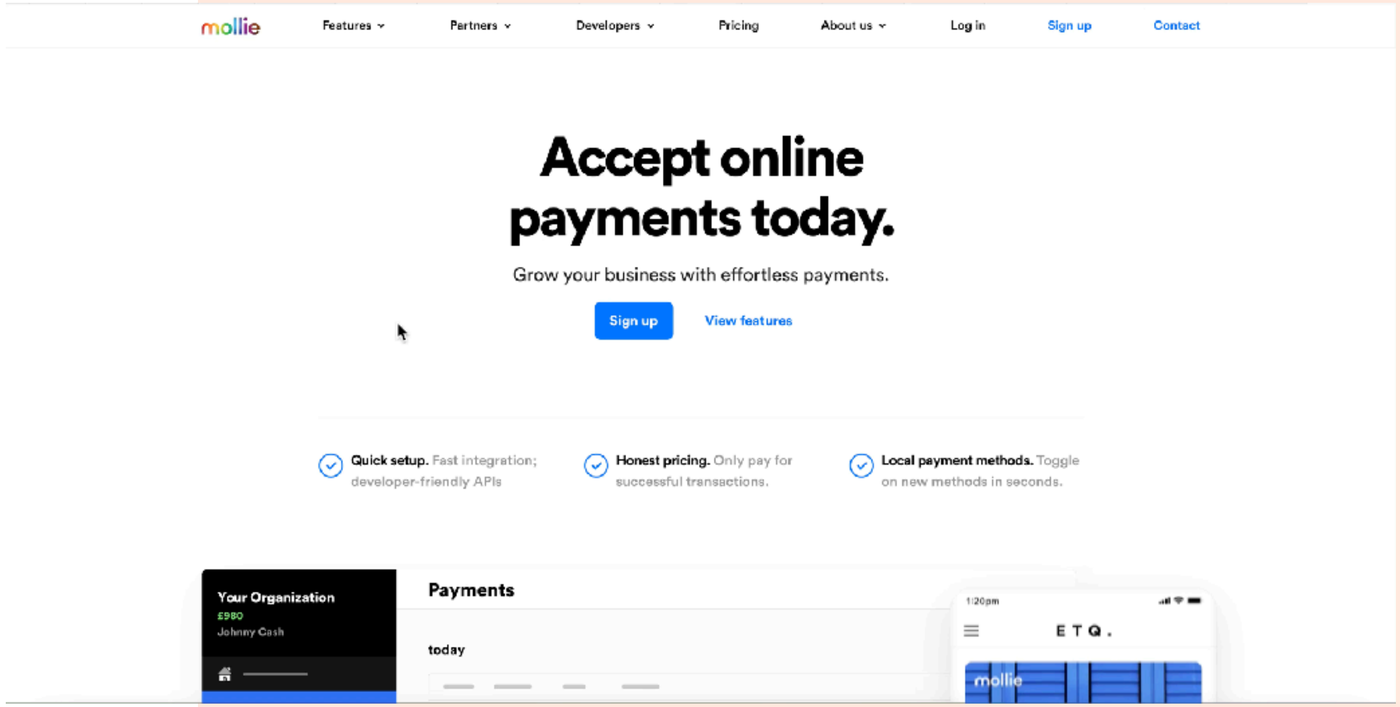
“If you design for the edges, you get the centre for free.”

Christopher Patnoe
Head of Accessibility and Disability Inclusion, Google

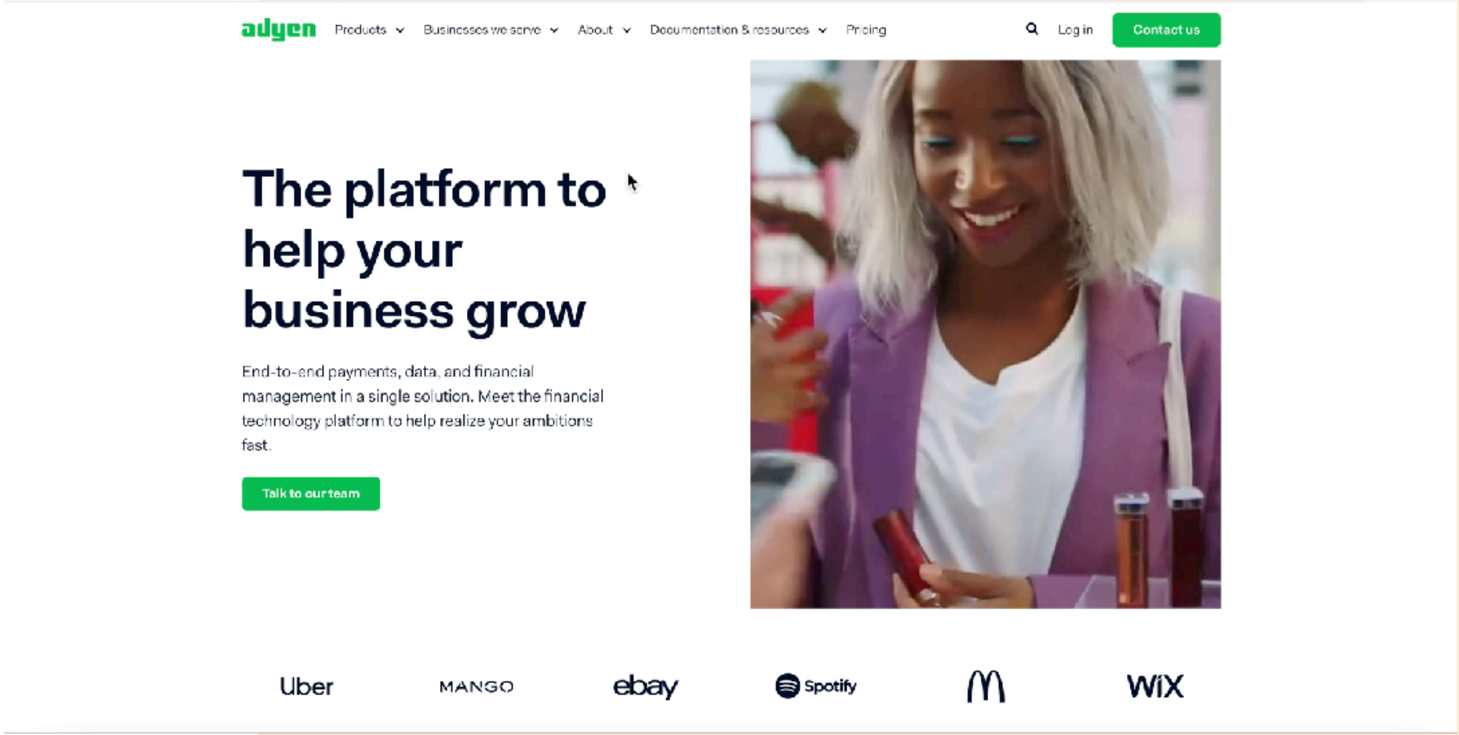
Tremors

- Tremors are neurological disorders that causes shaking in one or more parts of the body
- Tremors can happen to all, but are more common across middle-aged and older adults
- There are over 20 types of tremor. Essential tremor affect an estimated **5% of people worldwide**



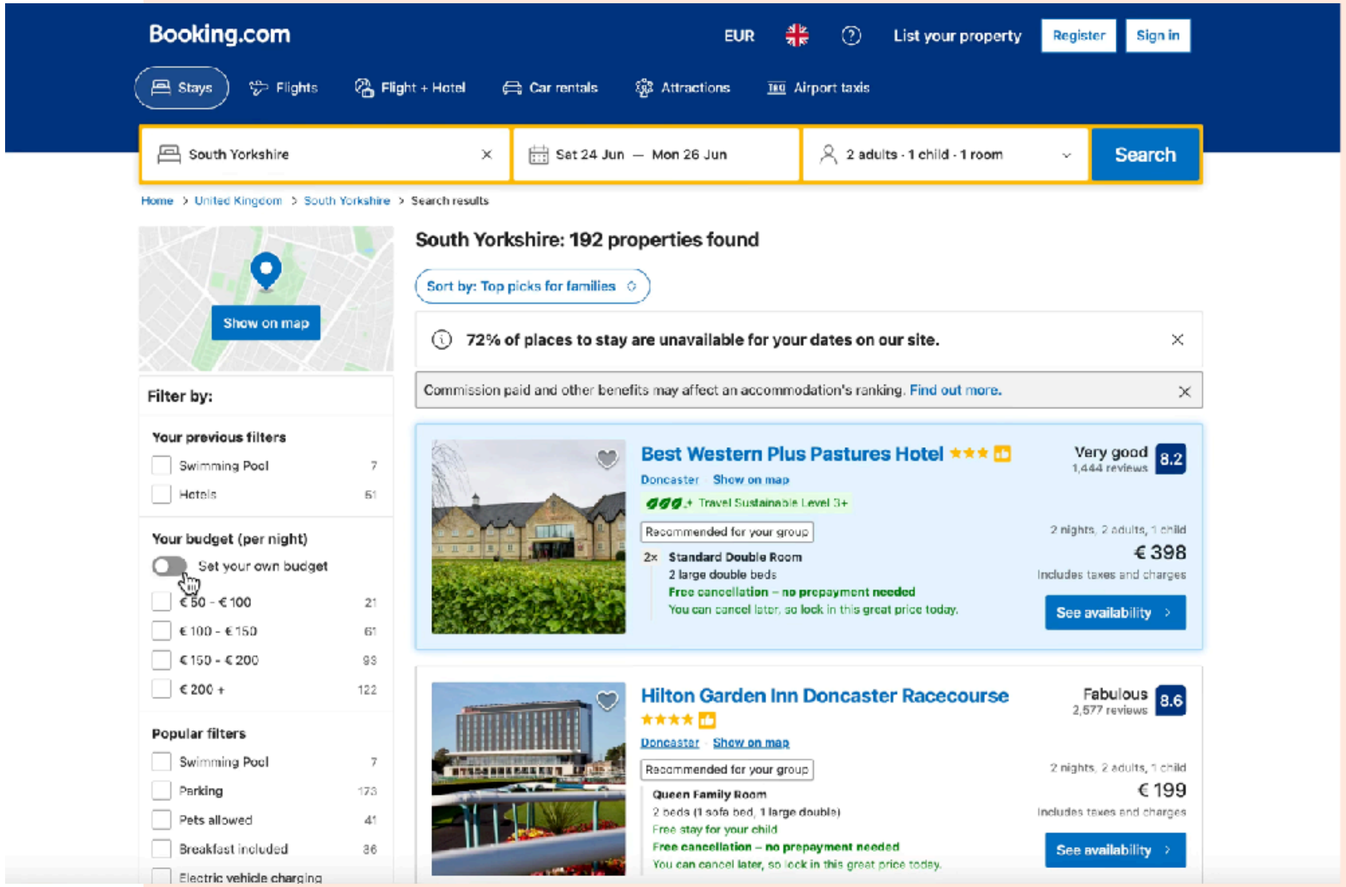
Tremors

- Make use of white space
- Be forgiving in your designs
- Hover often requires precision (but **don’t forget people who don’t use a mouse**)



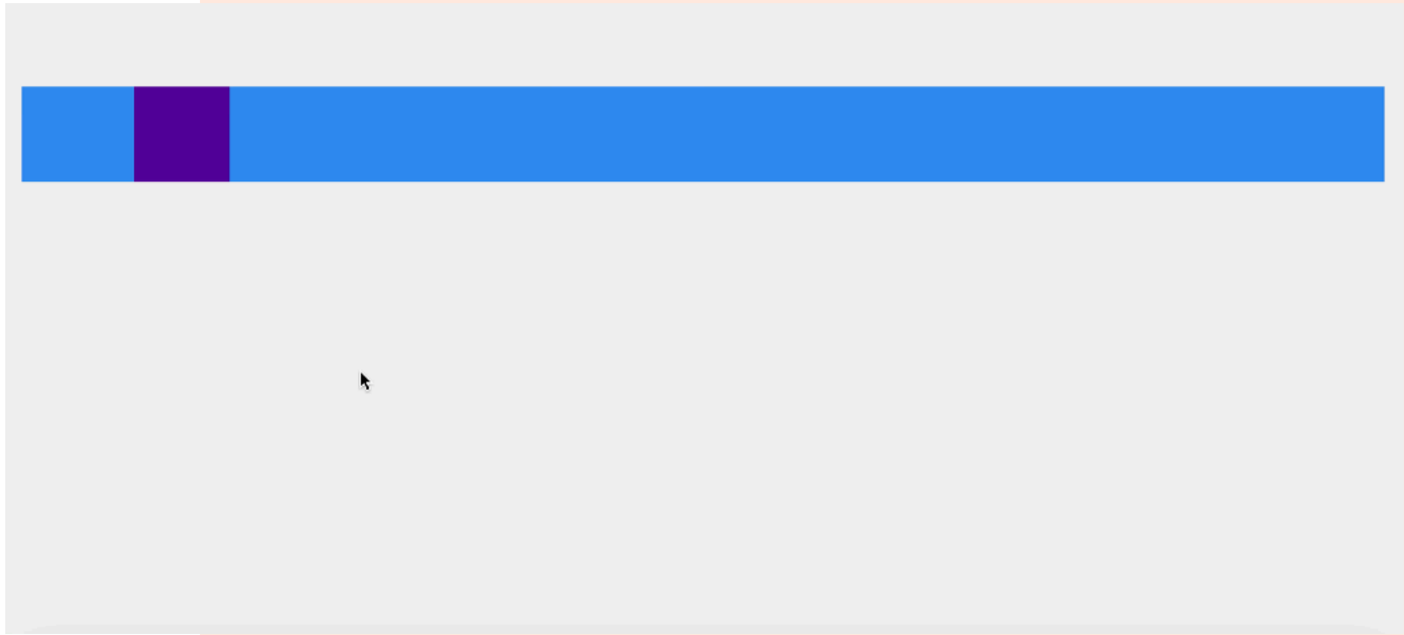
Dragging movements

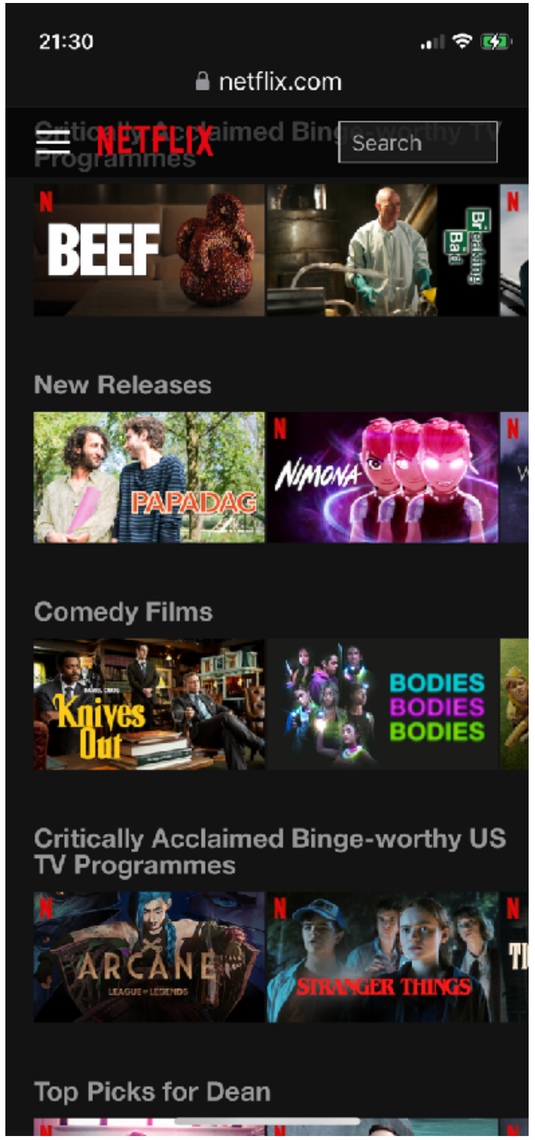
- **Difficult to perform** by people with upper body mobility impairments, tremors, or people using alternative pointing devices such as a head wand, or mouth stick
- Pressing (or clicking), holding down, moving and releasing are **complex interactions**



Dragging movements

- Dragging can include drag & drop, volume sliders, carousels, etc.
- WCAG 2.2 SC 2.5.7 Dragging movements (AA) **requires a single input gesture**
- **All functionality** should be achieved without dragging

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PAPADAG
NIMONA
Comedy Films
Knives Out
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BODIES
Critically Acclaimed Binge-worthy US TV Programmes
ARCANE
LEAGUE of LEGENDS
STRANGER THINGS
Top Picks for Dean

Hardware solutions

Hardware solutions to remove digital barriers include (ergonomic) keyboards, head pointers, mouth sticks, sip and puff devices, eye tracking, voice input, switches, and many, many more.

Switches

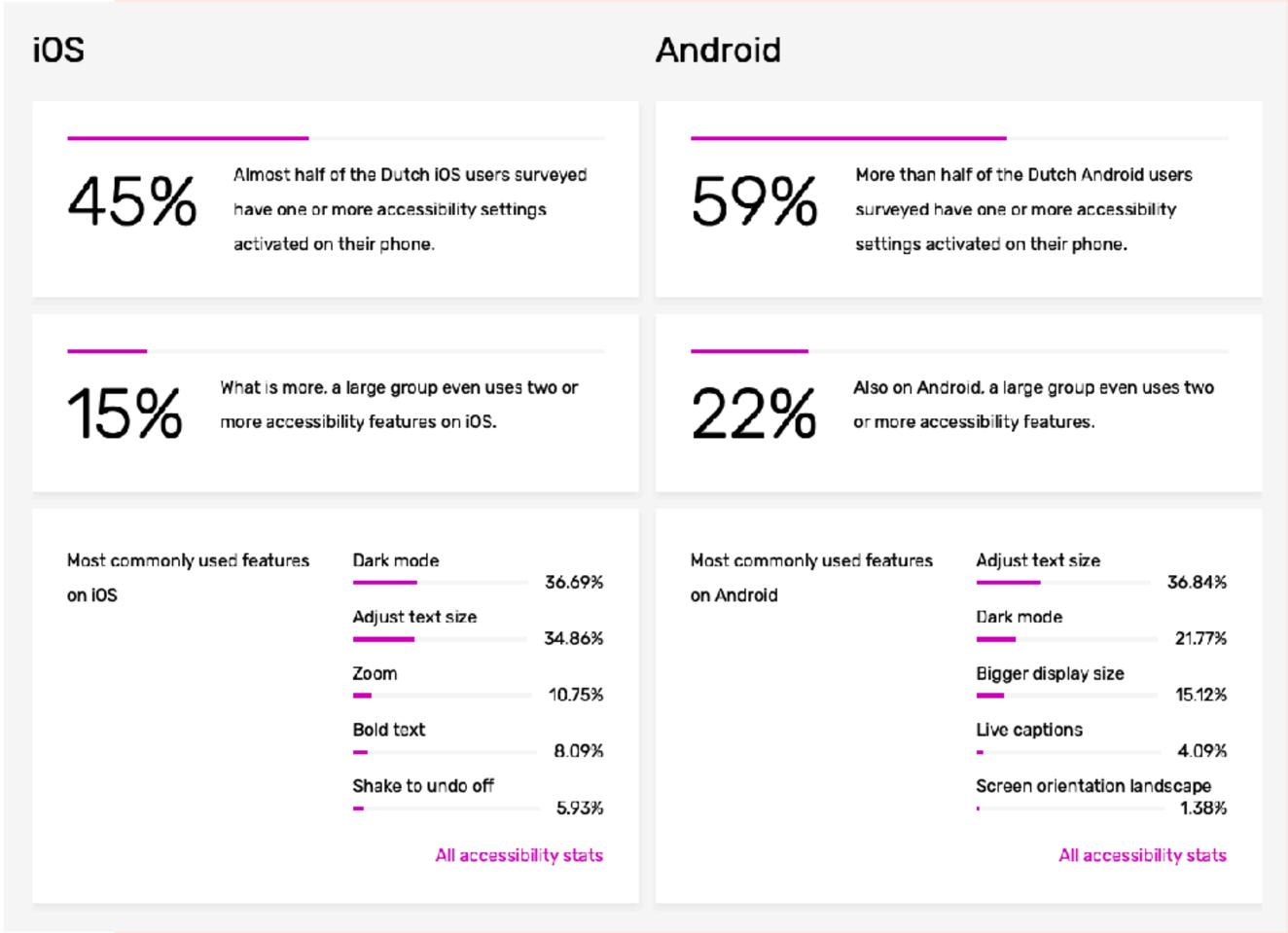
Switches are primarily used by people with motor impairments, they can be:

- A single switch.
- Multiple switches.
- Sip-and-puff is a type of switch.
- Switches can be operated in multiple ways.

Device settings

Device settings can be made on both iOS and Android devices. Research in the Netherlands found:

- **59% of Android users** had at least one accessibility setting turned on.
- **45% of iOS users** had at least one accessibility setting turned on.



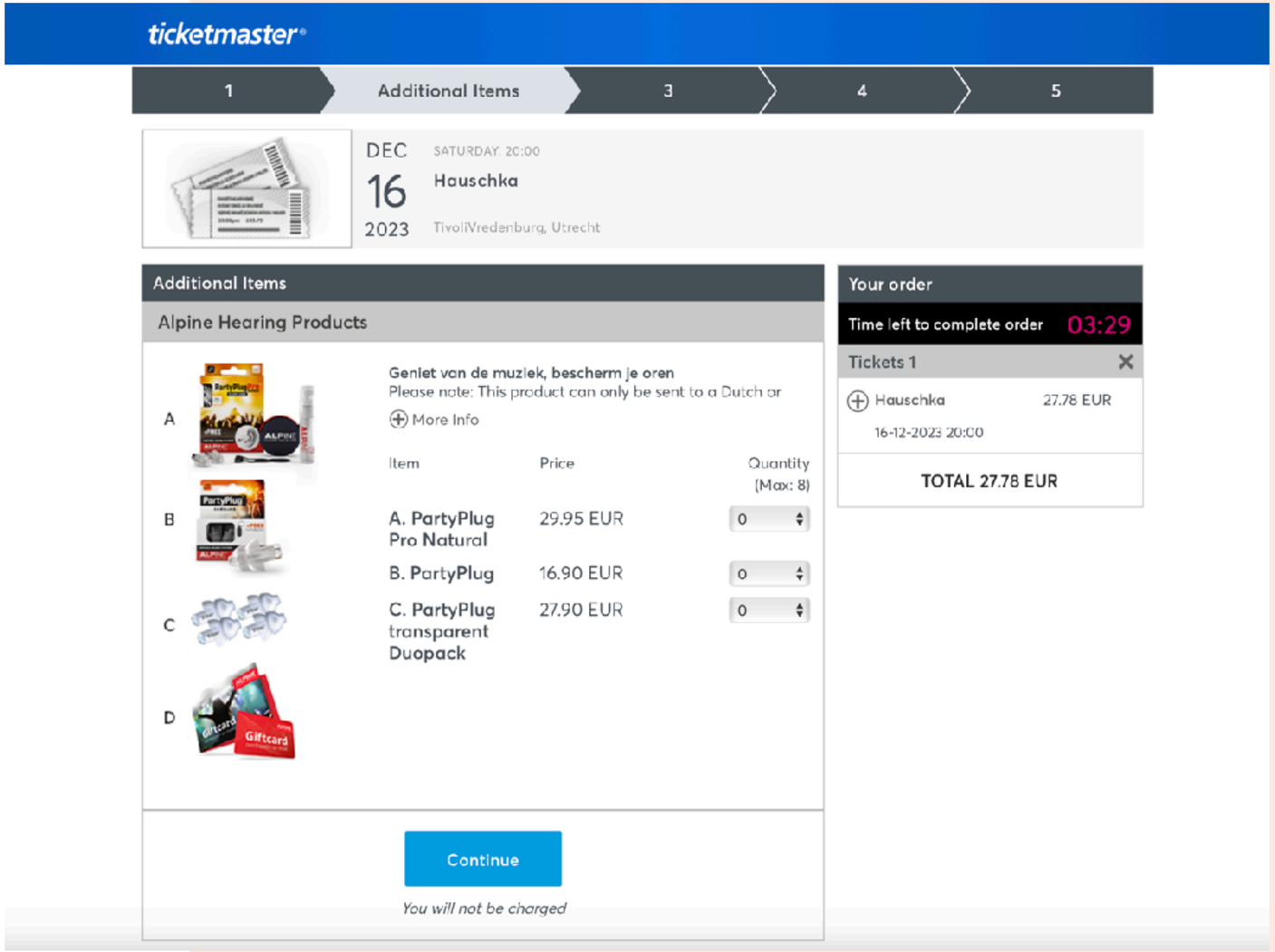
Source: APPT.org

Threads example

- Does not allow user-generated alternative text.
- Does not allow for captioning of videos.
- Does not respect user settings for people with motion disabilities.
- …or user settings for dynamic text, font scaling…..etc.

Time limits

- **Some people need longer to complete a task**
- ..this could be someone with a motor impairment, cognitive impairment, low literacy, reading content in a second language or…
- …someone distracted, multi tasking, etc.

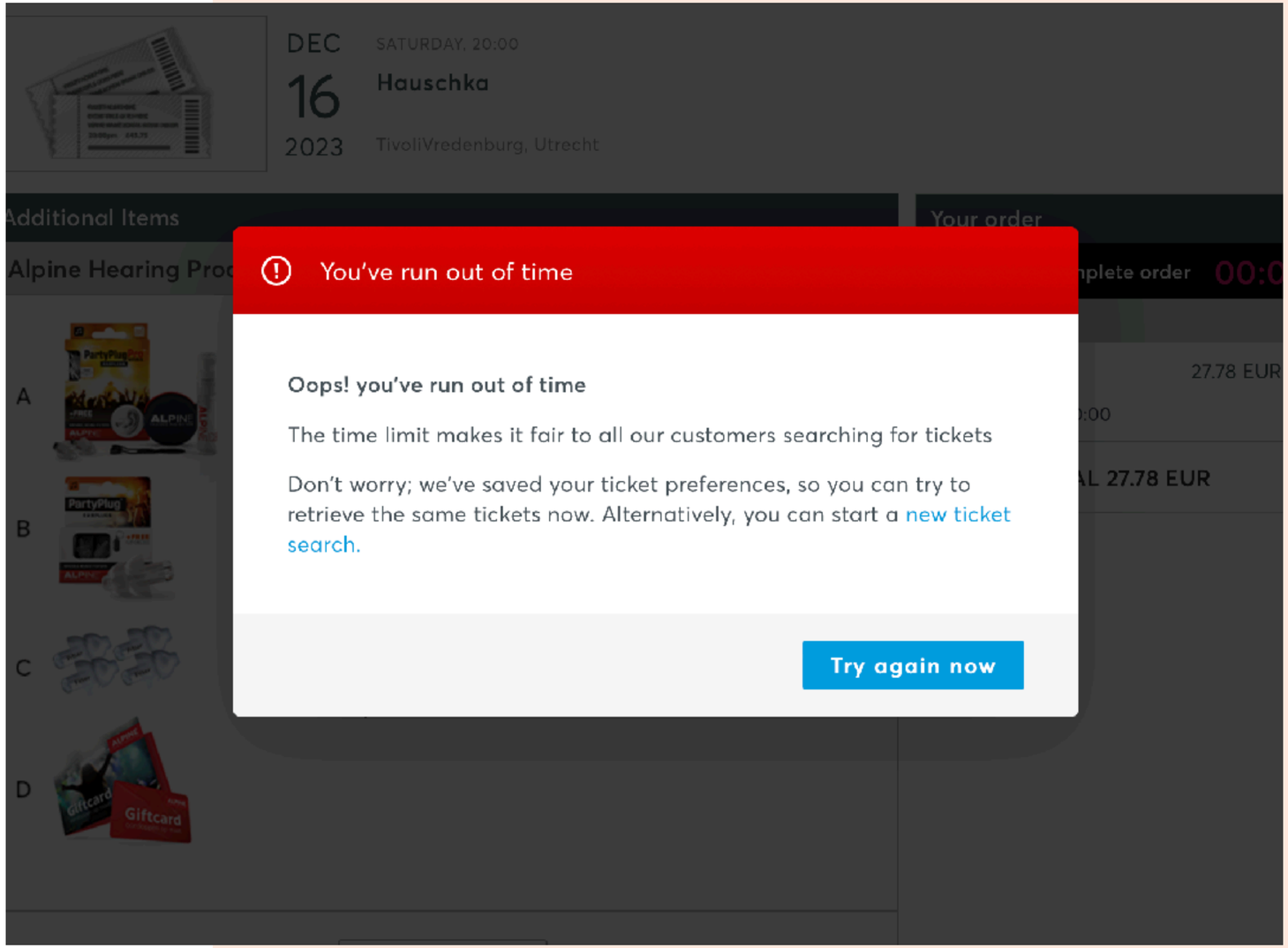


Physical world example: Green Man +

- Green Man+ is a service for pedestrians in Singapore who need more time to cross the road
- People who need more time can apply for a card to activate the service
- Tapping the card at a pedestrian crossing extends the green man time by 3 - 13 seconds

Time limits

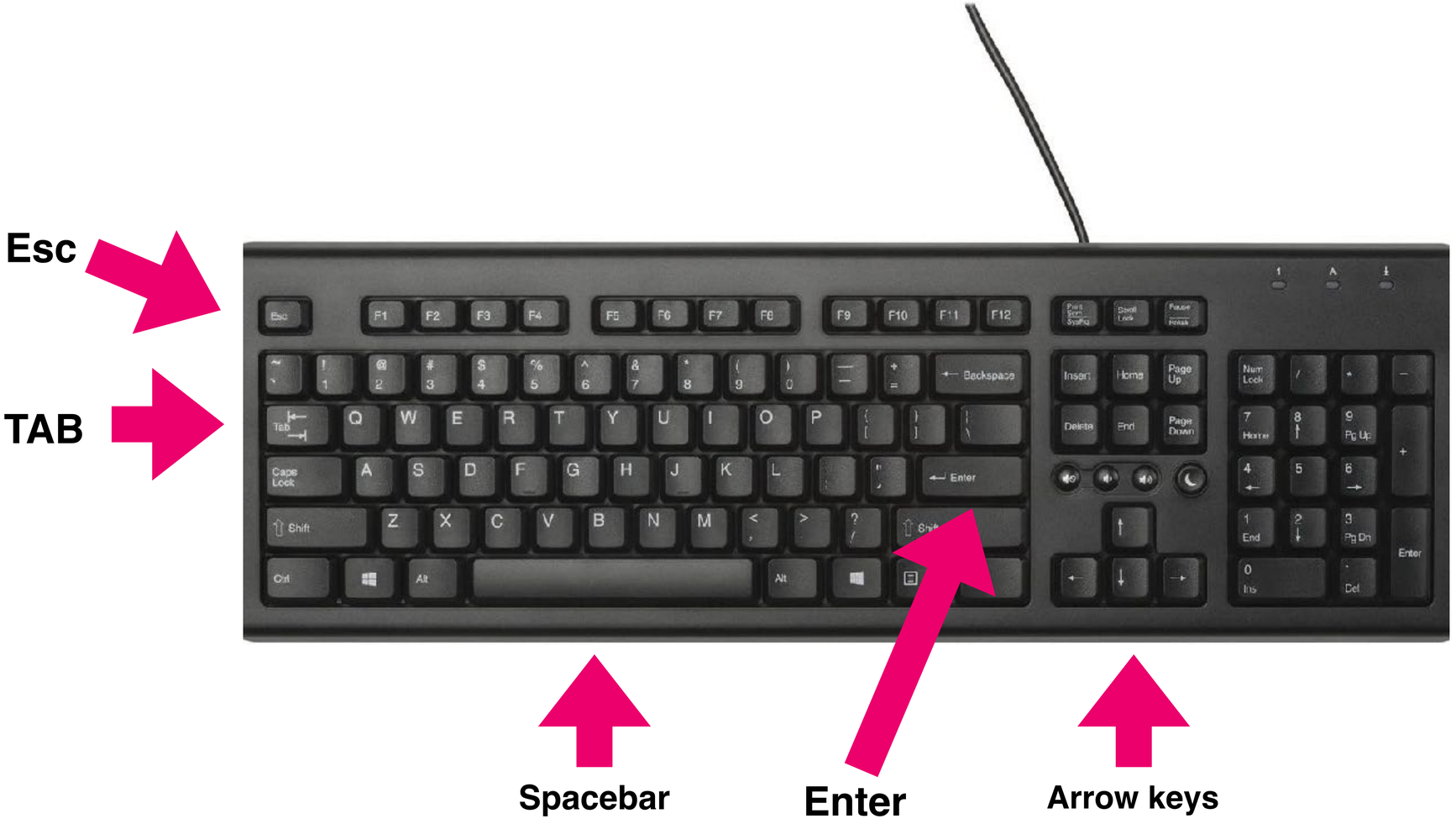
- Allow people to extend the time
- …manually adjust the time
- …or turn off, when appropriate
- Save progress and allow people to carry on from where they left off
- See WCAG guideline 2.2 for more information



Keyboards

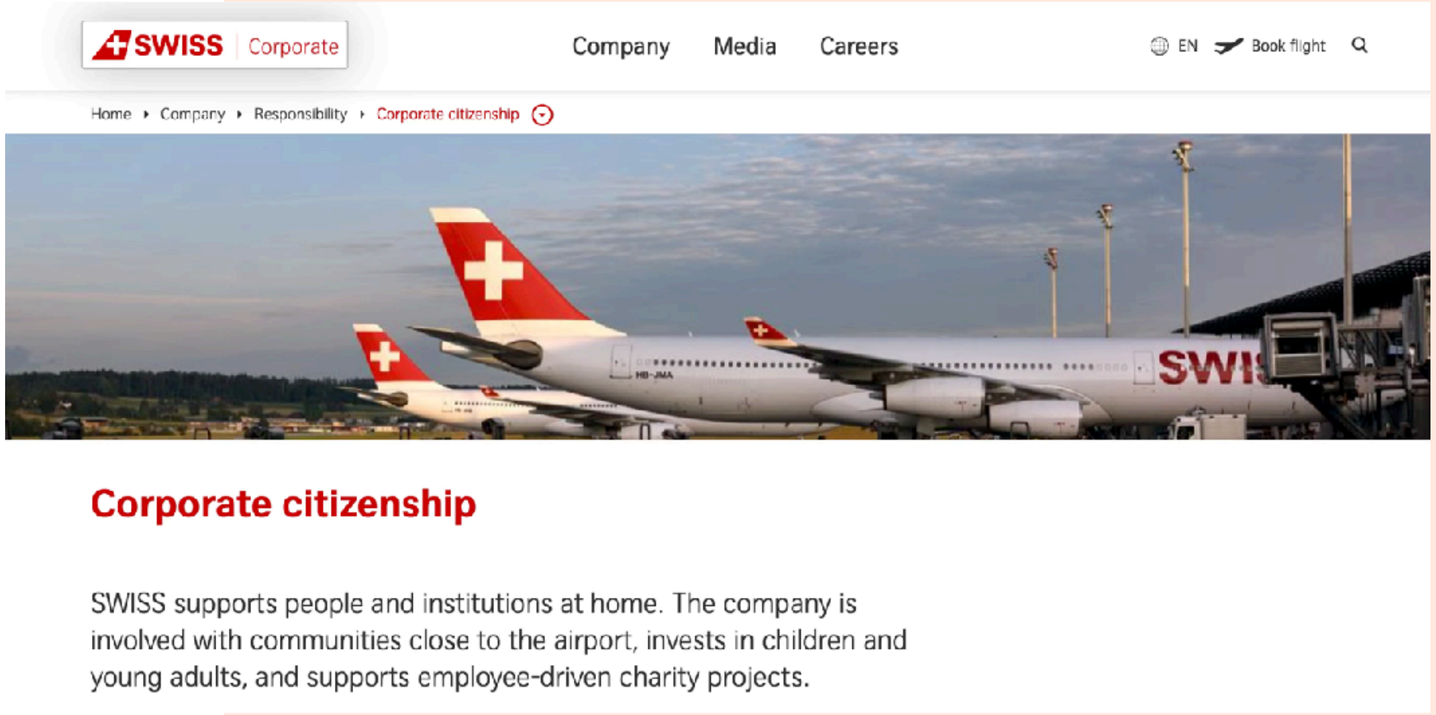
Keyboards are the main form of input for:

- Most computer users
- Screen reader users
- People with some motor impairments, who find it difficult to grasp or move a mouse


Esc
TAB
Spacebar
Enter
Arrow keys

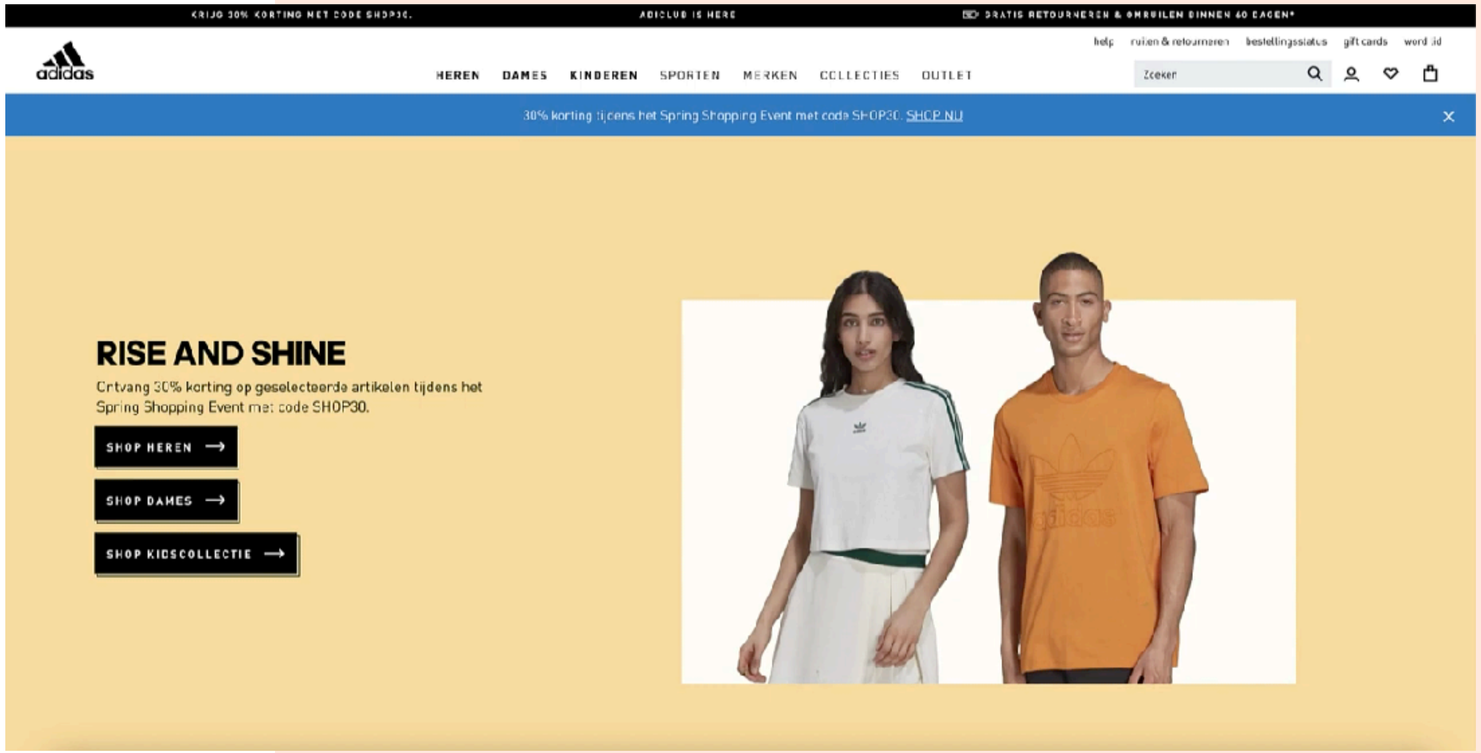
Focus states

- Focus states allow keyboard users to see what they are interacting with prior to actioning them
- **All interactive elements should be focusable**, elements that do not trigger an action should not be in the focus order
- Focus order should be logical
- Focus should be visible at all times



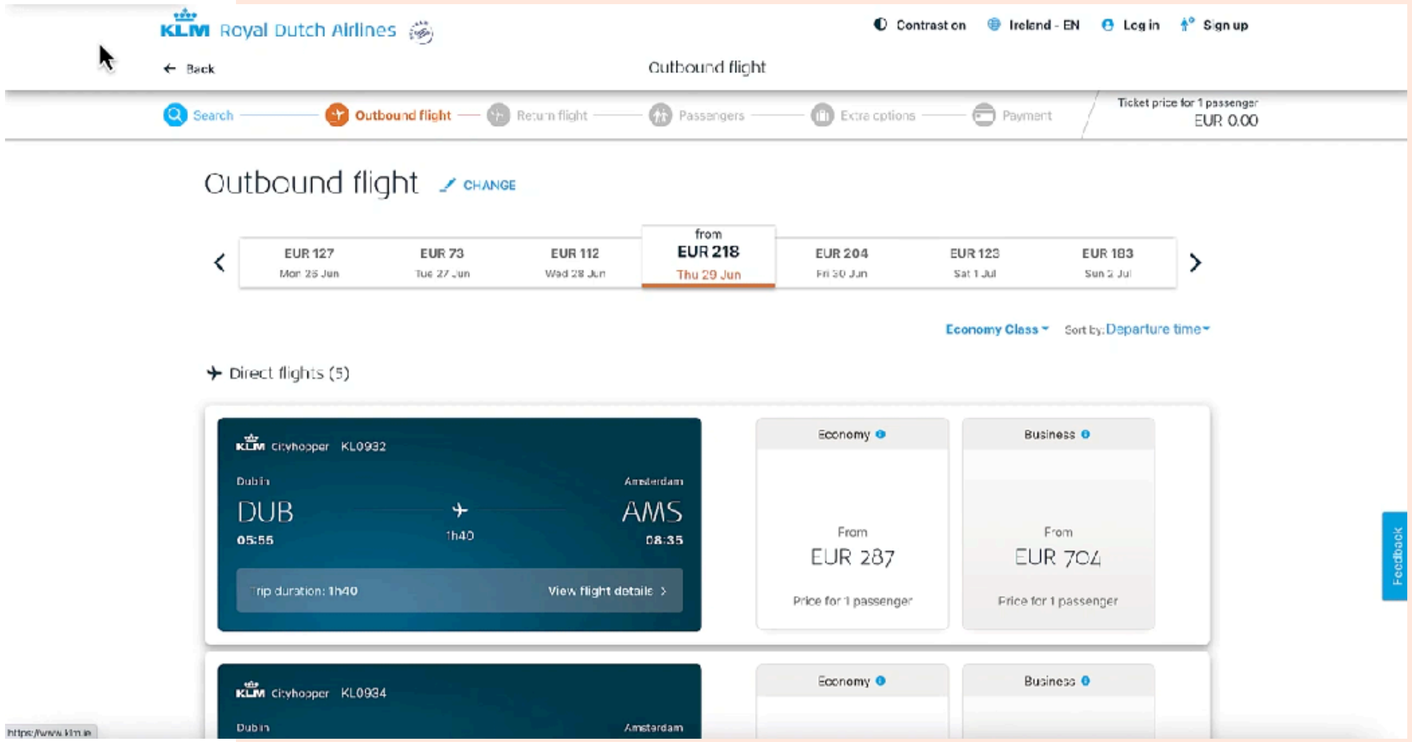
Focus states

- Default focus states are defined by the browser, but many are weak signifiers
- When focus states are removed then it makes it very difficult / impossible for someone to know what they will interact with

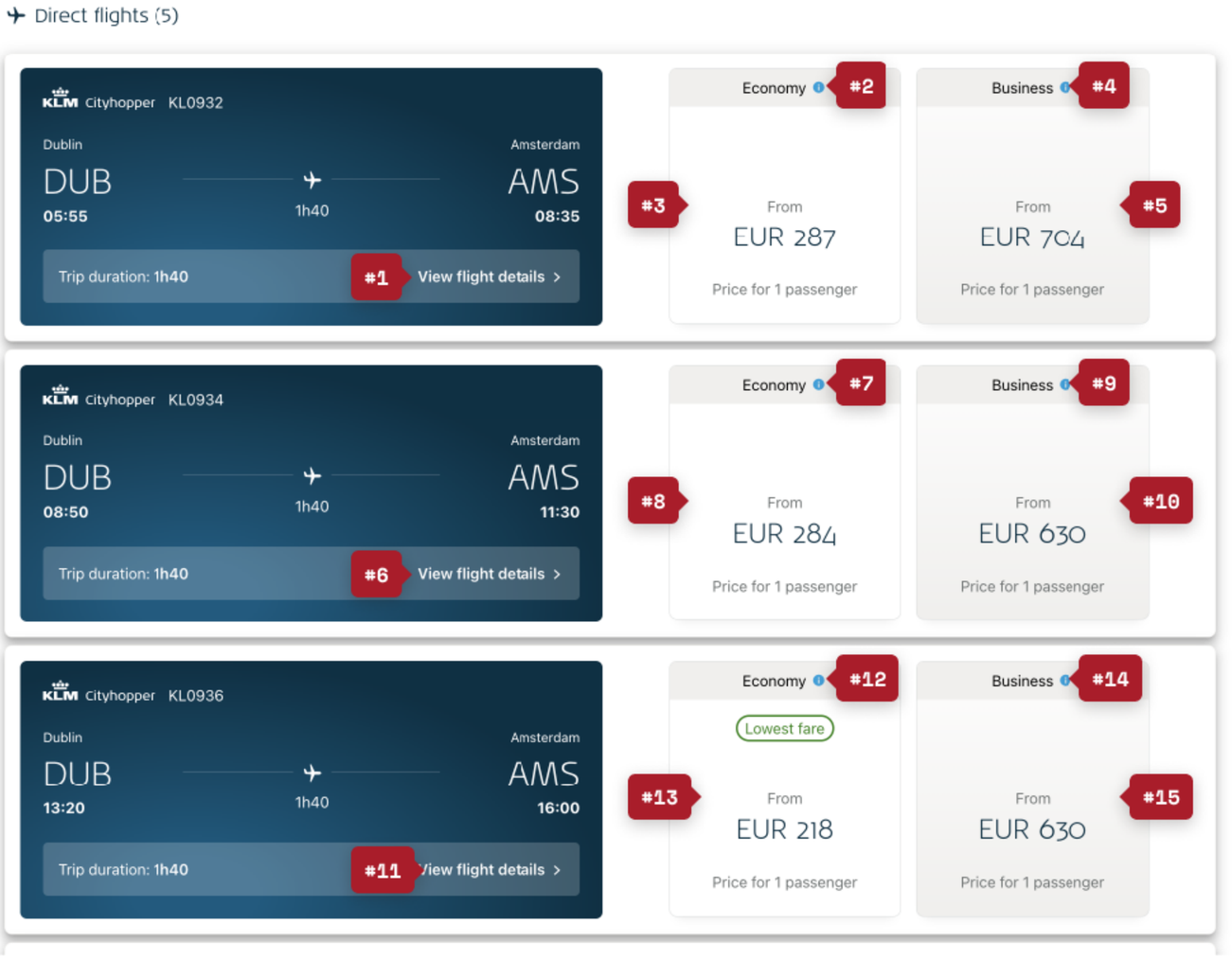


Key presses

- Annotating focus order can help us see how many tab stops have been introduced in our designs
- …this can help us to see if there are ways to reduce them, and **make our designs more efficient**



Question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Dublin
DUB
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Trip duration: 1h40
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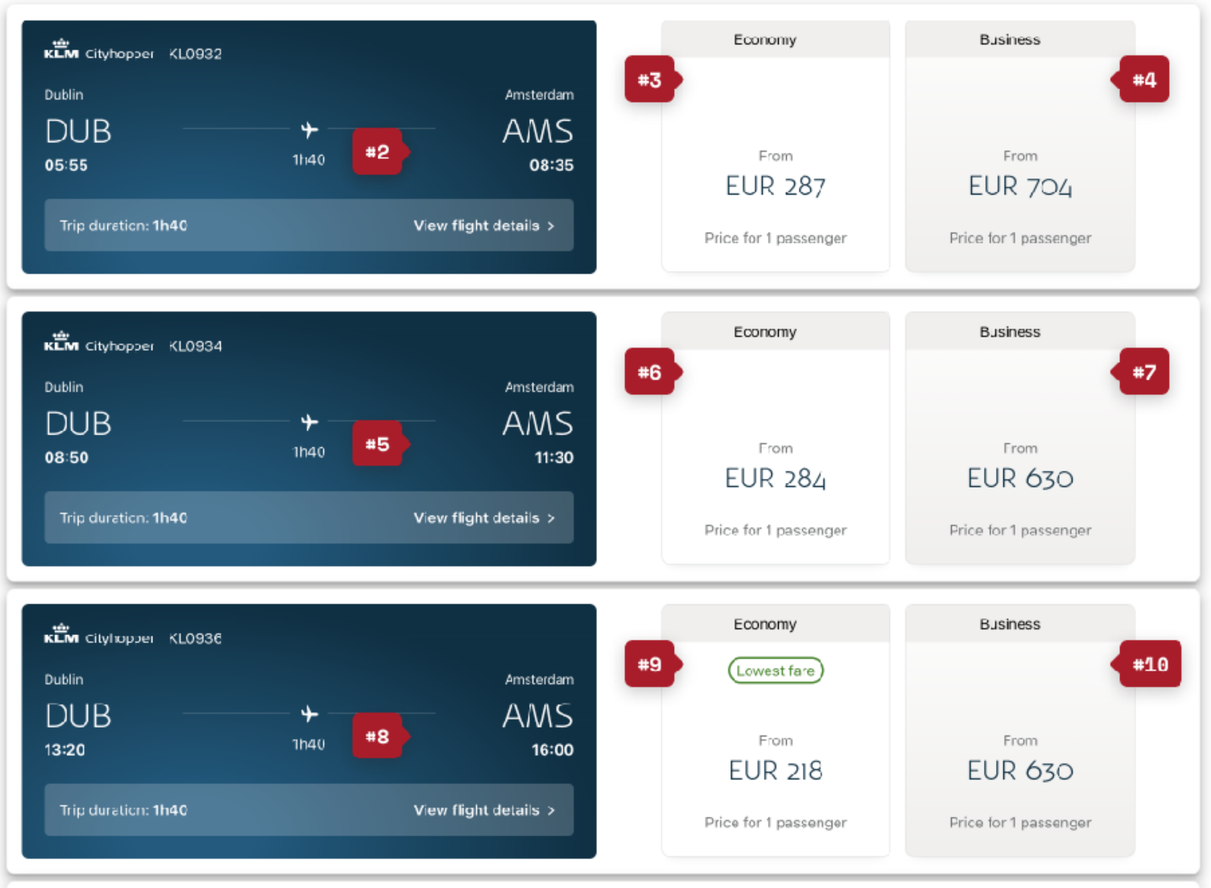
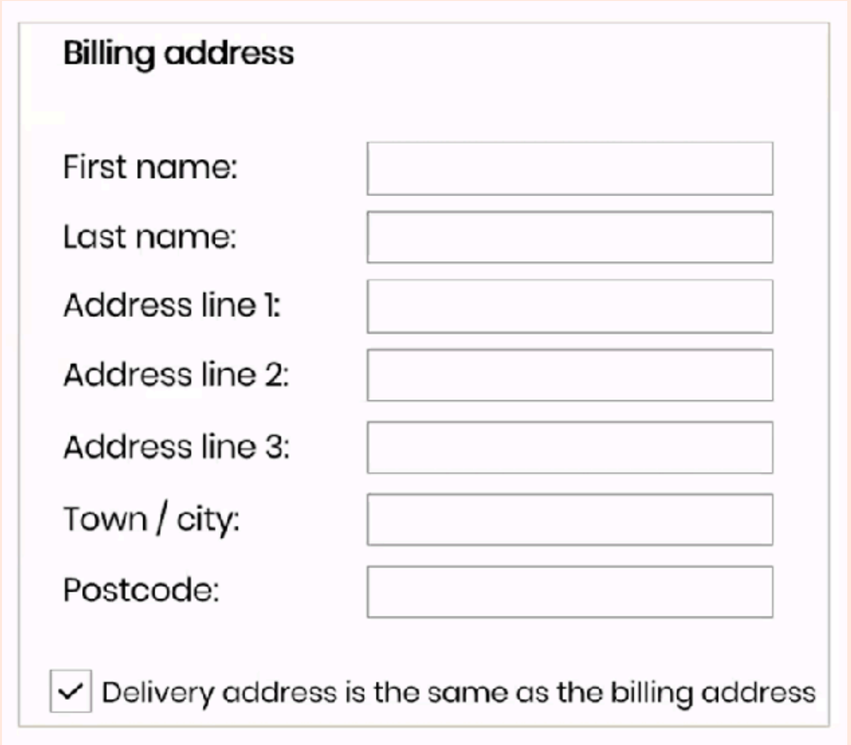
Direct flights (5)

Find the perfect seat for you. Compare our seats #1



Form considerations

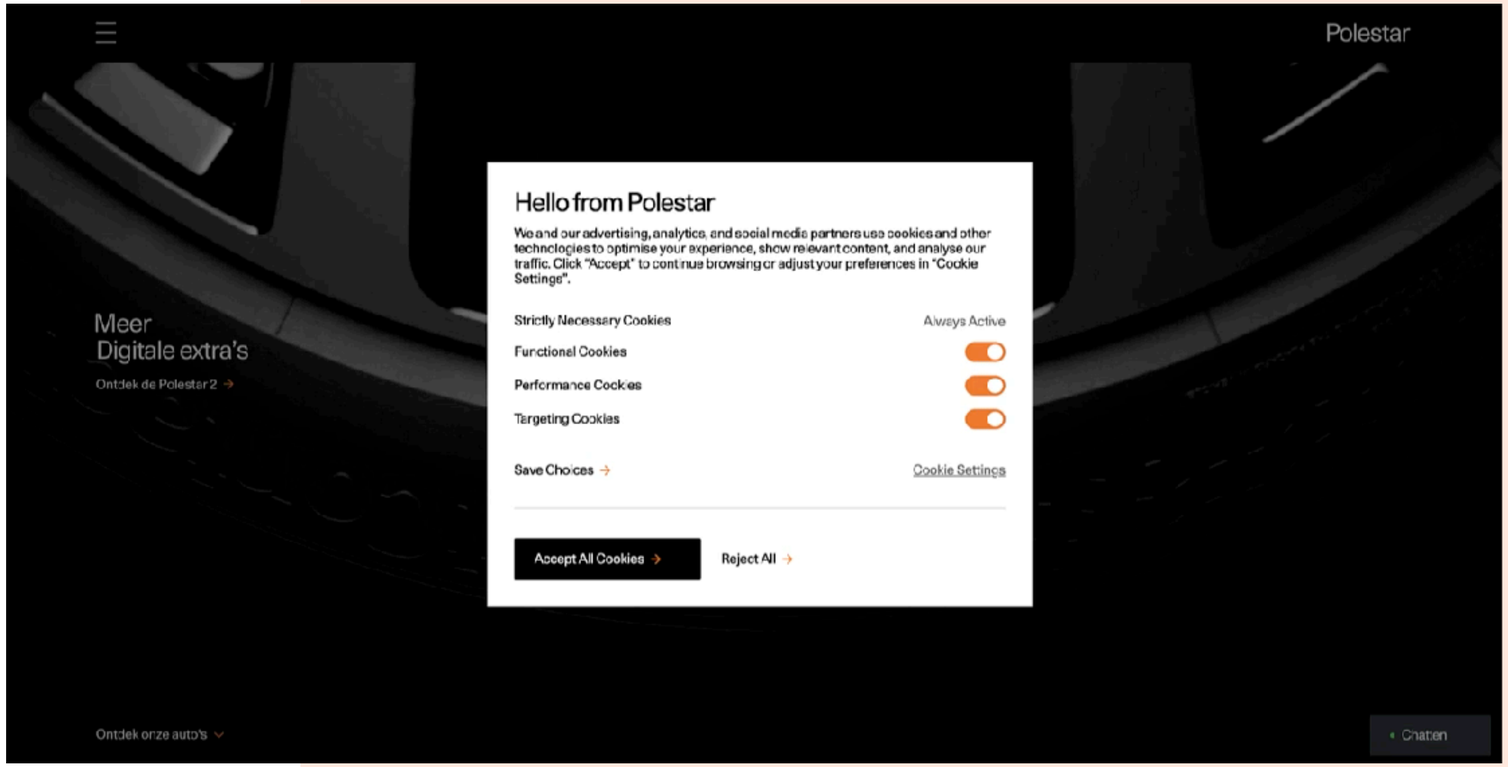
- Avoid repetition (WCAG 2.2 SC 3.3.9 Redundant entry)
- Allow copy & paste
- Remove optional fields where possible



Question protocol: bit.ly/question-protocol

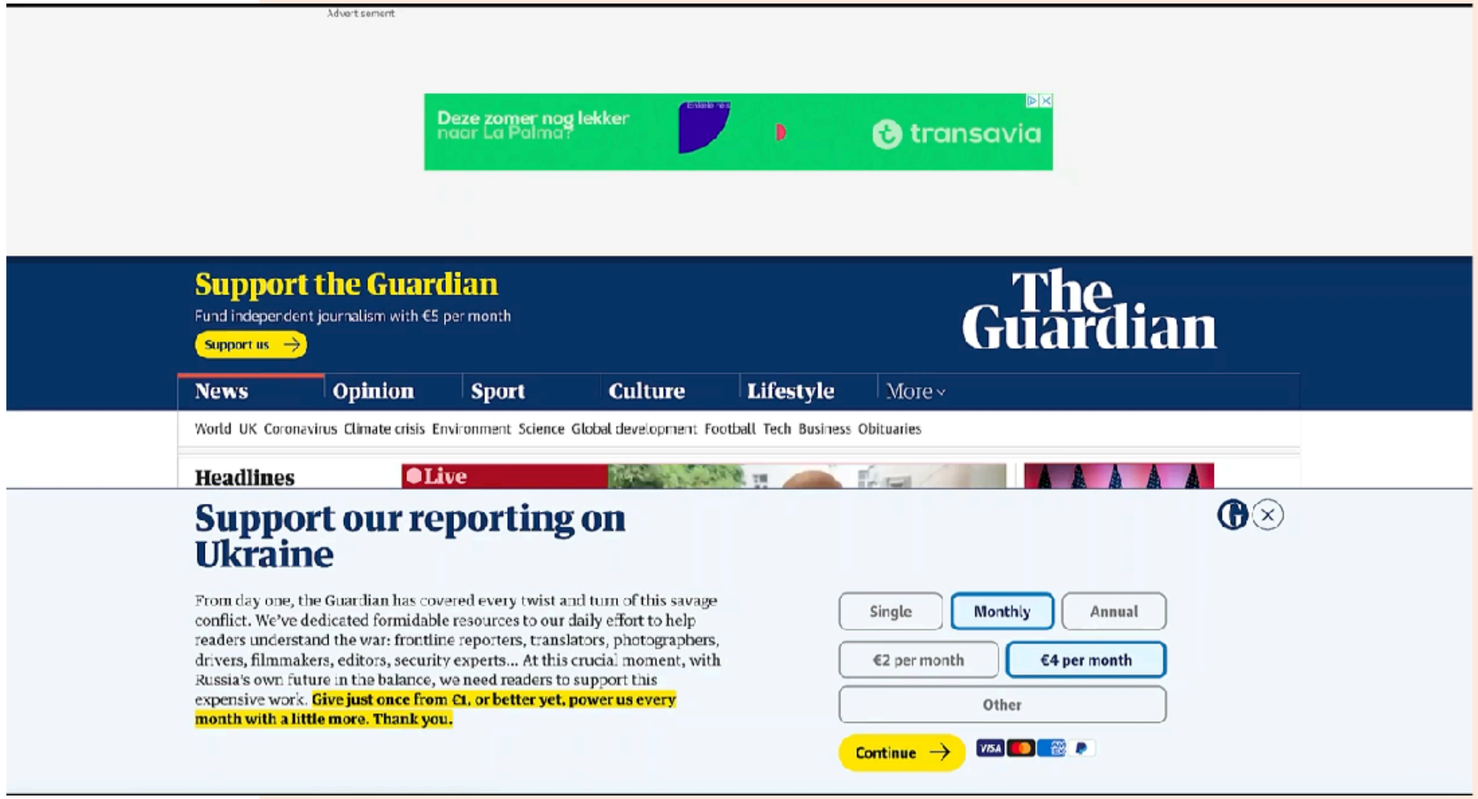
Trapping focus

- Content outside of the current task should (often) be removed from focus
- Modals, cookie banners, and (sometimes) slide in menus are instances where focus should be trapped



Focus not obscured

- New success criteria coming in WCAG 2.2, SC 2.4.11 Focus not obscured (minimum)
- Affects sticky elements, such as footers, headers, sidebars, tooltips, slide in menus
- Ensure that at least **part of the focused element is visible**



Moooi map example

- Pressing (or clicking), holding down, moving and releasing are complex interactions
- Zooming in and out, and choosing a store could all be performed with a single gesture
- **Adding arrows** to navigate the map would **include more people**

Moooi map example

- An input box gives a different way to get to the same information
- This design decision includes a wider audience, such as visually impaired screen reader users, power users, and people who prefer to use inputs over dragging a map

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