

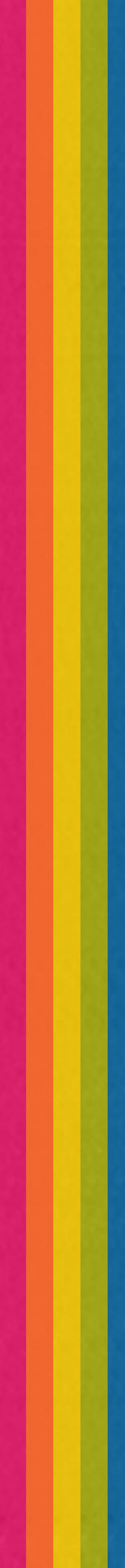
Progressive Enhancement

Where do I begin?

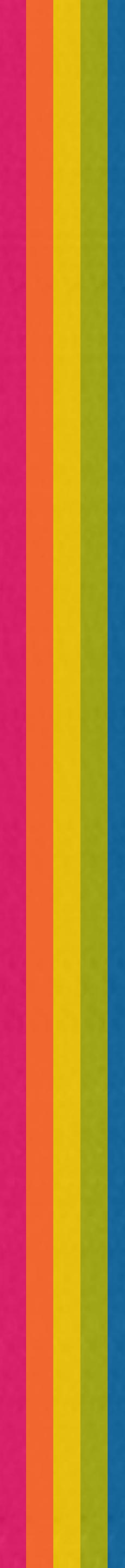
Aaron Gustafson

@AaronGustafson

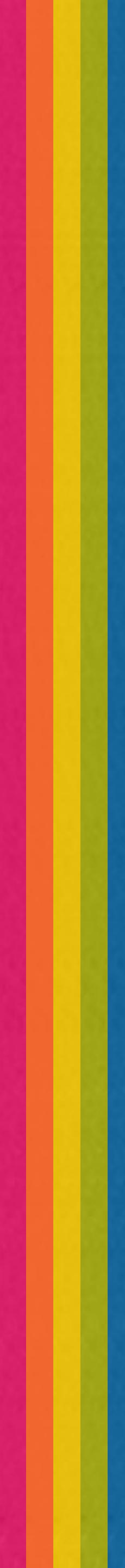
presented at MITRE Accessibility Technical Exchange Meeting, October 2022



**Access to the web
is no longer a luxury,
it's how we participate
in the modern world.**



**Despite our
best intentions,
we have designed an
inequitable system.**



Where are we going wrong?

“96.8% of home pages had detectable WCAG 2 failures.

The number of detectable accessibility errors was 50.8 on average per home page.

— **The WebAIM Million**

March 2022

perma.cc/WK2V-KDEQ

The most common culprits?

96.5% of all errors detected were low hanging fruit:

- ◆ low contrast text
- ◆ missing alternative text
- ◆ empty links
- ◆ missing form input labels
- ◆ empty buttons
- ◆ and missing document language

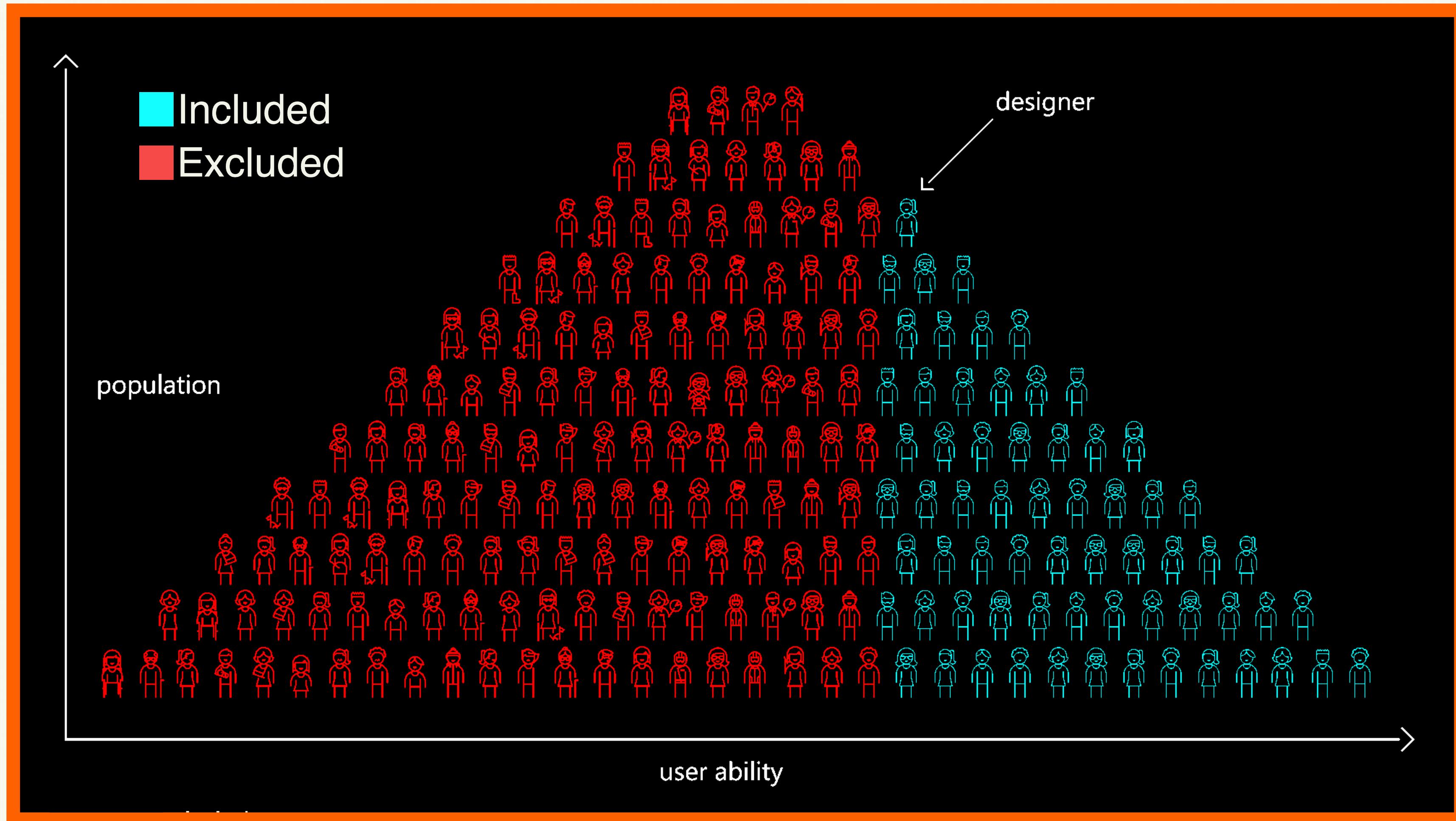
“Even the most physically-based disability is impairing only to the extent that the culture allows it to be.

— **Disability Science Review**

A disability is a mismatch between a person's abilities and their environment

perma.cc/97Z9-SB9A

Disabilities are designed

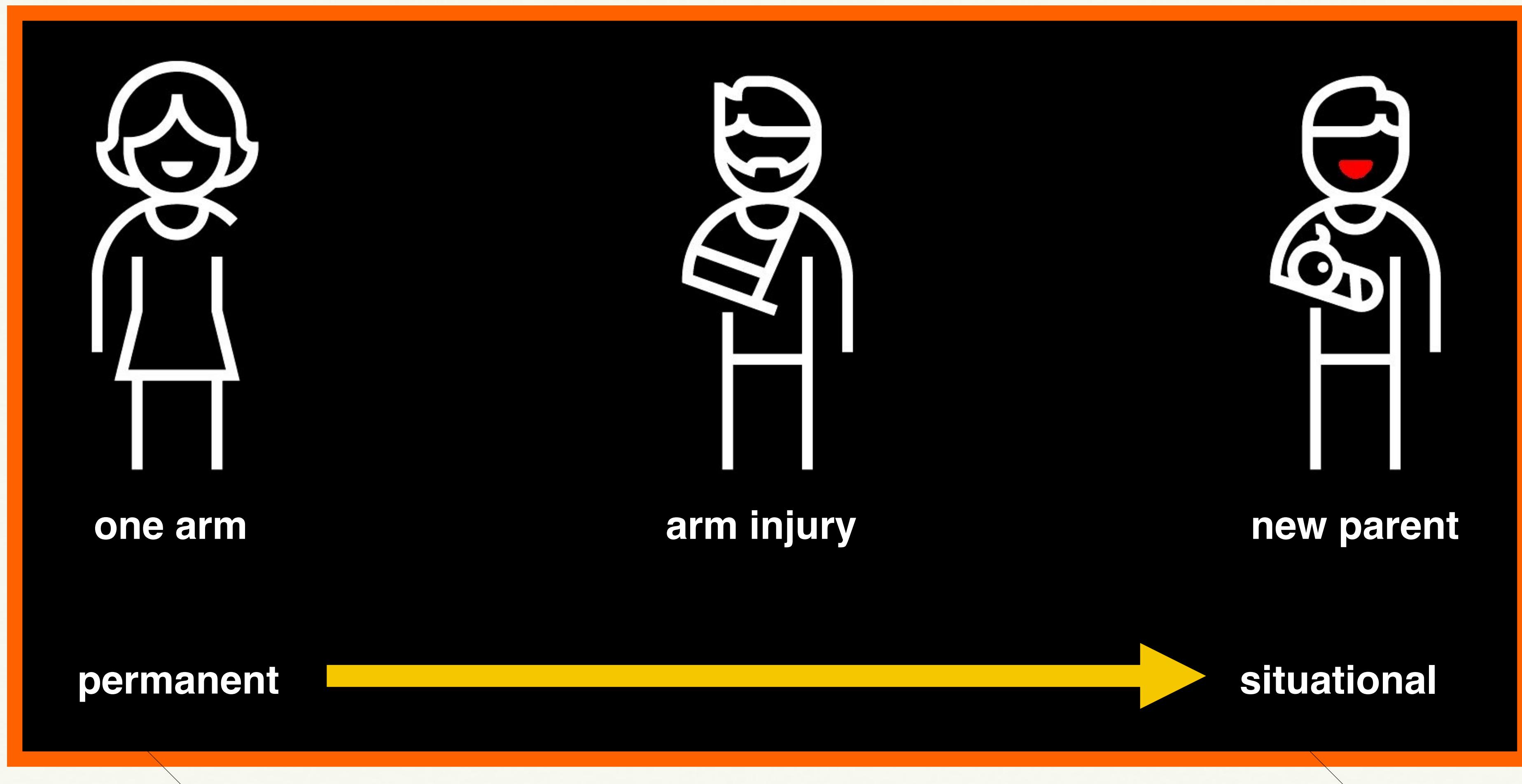


perma.cc/JKF6-8FQH

“Exclusion happens when we solve problems using our own biases.

- Microsoft inclusive design principals
perma.cc/JKF6-8FQH

The ripple effect



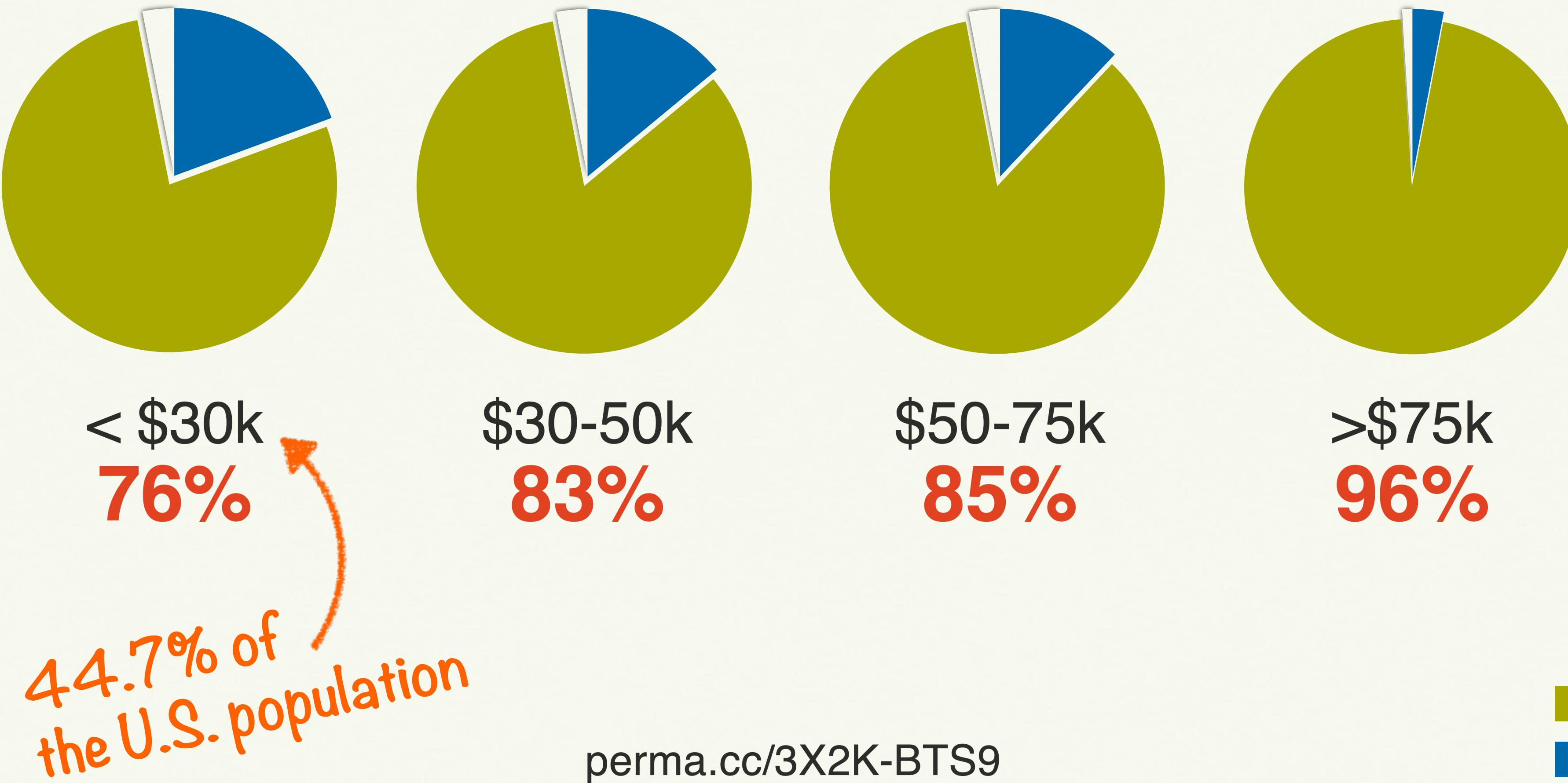
perma.cc/JKF6-8FQH



We need to think
more broadly about
the disabilities
we create.

U.S. Smartphone penetration

February 2021



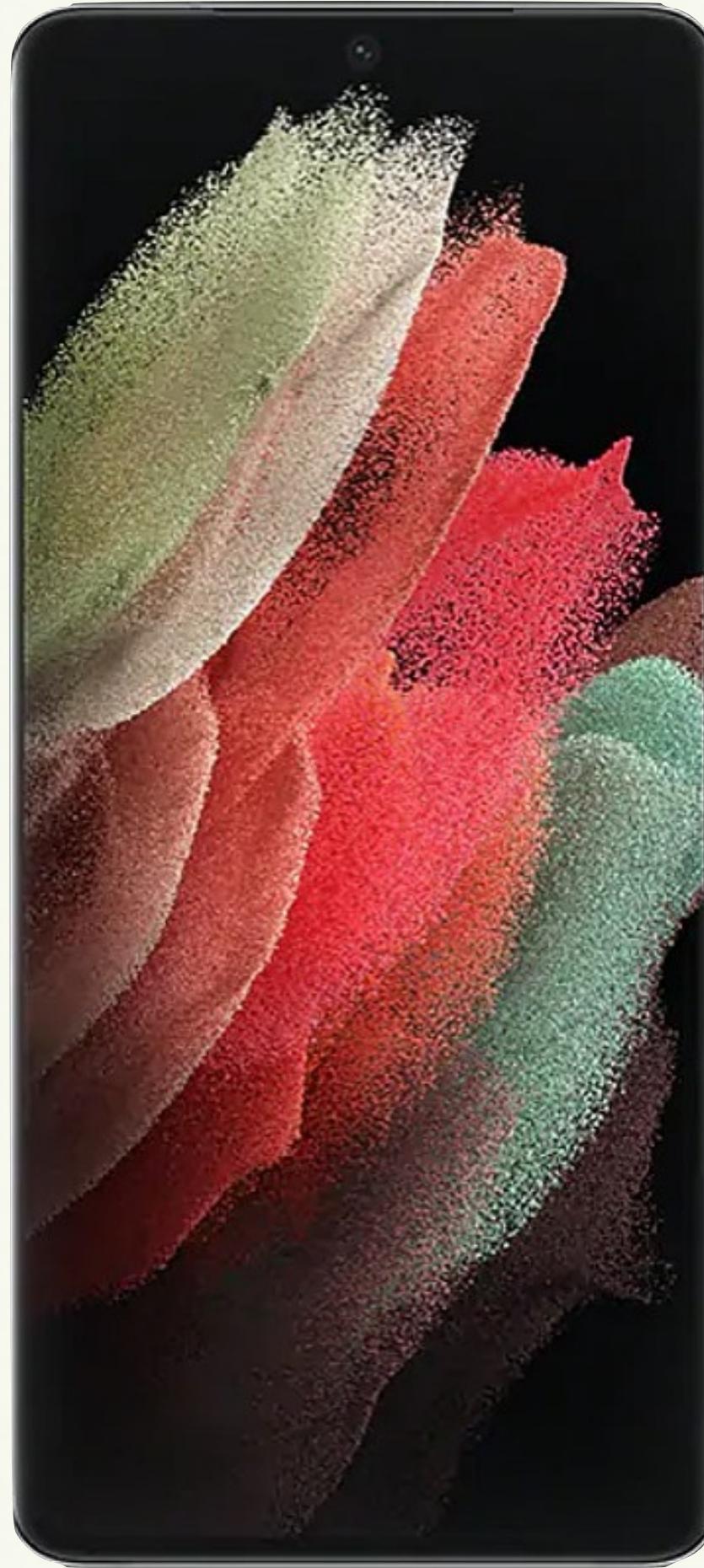
Fantasy



Reality



Not all smartphones are equal



Galaxy S21 Ultra 5G

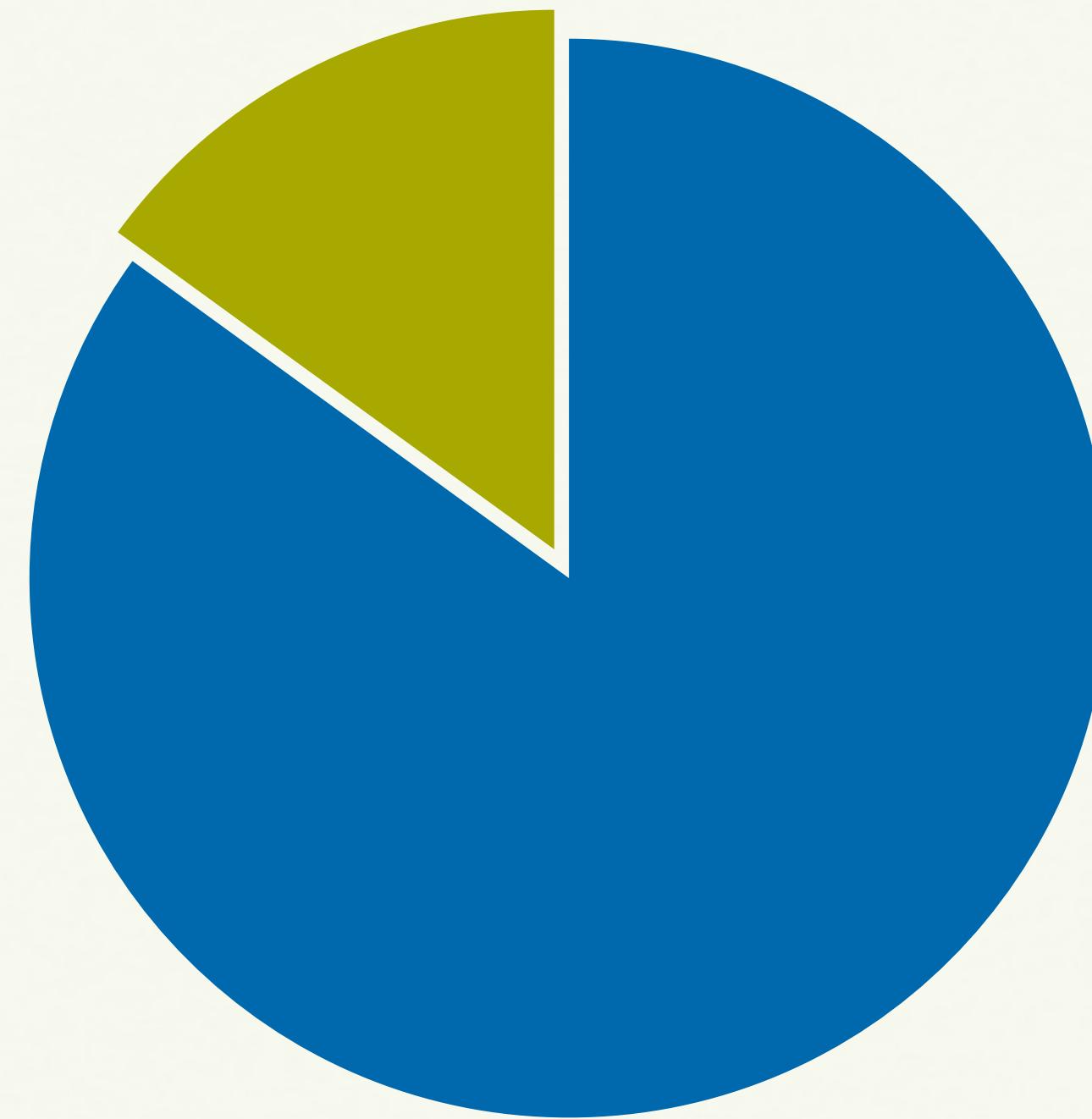
6.8" (3200 × 1440)
12 GB RAM
128 GB Storage
4 Cameras (10–108 MP)
2.8GHz (1) / 2.4GHz (3) /
1.8GHz (4)
Android 11
\$999

BLU Studio Mini

5.5" (1440 × 720)
2 GB RAM
32 GB Storage
13 MP Camera
1.6 GHz Octo-core
Android 9
\$79



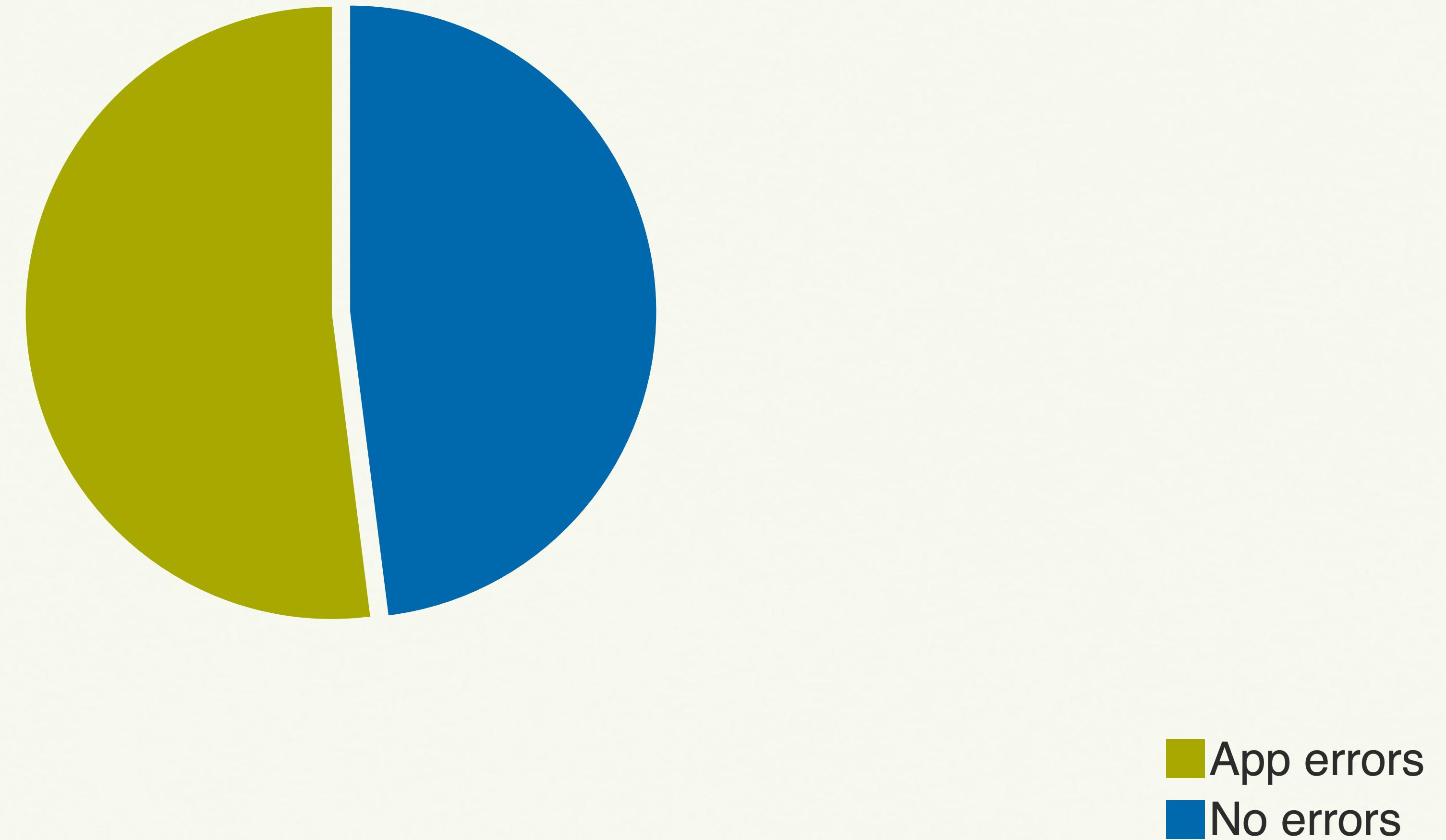
15% of U.S. adults is a smartphone-only Internet user.



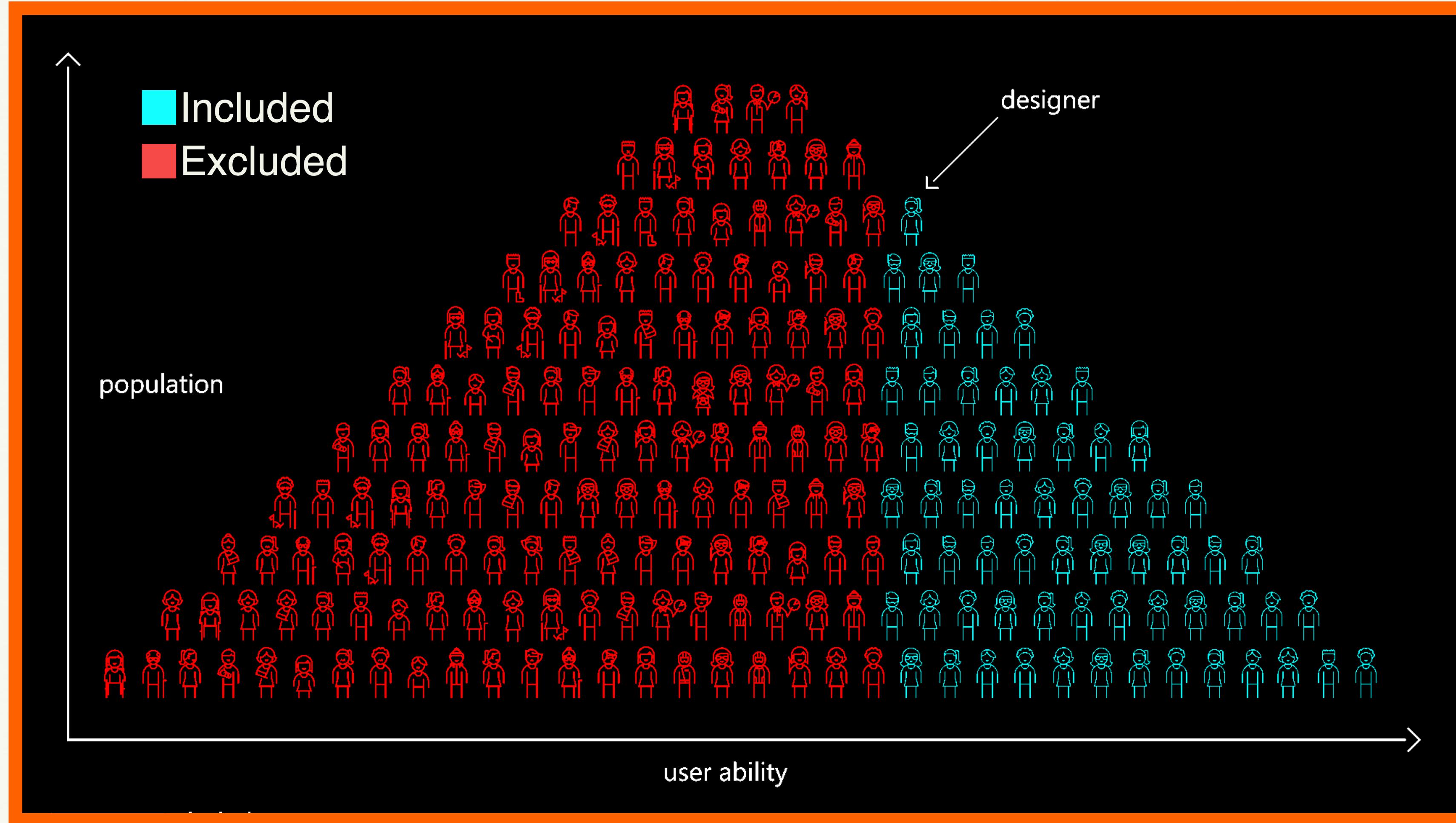
■ Smartphone
■ Other

perma.cc/3X2K-BTS9

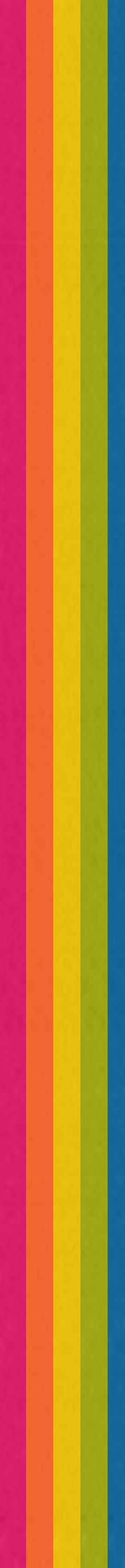
In the 2017 survey, smartphone users making < \$30k/yr experienced app errors
52% of the time



Remember: disabilities are designed



perma.cc/JKF6-8FQH



**Building
for the web
is complicated.**

Your content can and will go anywhere that's connected



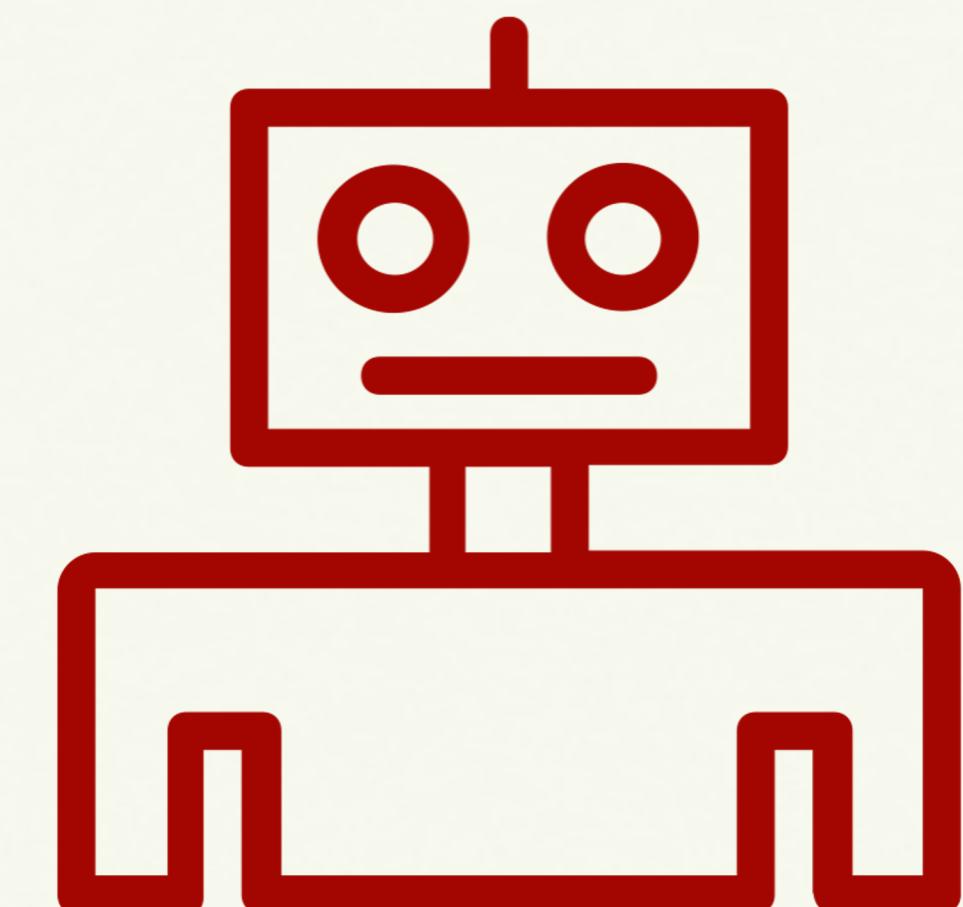
wearables



smart tvs

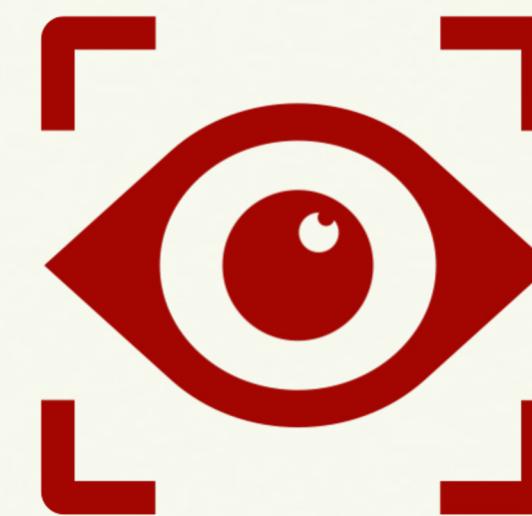


IoT

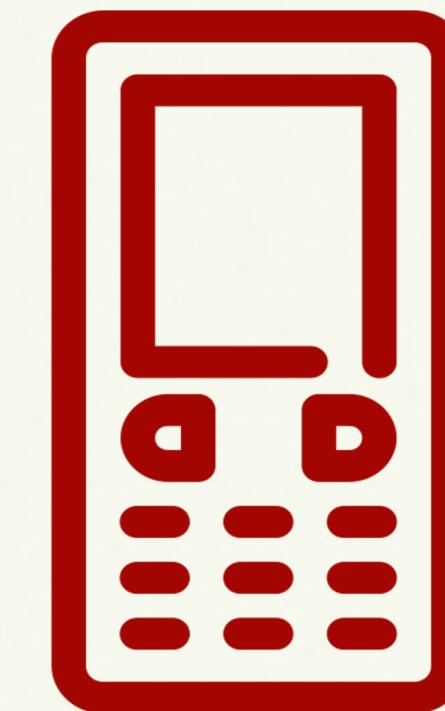


assistants

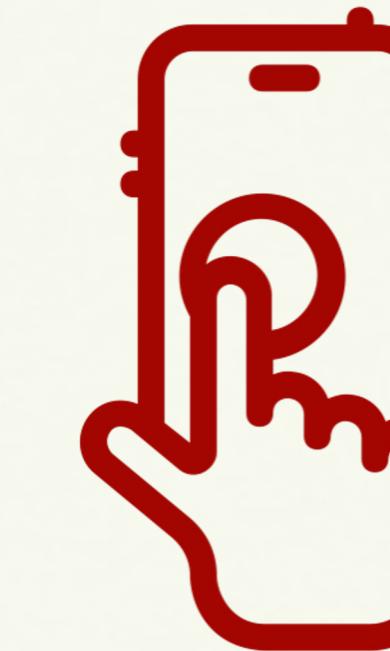
Meaning users will need to interact in different ways



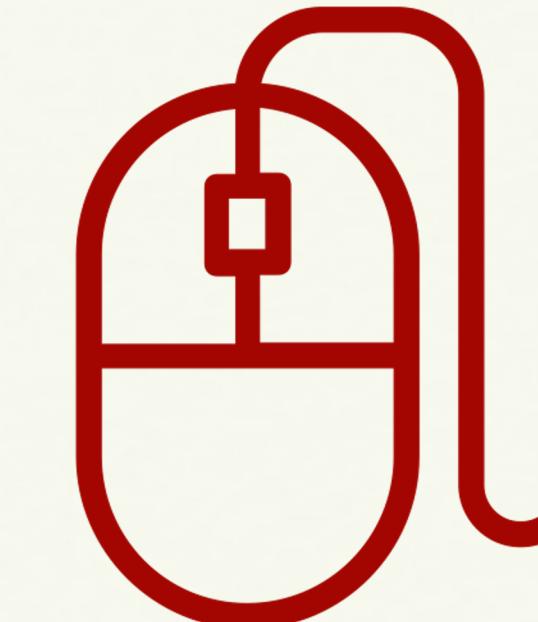
eye tracking



T9



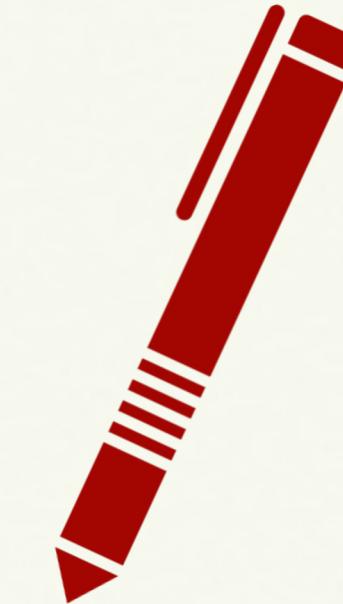
touch



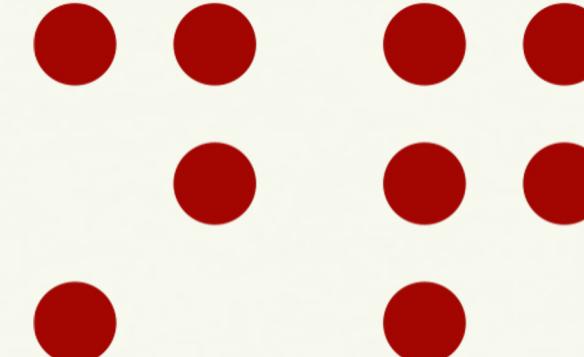
mouse



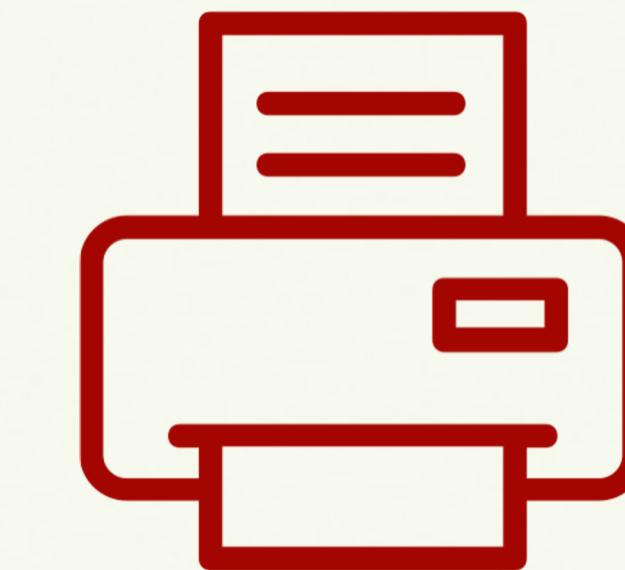
remote



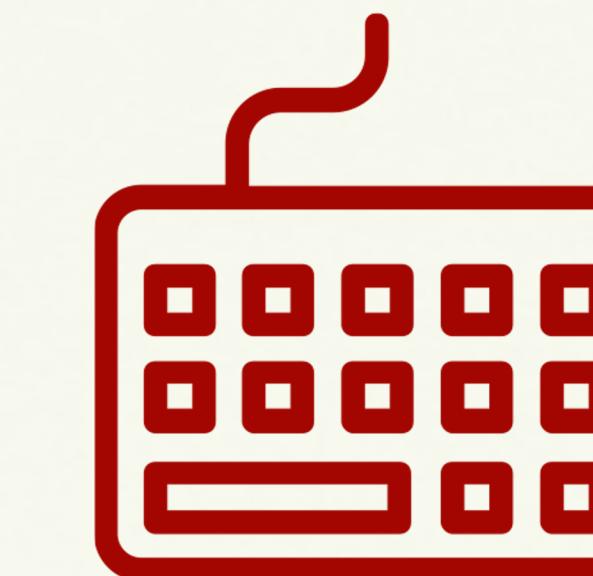
pen



braille



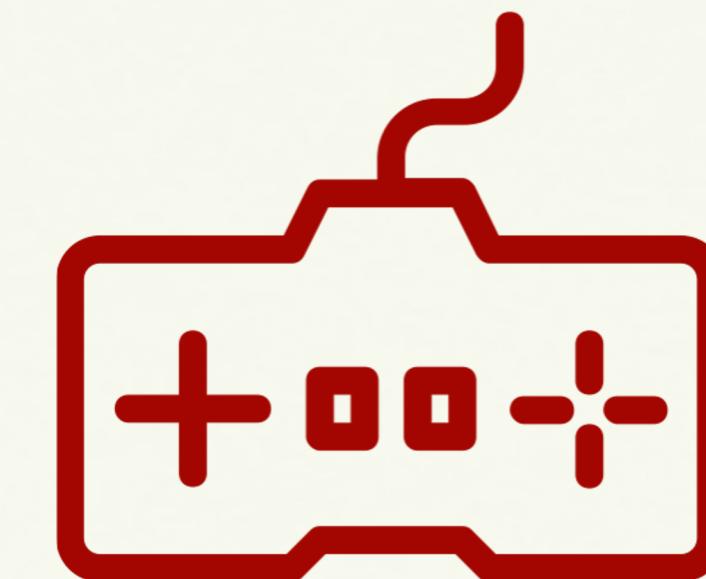
print



keyboard

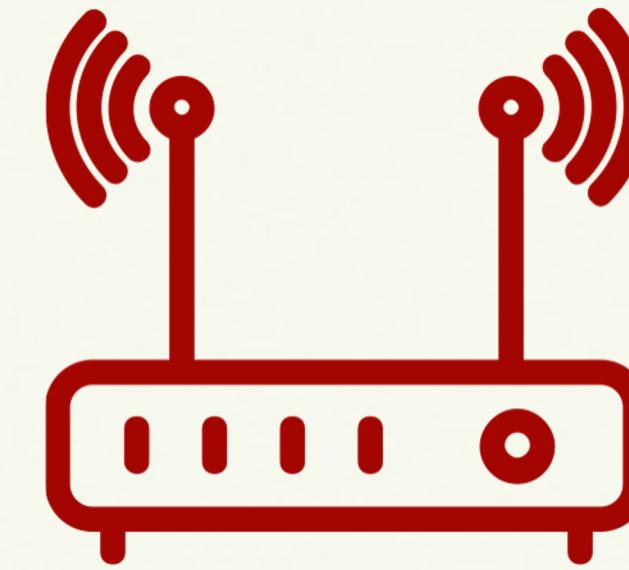


audio



gamepad

Over varied networks and in changing conditions



wifi



hardline



mobile



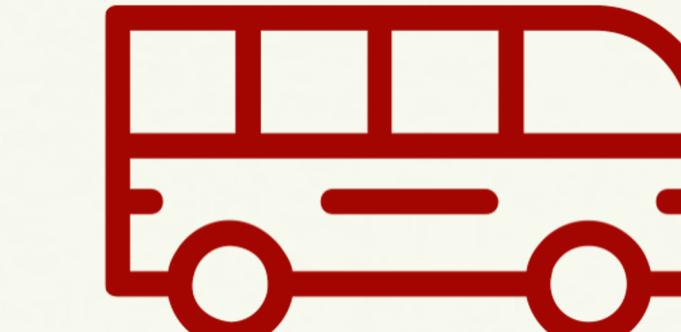
homes



buildings



cars



buses



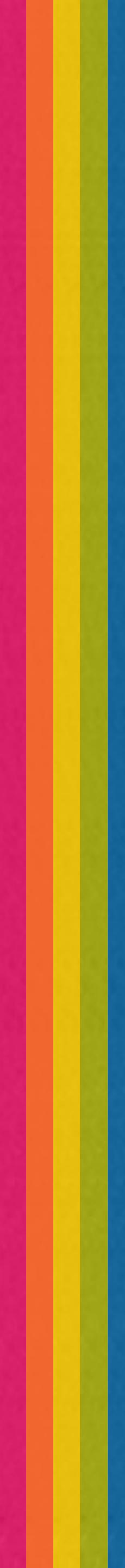
trains



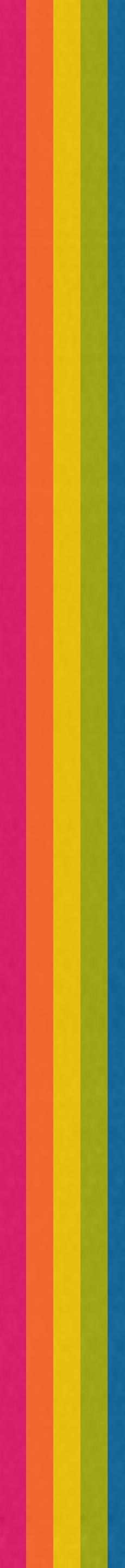
airplanes

And, ultimately, our users all have different needs too

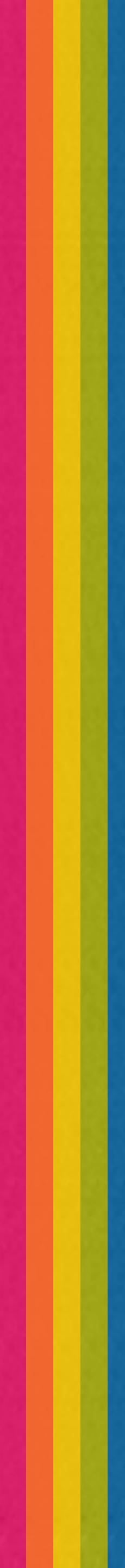




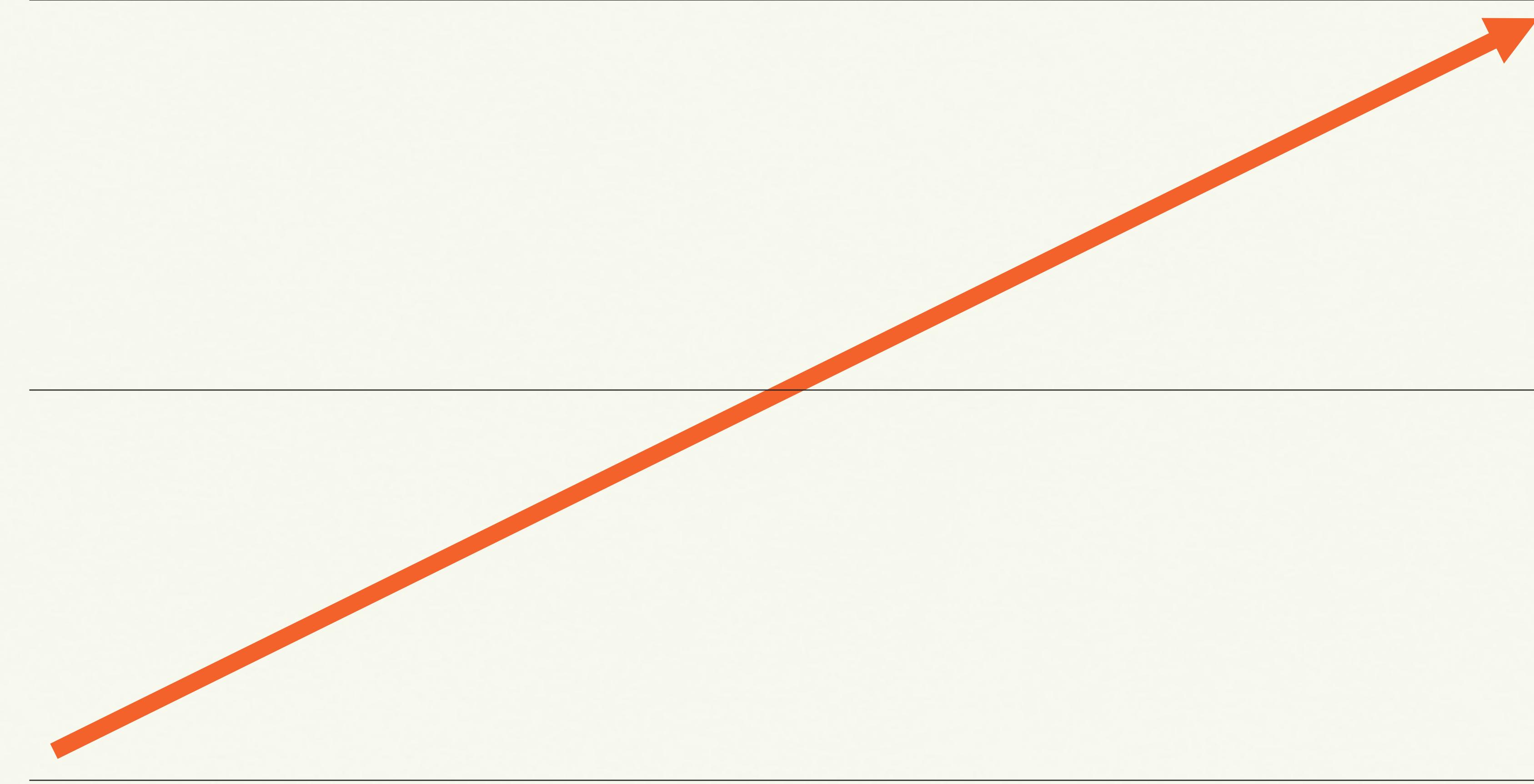
**So how can we make
our interfaces work
for everyone?**



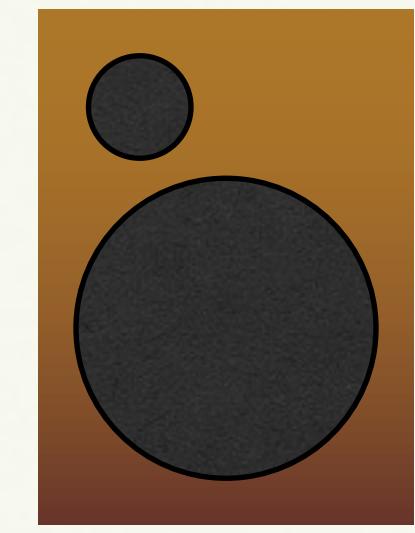
Practicing Progressive Enhancement



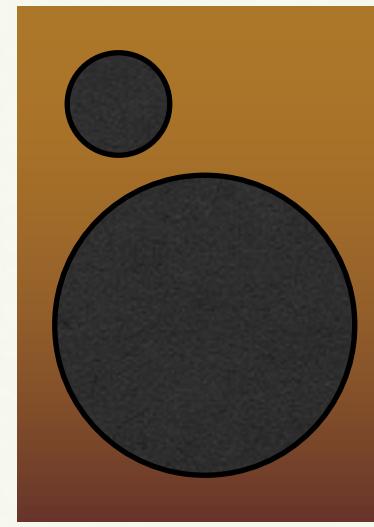
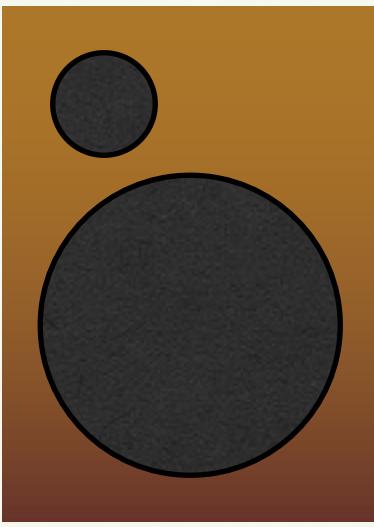
User Experience



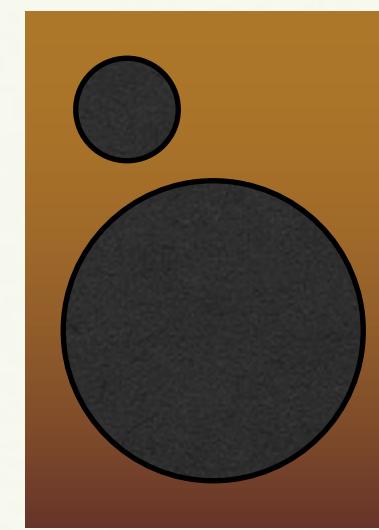
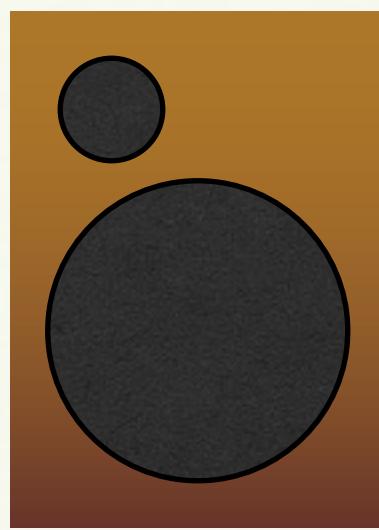
Capabilities of Browser, Device & User



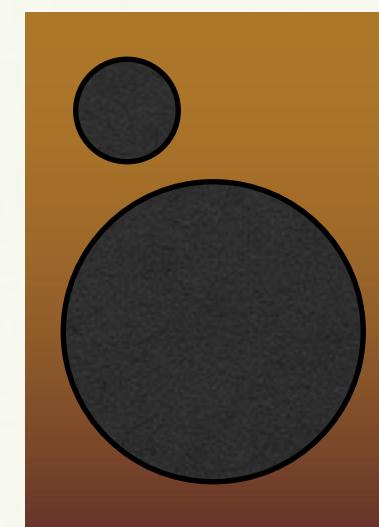
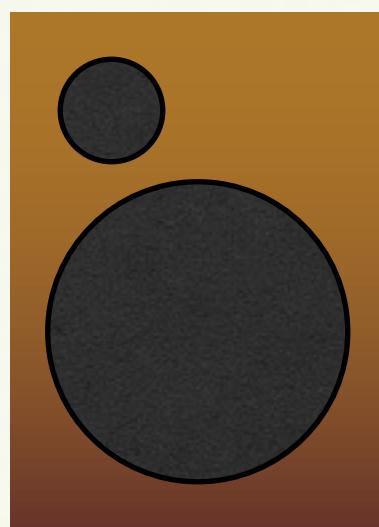
Mono

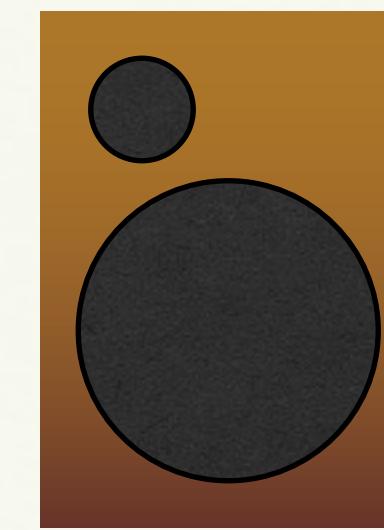
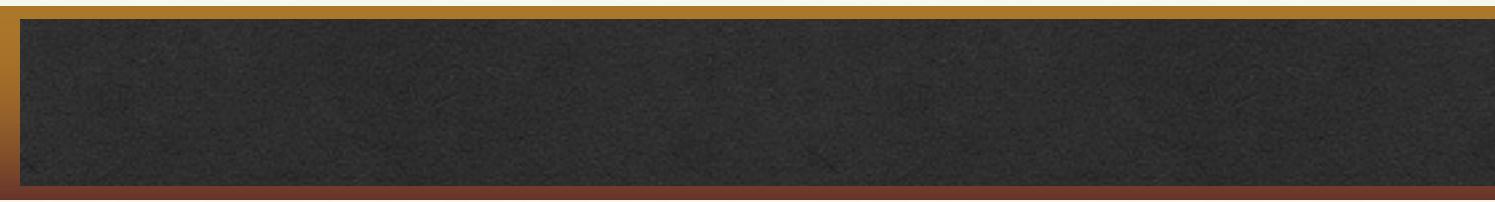
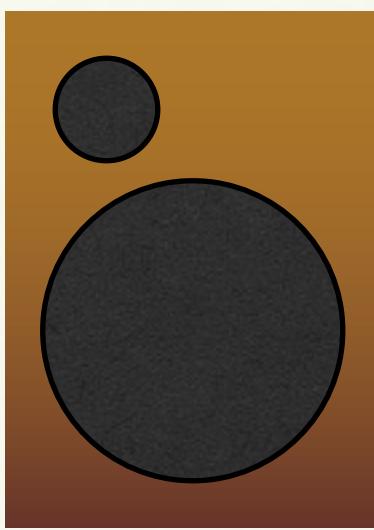


Stereo

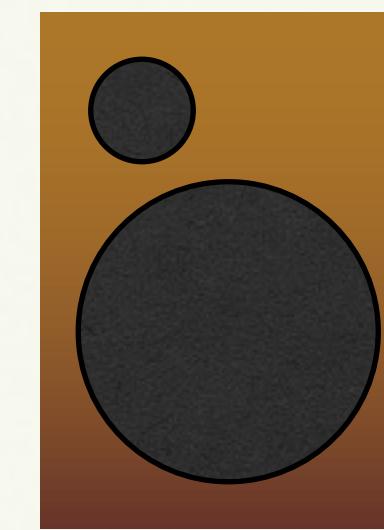
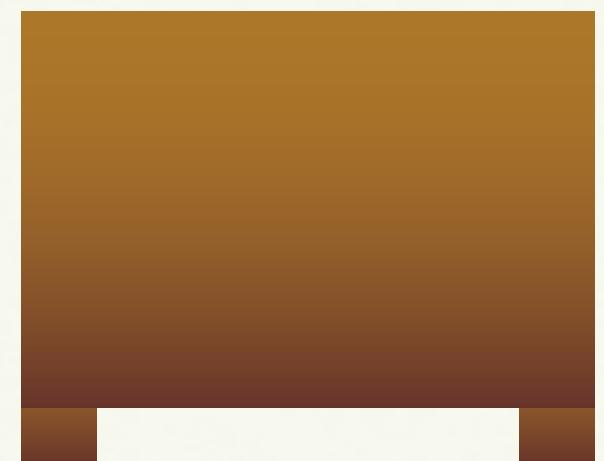
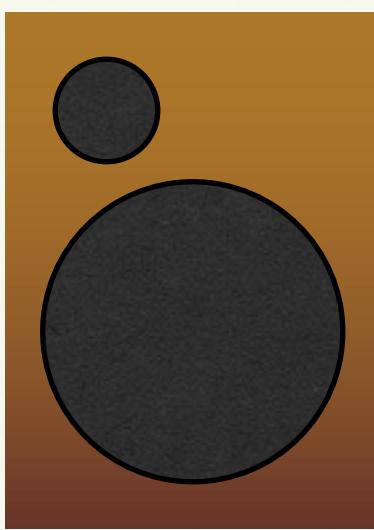


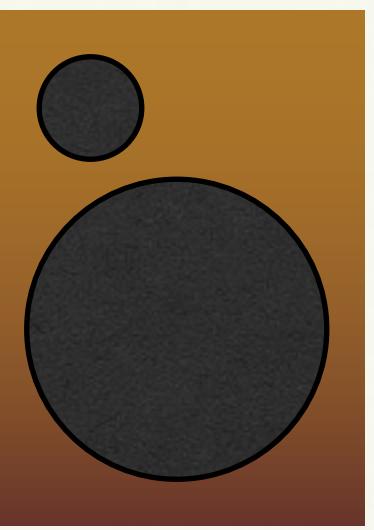
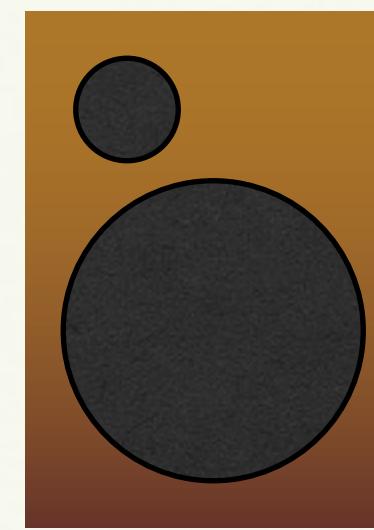
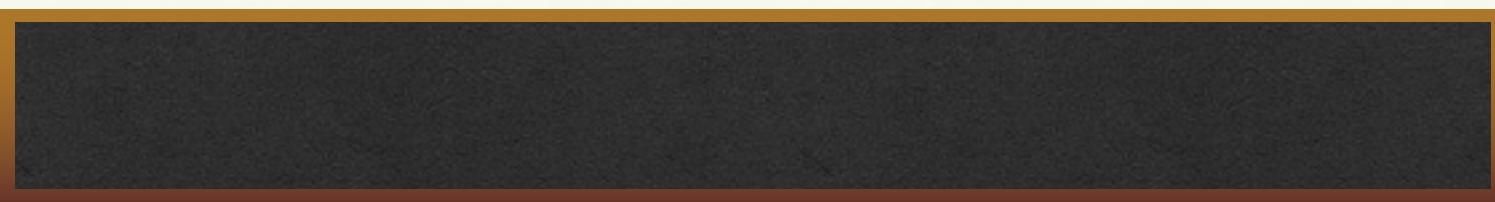
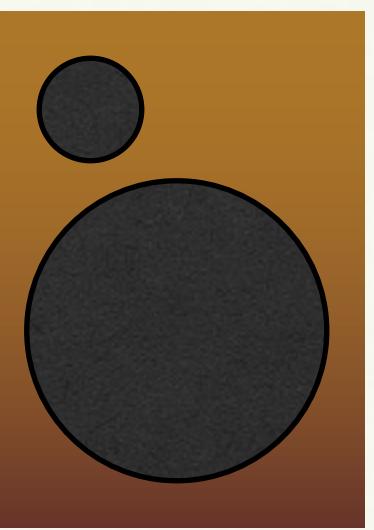
Quadraphonic (Surround) Sound



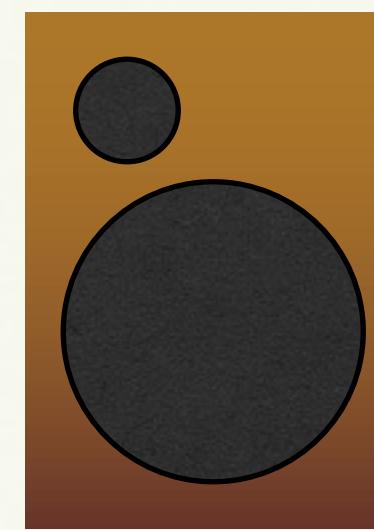
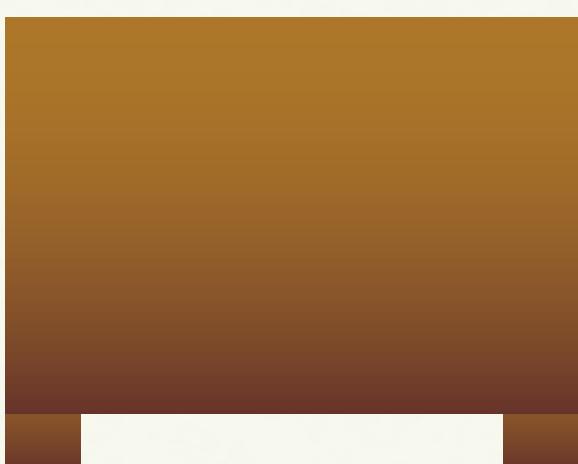
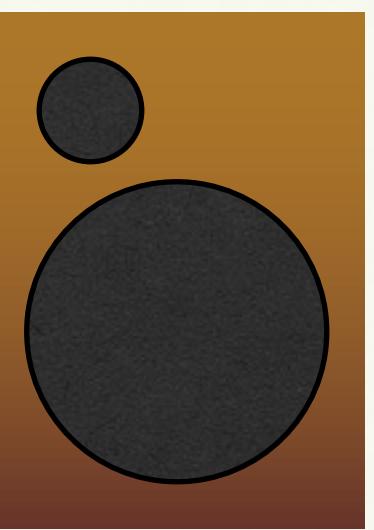
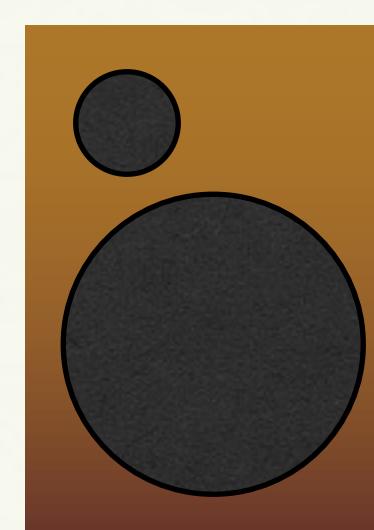


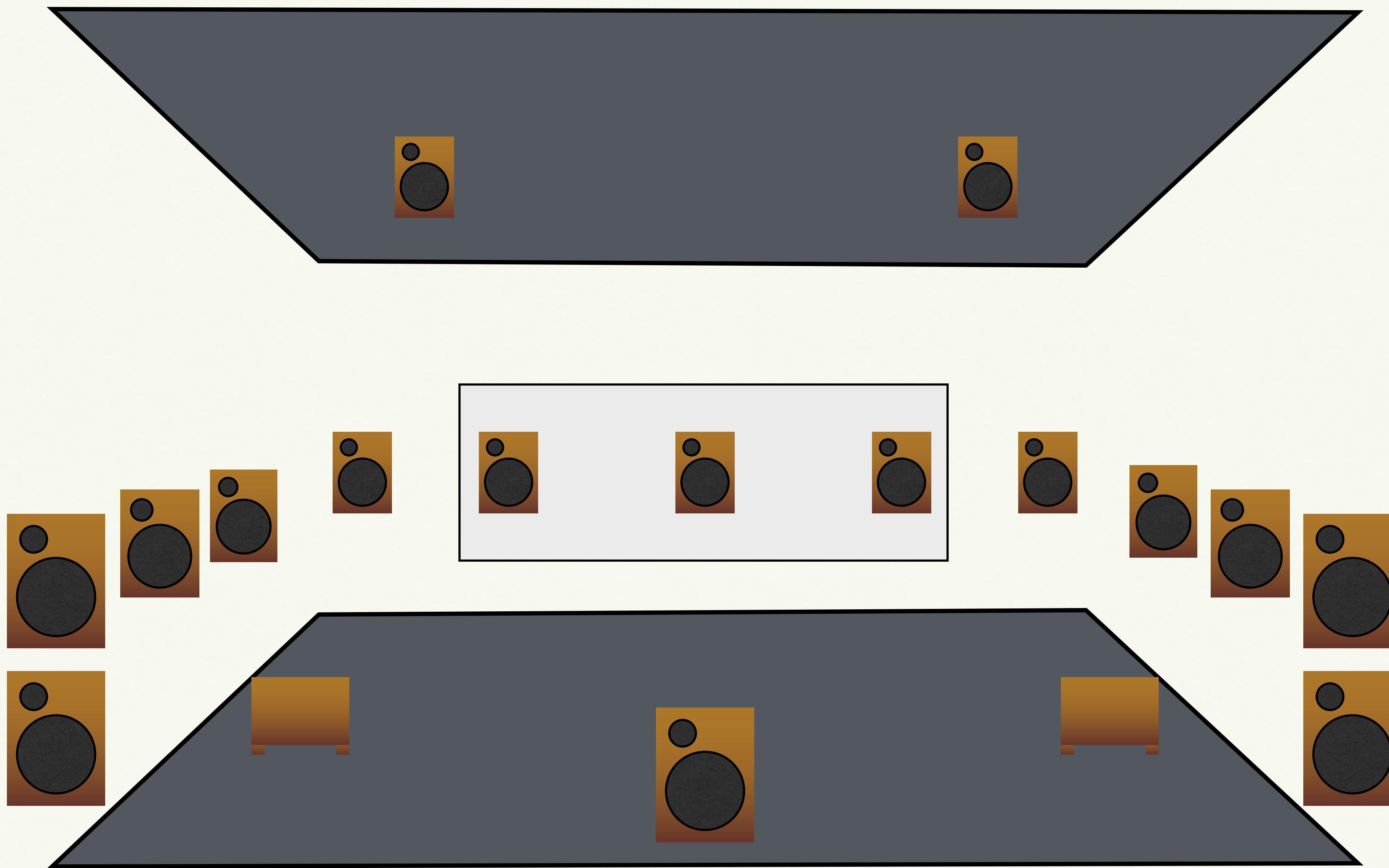
5.1 Channel Surround



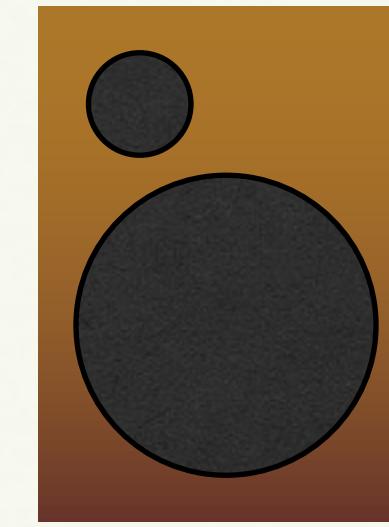


7.1 Channel Surround

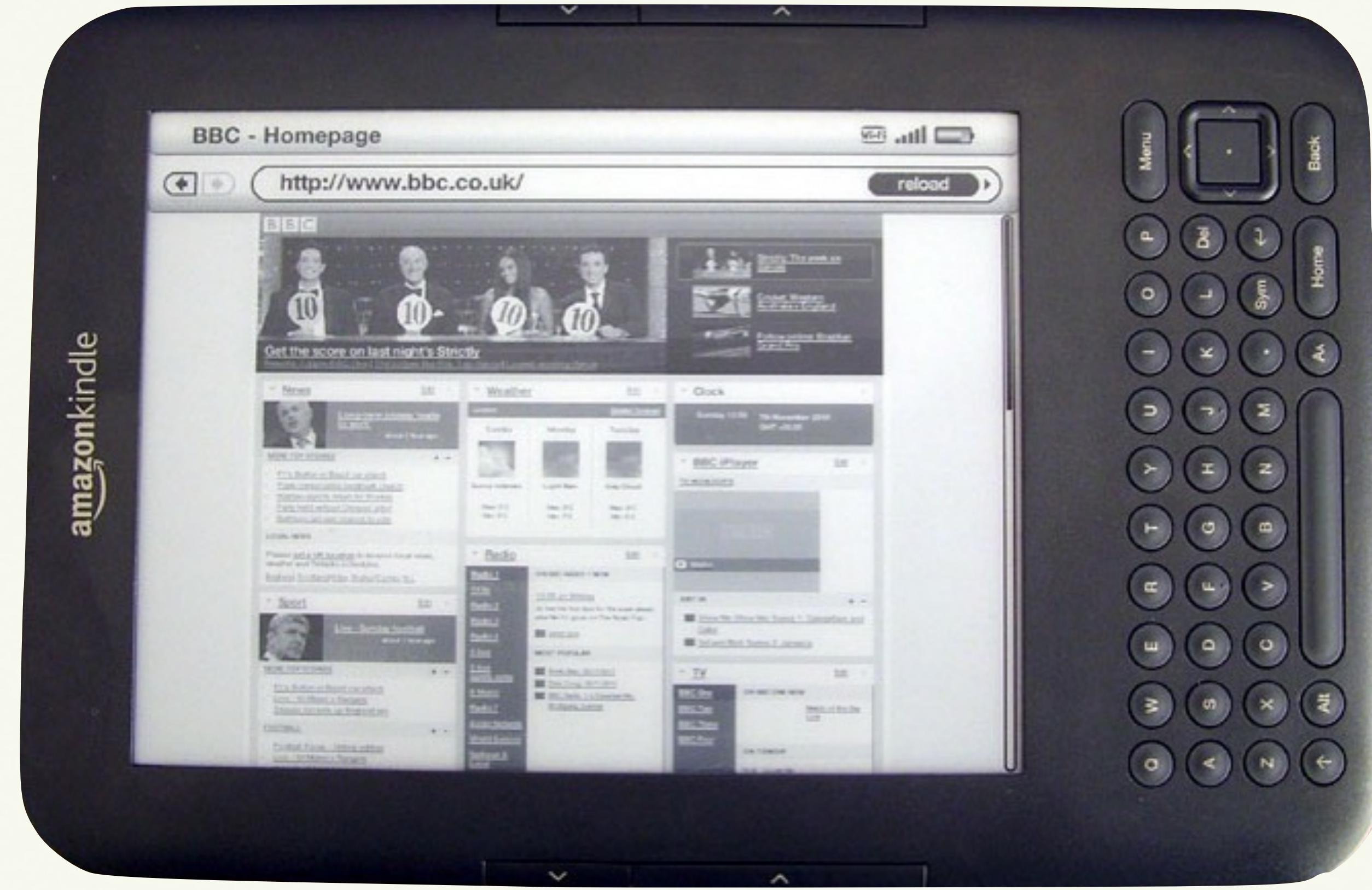




16.2 Channel Surround



**Sometimes mono
is all someone has**

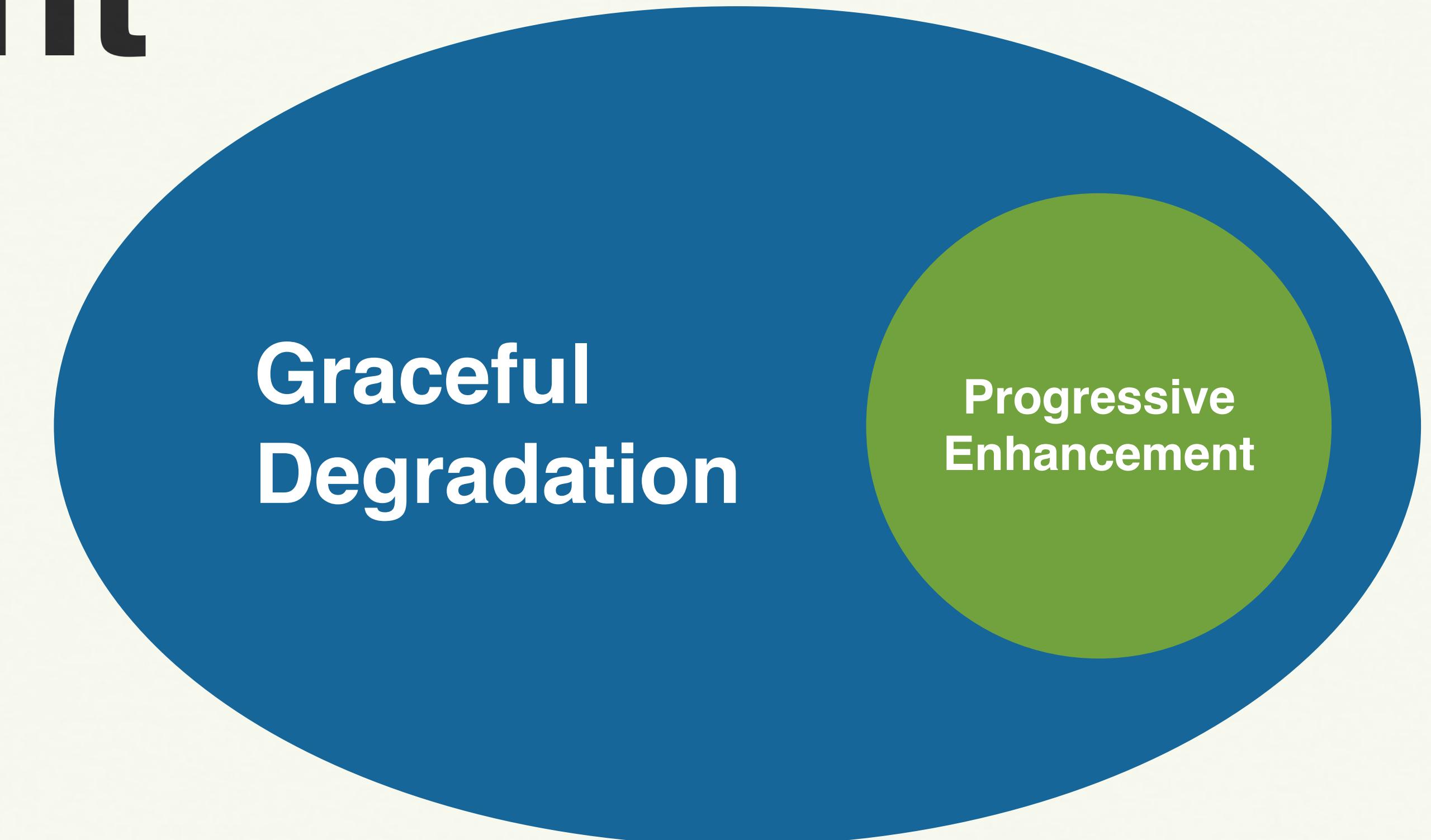


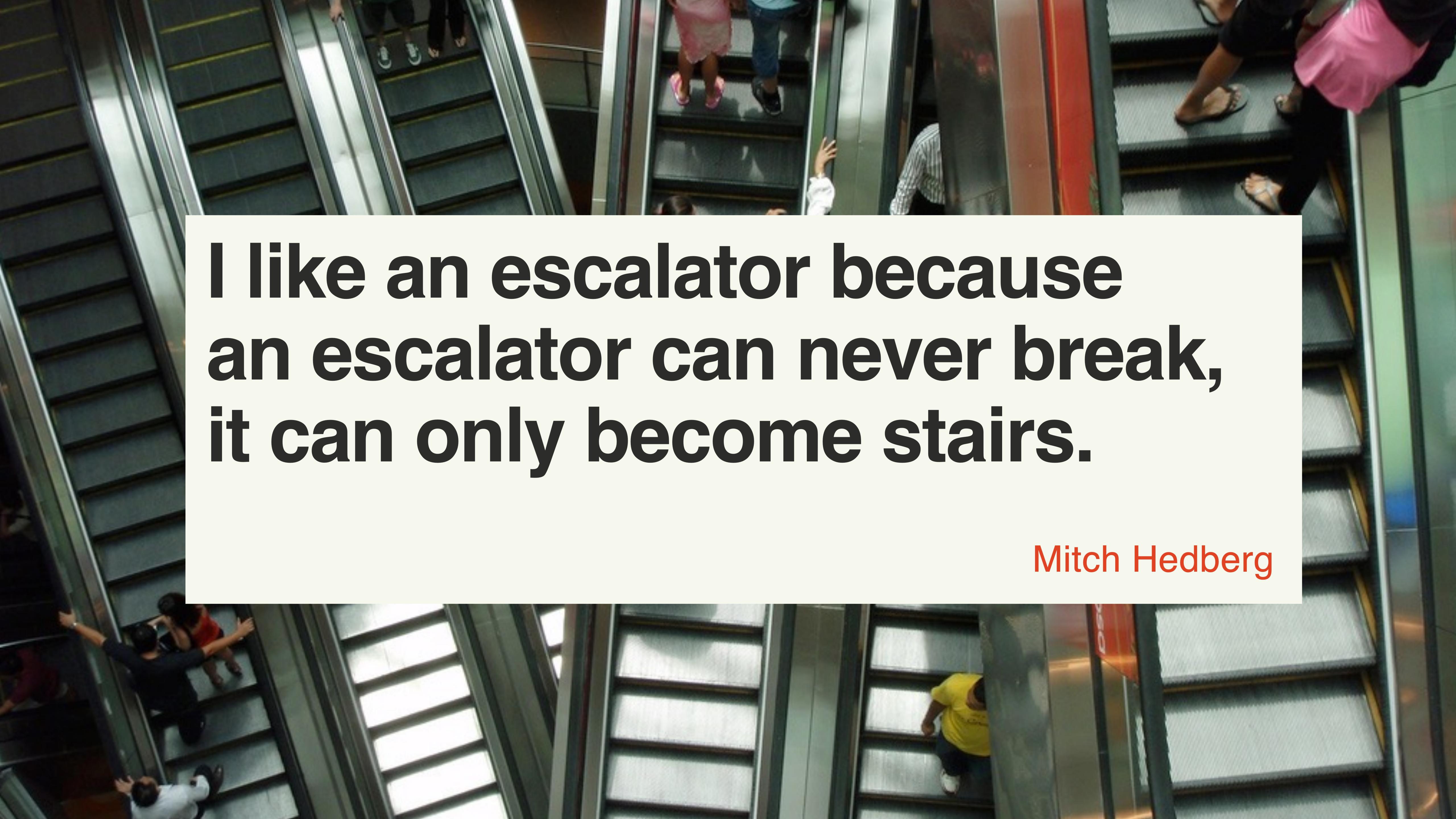
Kindle 3 = Free global data

Progressive Enhancement

versus

Graceful Degradation





I like an escalator because
an escalator can never break,
it can only become stairs.

Mitch Hedberg



Andrew Wight

@AndrewUX

Progressive enhancement is an escalator that becomes stairs.
Graceful degradation is building a lift then having to add
stairs.

14 May 12



Reply



Retweet



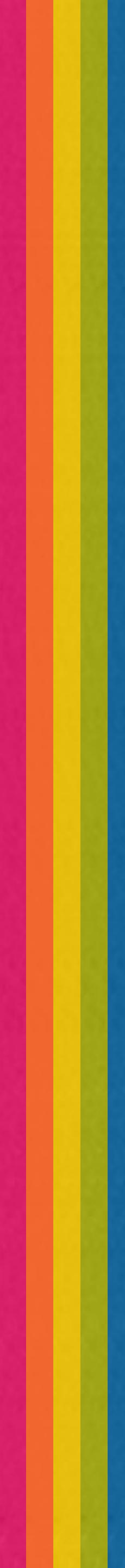
Favorite



**I'm sorry,
you need
more channels**



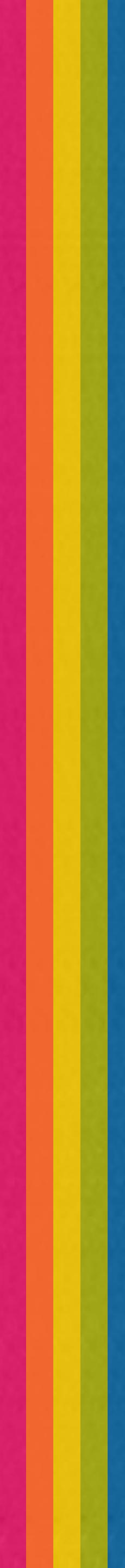
**YOU MUST BE THIS TALL
TO RIDE WITH AN ADULT**



**So how to we
practice
Progressive
Enhancement?**

The process

- ◆ Focus on what matters.
- ◆ Write it out, then read it back.
- ◆ Support content with appropriate semantics.
- ◆ Use design to improve comprehension.
- ◆ Consider how your design choices impact user experience.
- ◆ Think about the many different ways folks might interact.
- ◆ Map the potential experiences.



Step 1: Focus on what matters



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Travel

Security Screening



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Schedule

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Travel Tips



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**Experience a smoother screening process – no need to
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Available to US citizens, nationals and LPRs.



TSA uses unpredictable security measures, both seen and unseen, throughout the airport. All travelers will be screened, and no individual is guaranteed expedited screening.



- 2
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- Travel
- Security
- Special Features
- TSA PreCheck®
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- FAQ
- Trusted Traveler Programs
- Passenger Support
- Travel Tips

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App

29

sw

Rev

30

low

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Travel

Security Screening



Special Procedures



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TSA uses unpredictable security measures, both seen and unseen, throughout the airport. All travelers will be screened, and no individual is guaranteed expedited screening.

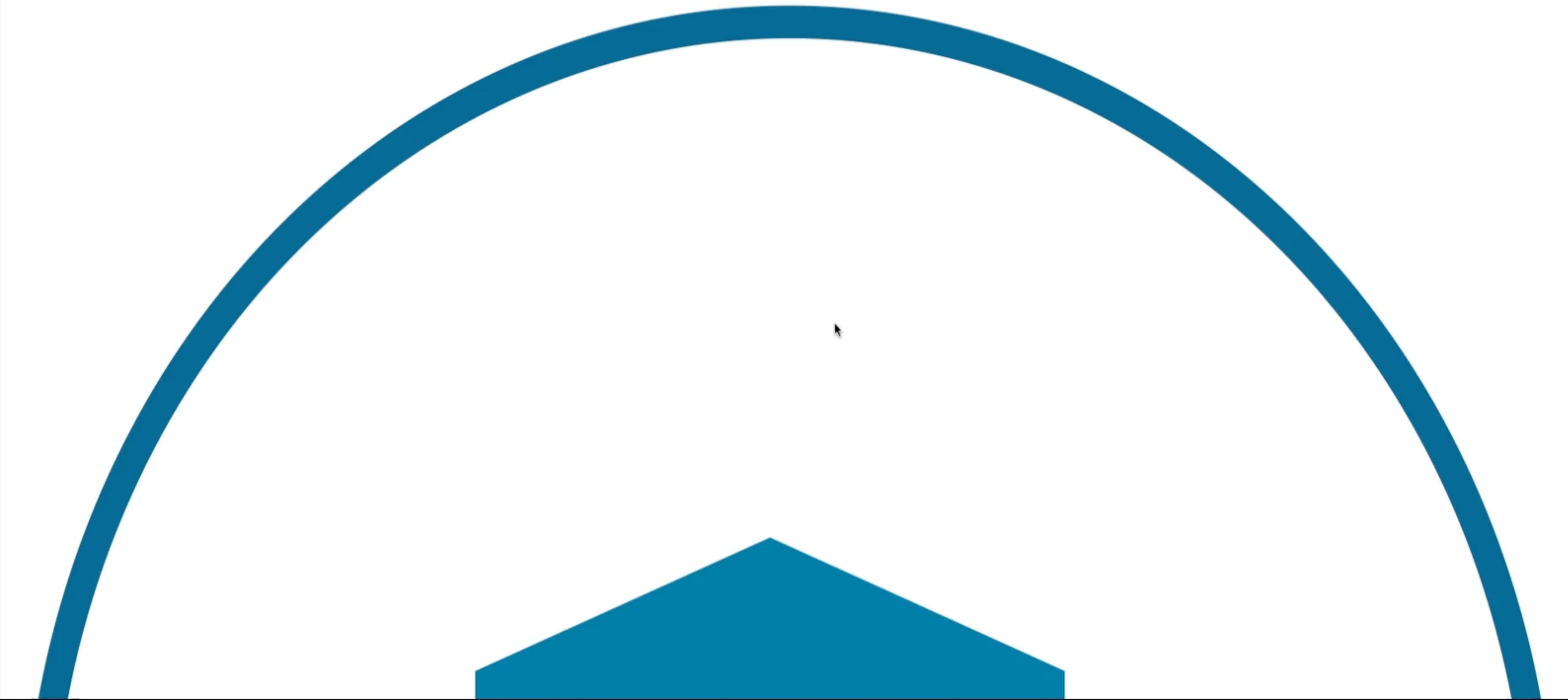
[Skip to main content](#)

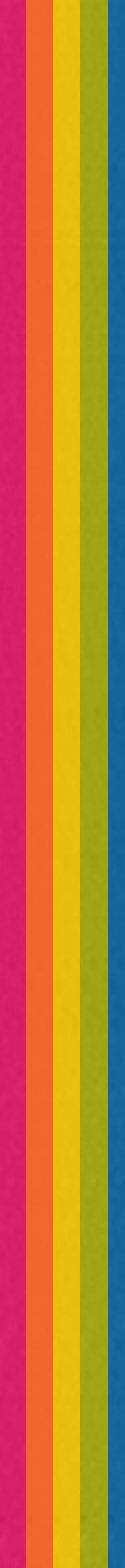


An official website of the United States government

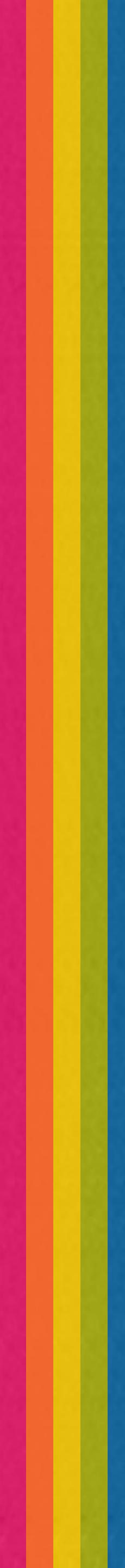
Here's how you know

Here's how you know





Why does this matter?

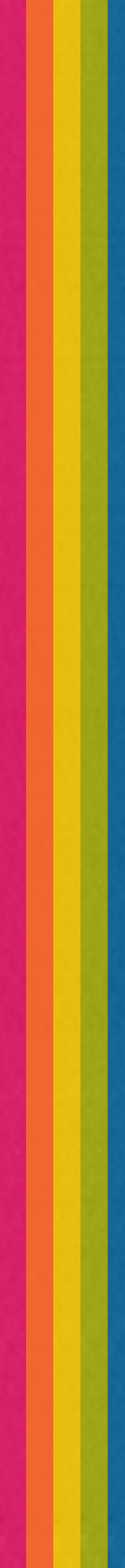


Why does this matter?

We don't control how & where our pages are rendered

Chaos agents

- ◆ Servers (including CDNs)
- ◆ Networking infrastructure
- ◆ Network providers
- ◆ Firewalls
- ◆ CSS parsers
- ◆ JavaScript parsers & runtimes
- ◆ Human error
- ◆ 3rd Party JavaScript
- ◆ Browser plugins
- ◆ Assistive Technologies



**Deliver your
core experience
with as few
dependencies
as possible.**

“In Hurricane #Irma’s path with
a weak phone connection?
Stay up to date with the text-
only version of our website
<http://lite.cnn.io>

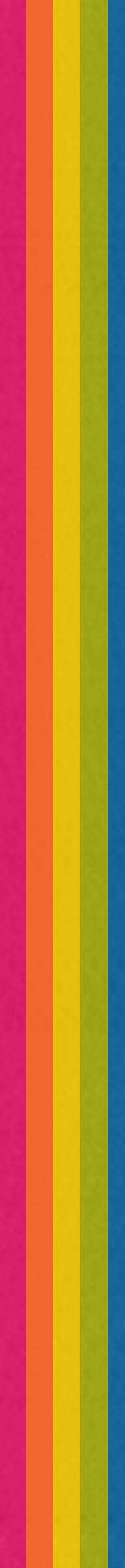
— CNN

9 September 2017

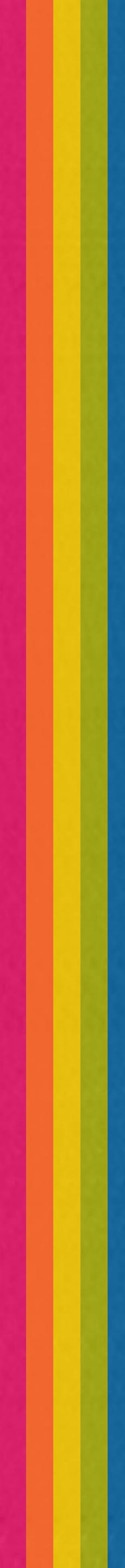
twitter.com/CNN/status/906655810612232193

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- [US surpasses 4 million reported coronavirus cases as hospitalizations near record](#)
- [At least 15 prisoners at a California prison have died of apparent complications from Covid-19](#)
- [University professors fear the risks of classroom teaching in pandemic hot spots](#)
- [Birx warns of concerning rise in coronavirus cases in 12 cities as Trump paints a rosy picture](#)
- [Opinion: In Covid-19 crisis, expand service options for young people](#)
- [As US and China force consulates to close, the risk of missteps and spiraling tensions rises](#)
- [China orders closure of US consulate in Chengdu in retaliation for Houston](#)
- [Global stocks tumble as China tensions escalate and the US economy struggles](#)
- [Pompeo blasts Beijing as deadline nears for China to shutter Houston consulate](#)
- [How the Lincoln Project's brutal anti-Trump ads could remake US politics](#)
- [The strongest storm on the planet moves toward Hawaii](#)
- [Two young brothers from Houston lost both parents to Covid-19](#)
- [A key miscalculation by officers contributed to the tragic death of Breonna Taylor](#)
- [Watch the entire CNN coronavirus town hall](#)
- [The 32 most bizarre lines from Donald Trump's latest interview with Sean Hannity](#)
- [AOC to Yoho: 'I am someone's daughter too'](#)
- [AOC 1, Ted Yoho 0](#)
- [This Florida Republican just delivered a master class in how *not* to apologize](#)
- [Ted Yoho apologizes after reportedly verbally accosting Ocasio-Cortez over stance on unemployment, crime in New York](#)
- [Covid-19 "will end up as a Top 10 leading cause of death" in 2020, CDC statisticians tell CNN](#)
- [Covid-19 mask safety: Two or three layers best to protect against virus, study finds](#)
- [Covid-19 and breastfeeding: Moms unlikely to pass virus if careful](#)



Step 2: **Write it out,** **then read it back**



How does your interface sound?



How does your interface sound?

Are you speaking to your users with words they use?

Nicely Said recommends we

- ◆ Be clear.
- ◆ Be concise.
- ◆ Be honest.
- ◆ Be considerate.
- ◆ Write how we speak.

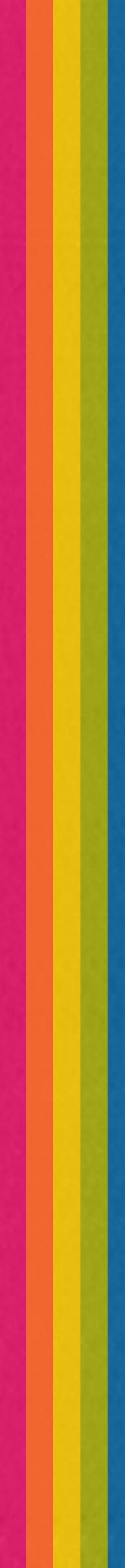
How does this photo make you feel?

- Embarrassing
- Upsetting
- Saddening
- Bad Photo
- Other



How does this photo make you feel?

- Embarrassing
- Upsetting
- Saddening
- Bad Photo
- Other it's embarrassing



Please describe the photo

- It's embarrassing
- It's a bad photo of me
- It makes me sad



Consider the reading order

- 1 Security Screening ▼
- 2 Special Procedures ▼
- 3 TSA PreCheck® ▲
- Airports & Airlines
- Schedule
- FAQ
- Trusted Traveler Programs
- 4 Passenger Support ▼
- 5 Travel Tips ▼
- 6 FAQ

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Travel with ease with TSA PreCheck®

Experience a smoother screening process – no need to remove shoes, belts, 3-1-1 liquids, laptops, or light jackets.

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Available to US citizens, nationals and LPRs.

 TSA uses unpredictable security measures, both seen and unseen, throughout the airport. All travelers will be screened, and no individual is guaranteed expedited screening.

 Read the latest information on COVID-19 impact to TSA Enrollment Services.



Elements

```
<body>
  <div id="skip-link">...</div>
  <div class="dialog-off-canvas-main-canvas" data-off-canvas-main-canvas>
    <div class="layout-container" style="flex">
      <div class="usa-overlay"></div>
      <header class="tsa-header usa-header usa-header--extended">...</header>
      <div class="block">...</div>
      <div class="region region-breadcrumb">...</div>
      <main role="main" class="usa-main usa-main--with-sidebar">
        <div class="usa-overlay"></div>
        <div class="grid-row grid-gap" style="flex">
          <div class="grid-col-12 desktop:grid-col-3">
            <div class="region region-sidebar">
              <nav role="navigation" aria-labelledby="block-travel-sidebar-menu" id="block-travel-sidebar" class="settings-tray-editable block block-menu navigation menu--sidebar" data-drupal-settingstray="editable">
                <h2 id="block-travel-sidebar-menu">Travel</h2>
                <nav class="max-tablet-hidden" aria-label="Secondary navigation">
                  <ul class="usa-sidenav">...</ul>
                </nav>
                <nav aria-label="Secondary navigation" class="min-desktop-visible usa-sidenav usa-accordion">...</nav>
              </nav>
            </div>
          </div>
        </div>
      </main>
    </div>
  </div>
</body>
```

Styles Computed Layout Event Listeners DOM Breakpoints Properties Accessibility

► Accessibility Tree

▼ ARIA Attributes

No ARIA attributes

► Computed Properties

▼ Source Order Viewer

Show source order

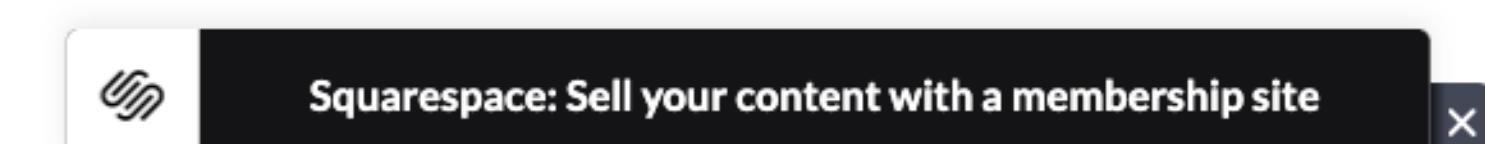
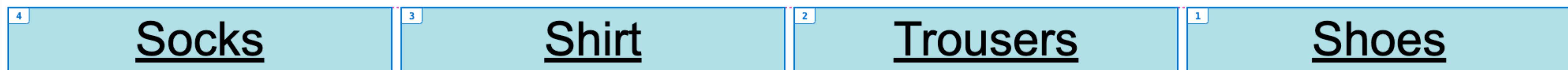


View in Editor

Sign Up

Log In

Getting ready in the morning



Elements

- <body class="fullpage logged-out sidebar-false"> (flex)
- > <header id="main-header" class="main-header">...</header>
- > <div class="oldie-header">...</div>
- > <div id="result-iframe-wrap" role="main">
- > <iframe id="result" src="https://cdpn.io/codepo8/fullpage/mdPMZQY" sandbox="allow-forms allow-modals allow-pointer-lock allow-pops allow-same-origin allow-scripts allow-top-navigation-by-user-activation allow-downloads allow-presentation" allow="accelerometer; ambient-light-sensor; camera; display-capture; encrypted-media; geolocation; gyroscope; microphone; midi; payment; web-share; vr" allowtransparency="true" allowpaymentrequest="true" allowfullscreen="true" class="result-iframe" loading="lazy">
- > #document
- <!DOCTYPE html>
- > <html lang="en">
- > <head>...</head>
- > <body translate="no">
- <h1>Getting ready in the morning</h1>
- > (flex) == \$0
- > <li id="shoes">...
- > <li id="trousers">...
- > <li id="shirt">...
- > <li id="socks">...
-
- </body>

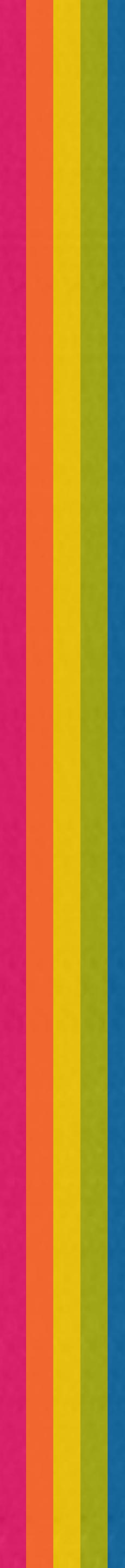
Styles Computed Layout Event Listeners DOM Breakpoints Properties Accessibility

- ▶ Accessibility Tree
- ▶ ARIA Attributes
- ▶ Computed Properties
- ▼ Source Order Viewer

Show source order

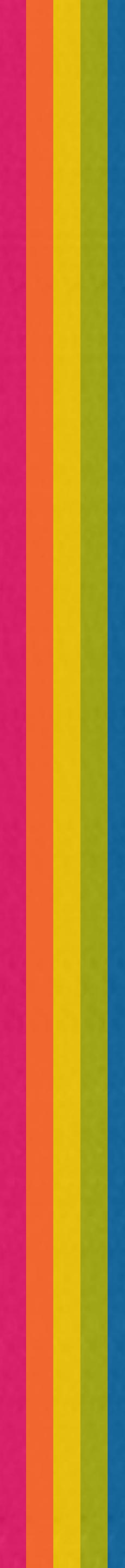
html.mac.js body.fullpage.logged-out.sidebar-false div#result-iframe-wrap iframe#result.result-iframe html body ul

Quick View: Console ▾

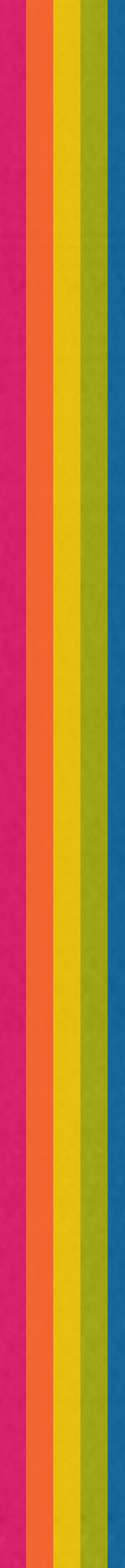


Reality Check

**When people
are in crisis,
their personal
compute power
is reduced.**



Step 3: **Support content** **with appropriate** **semantics**



We should choose
our markup
as carefully as
our words.

What are we saying here?

```
<div class="entry">
  <div class="entry__title">
    Progressive Web Apps and the Windows Ecosystem
  </div>
  <div class="entry__meta">
    <div><b>Published</b> 24 May 2017</div>
    <div><b>Reading Time</b> 25 minutes</div>
  </div>
  <div class="entry__content">
    I had the great pleasure of delivering a talk...
    <br><br>
    I do a lot of traveling and it's...
  </div>
</div>
```

Markup should convey meaning

```
<div class="entry">
  <div class="entry__title">
    Progressive Web Apps and the Windows Ecosystem
  </div>
  <div class="entry__meta">
    <div><b>Published</b> 24 May 2017</div>
    <div><b>Reading Time</b> 25 minutes</div>
  </div>
  <div class="entry__content">
    I had the great pleasure of delivering a talk...
    <br><br>
    I do a lot of traveling and it's...
  </div>
</div>
```

Altera s

- ◆ **p** - a paragraph
- ◆ **ol** - a list of items whose order matters
- ◆ **ul** - an list of items whose order doesn't matter
- ◆ **li** - an item in a list
- ◆ **dl** - a list of items and their associated descriptions
- ◆ **dt** - terms to be described within a dl
- ◆ **dd** - description data within in a dl
- ◆ **figure** - referenced content (images, tables, etc.)
- ◆ **figcaption** - caption for a figure

Structural Alterna-divs

- ◆ **article** - a piece of content that can stand on its own
- ◆ **section** - a section of a document or article
- ◆ **header** - preamble content for a document, article, or section
- ◆ **footer** - supplementary information for a document, article, or section
- ◆ **main** - the primary content of a document
- ◆ **nav** - navigational content
- ◆ **aside** - complementary content

Which of these is more readable?

Progressive Web Apps and the Windows Ecosystem
Published 24 May 2017

Reading Time 25 minutes

I had the great pleasure of delivering a talk...

I do a lot of traveling and it's...

Progressive Web Apps and the Windows Ecosystem

Published
24 May 2017

Reading Time
25 minutes

I had the great pleasure of delivering a talk...

I do a lot of traveling and it's...

<https://www.tsa.gov/precheck#main-content>

⊖ 16 headings

<h1> (Missing heading)

<h2> Travel

<h2> Travel

<h1> TSA PreCheck®

<h1> Travel with ease with TSA PreCheck®

<h2> (Missing heading)

<h3> (Missing heading)

<h4> Wait 5 Minutes or Less

<h4> Families Welcome

<h4> Nationwide Reach

<h2> How it Works

<h3> (Missing heading)

<h4> 1. Apply Online

<h4> 2. Enroll in person

<h4> 3. Travel with Ease

<h4> Loyalty Programs

<h4> Already a TSA PreCheck® Member?

<h4> Contact TSA

Useful landmarks

- ◆ **role="banner"**

Also: first **header** element not inside a sectioning element

- ◆ **role="navigation"**

Also: **nav**

- ◆ **role="search"**

- ◆ **role="main"**

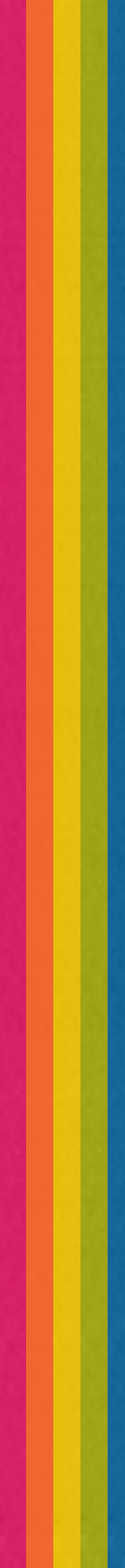
Also: **main**

- ◆ **role="complementary"**

Also: **aside**

- ◆ **role="contentinfo"**

Also: first **footer** element not inside a sectioning element



**Work with
browsers, don't
recreate them.**

Consider the humble button

Sign In

A button, 4 ways

```
<input type="submit" value="Sign In">
```

```
<button type="submit">Sign In</button>
```

```
<a href="#" class="button">Sign In</a>
```

```
<div class="button">Sign In</div>
```

What makes a button?

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	UnderlinedText	Named generic	Yes	Kinda	No
div	Block Text	Not exposed	No	No	No

Not all buttons are equal

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	UnderlinedText	Named generic	Yes	Kinda	No
div	Block Text	Not exposed	No	No	No

Some require CSS to look button-y

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	CSS Button Styles	Named generic	Yes	Kinda	No
div		Not exposed	No	No	No

Some require ARIA

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	CSS Button Styles	ARIA role="button"	Yes	Kinda	No
div			No	No	No

One needs to be made focusable

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	CSS Button Styles	ARIA role="button"	Yes	Kinda	No
div			HTML tabindex="0"	No	No

Some need JavaScript

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	CSS Button Styles	ARIA role="button"	Yes	JavaScript interaction events	No
div			HTML tabindex="0"		No

Some need even more JavaScript

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	CSS Button Styles	ARIA role="button"	Yes	JavaScript interaction events	JavaScript form events
div			HTML tabindex="0"		

Take the freebies

Sign In

Element	Appearance	Non-visible	Focusable	Activates	Submits Forms
input	Button	Button	Yes	Yes	Yes
button	Button	Button	Yes	Yes	Yes
a	CSS Button Styles	ARIA role="button"	Yes	JavaScript interaction events	JavaScript form events
div			HTML tabindex="0"		

JAVASCRIPT & ALL THE THINGS!

CSS



When is CSS unavailable?

- ◆ The browser doesn't support CSS.
- ◆ The user disabled CSS for performance reasons.
- ◆ The user is applying a user style sheet (which trumps your rules) to improve accessibility or for some other personal preference.
- ◆ A networking issue caused the external CSS to be unavailable.
- ◆ The selector you are using is too advanced for the browser.
- ◆ The rules are contained in a media query and the browser doesn't support them or the query doesn't apply.

When is JavaScript unavailable?

- ◆ The browser doesn't support JavaScript.
- ◆ JavaScript was disabled by the user.
- ◆ A networking issue caused the JavaScript to be unavailable.
- ◆ A firewall blocked requests for JavaScript.
- ◆ A browser plugin blocked the JavaScript download or execution.
- ◆ A third-party JavaScript error caused the JavaScript program to stop.
- ◆ A bug in your code caused the JavaScript program to stop.
- ◆ The browser failed a feature detection test and exited the program early.
- ◆ The user is still waiting for the browser to download, parse, and execute your JavaScript program.

But ARIA is safe, right?

- ◆ The browser & assistive tech combo must **both** support the feature.
- ◆ Users can experience a mismatch of expectation if an element appears to be something, but fails to act like it.

“If you *can* use a native HTML element or attribute with the semantics and behavior you require already built in, instead of re-purposing an element and adding an ARIA role, state or property to make it accessible, then do so.

— First Rule of ARIA Use

Reality Check

**This example
was a button.**



Step 4: Use design to improve comprehension



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remove shoes, belts, 3-1-1 liquids, laptops, or light jackets.**

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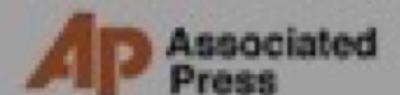
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Associated Press



Book Is Inside Look at War on Terror

By PETE YOST 09.07.07, 3:25 PM ET

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WASHINGTON - Vice President Dick Cheney and other Bush administration officials "blew through" legal constraints they didn't like and weakened the presidency with a go-it-alone approach in the war on terror, a former Justice Department official writes in a new book.

In "The Terror Presidency," former assistant attorney general Jack Goldsmith details what he calls "one of the underappreciated stories in the war on terrorism: the daily clash inside the Bush administration between fear of another attack - which drives officials into doing whatever they can to prevent it - and the countervailing fear of violating the law, which checks their urge toward prevention."

Goldsmith rescinded two legal memos written by attorneys who previously ran the Office of Legal Counsel, which he

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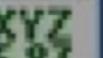
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Help Edit Delete Close

Business Day 30, 2008 4:52PM EDT

Watch List

S&P 500	94.25	+0.07
MSFT	25.47	-0.27
FAIR	6.08	-0.18
CSCO	19.79	-0.29

Learn more about the [Watch List](#).

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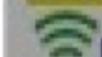
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Wait 5 Minutes or Less

In September 2022, 93% of TSA PreCheck® passengers waited less than 5 min.



Families Welcome

Children 12 and under can join a parent/guardian with TSA PreCheck® in the dedicated lanes.



Nationwide Reach

More than 200 airports and 85+ airlines provide TSA PreCheck®

How it Works

1. Apply Online

Submit an online application in 5 minutes & schedule an appointment at any of 500+ enrollment centers.

2. Enroll in person

10-min in-person appointment that includes fingerprinting for a background check.

3. Travel with Ease

Add your Known Traveler Number to your airline reservation to enjoy faster, more seamless screening.

With TSA PreCheck® you **do not** need to remove:



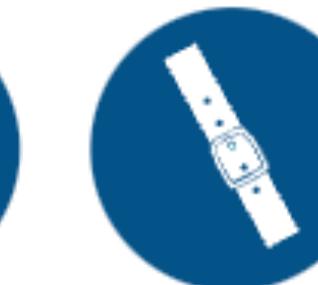
✓ shoes



✓ laptops



✓ 3-1-1 liquids



✓ belts



✓ light jackets

Loyalty Programs

See if your credit card program has TSA PreCheck® benefits.

Already a TSA PreCheck® Member?

Lookup your KTN and membership expiration date. Excludes Global Entry and employment-based members.

Contact TSA

TSA PreCheck Application Questions
Trusted Traveler Questions (Global Entry, NEXUS, SENTRI)



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Images can add value

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G.O.P. TAX PLAN

Adverse Report Threatened Tax Bill, So G.O.P. Went on Attack

- A Republican requirement that Congress consider the full cost of major legislation threatened to derail the party's \$1.5 trillion tax rewrite last week.
- Lawmakers went on the offensive to discredit the agency performing the analysis.

21m ago

At this quarry, how to spend G.O.P. tax cut isn't set in stone.

The failure to repeal Obamacare provided Senate Republicans with a road map of what not to do when pursuing their tax agenda.

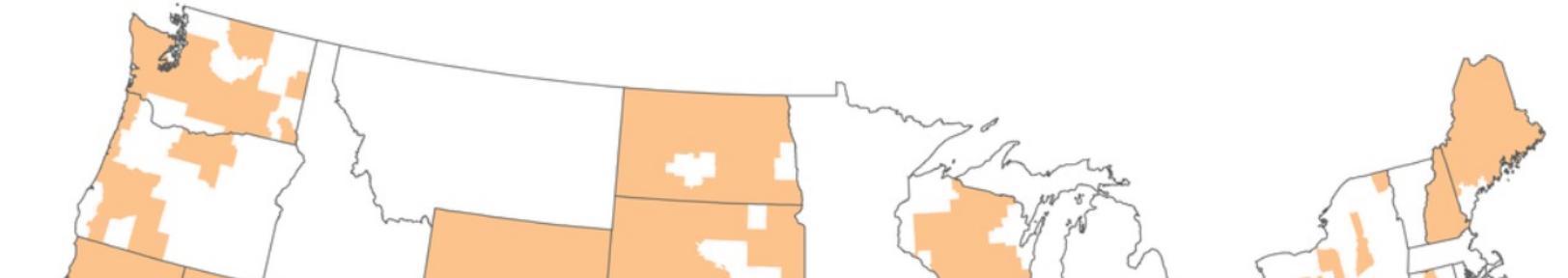


Tom Brenner/The New York Times

Republicans Try to Avert Federal Shutdown, Due Within Days

- With government funding set to expire Friday, Republicans are pushing for a stopgap spending measure that would extend

Where a bronze plan costs \$50 more than last year



Robert P. George and Sherif

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Opinion



Rob Kim/Getty Images

Billy Bush Yes, Donald Trump, You Said That

The president is currently engaging in some revisionist history.

Dec. 3

But they don't always

The New York Times

Dec. 4, 2017

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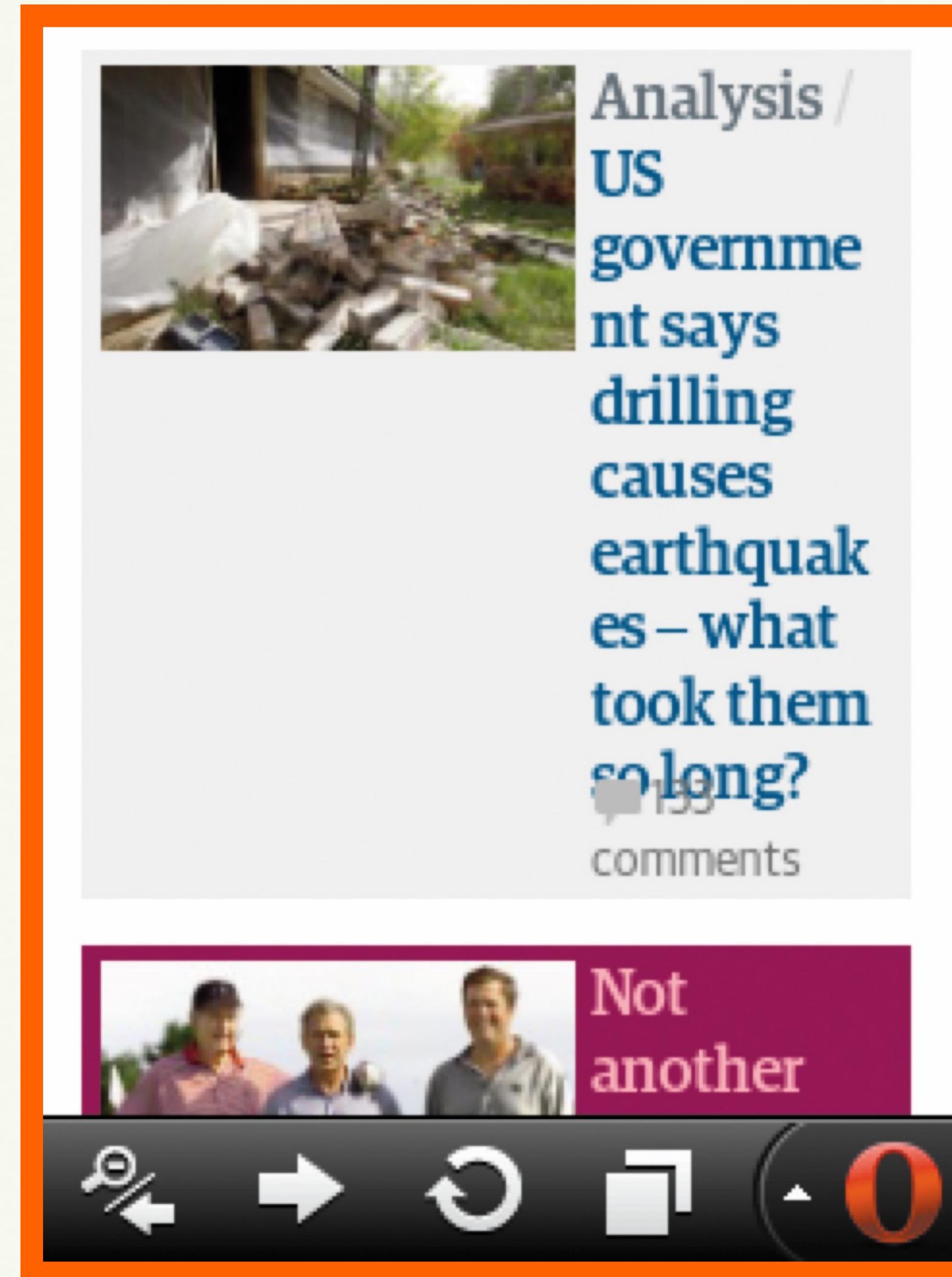
G.O.P. TAX PLAN

Tom Brenner/The New York Times

Adverse Report Threatened Tax Bill, So G.O.P. Went on Attack

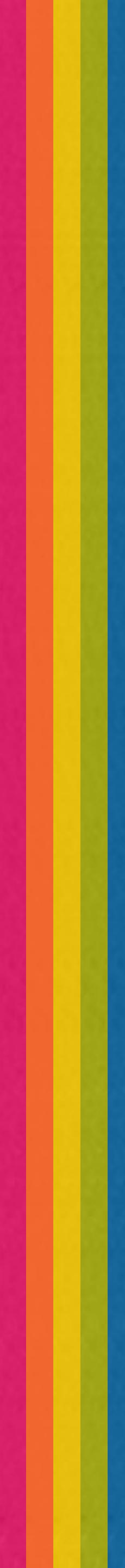
- A Republican requirement that Congress consider the full cost of major legislation threatened to derail the party's \$1.5 trillion tax rewrite last week.

They can also cause problems



Be selective (and realistic)

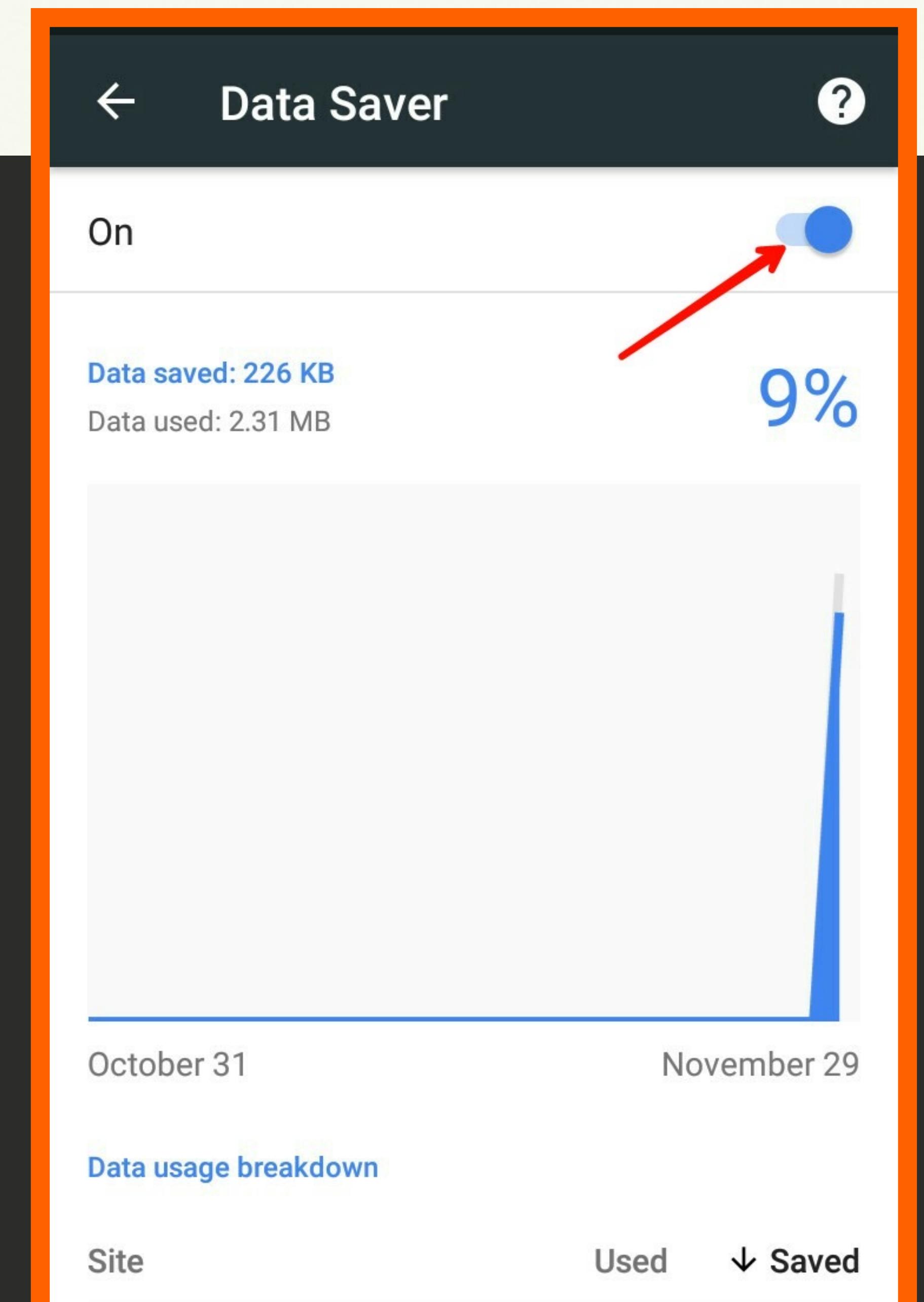
- ◆ Does the image reiterate information found in the surrounding text?
- ◆ Is the image necessary to understand the surrounding content?
- ◆ Does the image contain text?
- ◆ Is the image a graph, chart, or table?
- ◆ Could the content of the image be presented in a different format that would not require an image?
- ◆ Is the image purely presentational?



**Users should
be in control
of their data.**

Let them save data!

GET /image.jpg HTTP/1.0
Host: example.com
Save-Data: on



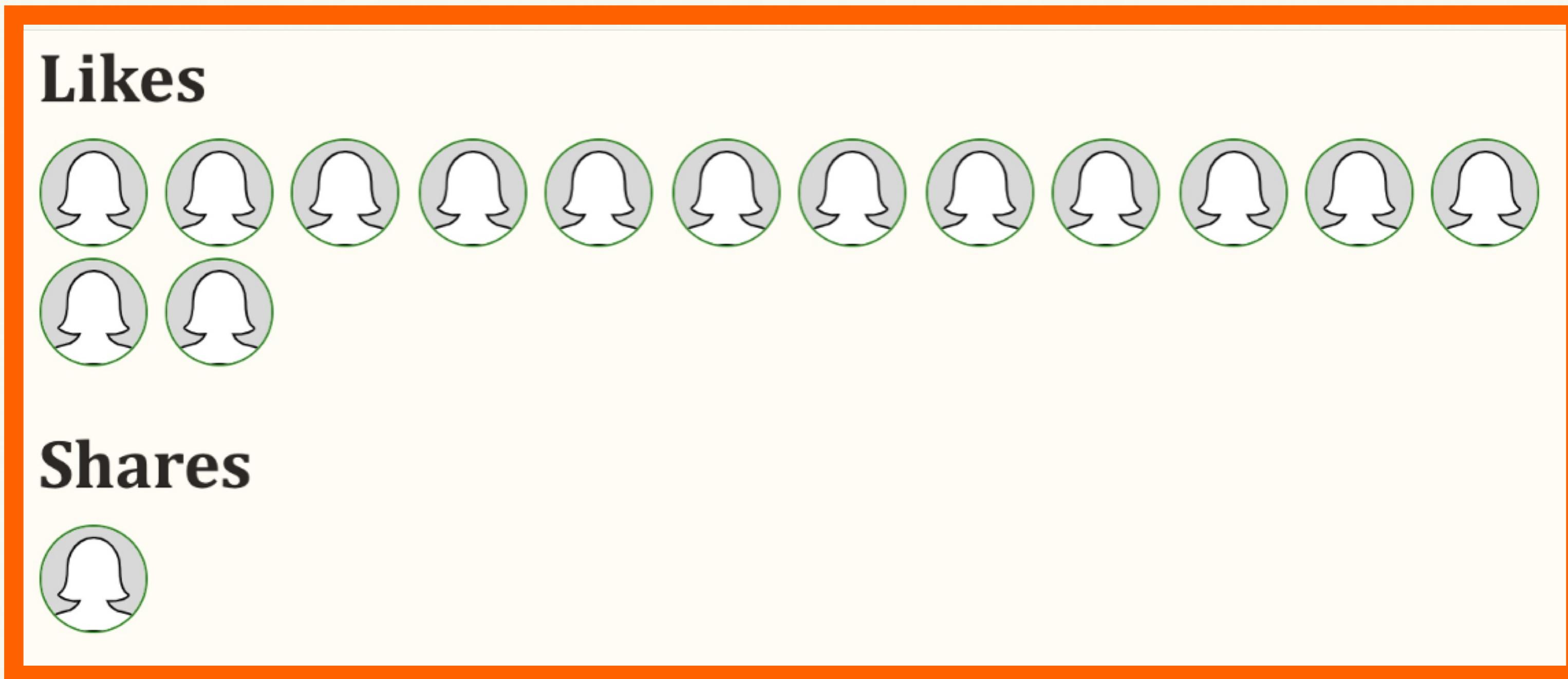
We can see what users want...

```
let save_data = false;  
if ( 'connection' in navigator ) {  
  save_data = navigator.connection.saveData;  
}  
  
```

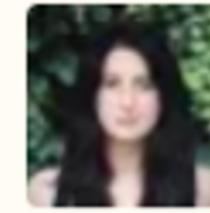
...and respond accordingly

```
self.addEventListener( "fetch", event => {  
  const request = event.request,  
        url = request.url;  
  if ( request.headers.get("Accept").includes("image") ) {  
    event.respondWith(  
      if ( save_data ) {  
        return respondWithFallbackImage( url );  
      }  
      // ...  
    );  
  }  
}
```

Result: avatars



Result: avatars & content



Emily Grossman

Bingbot is crawling the web for “quality PWAs” to ingest in the Windows Store (aaron-gustafson.com/notebook/progr...).

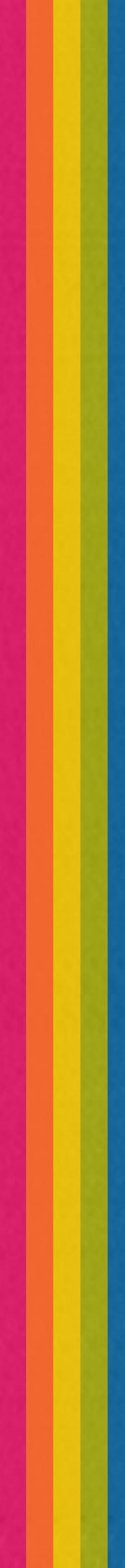
Here's what Microsoft looks for:

- **Does this site have a Web App Manifest?** In our initial crawl of sites looking for PWAs, we discovered over 1.5 million manifests across 800k domains. Looking at a selection of these sites, we discovered that not all are good candidates for ingestion. Some aren't PWAs at all, others have a boilerplate manifest generated by tools like favicon generators.
- **Does the Web App Manifest suggest quality?** We will be looking for non-boilerplate manifests that include a name, description, and at least one icon that is larger than 192px square.
- **Is the site secure?** At this point, we are only looking for HTTPS, we aren't evaluating CSP or other protections.
- **Does the site have a valid Service Worker?** Mozilla has a bunch of recipes if you are looking for somewhere to start.
- **Is the site popular?** We will prioritize sites that rank highly on Alexa, Quantcast, and other “top sites” lists.
- **Does the site pass automated testing for quality?** There are a number of tools out there for this, including our Site Scanner, Lighthouse, aXe, and more.
- **Is the app content free?** There are certainly ways to charge for apps and content in the Windows Store, but we won't passively ingest any sites that require a licensing fee or subscription. You'll be able to submit those manually though.
- **Does the app pass manual review?** PWAs will need to meet the standards of the Windows Store, just like any other app. We will not ingest apps that violate laws or Store policies.

12 October 2017 | [Permalink](#)

Good performance by default

- ◆ Selectively deliver advanced styles
- ◆ Isolate large CSS images in min-width media queries
- ◆ Don't hide `img` using CSS
- ◆ Use responsive images
- ◆ Prefer system fonts
- ◆ Use `font-display: optional`



Step 5:

Consider how

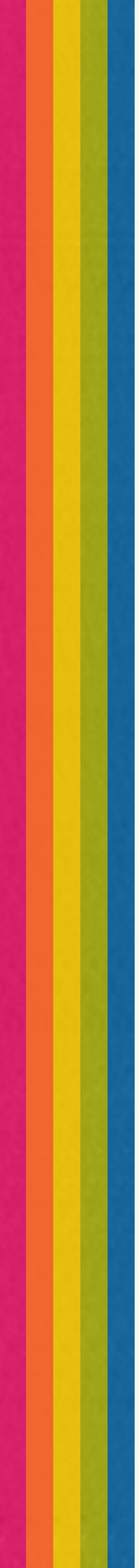
your design

choices impact

user experience

Design can ruin the experience





Pay attention to network dependencies

Learn from the past

The screenshot shows the Lifehacker website with a large orange border around the main content area. The main header features the word "lifehacker" in a stylized green font. Below it, a large graphic of two crossed wrenches is overlaid on a background image of an airplane. The word "WEEKENDHACKER" is written in a colorful, blocky font at the bottom of this graphic. To the right of the main content, there's a sidebar with several story cards.

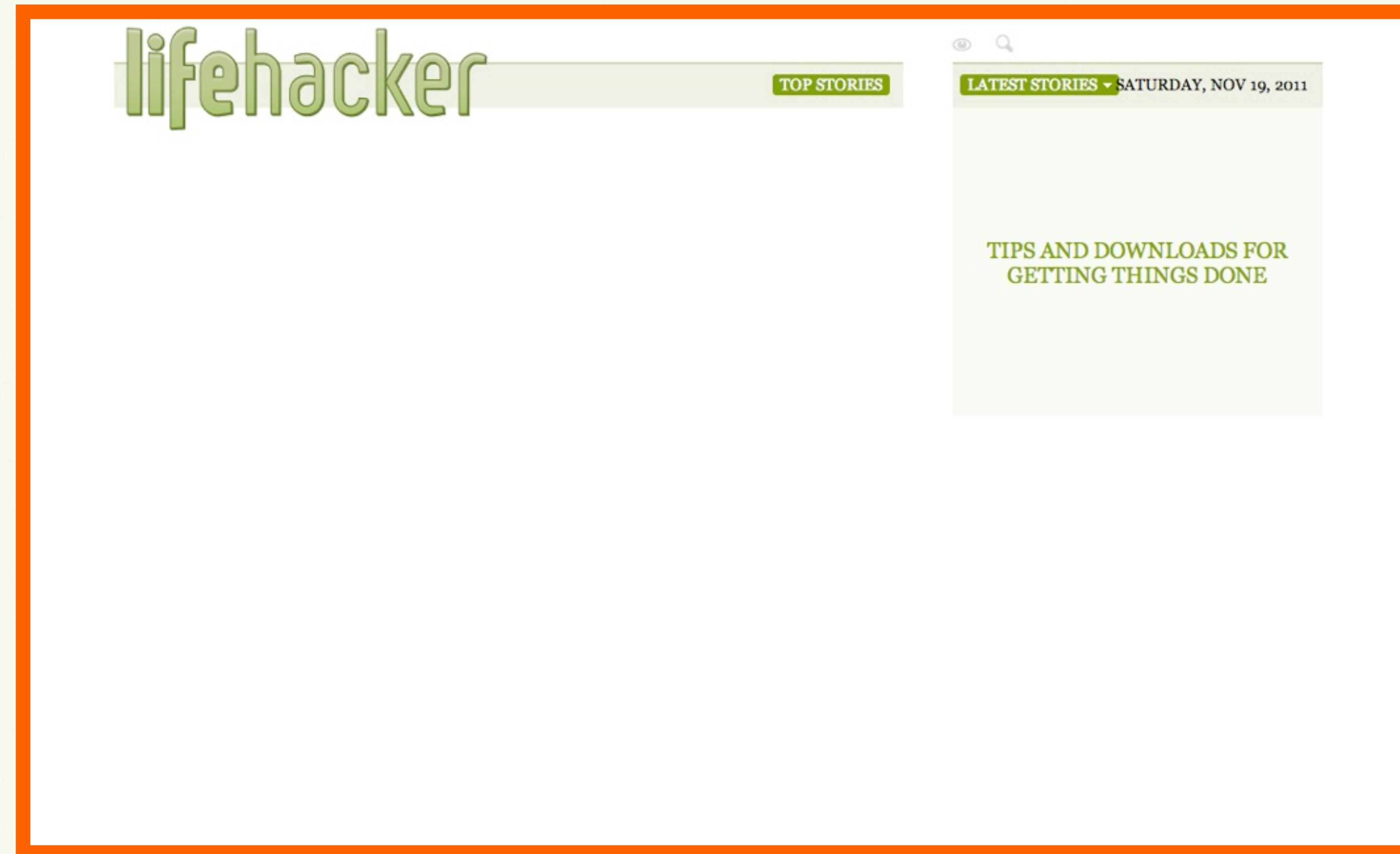
MAIN ARTICLE:

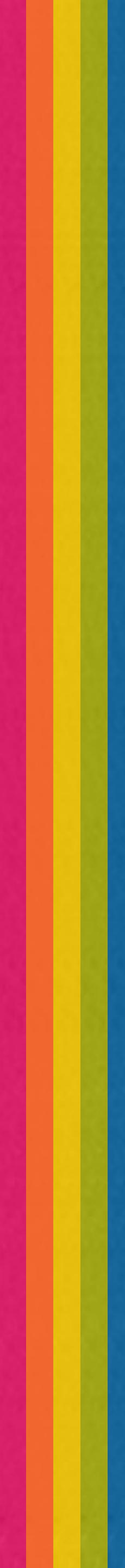
- Headline:** Make the Best of Your Travel Plans This Weekend
- By:** WHITSON GORDON
- Date:** NOV 18, 2011 5:00 PM
- Share Options:** Share, +1, Like (41)
- Engagement:** 6,190 views, 2 comments

SIDE BAR STORIES:

- LATEST STORIES (SATURDAY, NOV 19, 2011):**
 - ...you'll find it waiting in your basket online. (Tesco.com ad)
 - £10 OFF your first online shop* Start saving
 - WEEKENDHACKER** 5:00 PM: Make the Best of Your Travel Plans This Weekend
 - FOR WHAT IT'S WORTH** 4:00 PM: Remains of the Day: Ice Cream Sandwich Running on a Galaxy S II
 - HIGHLIGHTS** 3:30 PM: This Week's Most Popular Posts: November 12-November 18
 - WEB SITES** 3:00 PM: Our Favorite Single-Purpose Web Sites That Do Exactly What They Say They Do
 - DEALS** 2:30 PM: Daily App Deals: Get Deluxe Moon

No JavaScript, no content





**Make sure our
critical tasks can't
be undermined
by a failed request.**



The .gov means it's official.

Federal government websites often end in .gov or .mil. Before sharing sensitive information, make sure you're on a federal government site.



The site is secure.

The **https://** ensures that you are connecting to the official website and that any information you provide is encrypted and transmitted securely.

Home » Travel » TSA PreCheck®

Travel

Security Screening



What Can I Bring?

Identification

Liquids Rule

Emerging Technology

REAL ID

Special Procedures



Disabilities & Medical Conditions

Military

Children

Seniors

TSA PreCheck®

Travel with ease with TSA PreCheck®

Experience a smoother screening process – no need to remove shoes, belts, 3-1-1 liquids, laptops, or light jackets.

Apply Now

Renew Now

Available to US citizens, nationals and LPRs.

 TSA uses unpredictable security measures, both seen and unseen, throughout the airport. All travelers will be screened, and no individual is guaranteed expedited screening.

 Read the latest information on COVID-19 impact to TSA Enrollment Services.

[What Can I Bring?](#) | [A - Z Index](#) | [Employees](#)

Enter your search terms



TRAVEL

MEDIA

ABOUT

CONTACT

Travel

Media

About

Security Scr

Media Roo

Strategy

Special Pro

Social Mec

Mission

TSA PreChe

Blog

Organization

Passenger S

Videos

History

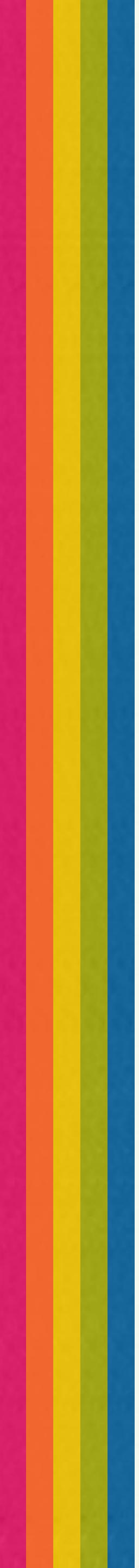
Travel Tips

Employee Stories

FAQ

Jobs at TSA





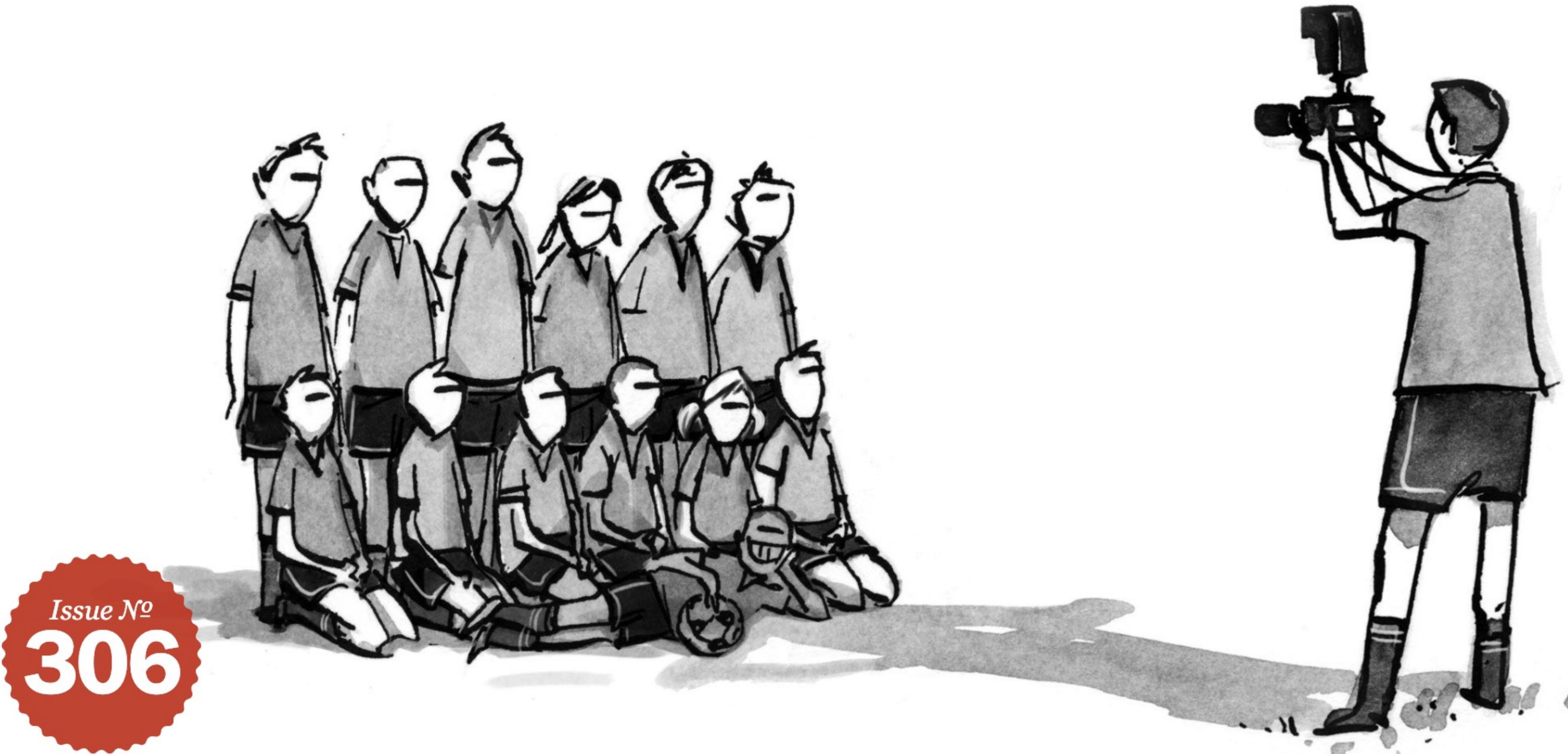
Keep designs open to interpretation.

[ARTICLES](#)[EVENTS](#)[TOPICS](#)[WRITE FOR US](#)[LANGUAGE \(ENGLISH\) ▾](#)

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Strategy. Choose from tracks
in content strategy, data
science and analytics, and
learning design.



Responsive Web Design



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A Dao of Web Design

by [John Allsopp](#) · April 07, 2000

Published in [Accessibility](#), [CSS](#), [Layout & Grids](#), [Typography & Web Fonts](#)

What Zen was to the 70's (most famously with motorcycle maintenance), the *Tao Te Ching* was to the 90's. From Piglet and Pooh to Physics and back, many have sought sense in applying the *Tao Te Ching* to something (the *Tao of Physics*), or something to the *Tao Te Ching* (the *Tao of Pooh*). It can be a cheap trick, but lately it has struck me that there is more than a little to be understood about web design by looking through the prism of the Tao.

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Daoism is a philosophy, like Buddhism, a way of living, of being in the world, which stems from a text of great antiquity, the *Tao Te Ching*, whose 81 "chapters" enigmatically sweep across human experience, but with a strong common theme, that of harmony.

For the last couple of years, for better or worse, my life has revolved more than a little around style sheets. I write software, tutorials, and guides for them; I've answered too

no comments yet

Share this:



Scale as necessary

```
h1 {  
  font-size: 3rem;  
}  
  
@media (min-width: 43em) {  
  ...  
}
```

Don't rely on color alone

Confirm

Cancel

Confirm

Cancel

Icons can aid differentiation

✓ Confirm

✗ Cancel

✓ Confirm

✗ Cancel

Ensure proper contrast

The screenshot shows a web-based tool for calculating contrast ratios. At the top, the words "contrast ratio" are displayed in a black and white checkerboard pattern. Below this, a green circular button contains the number "8.52". To the left of the button is the text "white" under the heading "Background:" and "hsla(200, 0%, 0%, .7)" under "Text color:". A "Swap colors" button is located to the right of the contrast value. The background of the tool is a black and white checkerboard pattern. On the left side of the main content area, there is explanatory text and a hint about keyboard navigation.

How to use

As you type, the contrast ratio indicated will update.
Hover over the circle to get more detailed information.

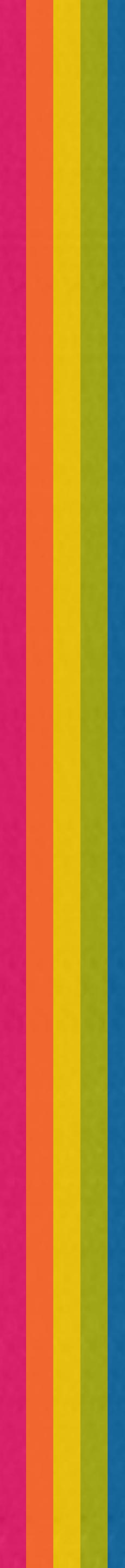
When semi-transparent colors are involved as backgrounds, the contrast ratio will have an error margin, to account for the different colors they may be over.

This sample text attempts to visually demonstrate how readable this color combination is, for normal or **bold** text of various sizes and font styles.

Hint: Press the up and down keyboard arrows while over a number inside a functional color notation. Watch it increment/decrement. Try with the Shift or Alt key too!

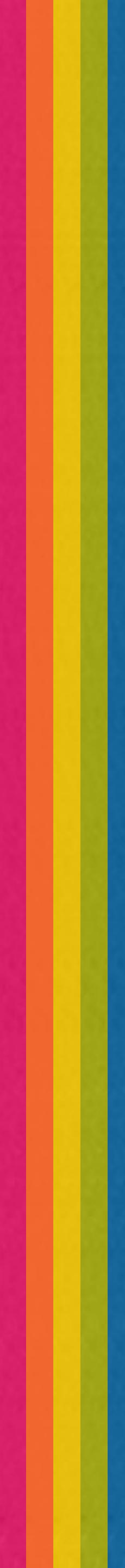
By Lea Verou • WCAG 2.0 on contrast ratio

contrast-ratio.com



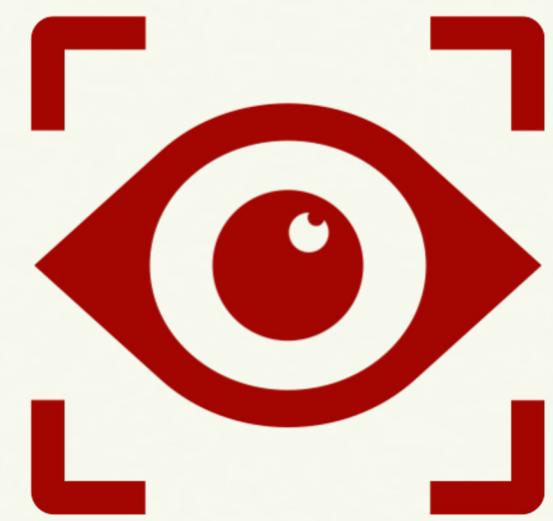
Step 6:

Think about the many different ways folks might interact

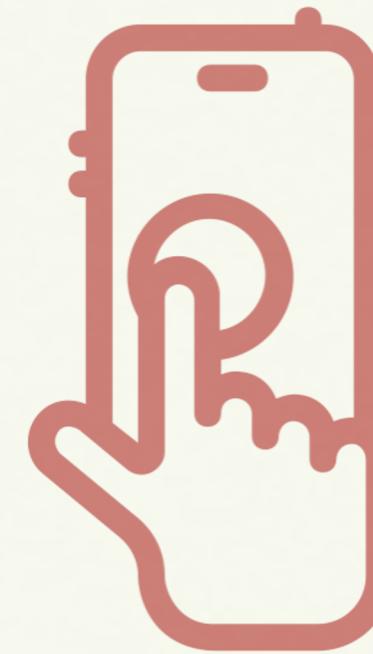


Consider which interaction methods apply in different scenarios

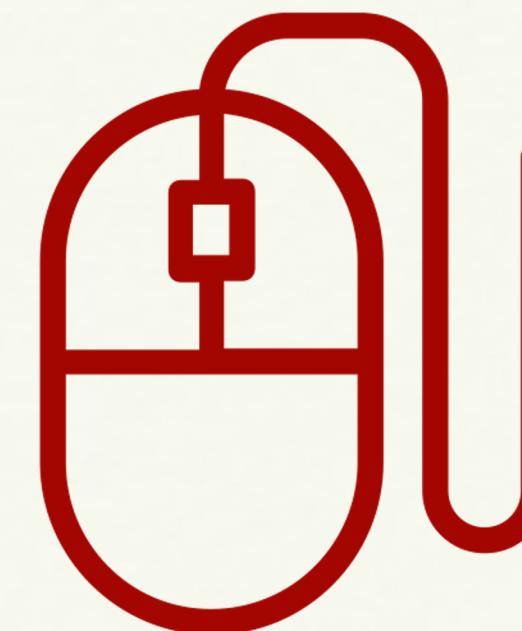
:hover?



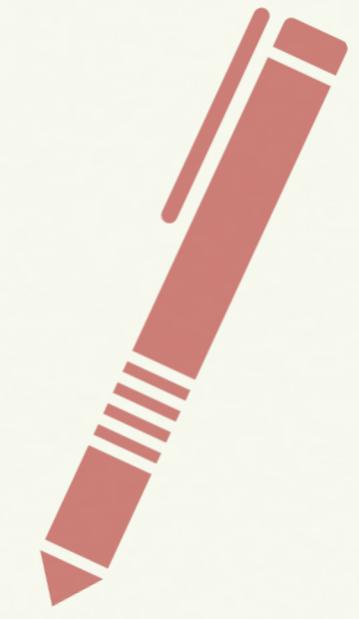
eye tracking



touch

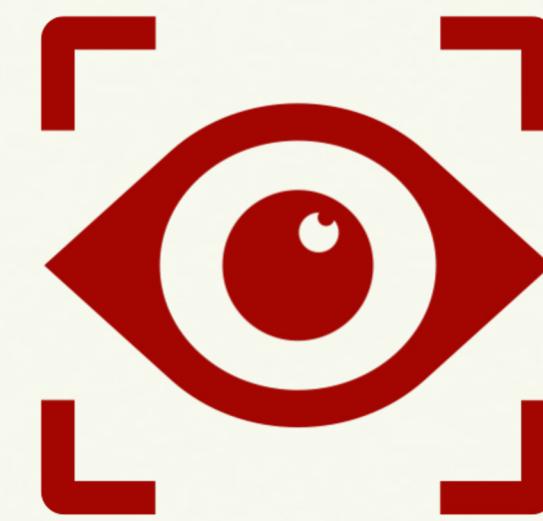


mouse

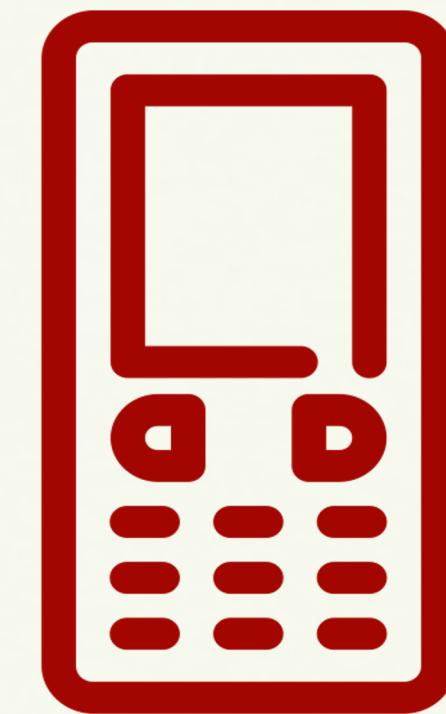


pen

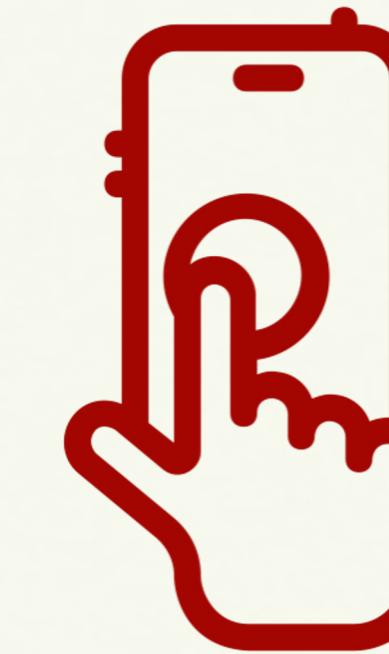
:focus and :target?



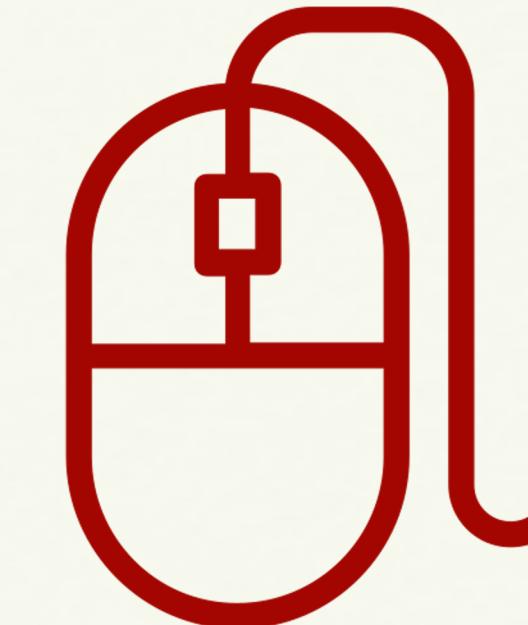
eye tracking



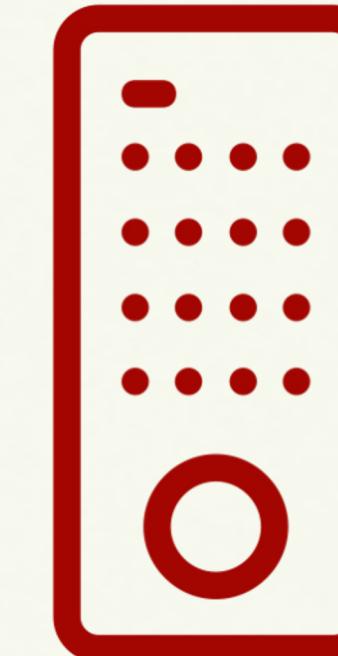
T9



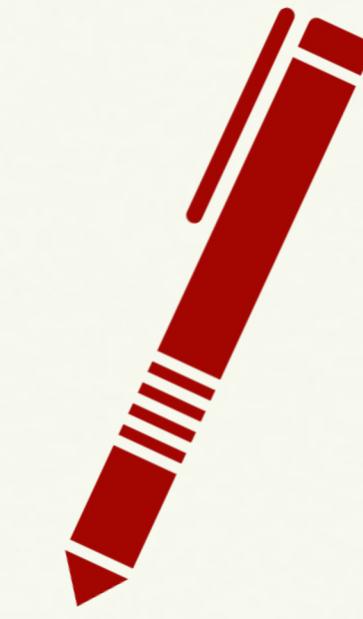
touch



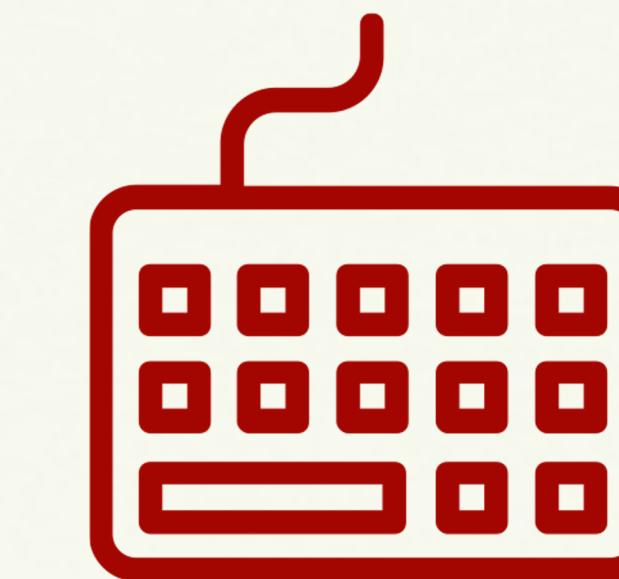
mouse



remote



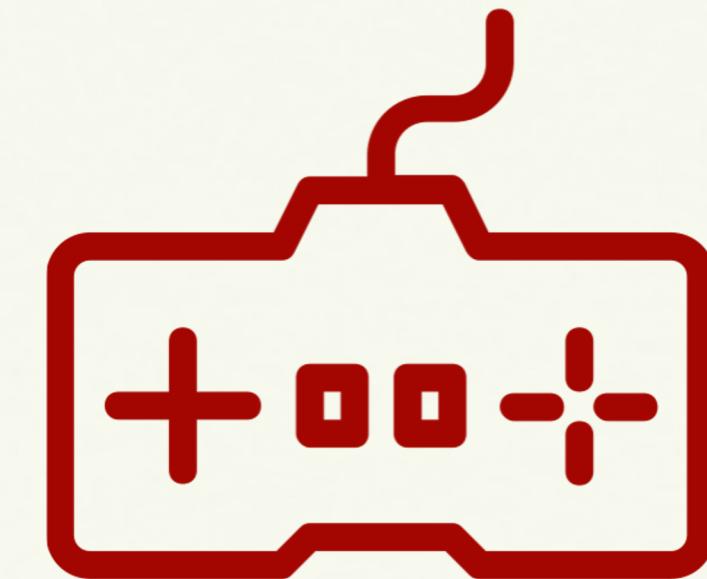
pen



keyboard

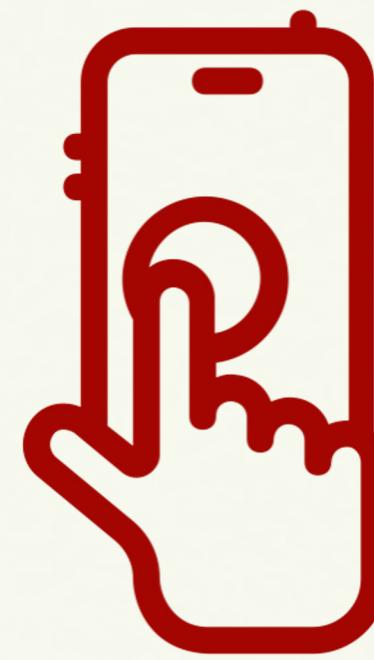


audio

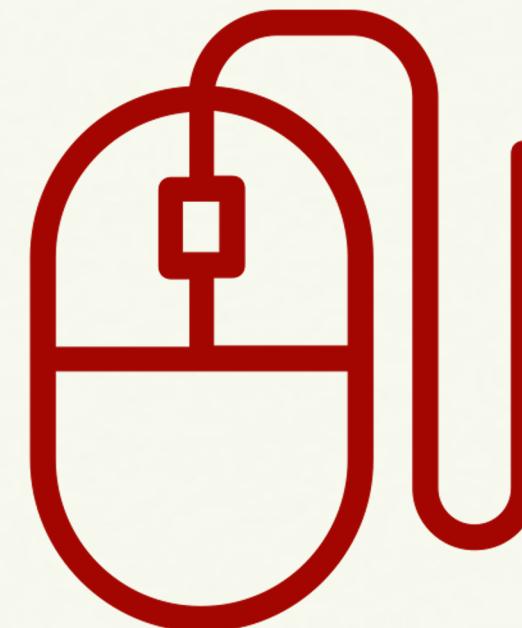


gamepad

Gestures?



touch

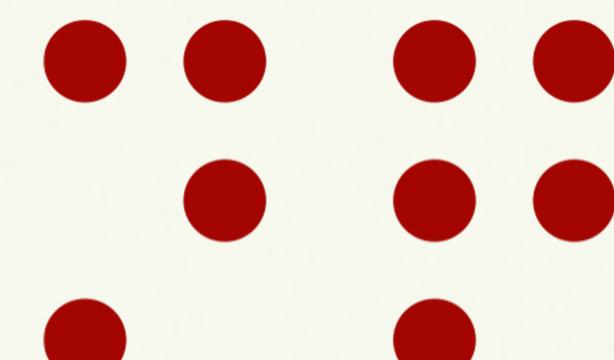


mouse

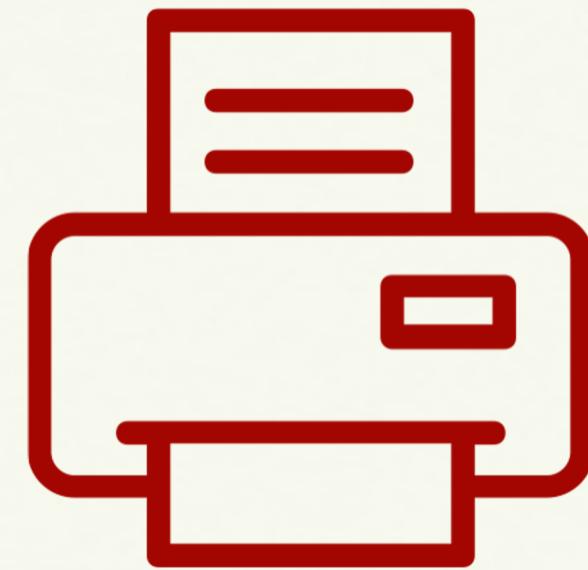


pen

Text expansions?



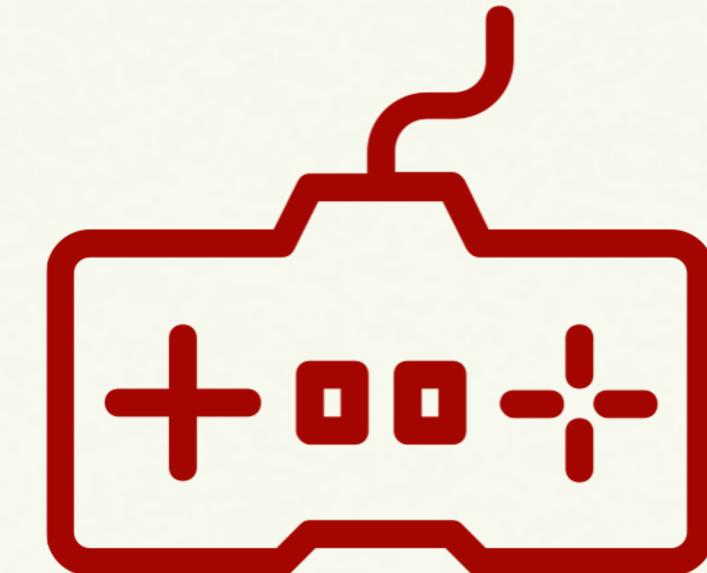
braille



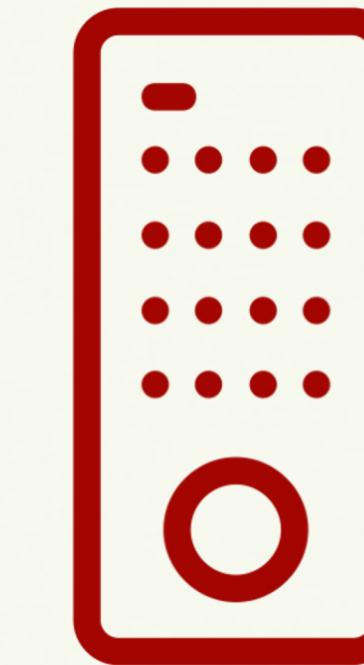
print



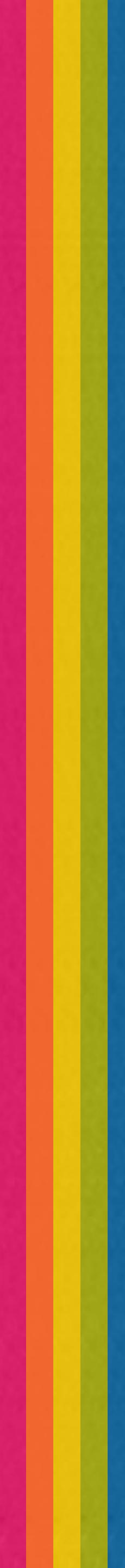
audio



gamepad

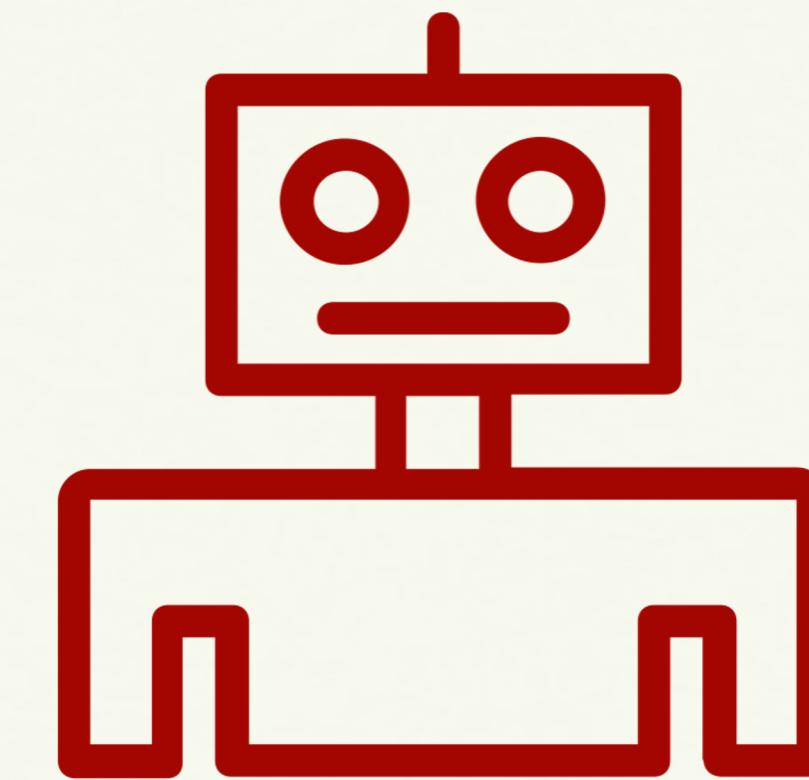
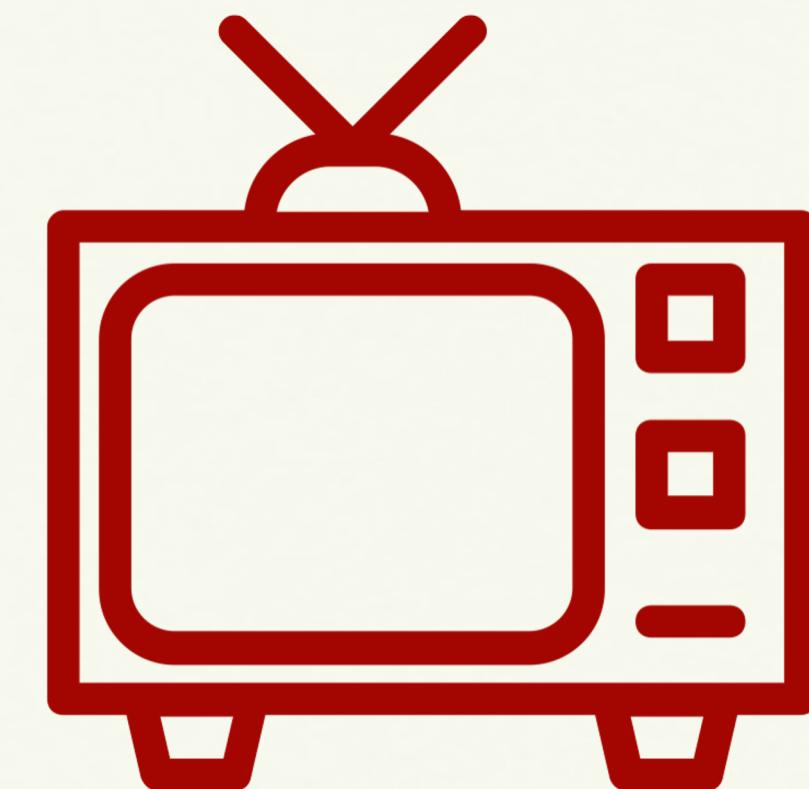
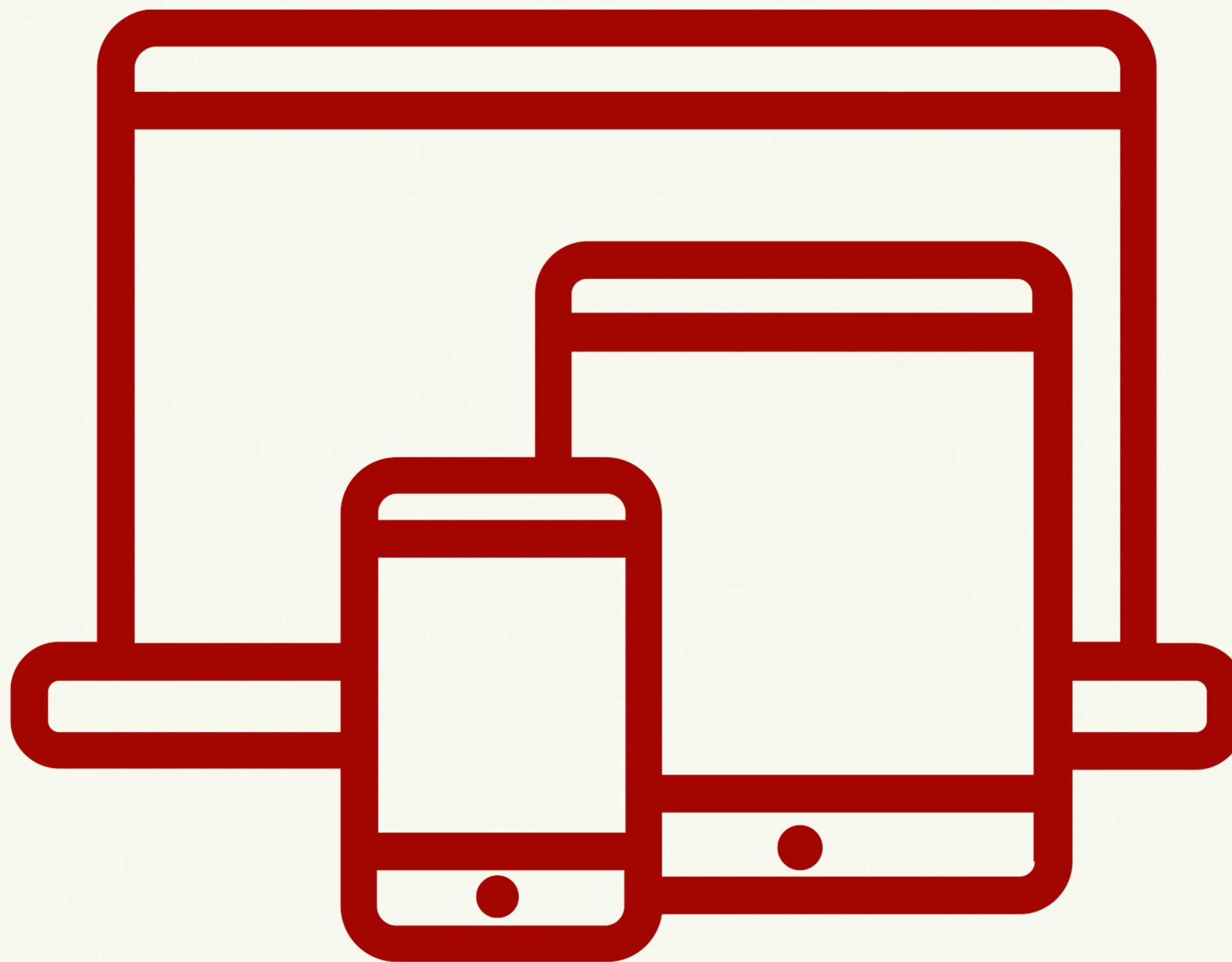


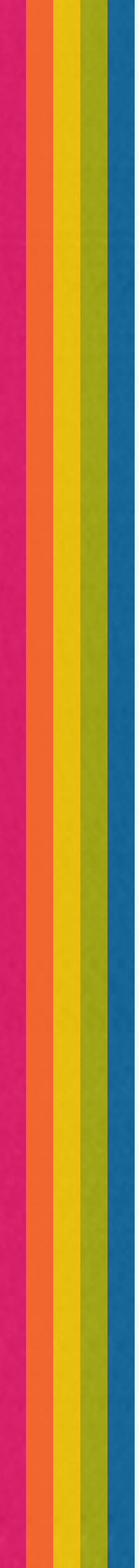
remote



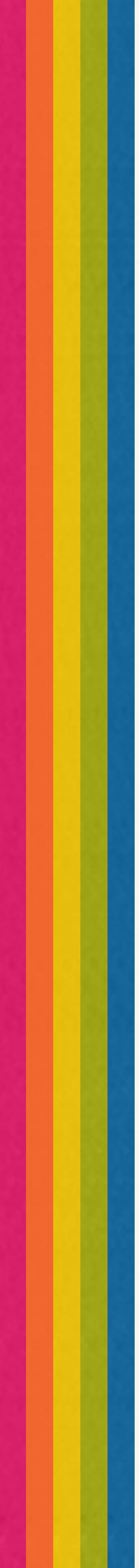
**Consider where
and how your
content might
be rendered**

Some UI constructs aren't universally usable



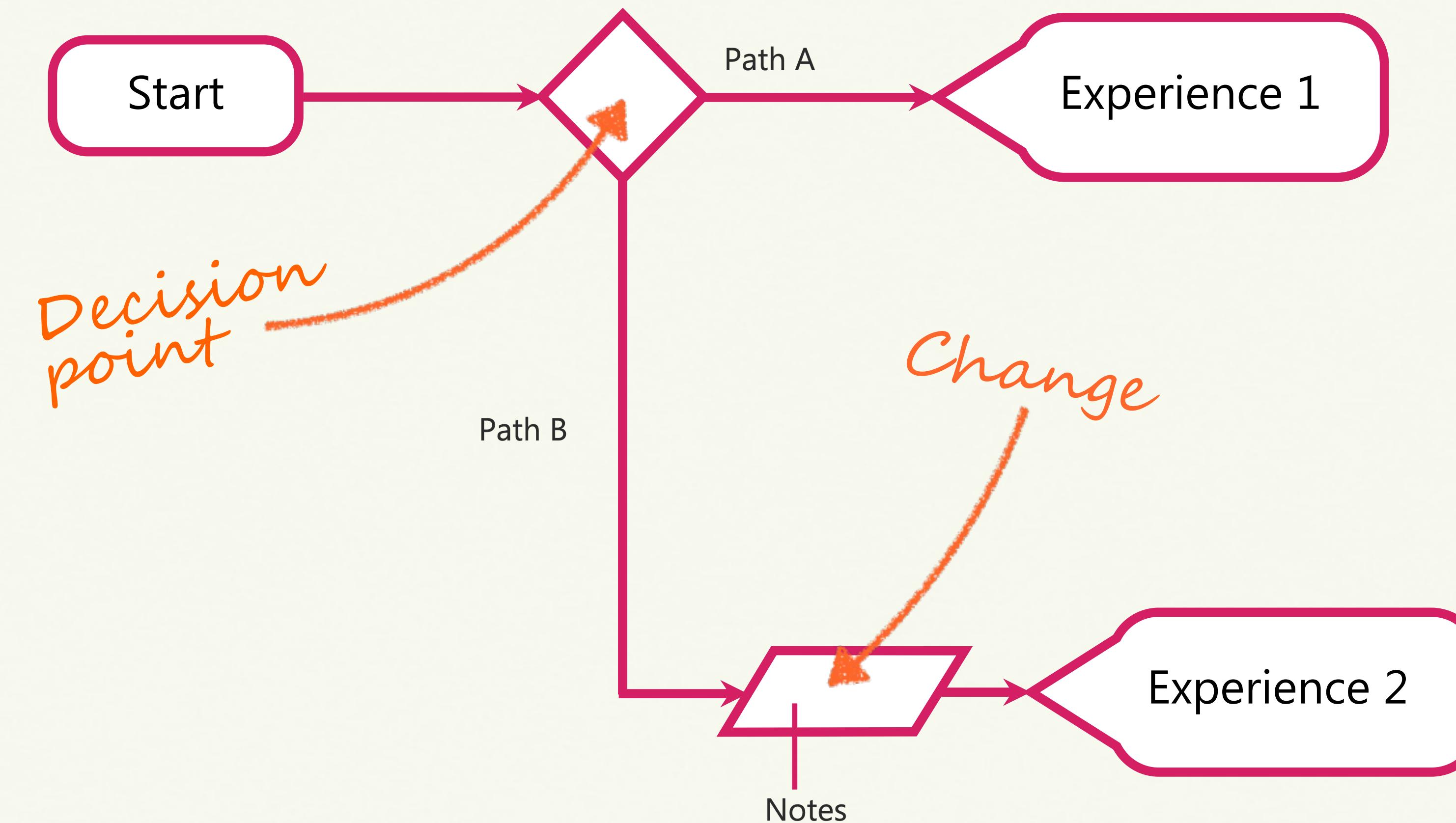


How might your answers change based on the a user's language?



Step 7: **Map the** **potential** **experiences**

Interface eXperience (IX) Mapping



IX Map Example: Optional Image

**Travel with
ease with TSA PreCheck®**

Experience a smoother screening process – no need to
remove shoes, belts, 3-1-1 liquids, laptops, or light jackets.

[Apply Now](#) [Renew Now](#)

Available to US citizens, nationals and LPRs.



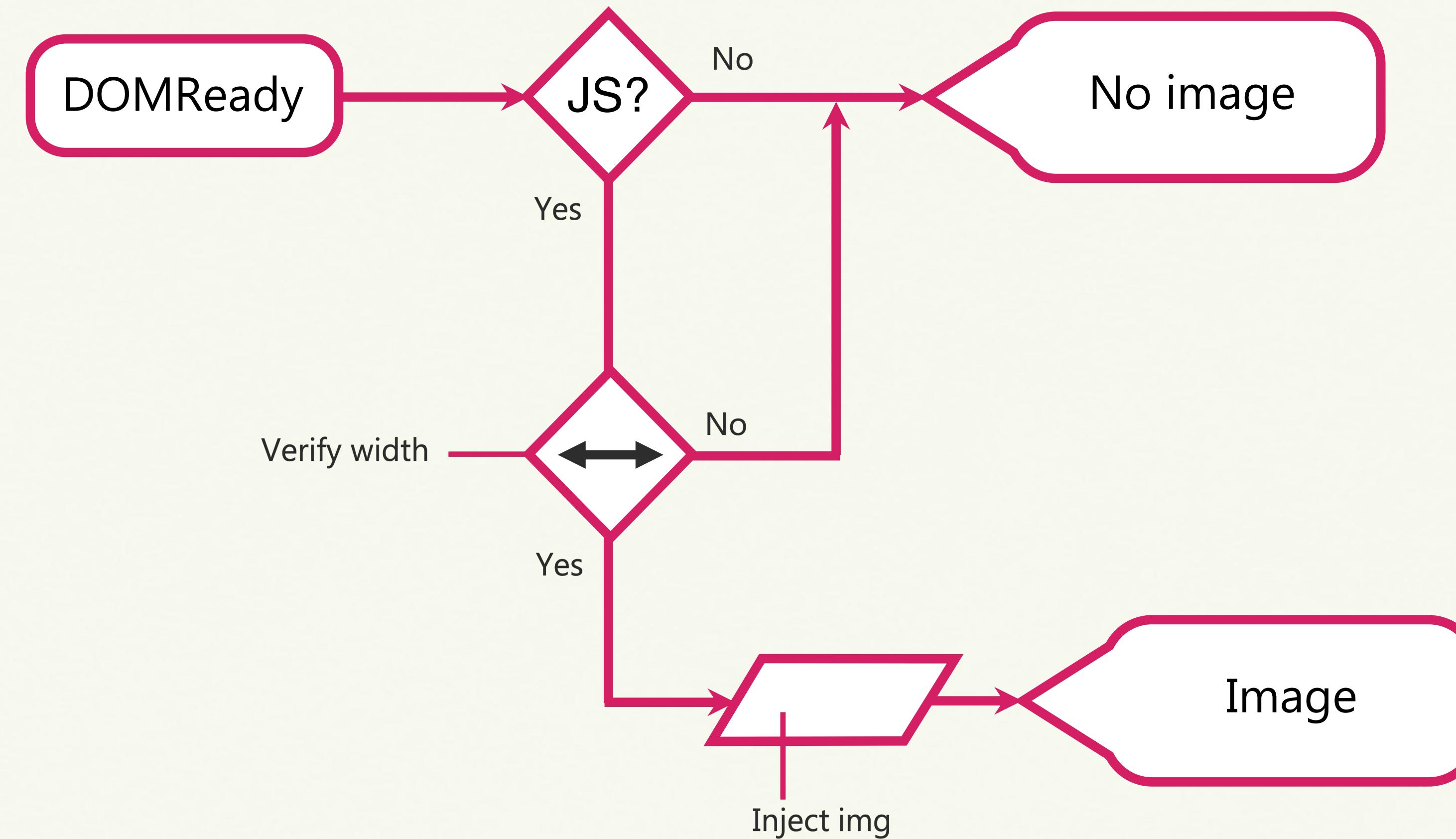
Requirements

- ◆ Image controlled by editorial
Should be in CMS/markup
- ◆ Image is not required to understand the surrounding content
Default should be no image
- ◆ Image is helpful for drawing the eye on larger screens
Load image on larger screens

Baseline experience, no JS



Baseline experience, with JS



Markup, default

```
<div class="entry-image"  
      data-image-src="/i/sample.jpg"></div>
```

Markup, enhanced

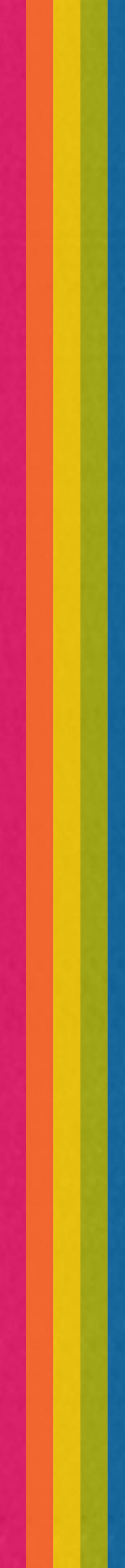
```
<div class="entry-image"  
      data-image-src="/i/sample.jpg"  
      data-has-image="true">  
    
</div>
```

CSS for each state

```
[data-image-src] {  
    display: none;  
}  
[data-image-src][data-image-loaded] {  
    display: block;  
}
```

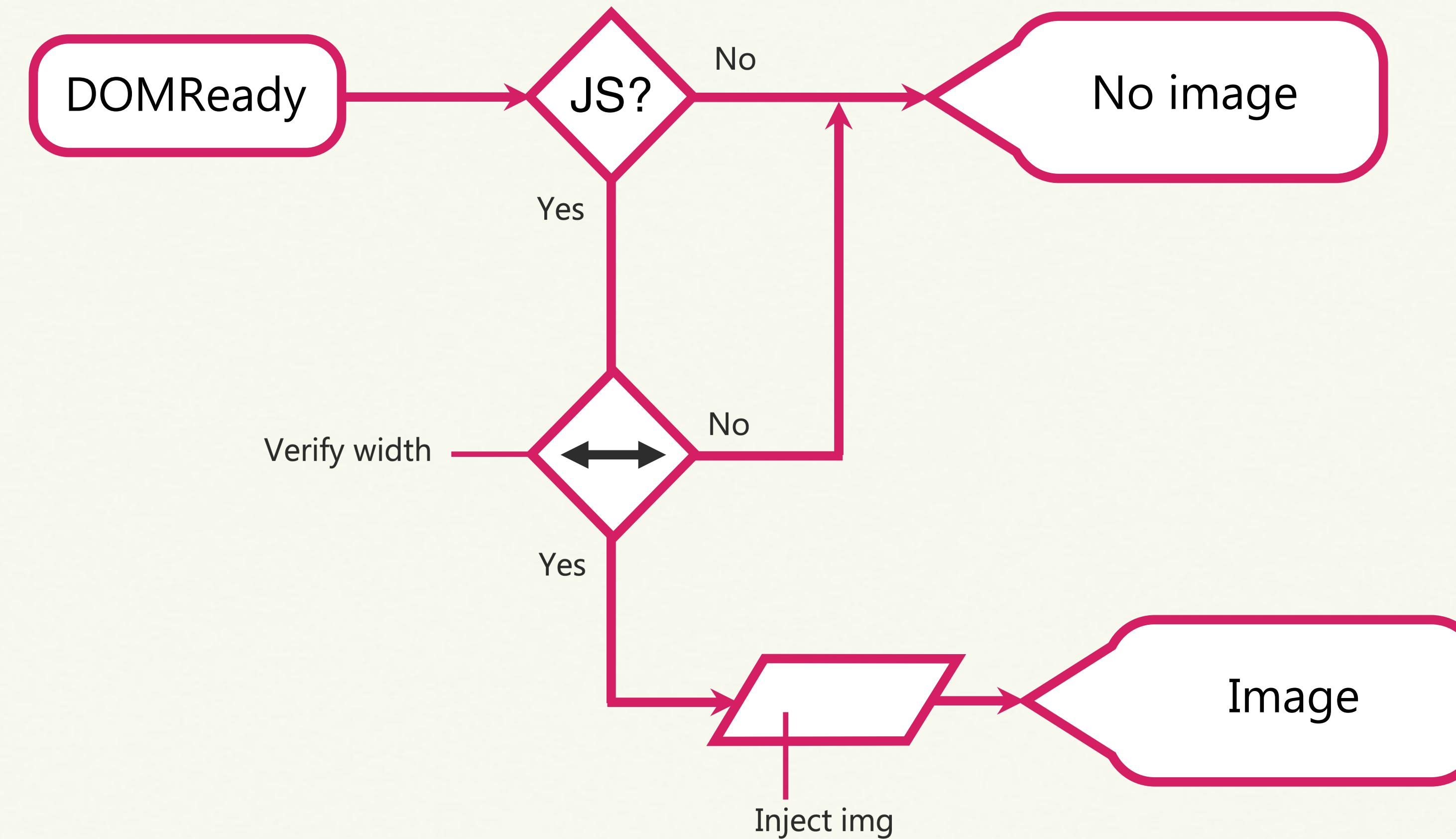
More modern (with caution)

```
[data-image-src] {  
    display: none;  
}  
[data-image-src]:has(img) {  
    display: block;  
}
```

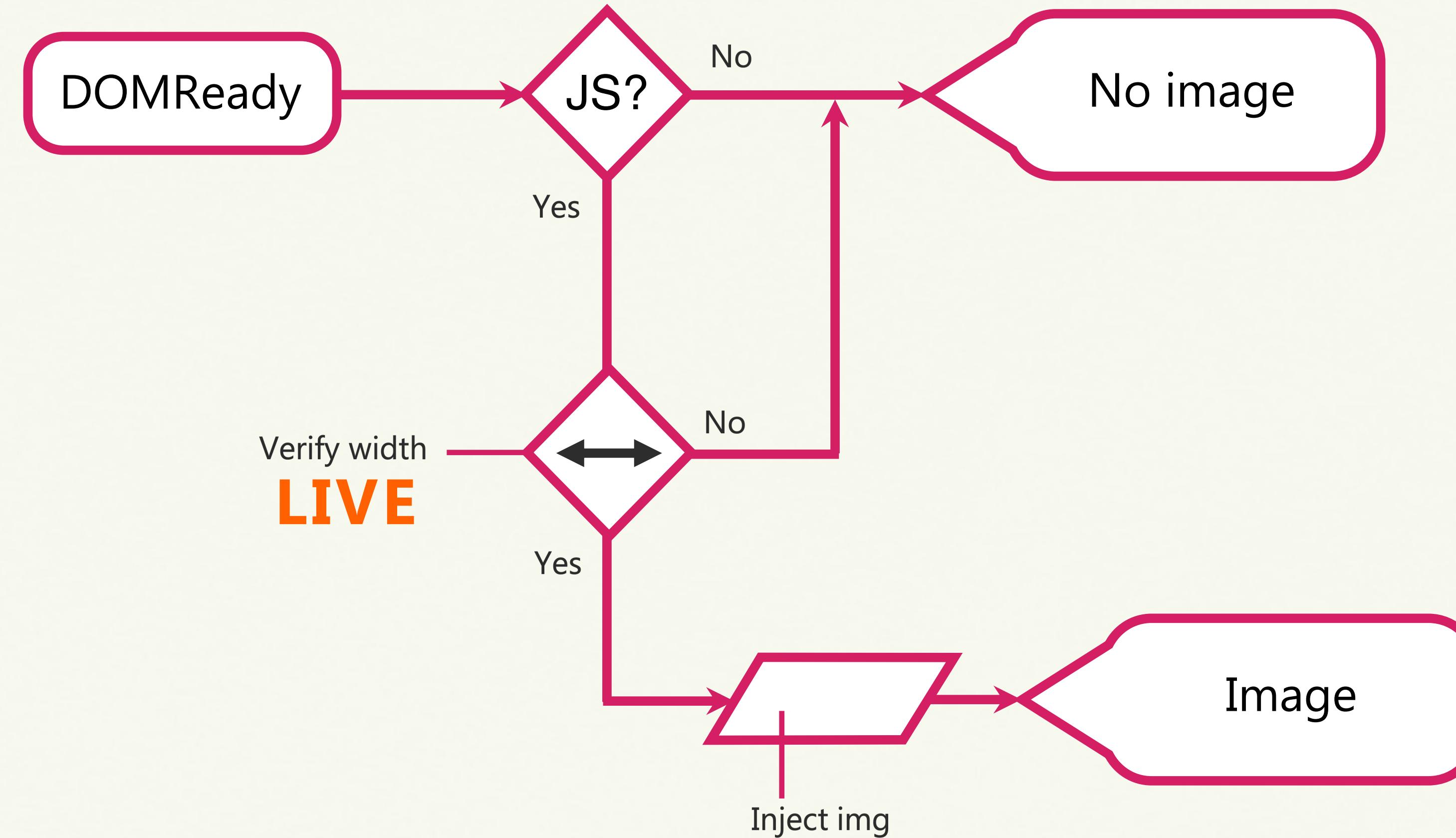


But what if a user shrinks the browser width?

Baseline experience

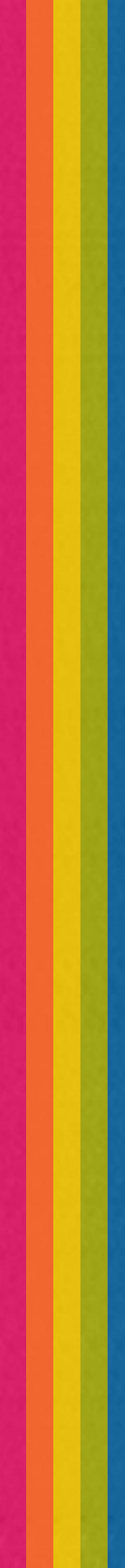


Enhance!



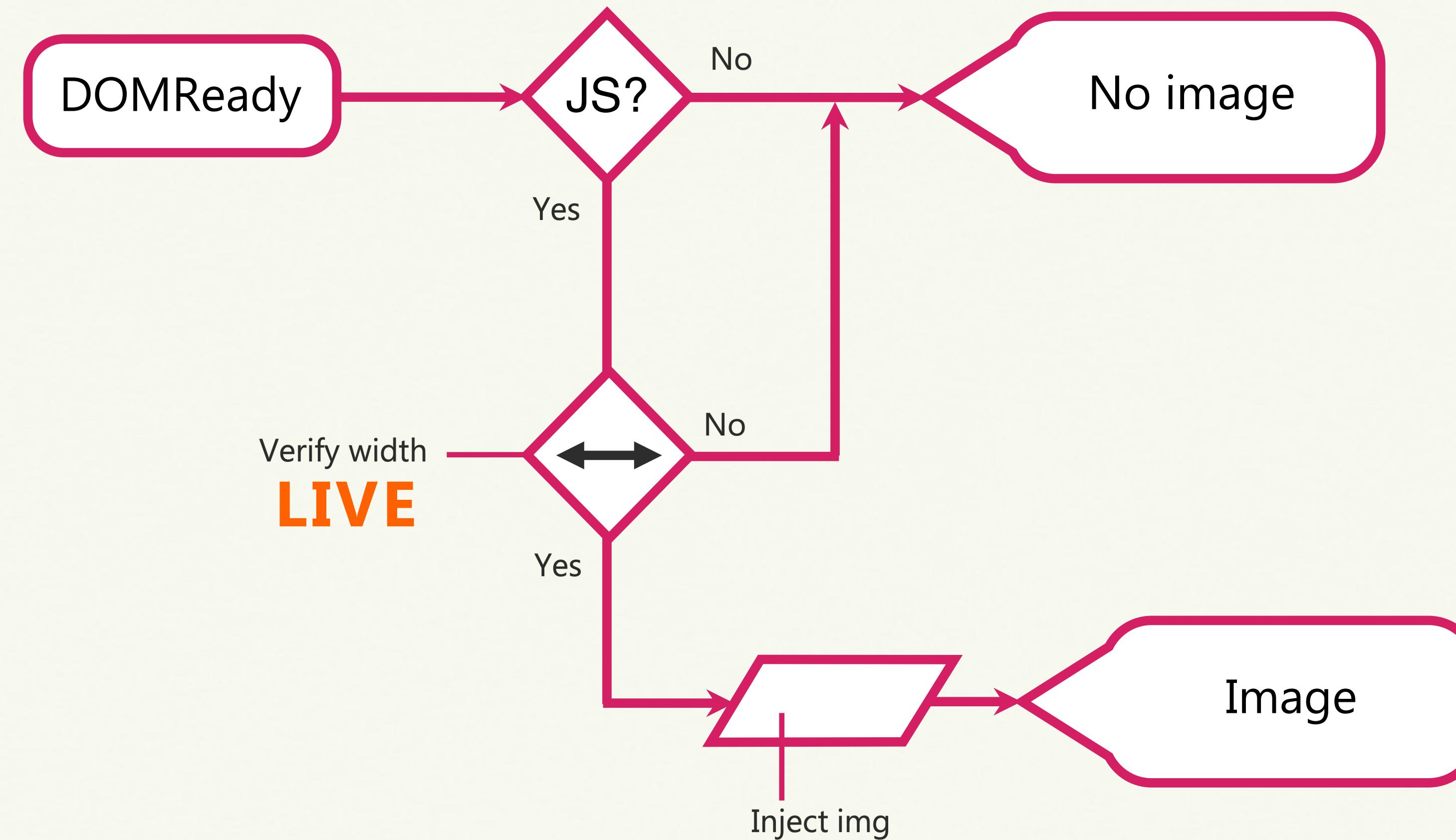
CSS for each state, enforced

```
[data-image-src] {  
    display: none;  
}  
@media (min-width: 48.75em) {  
    [data-img-src][data-image-loaded] {  
        display: block;  
    }  
}
```

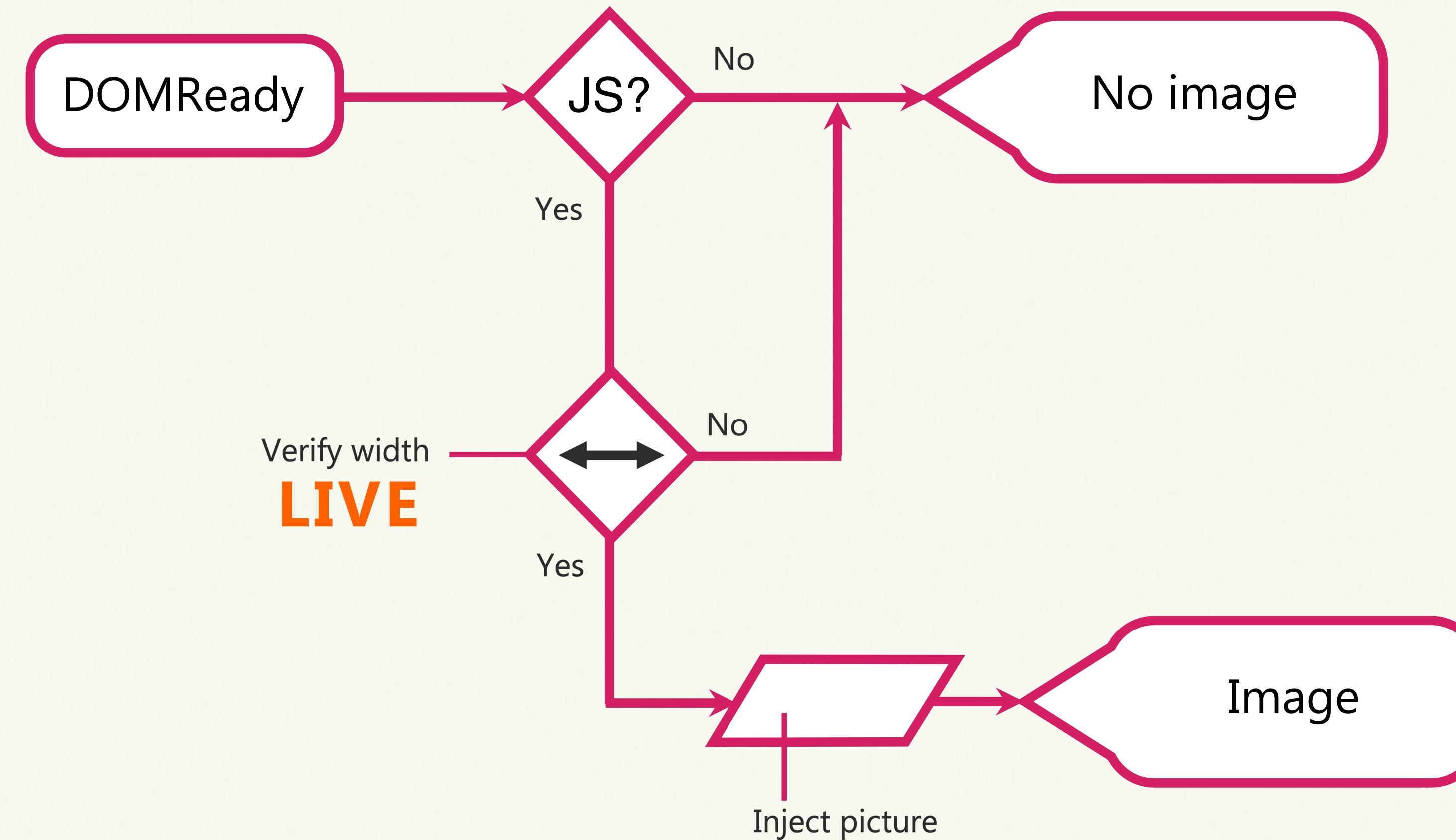


What if we want to serve the optimal image?

What we had



Enhanced again!

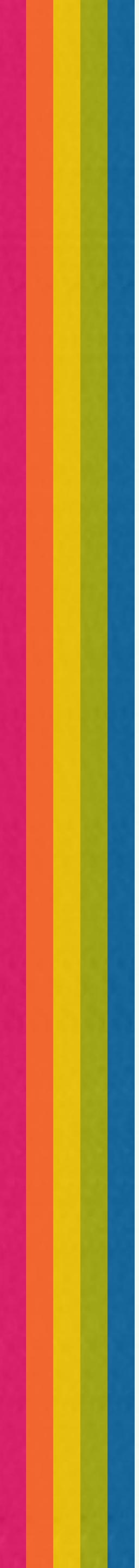


The original markup

```
<div class="entry-image"  
      data-image-src="/i/sample.jpg"></div>
```

Enhanced with alternate formats

```
<div class="entry-image"
    data-image-src="/i/sample.jpg"
    data-has-image="true">
<picture>
    <source type="image/webp" srcset="/i/sample.webp">
    
</picture>
</div>
```



**IX Maps document
all of the thinking
you've done in
prior steps**

IX Maps help

- ◆ Everyone get on (and stay on) the same page
- ◆ Designers to know what variations to design
- ◆ Developers to account for interaction differences
- ◆ Content authors to know what kinds of content are needed
- ◆ QA testers to know what to expect in different scenarios
- ◆ Transfer knowledge as new team members join

IX Maps can be

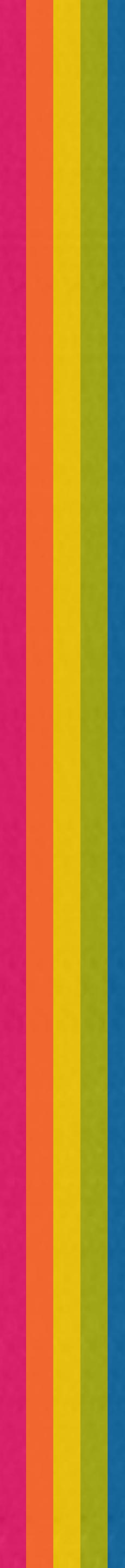
- ◆ Easily understood
- ◆ Drawn by anyone
- ◆ Created quickly
- ◆ Made in virtually any graphics software
- ◆ Created for every component type
- ◆ Updated easily as components evolve

Remember the process

- ◆ Focus on what matters.
- ◆ Write it out, then read it back.
- ◆ Support content with appropriate semantics.
- ◆ Use design to improve comprehension.
- ◆ Consider how your design choices impact the reading experience.
- ◆ Think about the many different ways folks might interact.
- ◆ Map the potential experiences.

Then iterate!

- ◆ Focus on what matters.
- ◆ Write it out, then read it back.
- ◆ Support content with appropriate semantics.
- ◆ Use design to improve comprehension.
- ◆ Consider how your design choices impact the reading experience.
- ◆ Think about the many different ways folks might interact.
- ◆ Map the potential experiences.
- ◆ **Iterate!**



**Let's rise to meet
our users with
what they need,
however they need it,
wherever they are**

Thank you!

@AaronGustafson

aaron-gustafson.com
noti.st/aarongustafson

Questions?

Or tweet me: **@AaronGustafson**