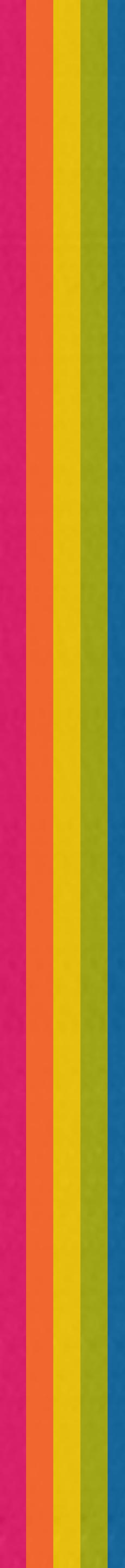


Delivering Critical Information & Services

Aaron Gustafson
@AaronGustafson

presented at JavaScript & Friends



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

“We ... declare our common desire and commitment to build a people-centred, inclusive ... Information Society, where everyone can create, access, utilize and share information and knowledge ... to achieve their full potential ... and [improve] their quality of life.

— World Summit on the Information Society

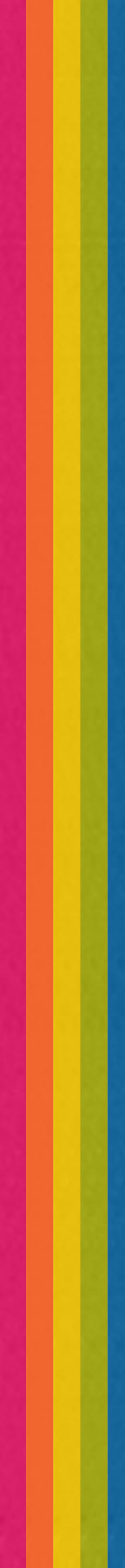
December 2003

perma.cc/WU9F-U54U



Given that the Internet has become an indispensable tool for realizing a range of human rights, combating inequality, and accelerating development and human progress, ensuring universal access to the Internet should be a priority for all states.

— United Nations Human Rights Council
May 2011
perma.cc/MD4K-CK6A



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

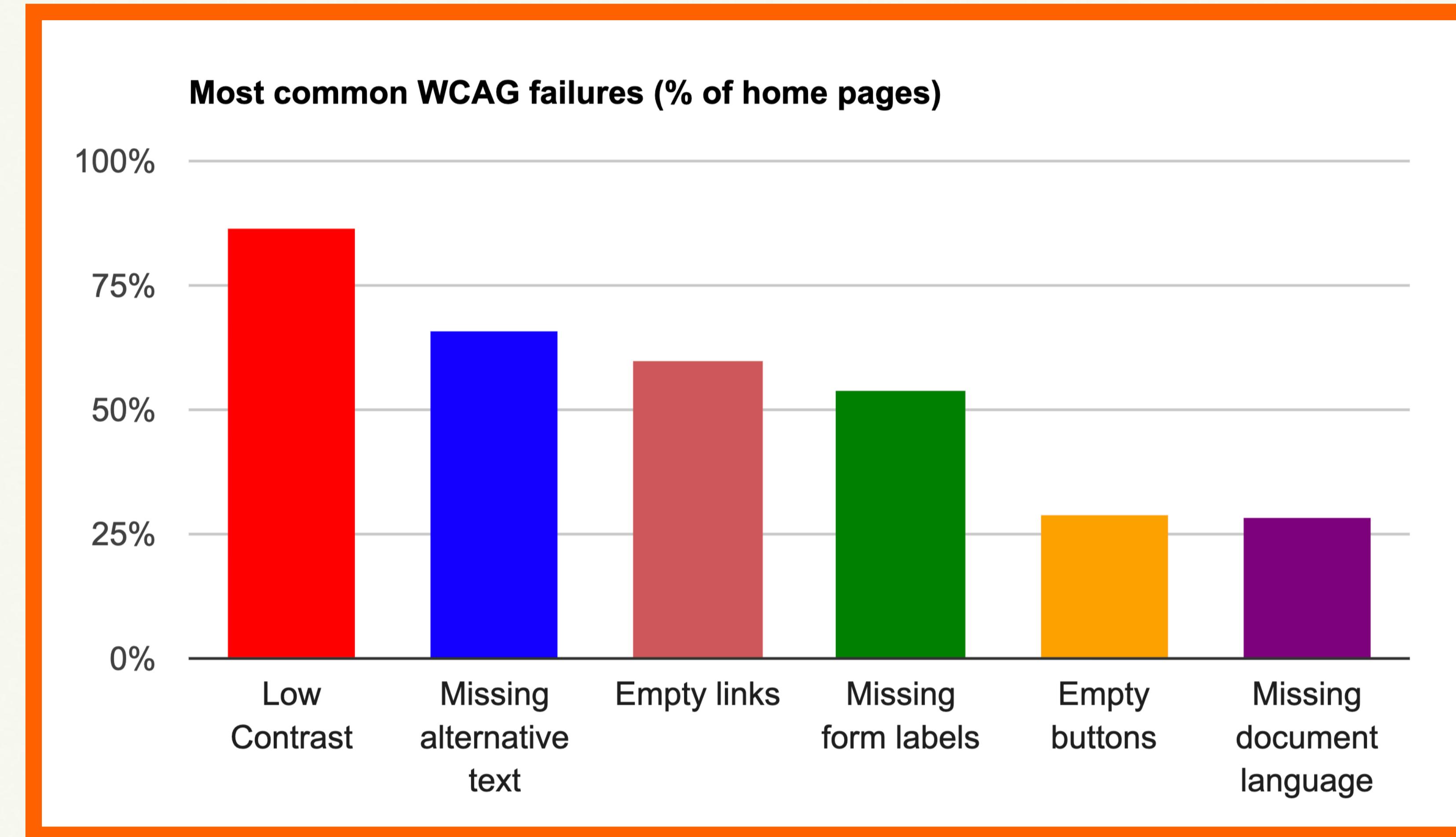


Where are we going wrong?

“98.1% of home pages had detectable WCAG 2 failures! This was up from 97.8% in February 2019.

— The WebAIM Million
March 2020
perma.cc/V89U-73DP

The most common culprits?



perma.cc/V89U-73DP

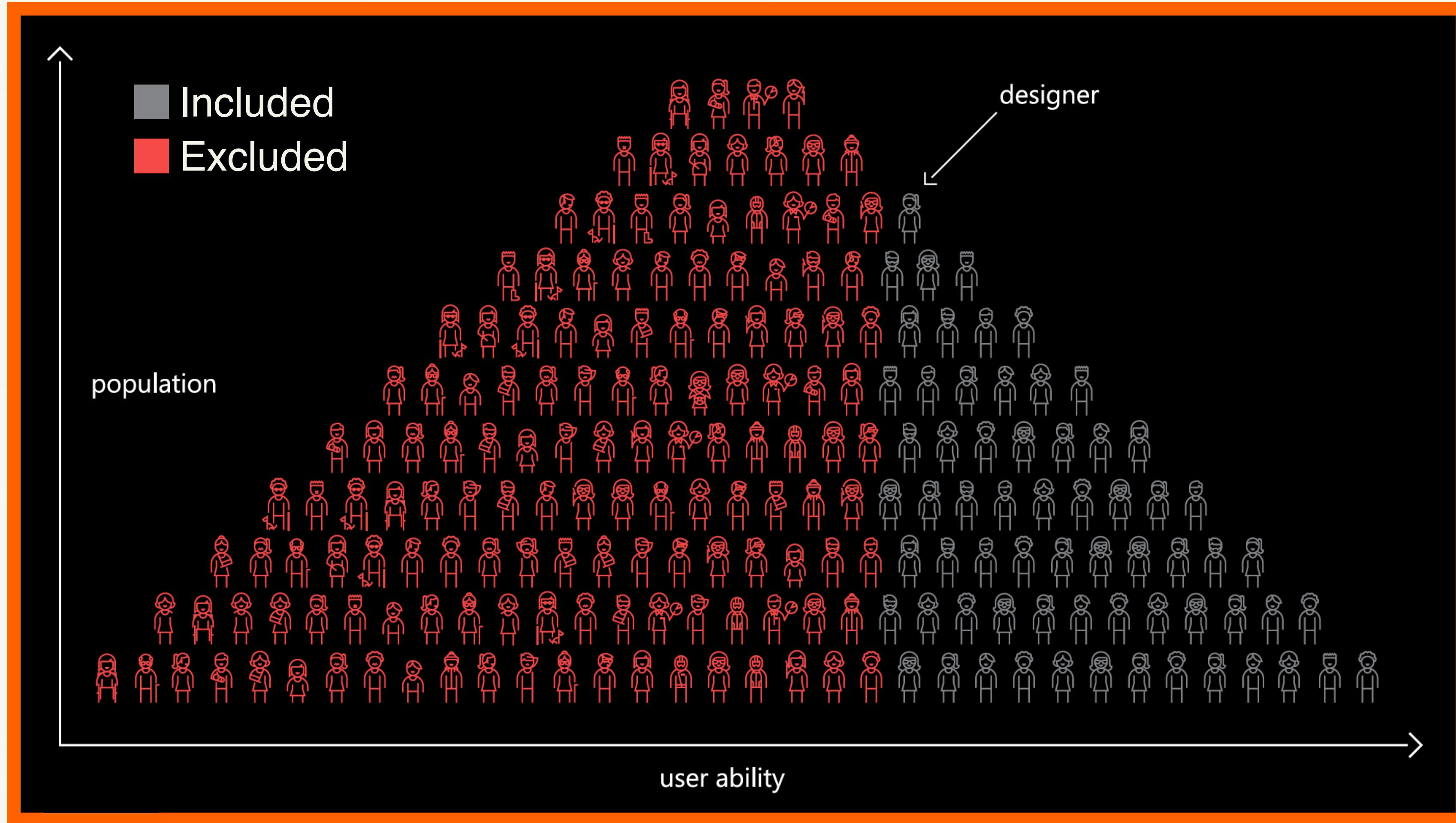
“Even the most physically-based disability is impairing only to the extent that the culture allows it to be.

— 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

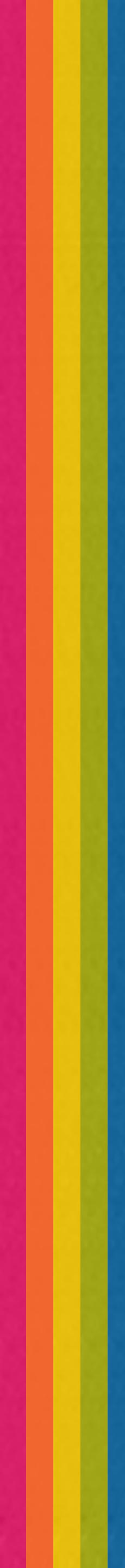
“Exclusion happens when we solve problems using our own biases.

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

The ripple effect



perma.cc/JKF6-8FQH



Where are we going wrong?

- ◆ We are failing when it comes to **accessibility**

The “Digital Divide”

Technology

Device · Capabilities · Condition

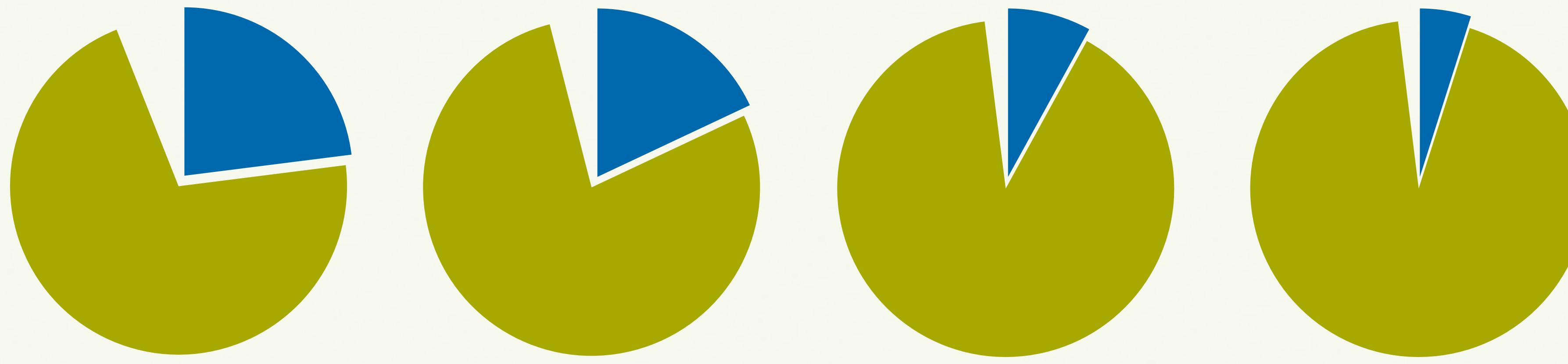
Access

Availability · Quality · Affordability



U.S. Smartphone penetration

February 2019



< \$30k
71%

\$30-50k
78%

\$50-75k
90%

>\$75k
95%

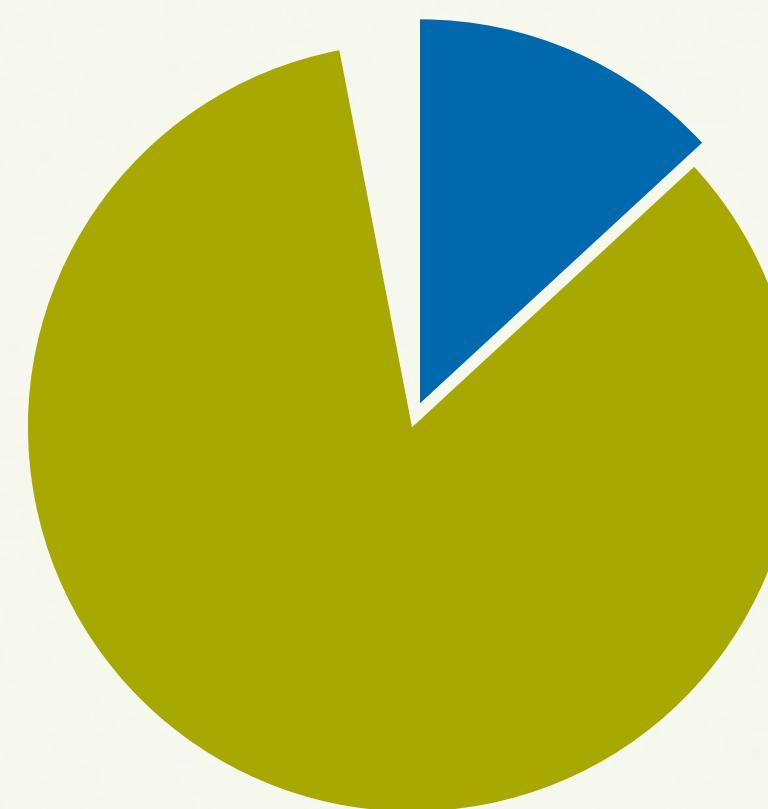
49.55% of the population

perma.cc/3X2K-BTS9

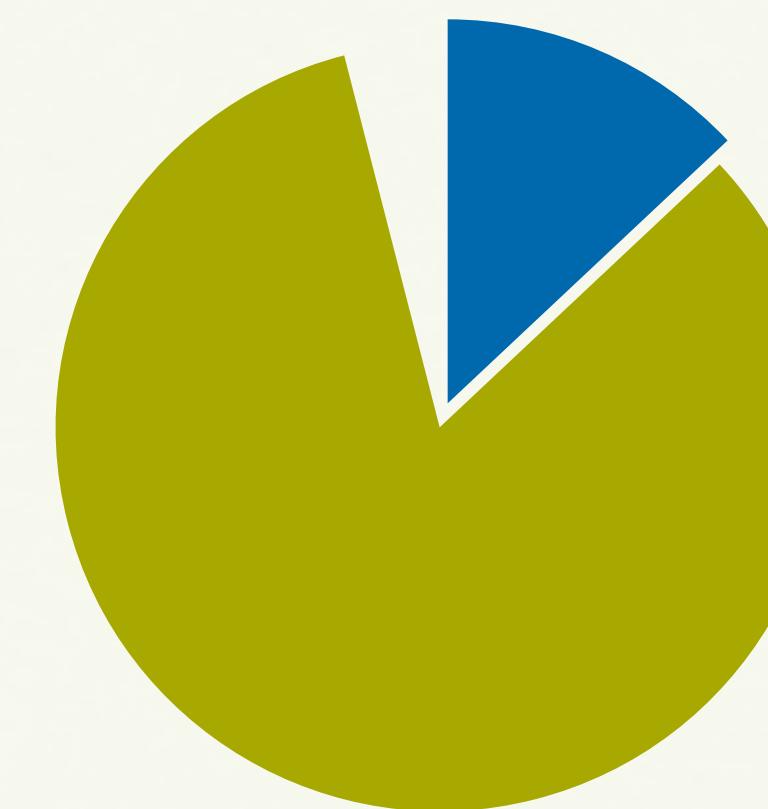
■ Smartphone
■ Feature phone

U.S. Smartphone penetration

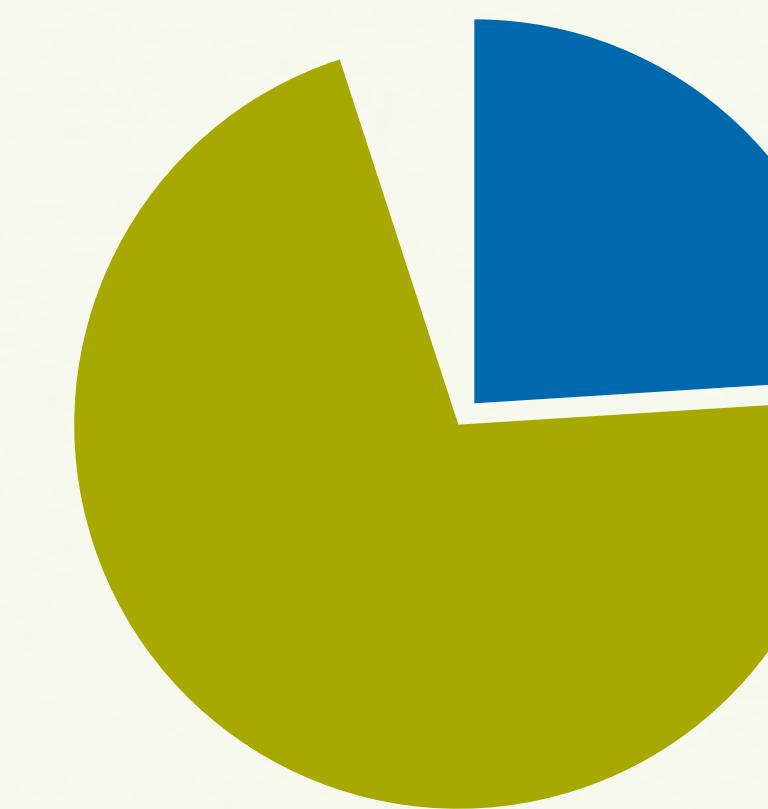
February 2019



Urban
83%



Suburban
83%

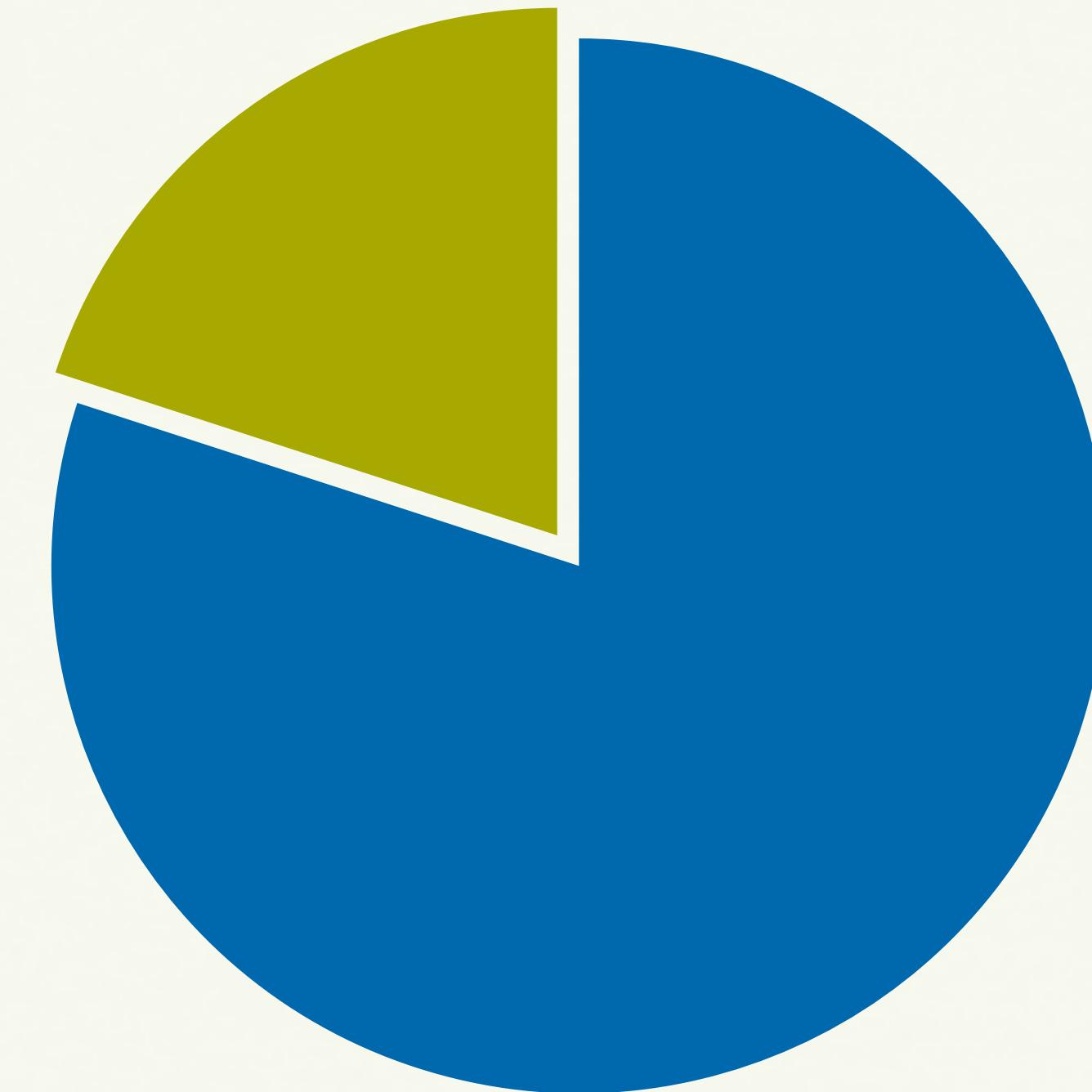


Rural
71%

perma.cc/3X2K-BTS9

- Smartphone
- Feature phone

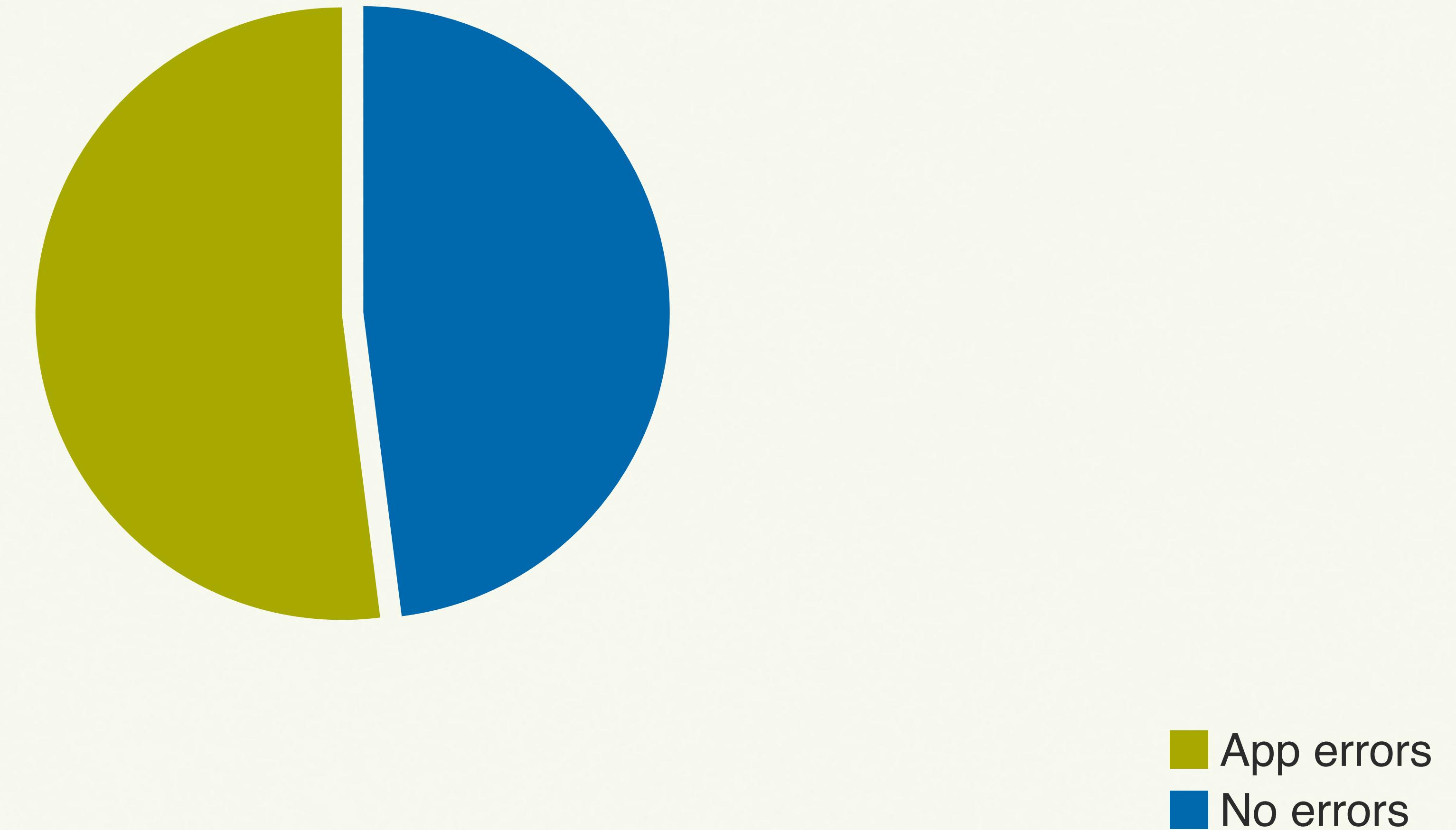
One in 5 U.S. adults is a smartphone-only Internet user.



■ Smartphone
■ Other

perma.cc/3X2K-BTS9

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



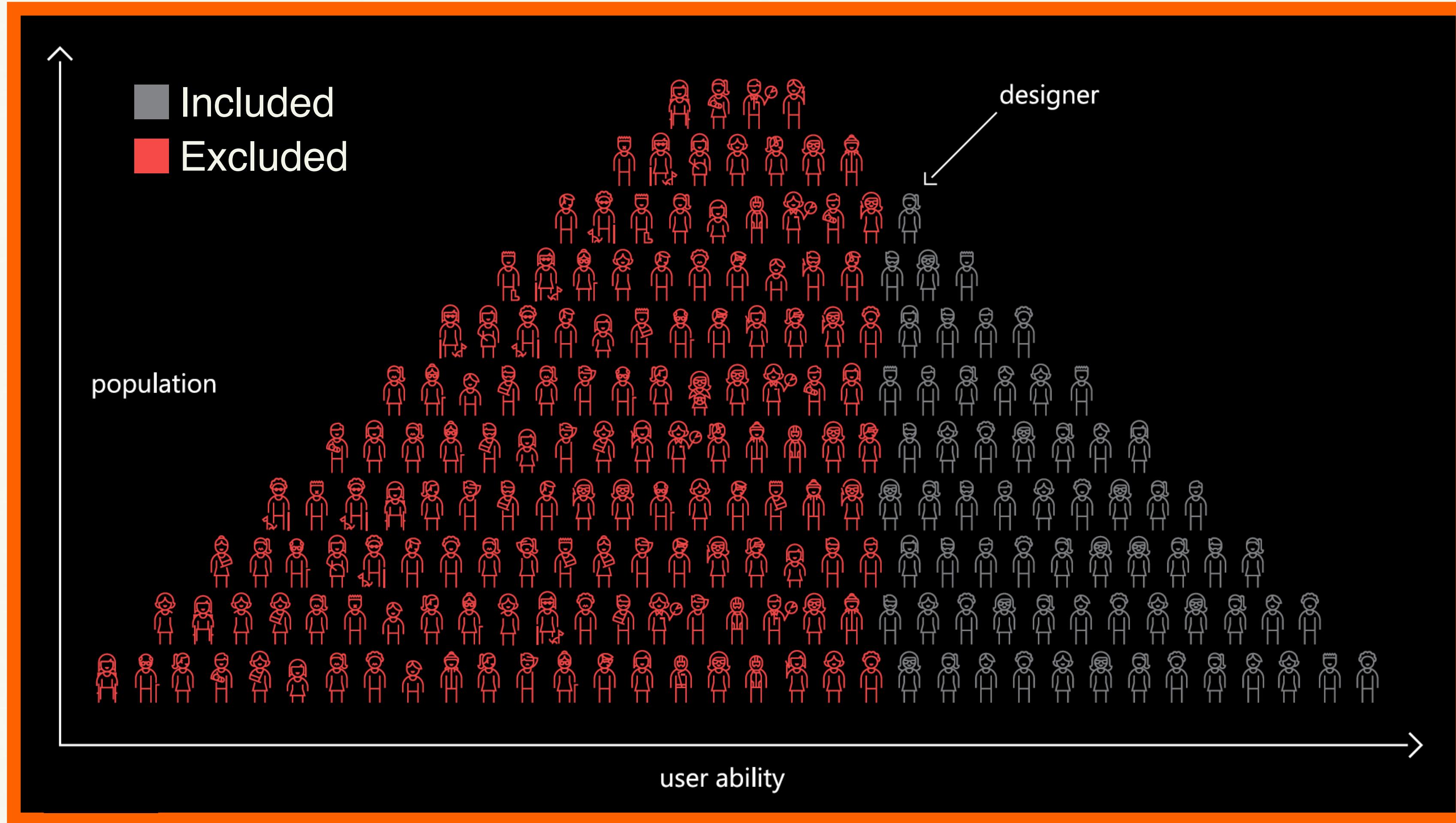
Fantasy



Reality



Disabilities are designed



perma.cc/JKF6-8FQH

The “Digital Divide”

Digital Literacy
Hardware · Software · Internet

Technology
Device · Capabilities · Condition

Access
Availability · Quality · Affordability

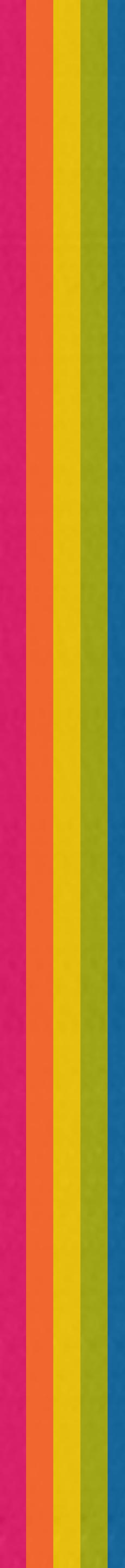


Digital Redlining

- ◆ Exclusion based on geography
- ◆ Exclusion based on opaque algorithms
- ◆ Exclusion based on personal traits or tendencies

Where are we going wrong?

- ◆ We are failing when it comes to **accessibility**
- ◆ We are failing when it comes to **managing access (or lack thereof) to the Internet**
- ◆ We are failing when it comes to **supporting broad categories of devices**
- ◆ We are failing when it comes to **recognizing that we are not our customers**



Crises have a way
of turning these
divisions into chasms.

I attempted to reach the ... website on my mobile browser to report the outage. I refreshed the page multiple times while my phone said I had data coverage and was on the network (one, maybe two bars at times), but the ... page came up as offline. I finally managed to get the page to load to report the outage after about 5 minutes.

— Stephanie Stimac

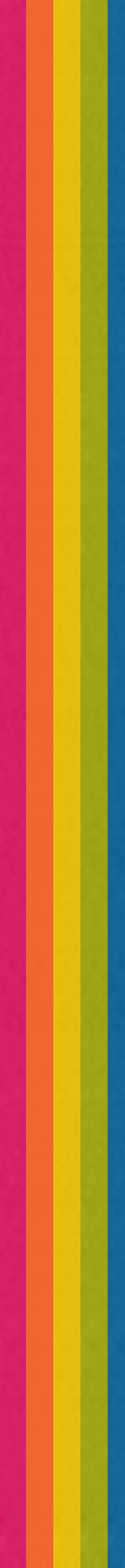
Location, Privilege and Performant Websites

perma.cc/5MBX-9GGD

“ Between 800 and 8,500 people lost their lives due to the damage and lack of basic services—including telecommunications—in the weeks and months following Hurricane Maria.

— Nick Thieme

After Hurricane Maria, Puerto Rico’s Internet Problems Go from Bad to Worse
perma.cc/E352-8BC7



What happens when the world grinds to a halt?

“ [I]n Kuala Lumpur, people are enjoying high-speed Internet up to 800Mbps per second. At the same time, in Sarawak (East Malaysia) speed is much slower [1Mbps up to 4Mbps], [while] some areas in the state do not have any access to Internet service.

— Nuurrianti Jalli

Lack of internet access in Southeast Asia poses challenges for students to study online amid COVID-19 pandemic

perma.cc/D43V-28AS

In Phoenix, three high school students were found huddled under a blanket outside a closed elementary school, the president of the city's school board said. They couldn't connect to the internet from home, so they camped out to access the school's Wi-Fi to do their homework.

— Erin Mansfield and Shelly Conlon

Coronavirus for kids without internet: Quarantined worksheets, learning in parking lots
perma.cc/4ZA4-RUKK

“The OECD average percentage of computer illiterate people hovers around 25%, meaning that a quarter of the population will have major trouble in accessing E-Learning as an educational method.

— Sander Tamm
Disadvantages of E-Learning
perma.cc/TVN3-9DKS

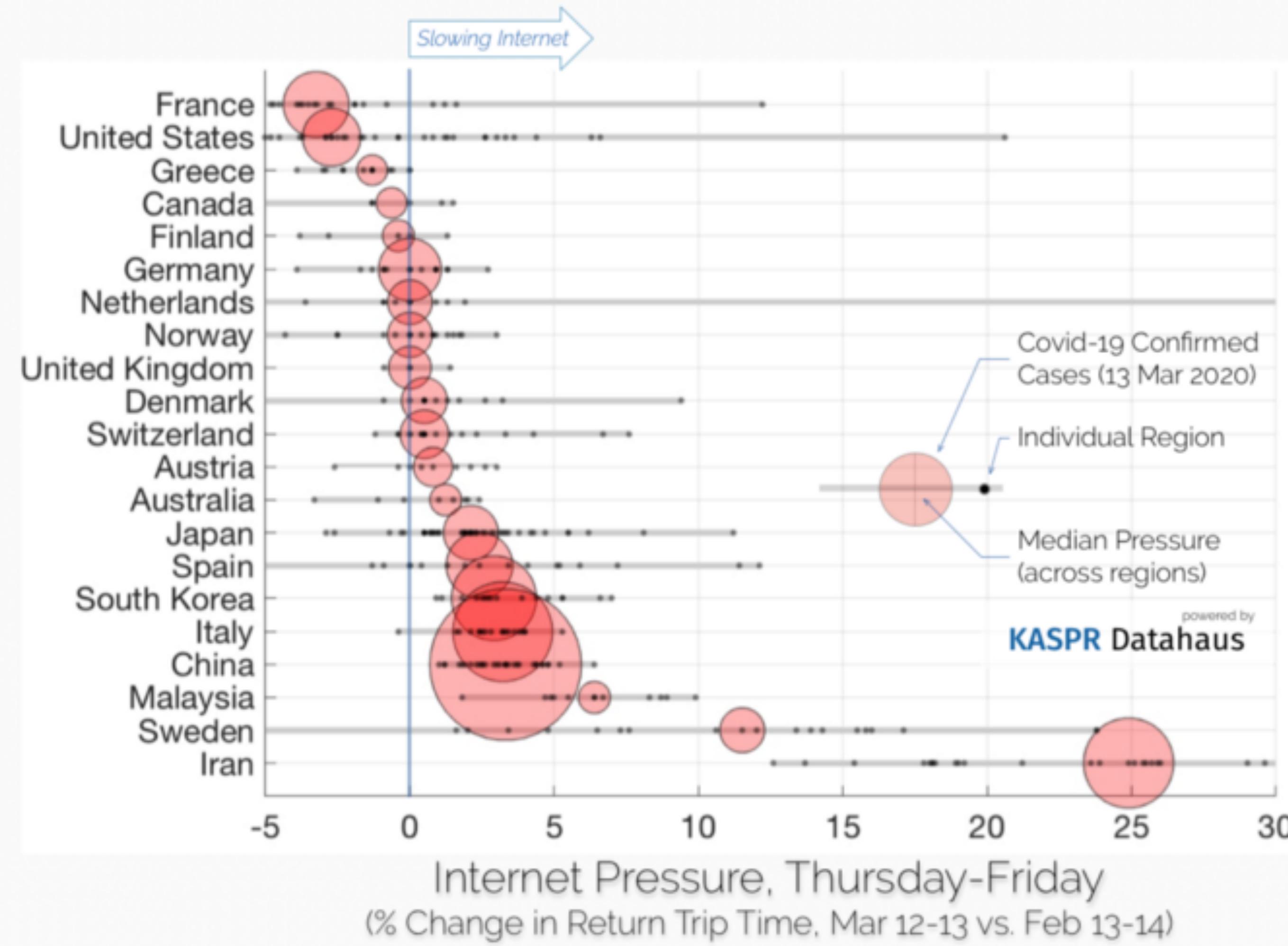
In Humboldt County, average download speeds fell 8.67% and average upload speeds fell 11.99% from March 9 to March 29, according to internet speed testing company Ookla.

— Sonia Waraich

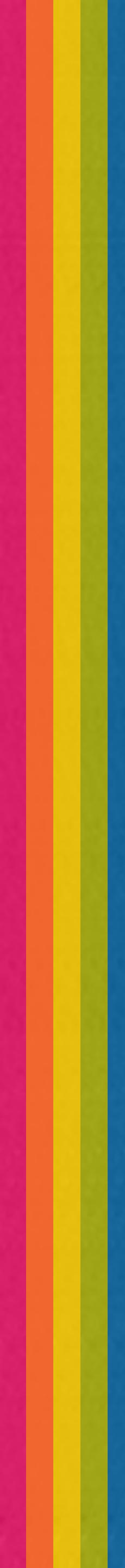
COVID-19: Internet speeds slow as more people work from home
perma.cc/KZ5R-FE5G

Internet Pressure in Major COVID-19 Countries

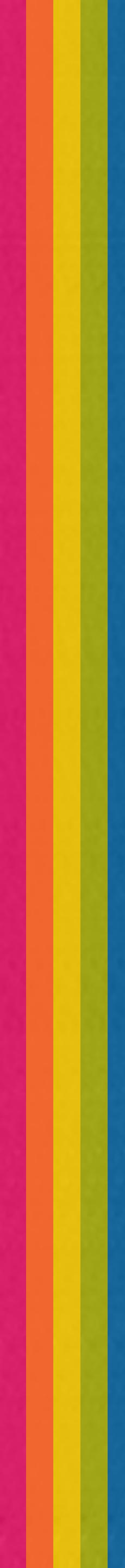
The impact of COVID-19 with **KASPR Datahaus** sub-national products



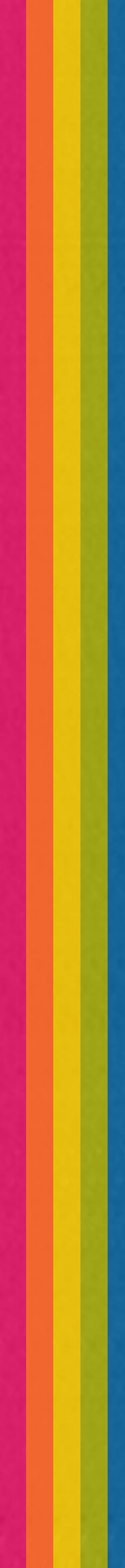
perma.cc/HQK2-F6TA



eLearning software
and courses often
fail to deliver
materials accessibly.



**If what we build
is important,
let's treat it
that way.**



Crises are inevitable, but we can rise to meet the moment.

- ◆ Plan for network issues
- ◆ Empower our customers, neighbors, constituents...
- ◆ Eliminate waste
- ◆ Reduce complexity

Plan for network issues

- ◆ Rely on small, static files
- ◆ Make fewer requests
- ◆ Leverage defaults
- ◆ Use a Service Worker



**Smaller files
with less processing
overhead are faster.**

Small, static files...

- ◆ Download more quickly (over HTTP/1.1, HTTP/2, or HTTP/3)
- ◆ Cost our users less to download
- ◆ Take up less space on our users' devices
- ◆ Cost us less to serve
- ◆ Put less stress on our servers & infrastructure
- ◆ Can be moved to “edge” servers & CDNs more easily

**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

Main Stories

- [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](#)
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- [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](#)
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- [Two young brothers from Houston lost both parents to Covid-19](#)
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- [Watch the entire CNN coronavirus town hall](#)
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- [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](#)
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- [Another study finds hydroxychloroquine does not help Covid-19 patients](#)

Home

July 24, 2020

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- [Trump's Favorite Coronavirus Metric, The Case Fatality, Is Unreliable](#)
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National Hurricane Center

Top News of the Day... [view past news](#)

Last update Fri, 24 Jul 2020 19:26:25 UTC

- NHC issuing advisories for the Atlantic on [TS Gonzalo](#) and [TS Hanna](#)
- CPHC issuing advisories for the Central Pacific on [Hurricane Douglas](#)
- [Key Messages regarding Tropical Storm Gonzalo](#) (en Español: [Mensajes Claves](#))
- [Key Messages regarding Tropical Storm Hanna](#) (en Español: [Mensajes Claves](#))
- [Key Messages regarding Hurricane Douglas](#)
- [Hurricane Warning: Atlantic High Seas](#)
- [Tropical Storm Warning: Caribbean/SW Atlantic – Graphical Forecast](#)
- [Tropical Storm Warning: Gulf of Mexico – Graphical Forecast](#)
- [Tropical Storm Warning: Atlantic High Seas](#)

[Mission / Vision](#)

Page last updated Fri, 24 Jul 2020 19:26:25 UTC

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[How to Read The Public Advisory](#)

[How to Read The Forecast/Advisory](#)

Atlantic - Caribbean - Gulf of Mexico

[Tropical Weather Outlook \(en Español*\)](#)

Tropical Storm Gonzalo

[Public Advisory #12A](#) 200 PM AST

[Aviso Público* #12A](#) 200 PM AST

[Forecast Advisory #12](#) 1500 UTC

[Forecast Discussion #12](#) 1100 AM AST

[Wind Speed Probabilities #12](#) 1500 UTC

[Maps and Charts](#)

[Archive](#)

Tropical Storm Hanna

[Public Advisory #7A](#) 100 PM CDT

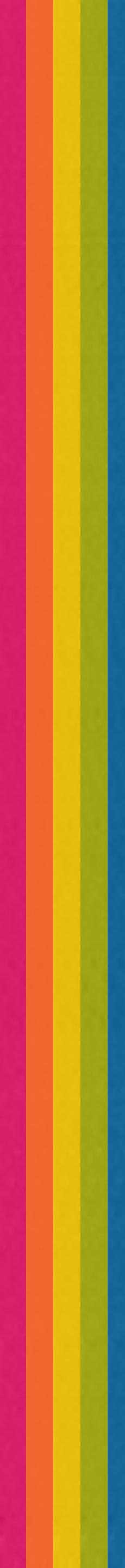
[Forecast Advisory #7](#) 1500 UTC

[Forecast Discussion #7](#) 1000 AM CDT

Let's compare*

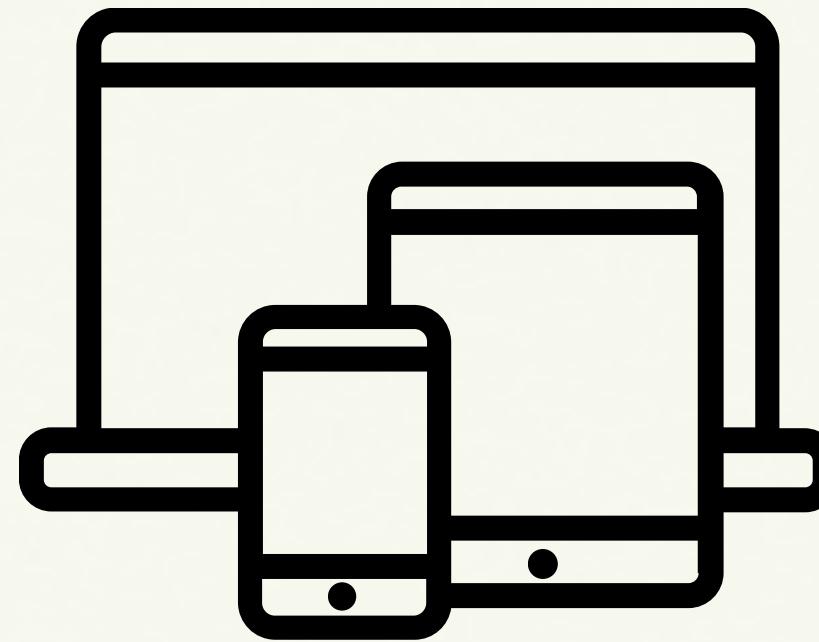
Site	Size	Requests	Starts Rendering	“Uncanny Valley”	Loaded	Cost
“Normal”	679 KB	57	2.7s	.2s	8.2s	\$0.07
Text-only	39 KB	7	2.3s	.1s	6.2s	\$0.00

* Moto G4 over 3G

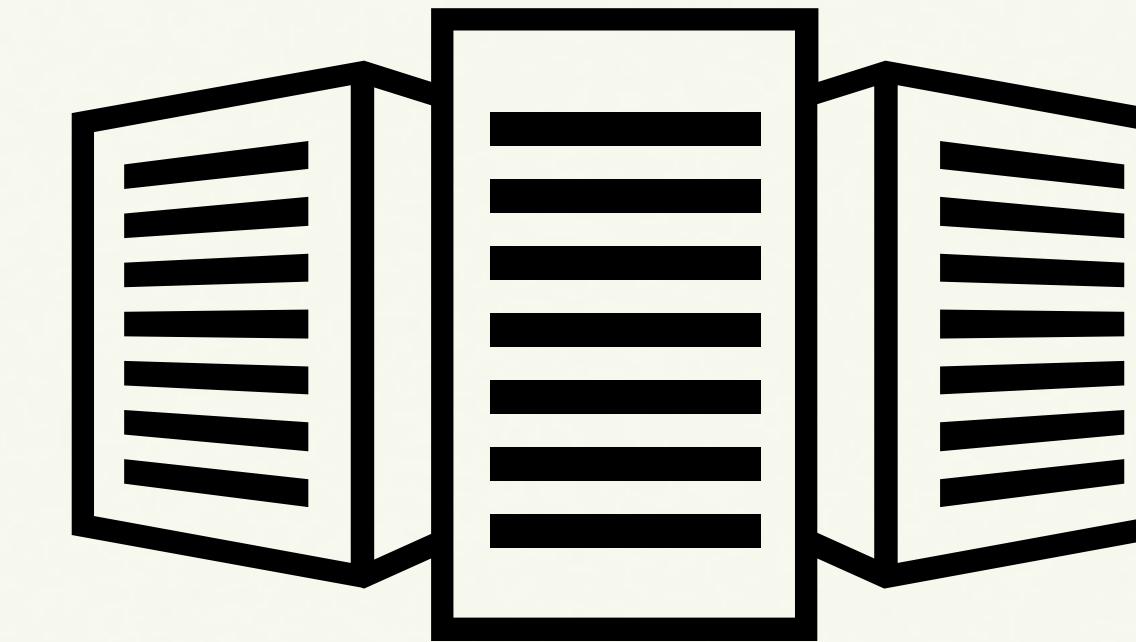


**Fewer requests
lead to a faster,
more resilient
experience.**

Your Users



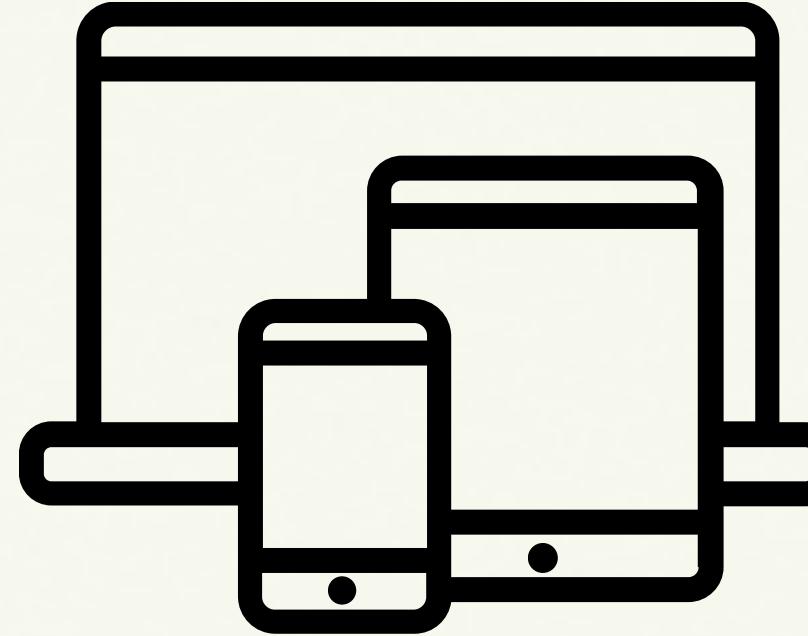
Your Server



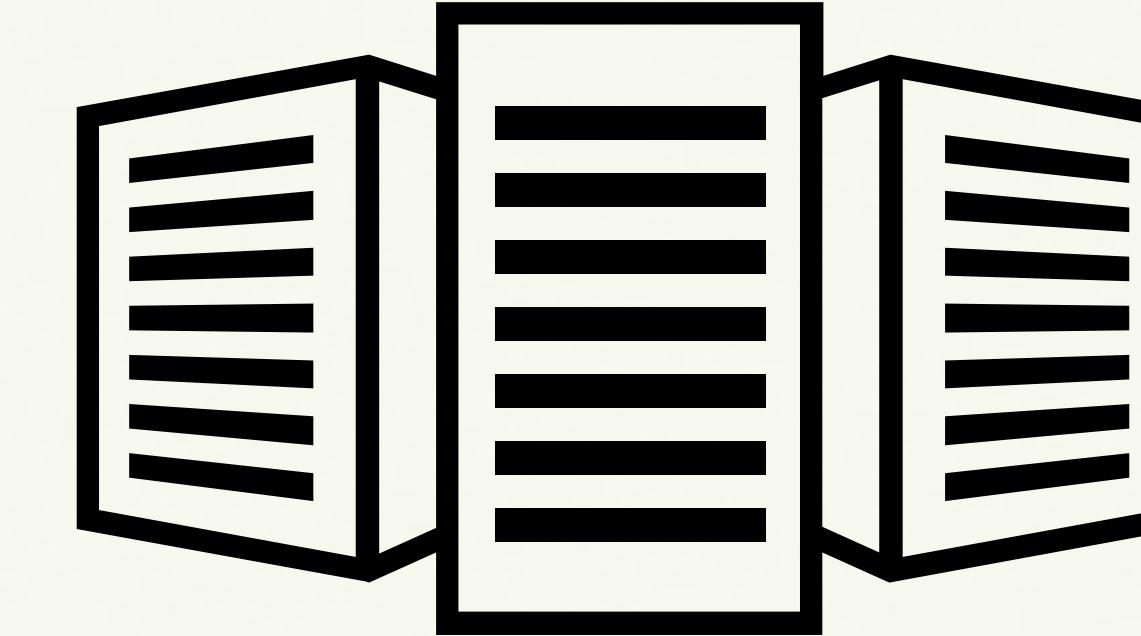
HTTP/1.1



Your Users

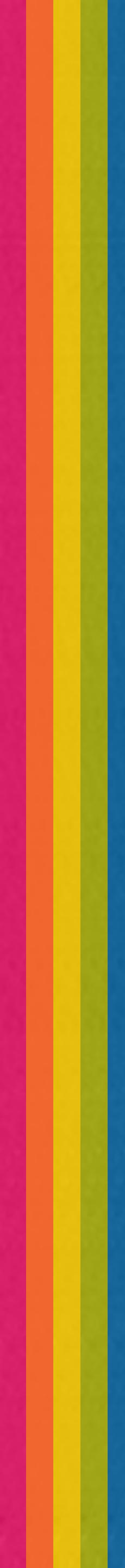


Your Server

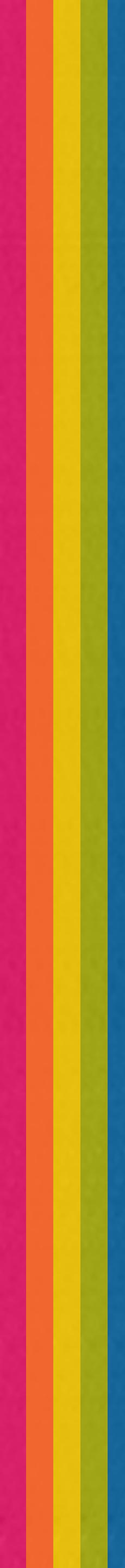


HTTP/2





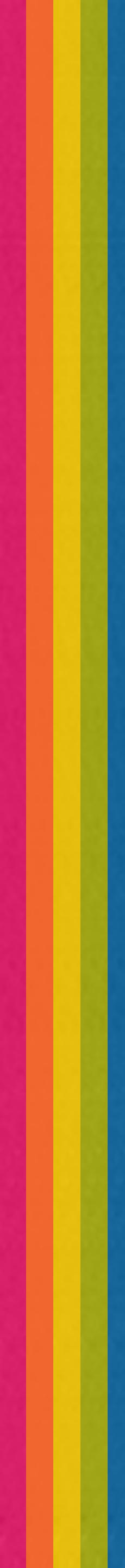
Fewer requests benefit everyone.



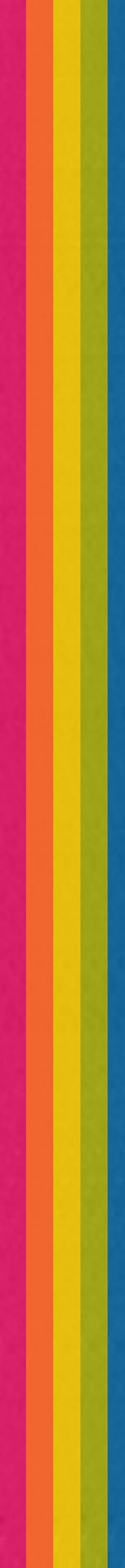
**Work with
the browser,
don't replace
the browser.**

JAVASCRIPT & CSS ALL THE THINGS!





**Use browser
default styles,
controls,
interactions,
and fonts
whenever possible.**

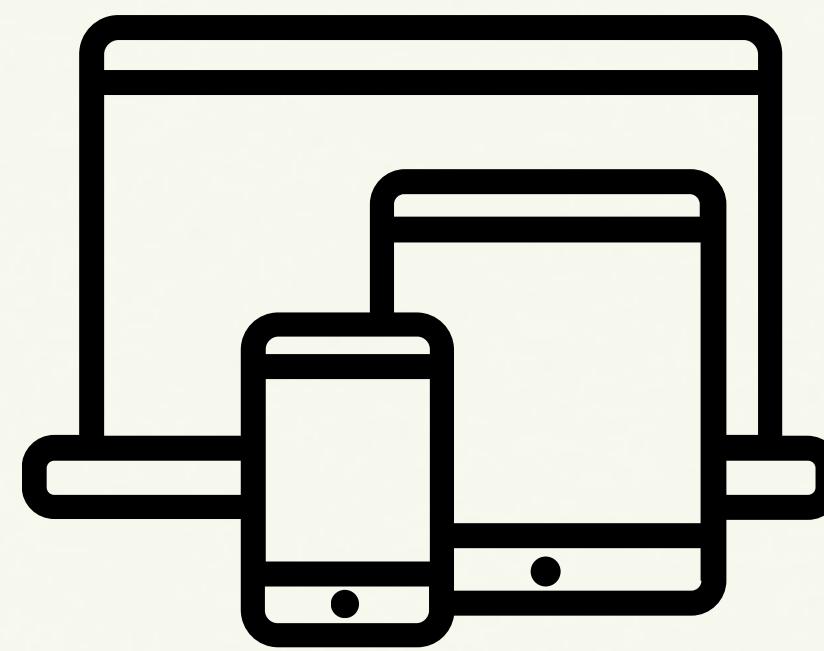


**Hire a
Service Worker
to up your
caching game.**

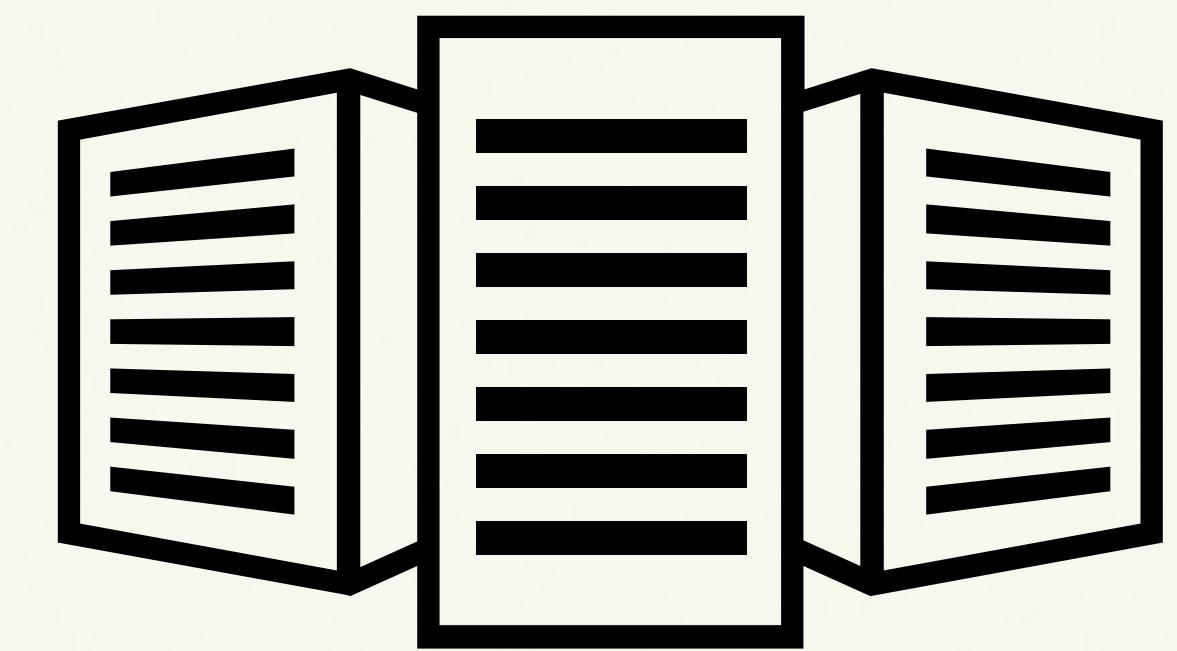
A Service Worker

- ◆ Runs in its own thread
- ◆ Runs in the background
- ◆ Sits between your users and the network

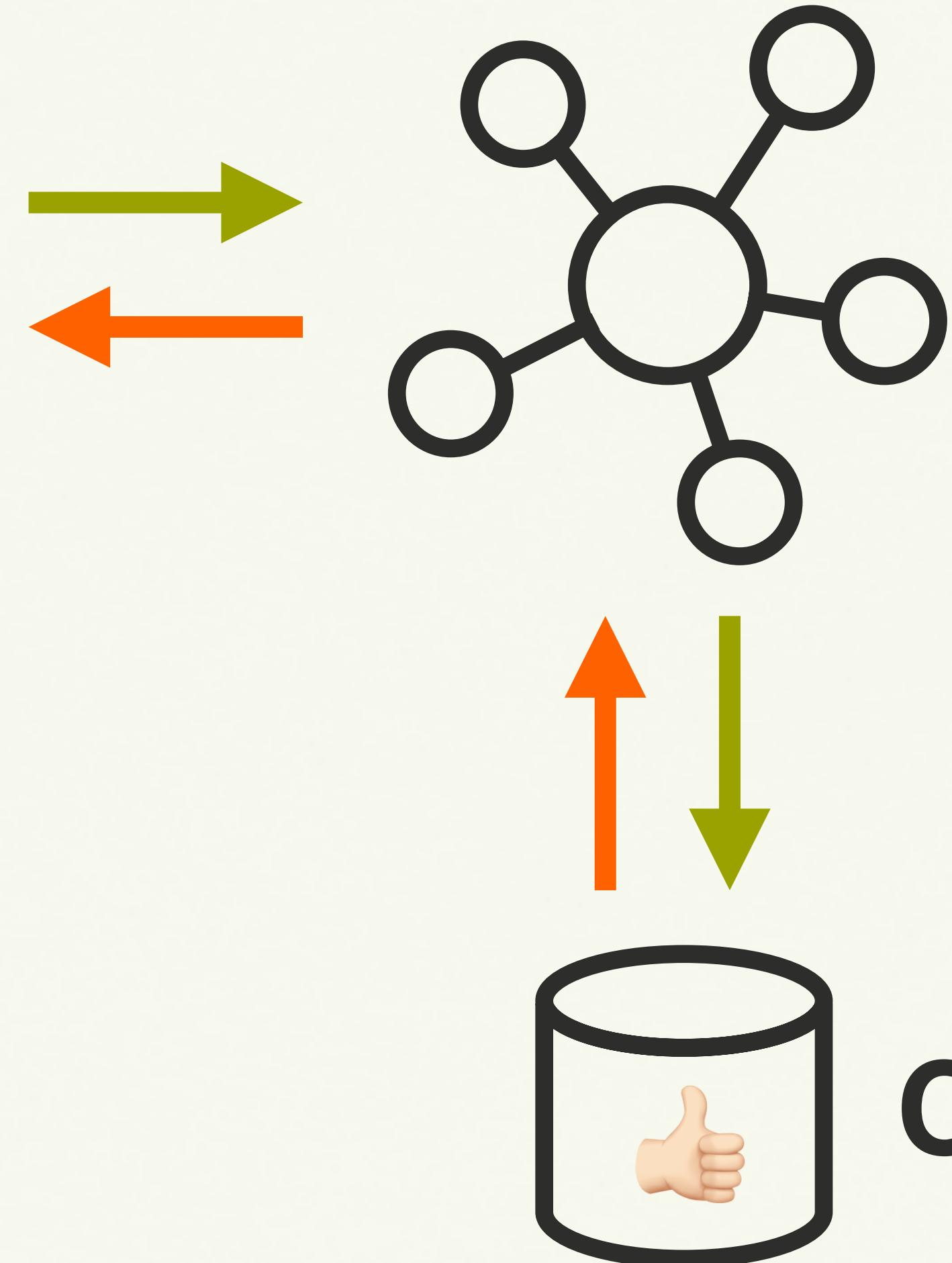
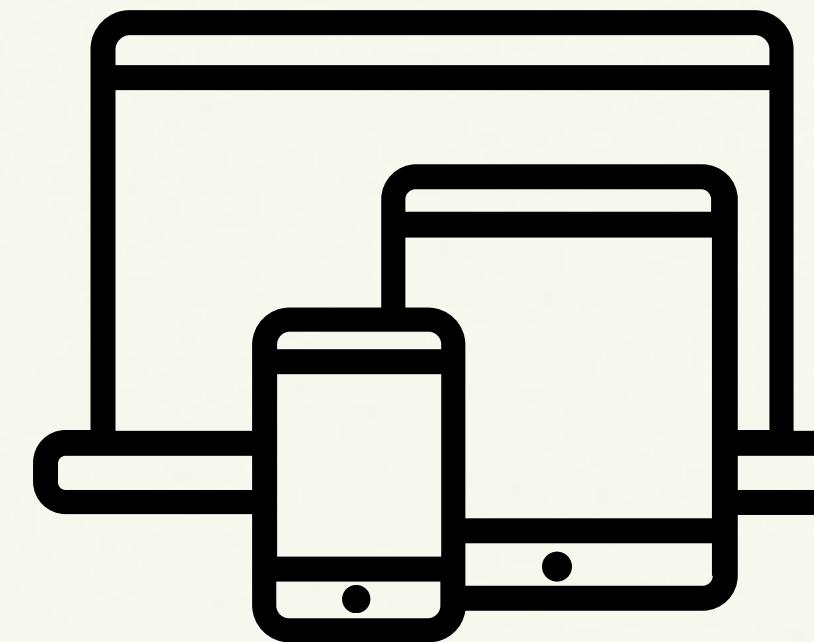
Your Users



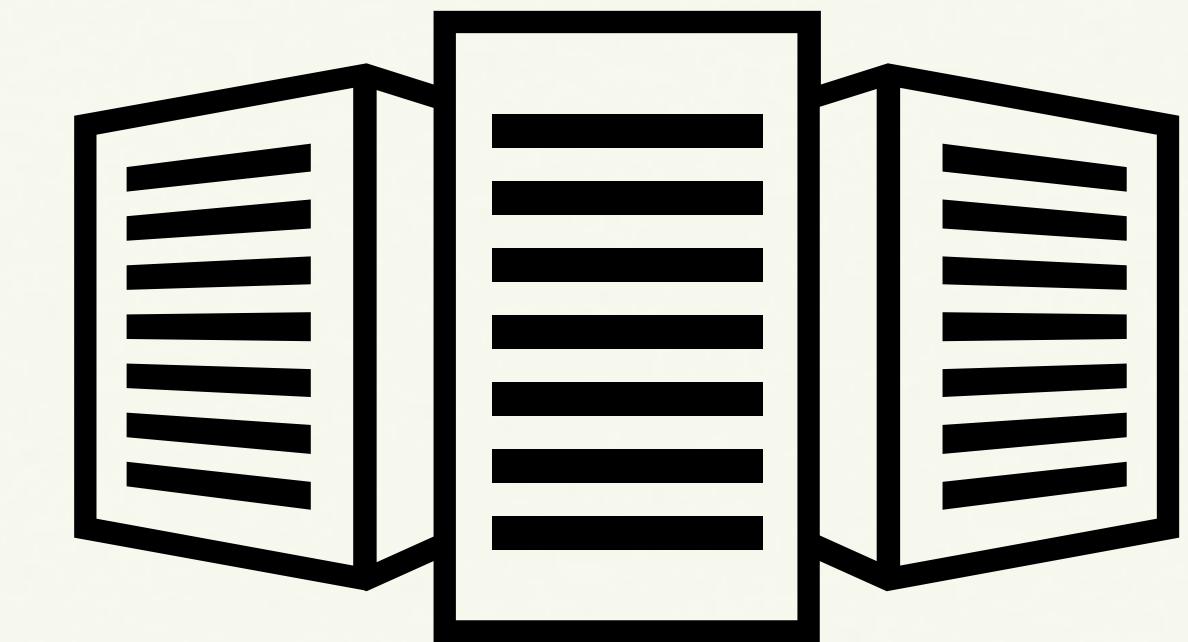
Your Server



Your Users

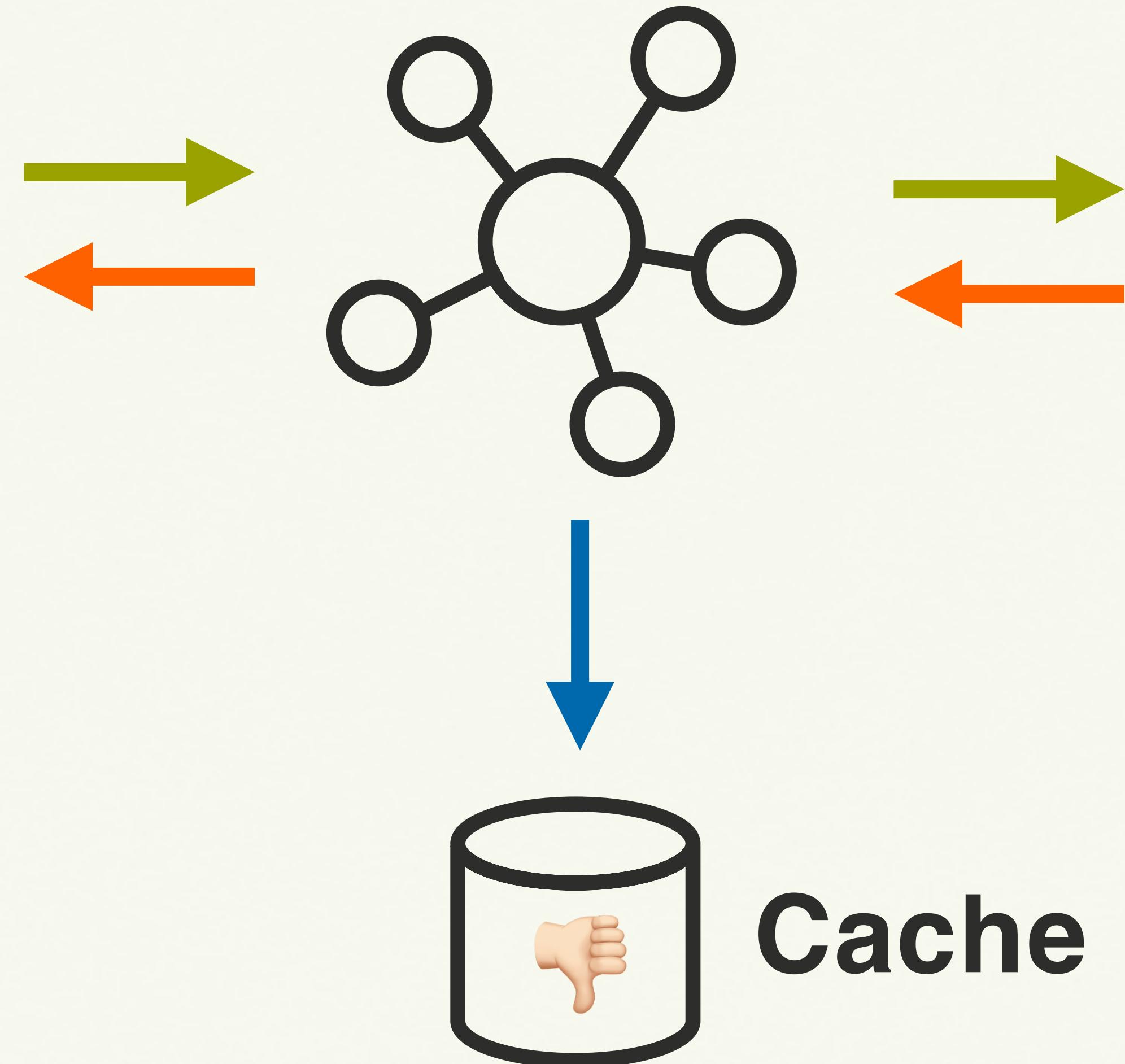
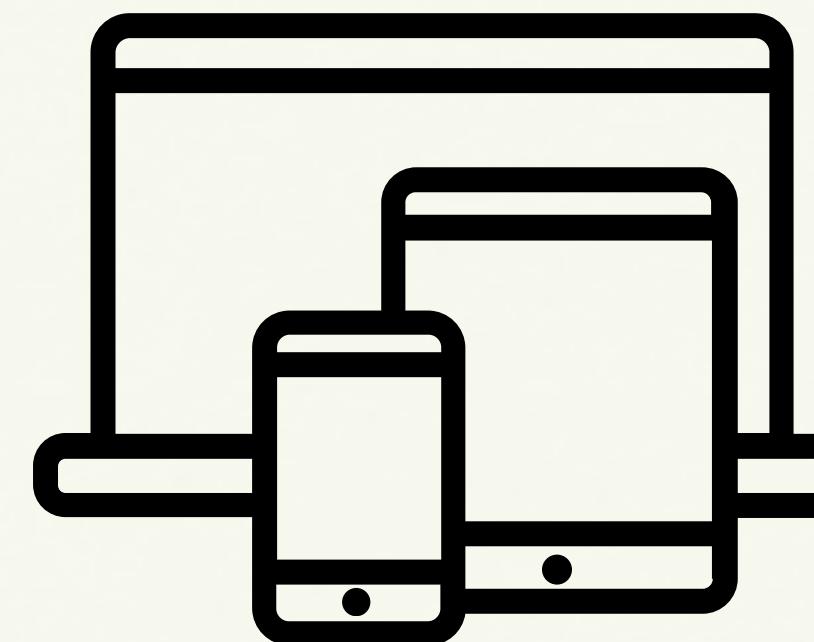


Your Server

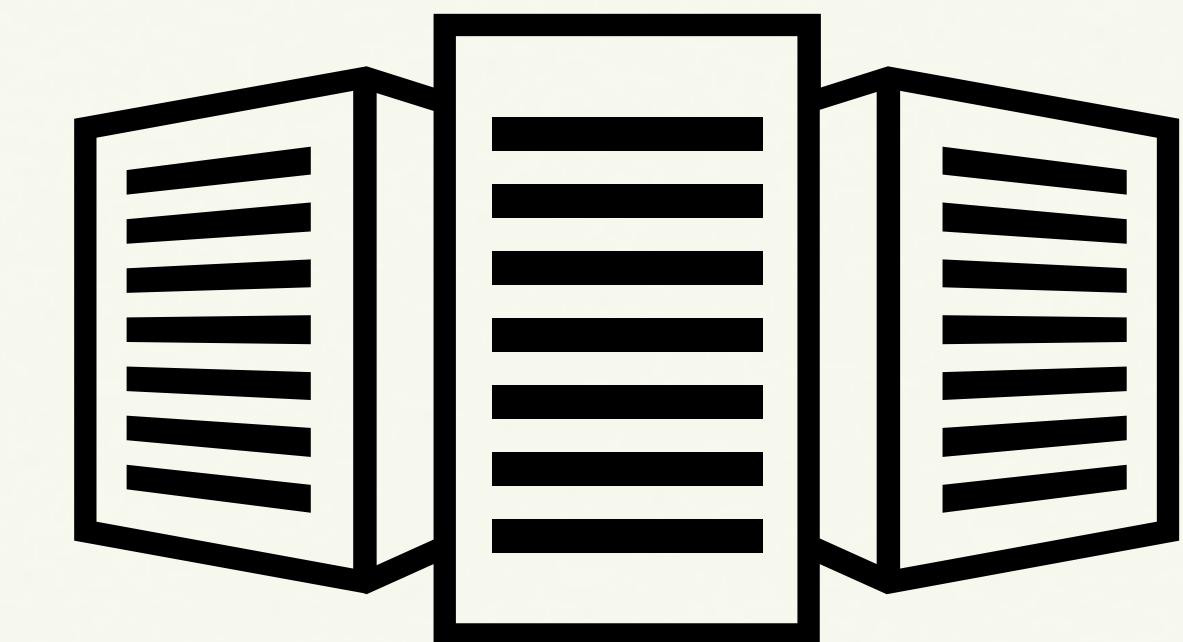


Cache

Your Users



Your Server



Cache

Better experiences:

- ◆ Offline pages
- ◆ Provide stale content while you look for new content
- ◆ Provide alternate content to save bandwidth

Plan for network issues

- ◆ Rely on small, static files
- ◆ Make fewer requests
- ◆ Leverage defaults
- ◆ Use a Service Worker

Empower everyone

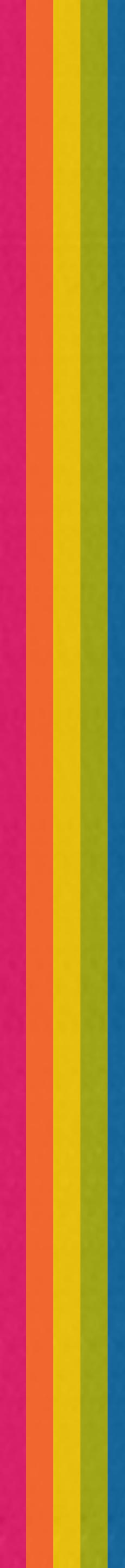
- ◆ Write clearly and concisely
- ◆ Make accessible markup choices
- ◆ Ensure our designs adapt
- ◆ Don't let JavaScript get in the way



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

Nicely Said recommends we

- ◆ Be clear.
- ◆ Be concise.
- ◆ Be honest.
- ◆ Be considerate.
- ◆ Write how we speak.
- ◆ Avoid technical and legal jargon.



**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 can 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-divs

- ◆ **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

Altera-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...

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



**Our designs
should remain
open to
interpretation.**

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in content strategy, data
science and analytics, and
learning design.



Issue №
306

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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Northwestern's Online MS in Information Design and Strategy. Choose from tracks in content strategy, data science and analytics, and learning design.

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

Don't rely on color alone

✓ Confirm

✗ Cancel

✓ Confirm

✗ Cancel

Ensure proper contrast

The screenshot shows a web application for calculating contrast ratios. At the top, it displays "contrast ratio" over a checkerboard background. Below this, a color picker interface shows a white square labeled "white" and a green circle containing the number "8.52". To the right, the text color is listed as "hsla(200, 0%, 0%, .7)". A "Swap colors" button is also visible. The main content area contains the following text:

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.

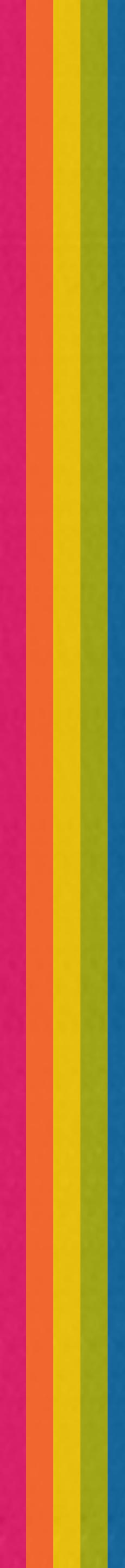
Hint: Press the up and down keyboard arrows while over a number inside a functional color notation. Watch it increment/decrement. Try with the Shift or Alt key too!

By Lea Verou • WCAG 2.0 on contrast ratio

contrast-ratio.com

Bake in good performance

- ◆ Selectively deliver advanced styles using media queries
- ◆ 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`



**JavaScript can
enable great
experiences or
undermine them.**

Love ES2015?

```
document.body.innerHTML += '<p>Can I count to four?</p>';

for ( let i=1; i<=4; i++ )
{
  document.body.innerHTML += '<p>' + i + '</p>';
}

document.body.innerHTML += '<p>Success!</p>';
```

Works on my machine



Does your browser support let?

If it does, you should see some numbers in paragraphs, followed by a success message.

Can I count to four?

1

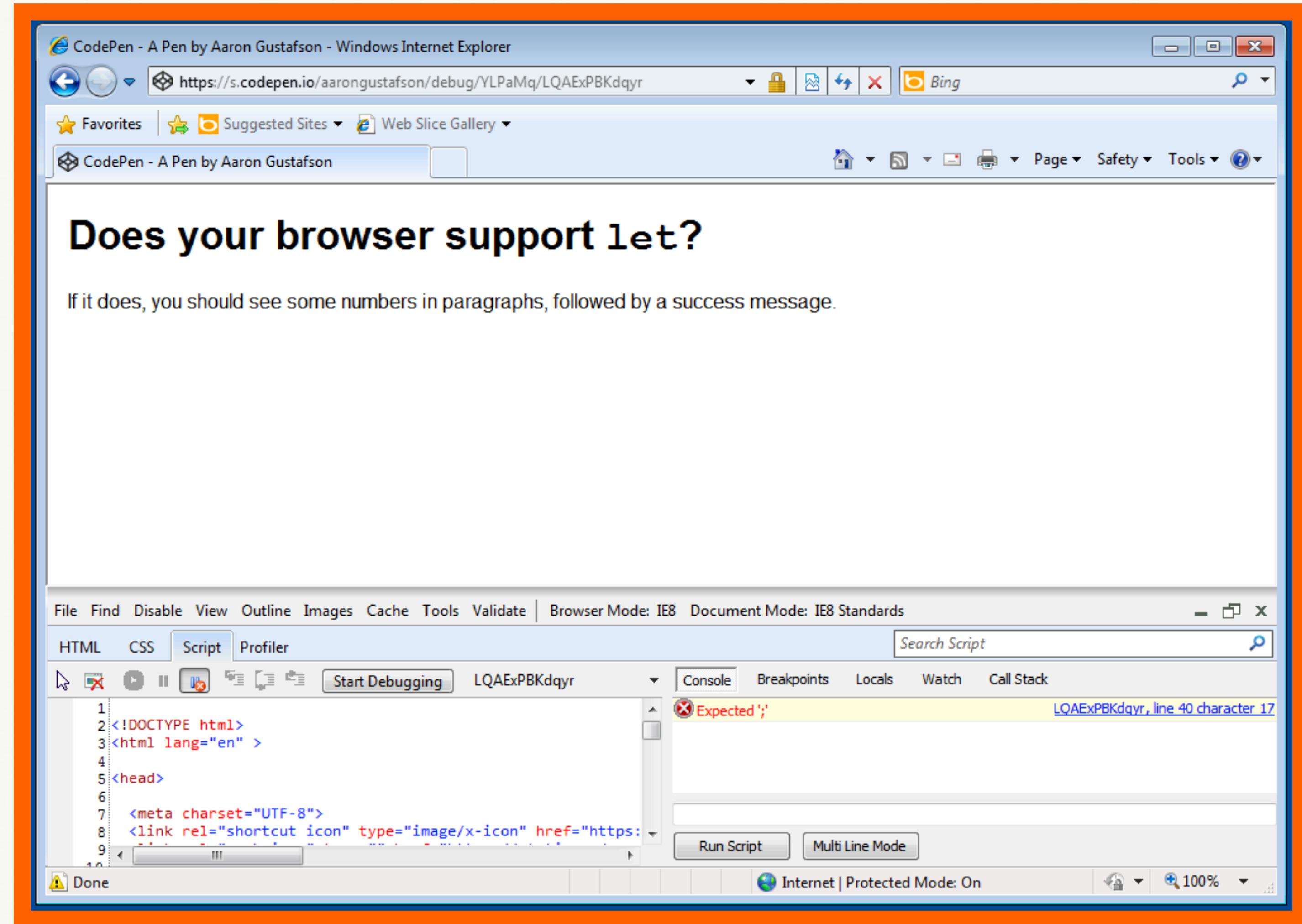
2

3

4

Success!

Elsewhere...?

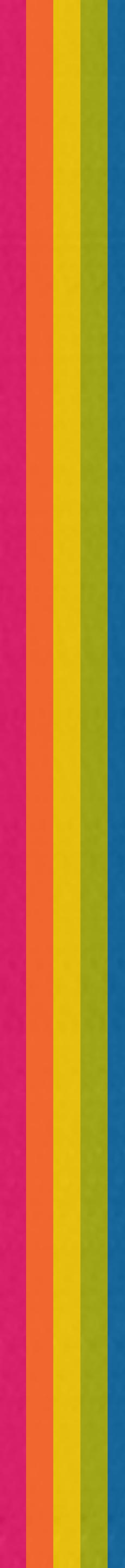


One teensy, little problem

```
document.body.innerHTML += '<p>Can I count to four?</p>';

for ( let i=1; i<=4; i++ )
{
  document.body.innerHTML += '<p>' + i + '</p>';
}

document.body.innerHTML += '<p>Success!</p>';
```



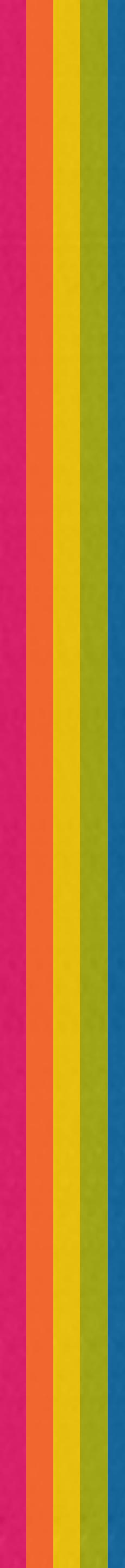
If a browser
doesn't grok
our JavaScript,
it won't run it.

“Surprisingly, the proportion of people that have explicitly disabled JavaScript or use a browser that doesn't support JavaScript, only makes up a small slice of people that don't run JavaScript.

— Peter Herlihy

How many people are missing out on JavaScript enhancement?

perma.cc/6RPU-8UDA



Use JavaScript, but understand its limitations.

Empower everyone

- ◆ Write clearly and concisely
- ◆ Make accessible markup choices
- ◆ Ensure our designs adapt
- ◆ Don't let JavaScript get in the way

Eliminate waste

- ◆ Get rid of unnecessary imagery
- ◆ Grant users some control
- ◆ Minimize our RAM footprint
- ◆ Reduce our energy consumption

“

I want to share with you my simple two-step secret to improving the performance of any website.

1. Make sure that the most important elements of the page download and render first.
2. Stop there.

— Maciej Ceglowski

The Website Obesity Crisis

perma.cc/L89N-2E3T



**Images aren't
always worth
1,000 words.**

The Web is smothering us in useless images that create lots of pollution. These clichéd, stock images communicate absolutely nothing of value, interest or use. They are one of the worst forms of digital pollution and waste, as they cause page bloat, making it slower for pages to download, while pumping out wholly unnecessary pollution. They take up space on the page, forcing more useful content out of sight, making people scroll for no good reason.

— Gerry McGovern

World Wide Waste: How Digital is Killing Our Planet—and What We Can Do About It

Images can add value

☰ 🔎

ENGLISH ESPAÑOL 中文 (CHINESE)

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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.

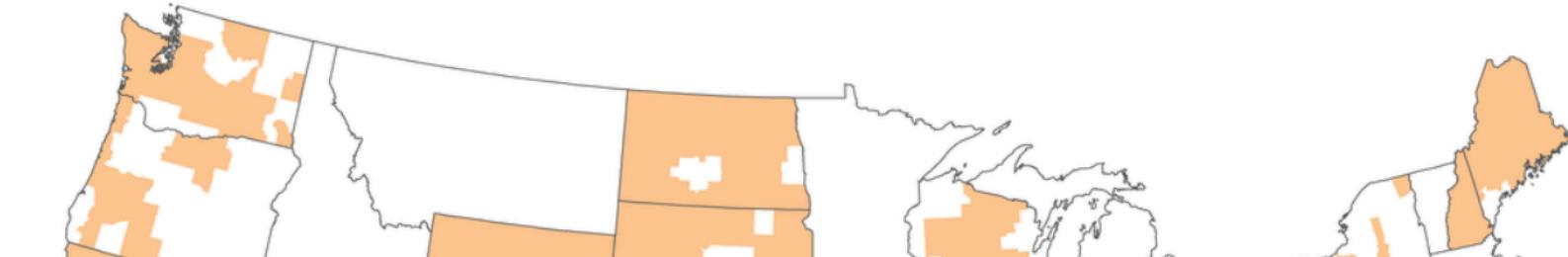


Tom Brenner/The New York Times

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



You're seeing a test of a new version of the New York Times home page.
What do you think?
[Send us your feedback.](#)
Miss the old experience?
[Opt out.](#)

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 [SUBSCRIBE](#) | [LOG IN](#)

G.O.P. TAX PLAN

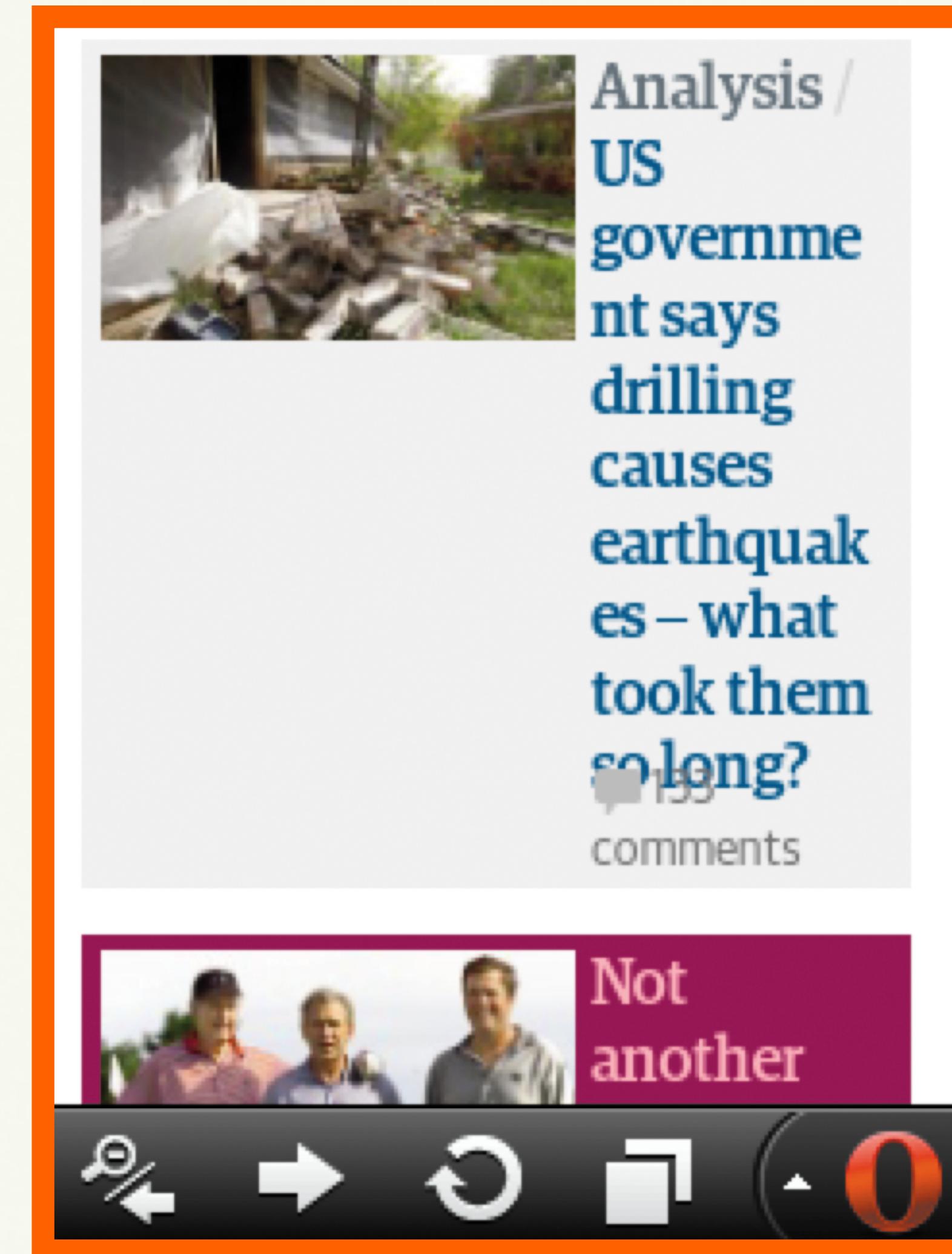


Tom Brenner/The New York Times

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)

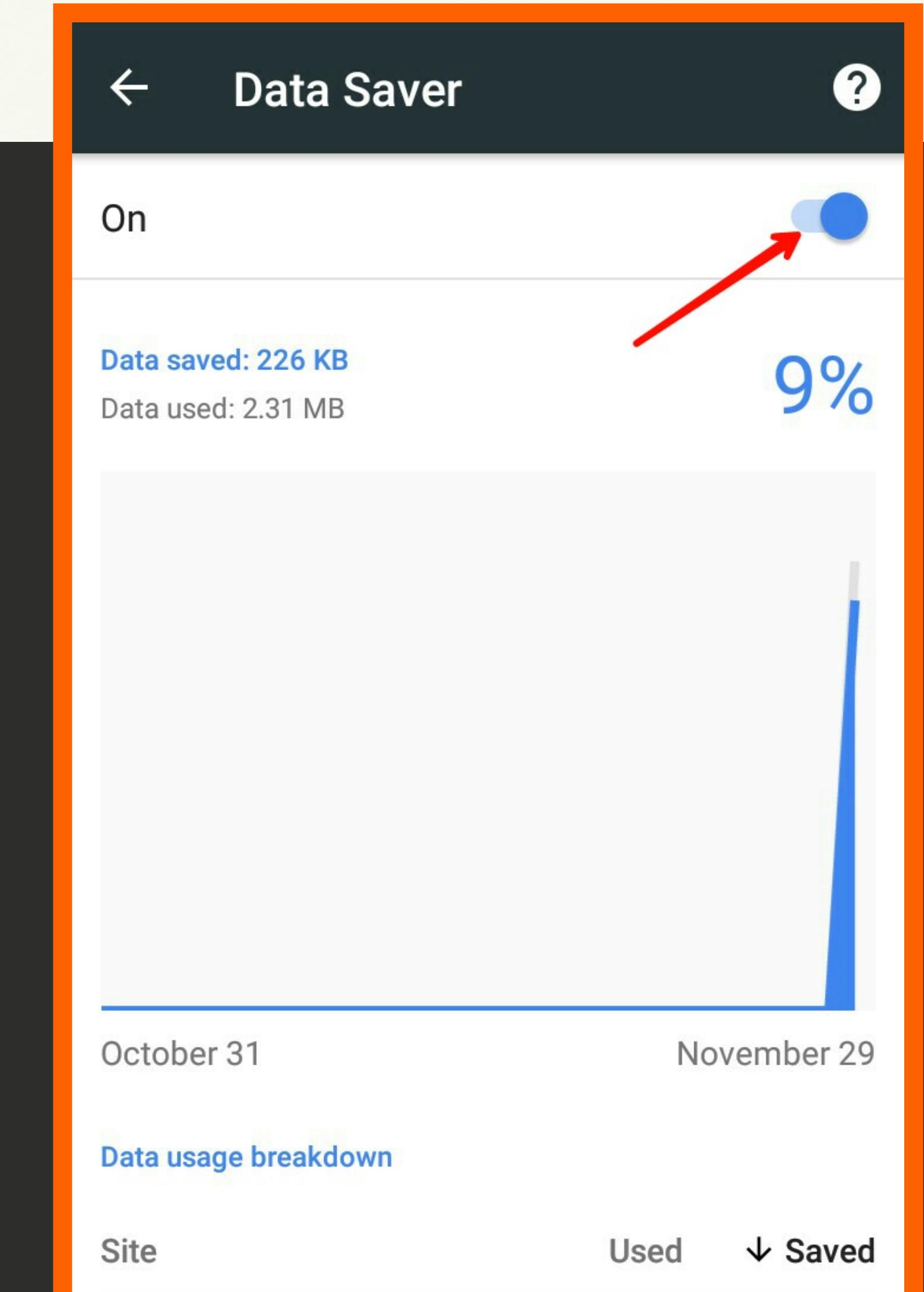
- ◆ Does the image reiterate information found in the surrounding text?
- ◆ Is the image necessary to understand the surrounding content?
- ◆ Does the image contain text?
- ◆ Is the image a graph, chart, or table?
- ◆ Could the content of the image be presented in a different format that would not require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



A Service Worker can see this...

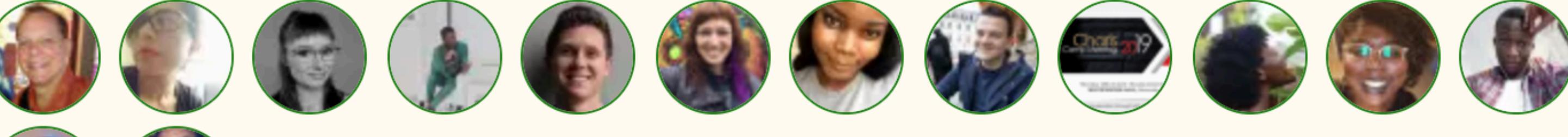
```
let save_data = false;  
if ( 'connection' in navigator ) {  
  save_data = navigator.connection.saveData;  
}  
  
```

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

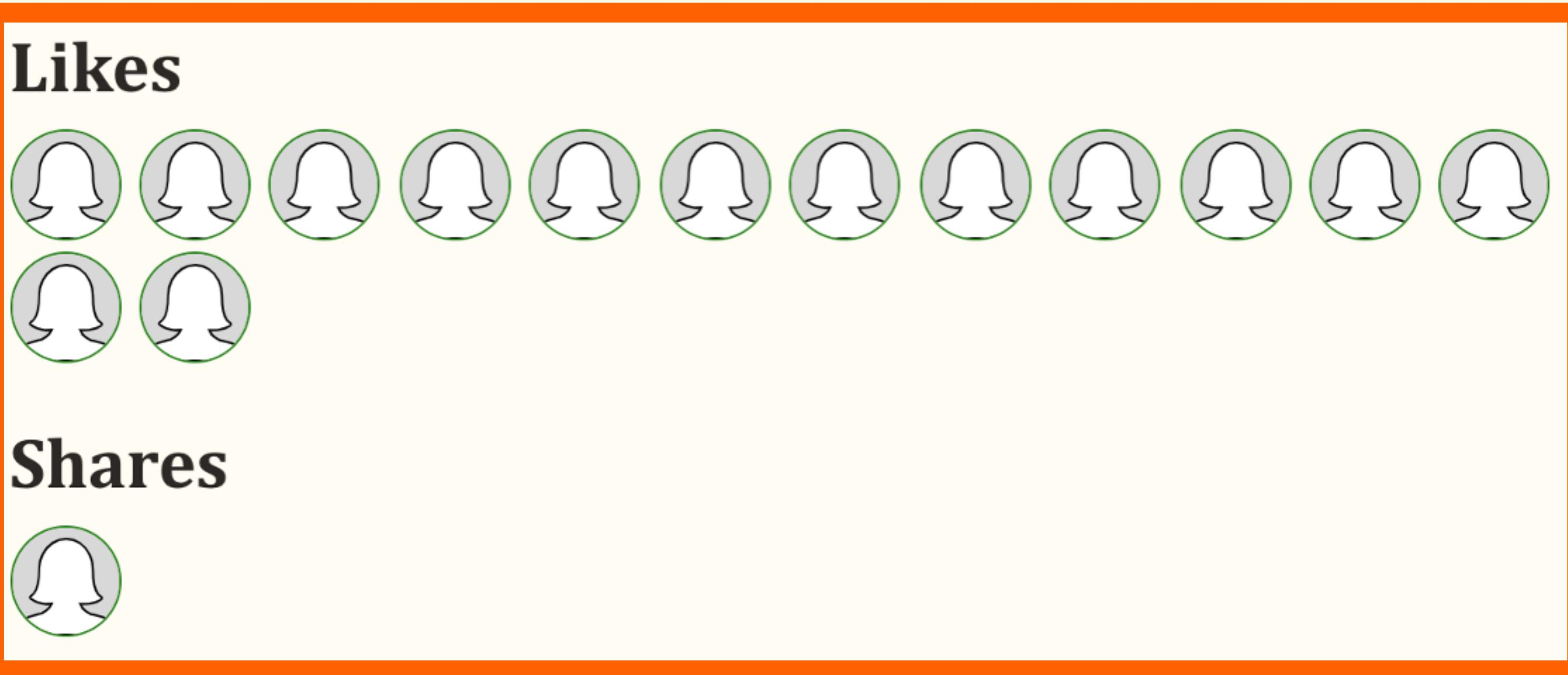
Likes



Shares



Result



Result



[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:

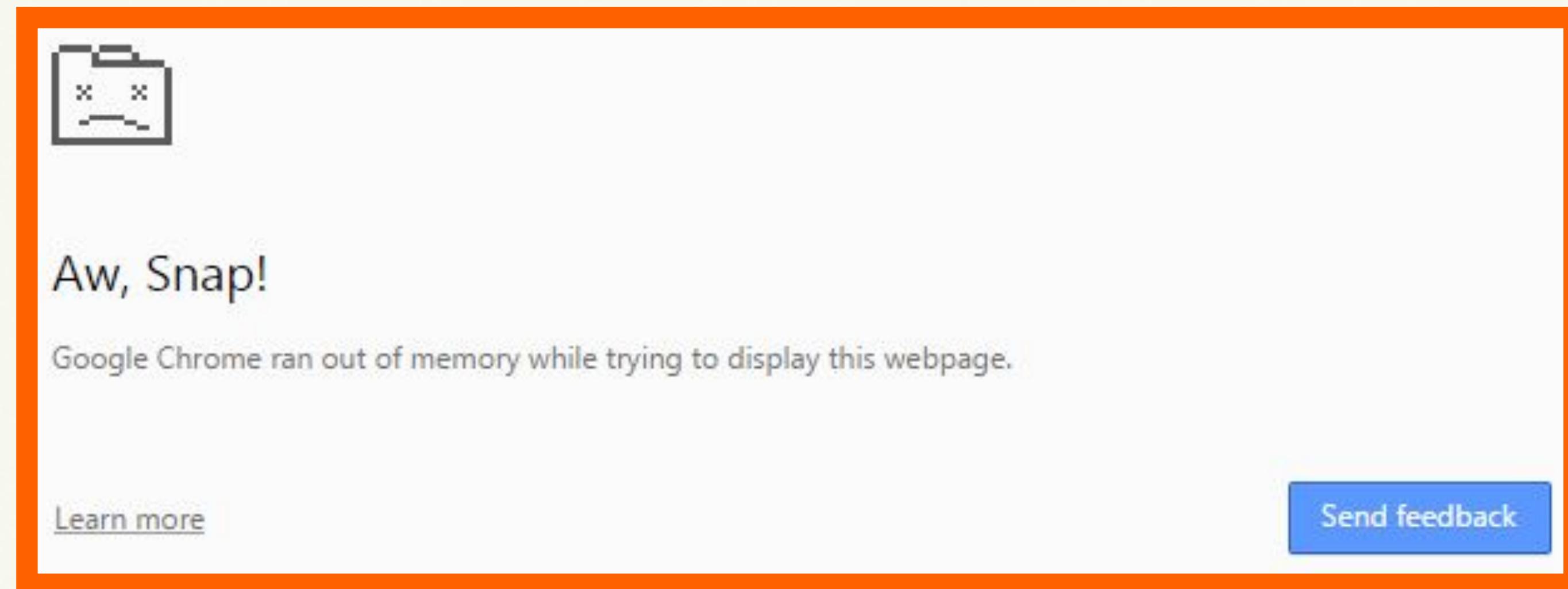


A large, solid gray rectangular placeholder image, likely representing a video or image that failed to load due to data saver being active.

**Data saver active,
media not loaded**

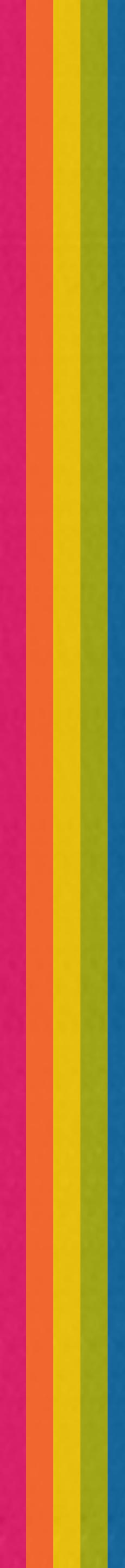
12 October 2017 | [Permalink](#)

RAM is a finite resource.



RAM-conscious websites...

- ◆ Ship less code.
- ◆ Restrict global variables.
- ◆ Clean up their timers and callbacks.
- ◆ Are careful with closures.
- ◆ Monitor memory use in DevTools.



**Electricity
is a luxury.**

Sip, don't gulp.

Smartphone charging times

- ◆ **Electrical grid:** 2-3 hours
- ◆ **Diesel generator:** 2-3 hours
- ◆ **Solar panel:** 8-10 hours*
- ◆ **Hand crank:** 3-10 min for 12-20 minutes of use
- ◆ **Bicycle crank:** 2-3 hours
- ◆ **Kinetic energy:** 1 hour for ~1 hour
- ◆ **Thermo power:** ~2 hours

* Depending on weather

Energy-efficient websites...

- ◆ Ship less code.
- ◆ Serve properly-sized images in the best format.
- ◆ Optimize & minify all files (code & graphics).
- ◆ Don't auto-play videos.
- ◆ Use system fonts.
- ◆ Deliver less JavaScript.
- ◆ Integrate as little 3rd party code as possible.
- ◆ Implement Service Worker.

“We were told that the Internet would “dematerialise” society and decrease energy use. Contrary to this projection, it has become a large and rapidly growing consumer of energy itself.

— Kris De Decker

How to Build a Low-tech Website?

perma.cc/FA9X-Z58P

Eliminate waste

- ◆ Get rid of unnecessary imagery
- ◆ Grant users some control
- ◆ Minimize our RAM footprint
- ◆ Reduce our energy consumption

Reduce complexity

- ◆ Develop dependency awareness
- ◆ Reach for the right tools for the job
- ◆ Consider going “static”

“Use the least powerful language suitable for expressing information, constraints or programs on the World Wide Web.

— Tim Berners-Lee
The Rule of Least Power
perma.cc/MXE6-EG3L

Consider the humble button

Sign In

Consider the humble button

```
<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>
```

Consider the humble button

Sign In

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

Bring on the dependencies

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"		

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?

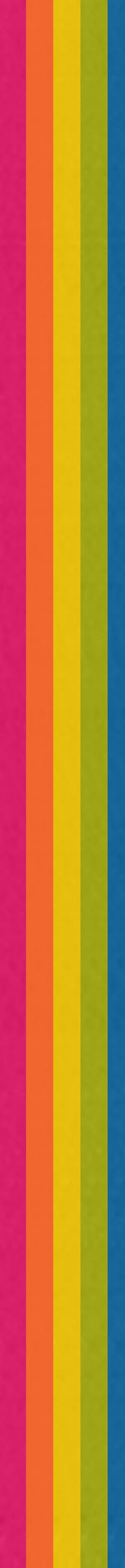
- ◆ The browser doesn't support JavaScript.
- ◆ JavaScript was disabled by the user.
- ◆ A networking issue caused the JavaScript to be unavailable.
- ◆ A firewall blocked requests for JavaScript.
- ◆ A browser plugin blocked the JavaScript download or execution.
- ◆ A third-party JavaScript error caused 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.

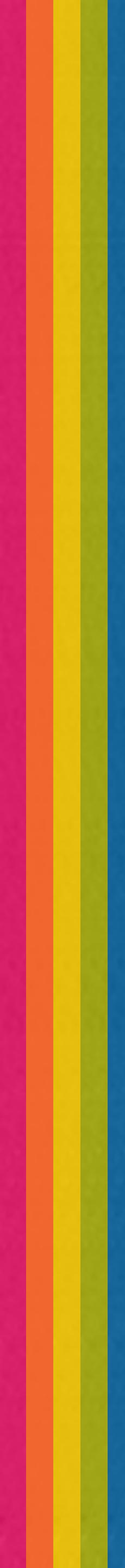
If you *can* use a native HTML element or attribute with the semantics and behavior you require already built in, instead of re-purposing an element and adding an ARIA role, state or property to make it accessible, then do so.

— First Rule of ARIA Use



Reality Check

**This example
was a button.**



**Dependency awareness
needs to extend to
networking as well.**

Learn from the past

The screenshot shows the Lifehacker website with a prominent orange border around the main content area.

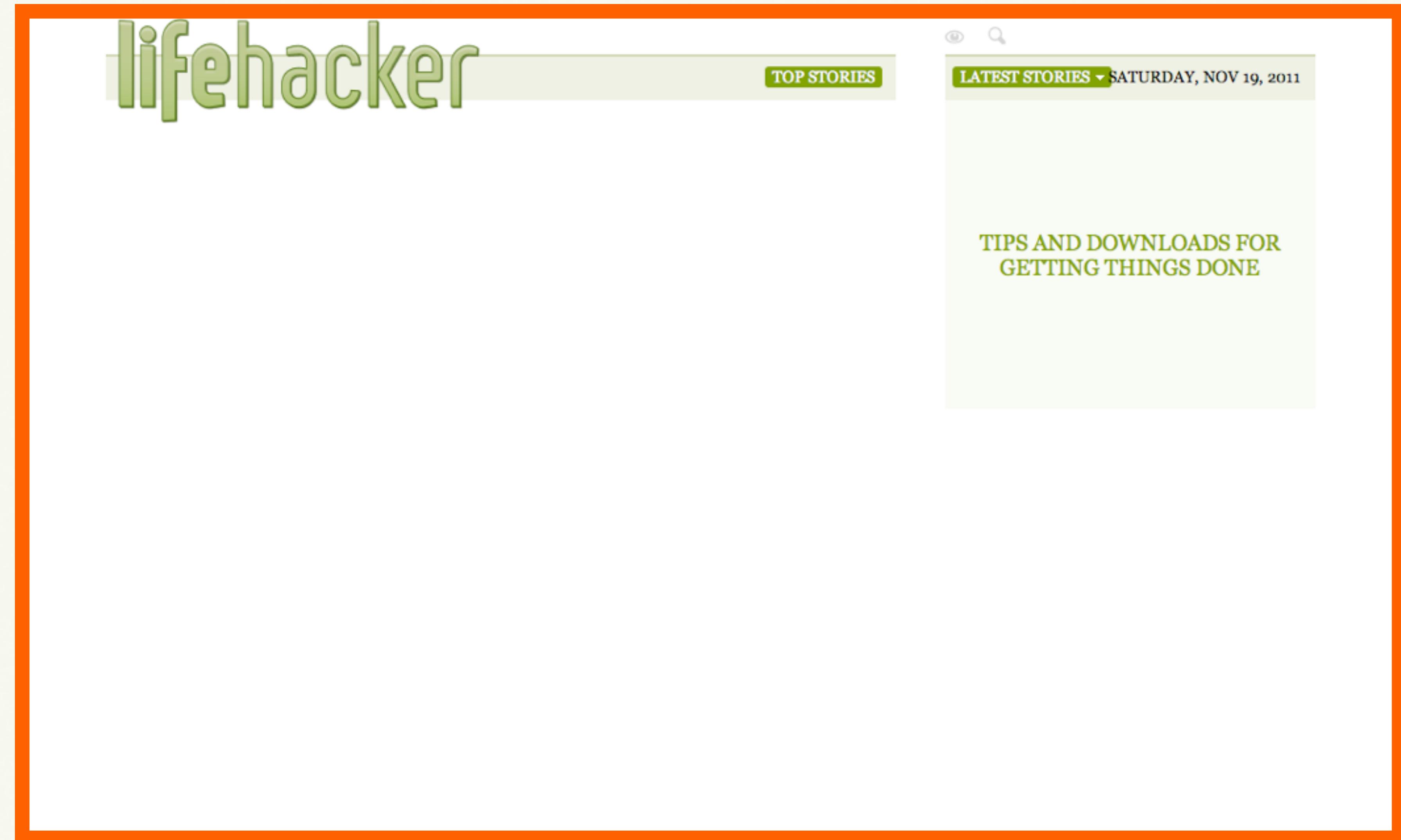
Top Left (Main Content Area):

- Header:** lifehacker
- Image:** A large graphic featuring a white airplane and two crossed wrenches.
- Title:** WEEKENDHACKER
- Section:** WEEKENDHACKER
- Article Title:** Make the Best of Your Travel Plans This Weekend
- Author:** BY WHITSON GORDON
- Date:** NOV 18, 2011 5:00 PM
- Share Buttons:** Share, +1, Like (41 likes)
- Comments:** 6,190 comments
- Text Preview:** The holidays are upon us, and if you're going to spend them with faraway family and friends, you're probably going to be dealing with the stress that is traveling. Here are some of our best tips for making travel as pain-free as possible. [More »](#)
- Related Stories:** RELATED STORIES

Top Right (Sidebar):

- Header:** LATEST STORIES
- Date:** SATURDAY, NOV 19, 2011
- Advertisment:** ...you'll find it waiting in your basket online. £10 OFF your first online shop*. Start saving www.tesco.com
- Story 1:** WEEKENDHACKER 5:00 PM - Make the Best of Your Travel Plans This Weekend
- Story 2:** FOR WHAT IT'S WORTH 4:00 PM - Remains of the Day: Ice Cream Sandwich Running on a Galaxy S II
- Story 3:** HIGHLIGHTS 3:30 PM - This Week's Most Popular Posts: November 12-November 18
- Story 4:** WEB SITES 3:00 PM - Our Favorite Single-Purpose Web Sites That Do Exactly What They Say They Do
- Story 5:** DEALS 2:30 PM - Daily App Deals: Get Deluxe Moon

Learn from the past



Learn from the past

The screenshot shows the homepage of Lifehacker.com. At the top, there's a navigation bar with links to various sites like THE A.V. CLUB, DEADSPIN, GIZMODO, JALOPNIK, JEZEBEL, KOTAKU, LIFEHACKER, THE ROOT, THE TAKEOUT, THE ONION, and THE INVENTORY. Below the navigation is the Lifehacker logo with the tagline "Do everything better". The main menu includes LATEST, SKILLET, TWO CENTS, VITALS, OFFSPRING, TECH 911, CORONAVIRUS, THE UPGRADE, and VIDEO. The main article features a large image of a blue surgical mask with green, bubbly vapor coming out of it. The title of the article is "Why You Can Smell a Fart Through a Mask" by Beth Skwarecki. To the right, there are three more articles: "How You Can Help Save the Fireflies" by Jaclyn Youhana Garver, "How to Lock Your Facebook Messenger Chats Using Face ID" by Emily Long, and "Build Your Own Peloton-Style Exercise Bike and Save Money" by Abu Zafar. There's also a section titled "More Assorted Hacks" with articles like "How to Know if Your 401(k) Fees Are Too High" by Kate Dore and "Build an 'Oh, Shit' Block Into Your Schedule" by Meghan Moravcik Walbert.

Why You Can Smell a Fart Through a Mask

Beth Skwarecki

How You Can Help Save the Fireflies

Jaclyn Youhana Garver

How to Lock Your Facebook Messenger Chats Using Face ID

Emily Long

More Assorted Hacks

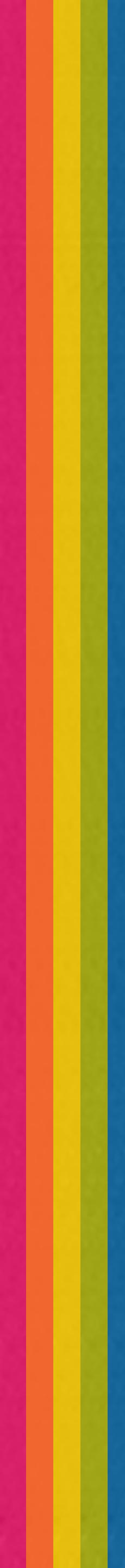
- Build Your Own Peloton-Style Exercise Bike and Save Money
- How to Know if Your 401(k) Fees Are Too High
- Build an 'Oh, Shit' Block Into Your Schedule
- Flavor Your Mayo With Sad, Wilted Herbs



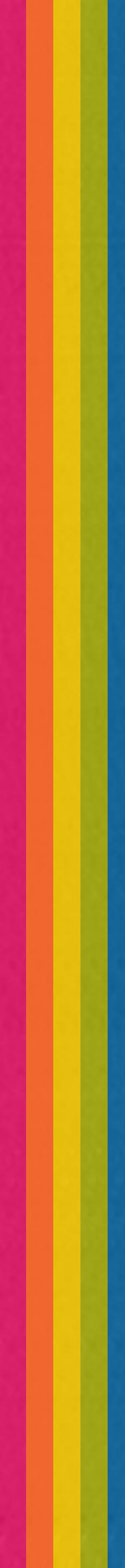
**Make sure our
critical tasks can't
be undermined
by a failed request.**



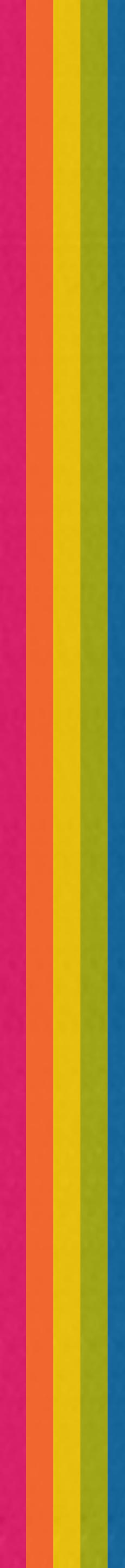
If we make
mission-critical
API calls, we should
do that **before** sending
pages to the browser.



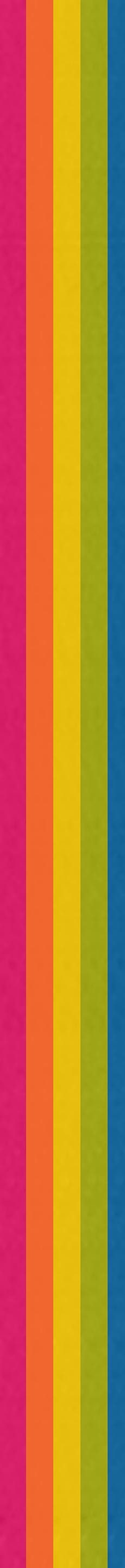
**We must choose
the right tools
for the job.**



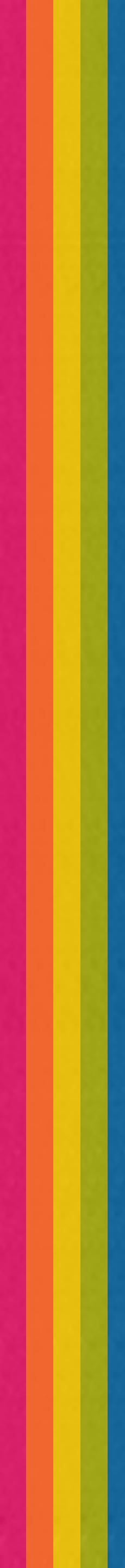
**Just because
a popular company
built or is using a tool
does not mean that
it's a good fit for
our project.**



We should focus on the technical requirements of our project and evaluate the options through that lens.

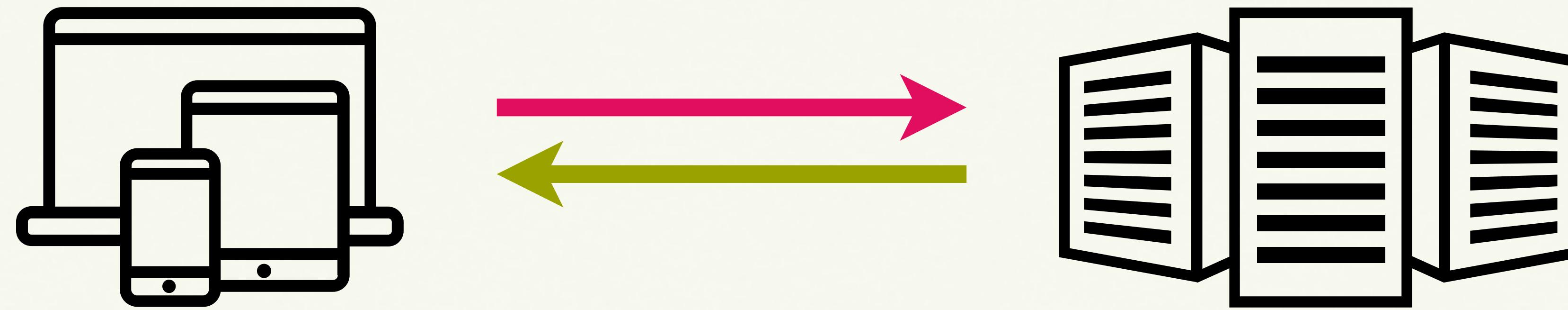


We shouldn't experiment on critical projects.

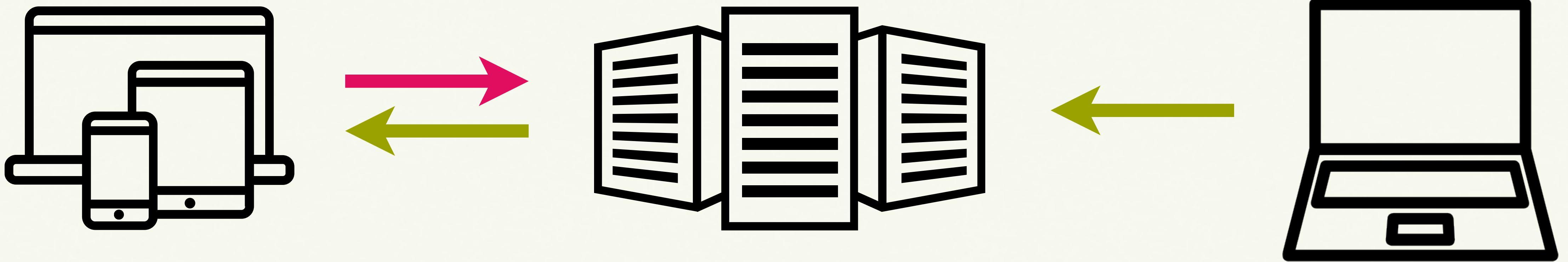


We should consider going “static.”

Server-rendered



“Static” sites

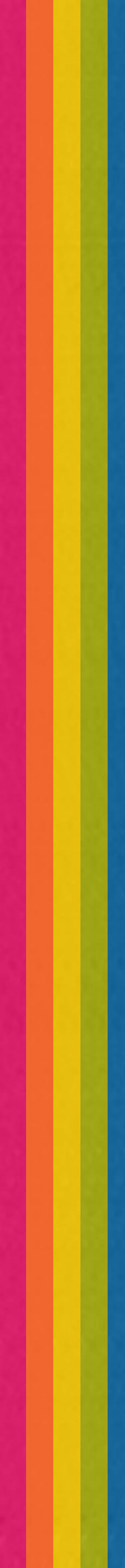


JAM: JavaScript, APIs, and Markup



Reduce complexity

- ◆ Develop dependency awareness
- ◆ Reach for the right tools for the job
- ◆ Consider going “static”



Let's rise to meet every moment.

- ◆ Plan for the worst
- ◆ Empower our customers, neighbors, constituents...
- ◆ Eliminate waste
- ◆ Reduce complexity

Thank you!

@AaronGustafson

aaron-gustafson.com
noti.st/aarongustafson

Questions?

Or tweet me: **@AaronGustafson**