

PWAs

Where Do I Begin?



What exactly is a
PWA?

What exactly is a
Progressive Web App?



119



20



40



DISCUSS (51)



What the heck is a "Progressive Web App"? Seriously.



Ben Halpern



Nov 6 '17 Updated on Mar 21, 2018 · 3 min read

#webdev

**Ben Halpern**

@ben

A Canadian software developer who thinks he's funny.

[+ FOLLOW](#)

work

Founder/webmaster at DEV

location

Brooklyn, NY

education

Mount Allison University

joined

Dec 27, 2015

This morning I want to write an article outlining a few things about



Seriously, though. What is a progressive web app?



Amberley Romo [Follow](#)

Aug 6, 2018 · 8 min read



Infrequently Noted

Alex Russell on browsers, standards, and the process of progress.

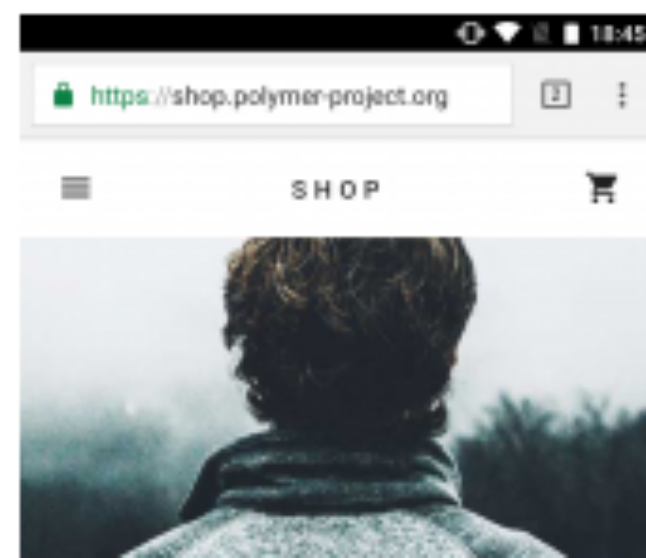
[« PWA Discovery: You Ain't Seen Nothin Yet](#)

[Web Components: The Long Game »](#)

What, Exactly, Makes Something A Progressive Web App?

Since [Frances](#) and I published a blog post last year introducing [Progressive Web Apps](#), a healthy conversation has started about what is and isn't a PWA. There are a lot of opinions and many shades of gray. What are the hard requirements? Which requirements are marginal? What's aspirational? This article outlines these requirements, attempts to classify them, and provides a baseline for "what is a Progressive Web App?"

Browsers gate Progressive Web App installation prompting and badging on criteria that they detect when users navigate to sites. These criteria have been designed to ensure that sites which invoke prompts are reliable, fast, and engaging.



What's All This Then?

I'm Alex Russell, a web developer working on Chrome, Blink, and the Web Platform at Google. I'm guilty of many JavaScript transgressions.

I help lead the team building a new application model for the web, and serve on ECMA TC39 (the standards body for JavaScript). I'm an elected member of the W3C Technical Architecture Group and am Tech Lead for Standards inside the Chrome team. I design and advocate for extensible, layered, data-driven evolution of the web platform.

My professional aim is to make the web a better platform and to the extent that I can keep politics and economics from warping it.

“Progressive Web App”
is a marketing term

Progressive Web App

Game
Gallery
Book
Progressive Web App
Newspaper
Art Project
Tool

Progressive Web Site

Who's behind PWAs?



What's a PWA, technically?



HTTPS

What's a PWA, technically?



HTTPS



Web App
Manifest

What's a manifest?

```
{  
  "lang": "en",  
  "short_name": "Wash Post",  
  "name": "The Washington Post",  
  "icons": [ { "src": "img/launcher-icon-2x.png",  
                "sizes": "96x96",  
                "type": "image/png" } ],  
  "start_url": "/pwa/",  
  "display": "standalone",  
  "orientation": "portrait",  
  "background_color": "black"  
}
```

What's a PWA, technically?



HTTPS




Web App
Manifest



Service
Worker

**Why I predict Progressive Web Apps
will change the game
agencies**

by  **PRATIK DHOLAKIYA** — 28 days ago in **CONTRIBUTORS**

**How Progressive Web Apps Could Change the
Mobile Landscape**

**It's time retailers embrace progressive web
apps**
GUEST COMMENT 23 Aug 2018

Should I believe
the hype?

circuit breaker
Web apps are only getting better
By **Paul Miller** | **@futurepaul** | Apr 11, 2018, 8:20am EDT

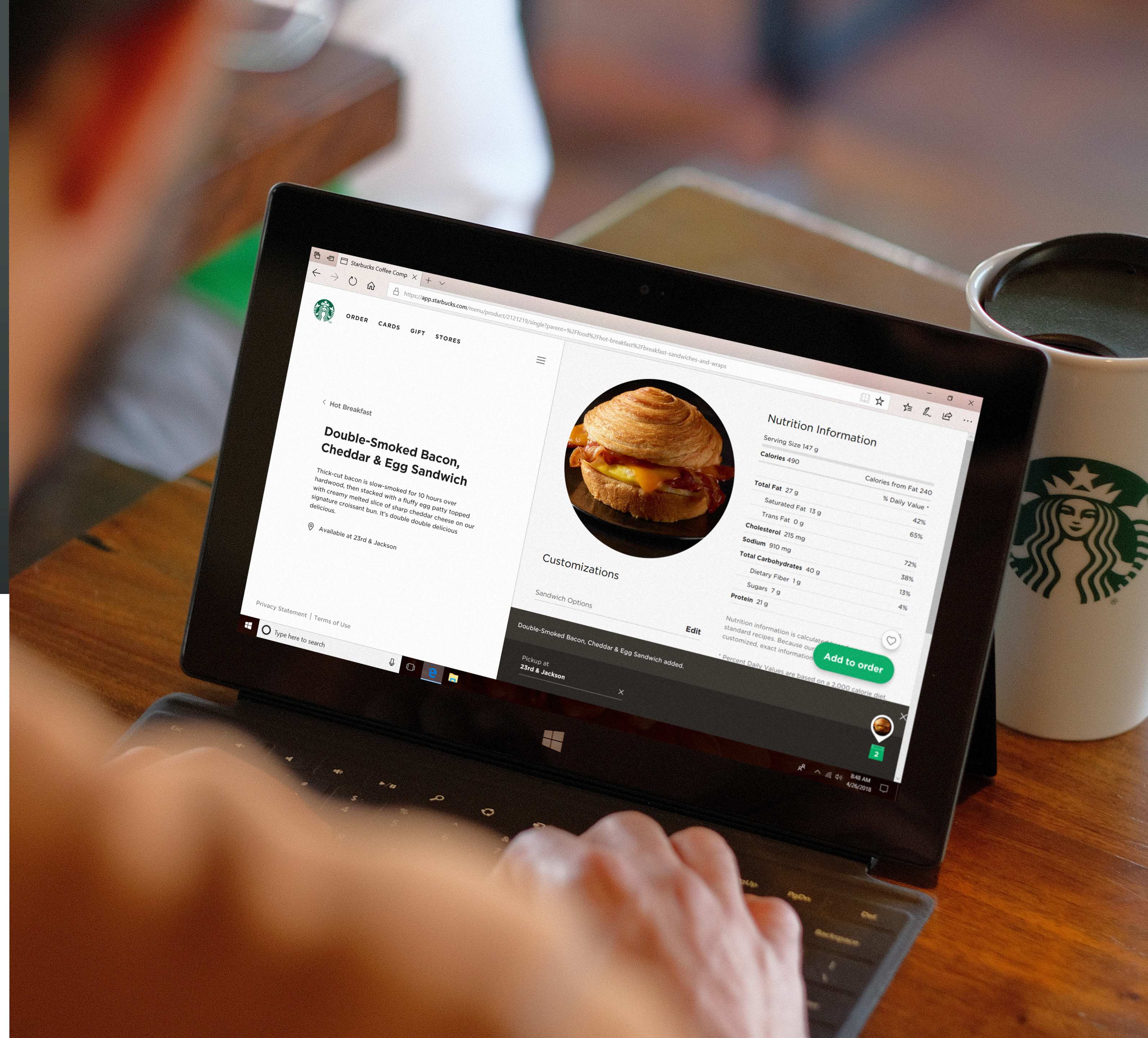
25,962 views | Mar 9, 2018, 07:30am
**Why Progressive Web Apps
Will Replace Native Mobile
Apps**
looki CommunityVoice

Maybe?

Starbucks: 2x increase in daily active users



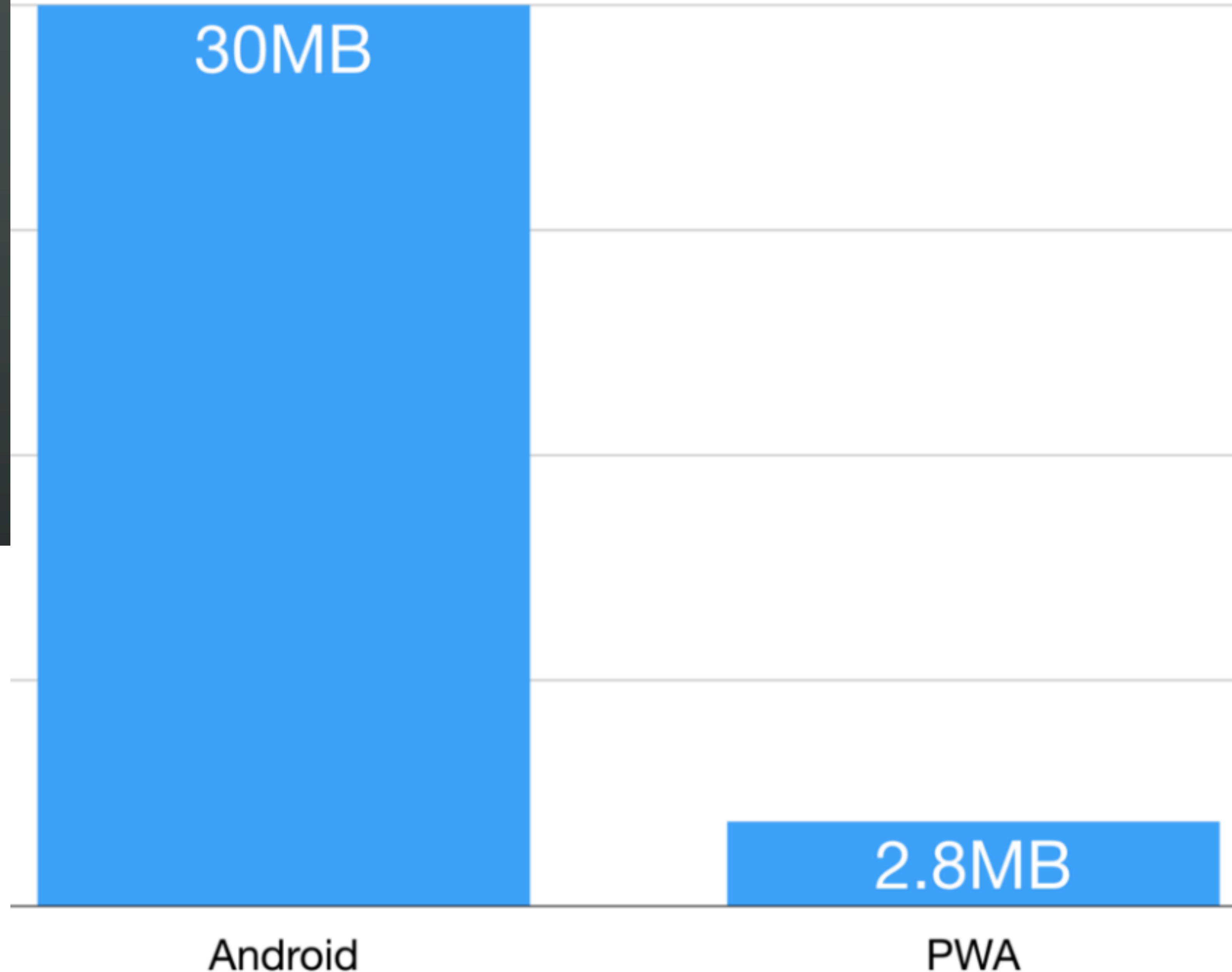
aka.ms/google-io-2018



Tinder:
Core experience
with 90% less code



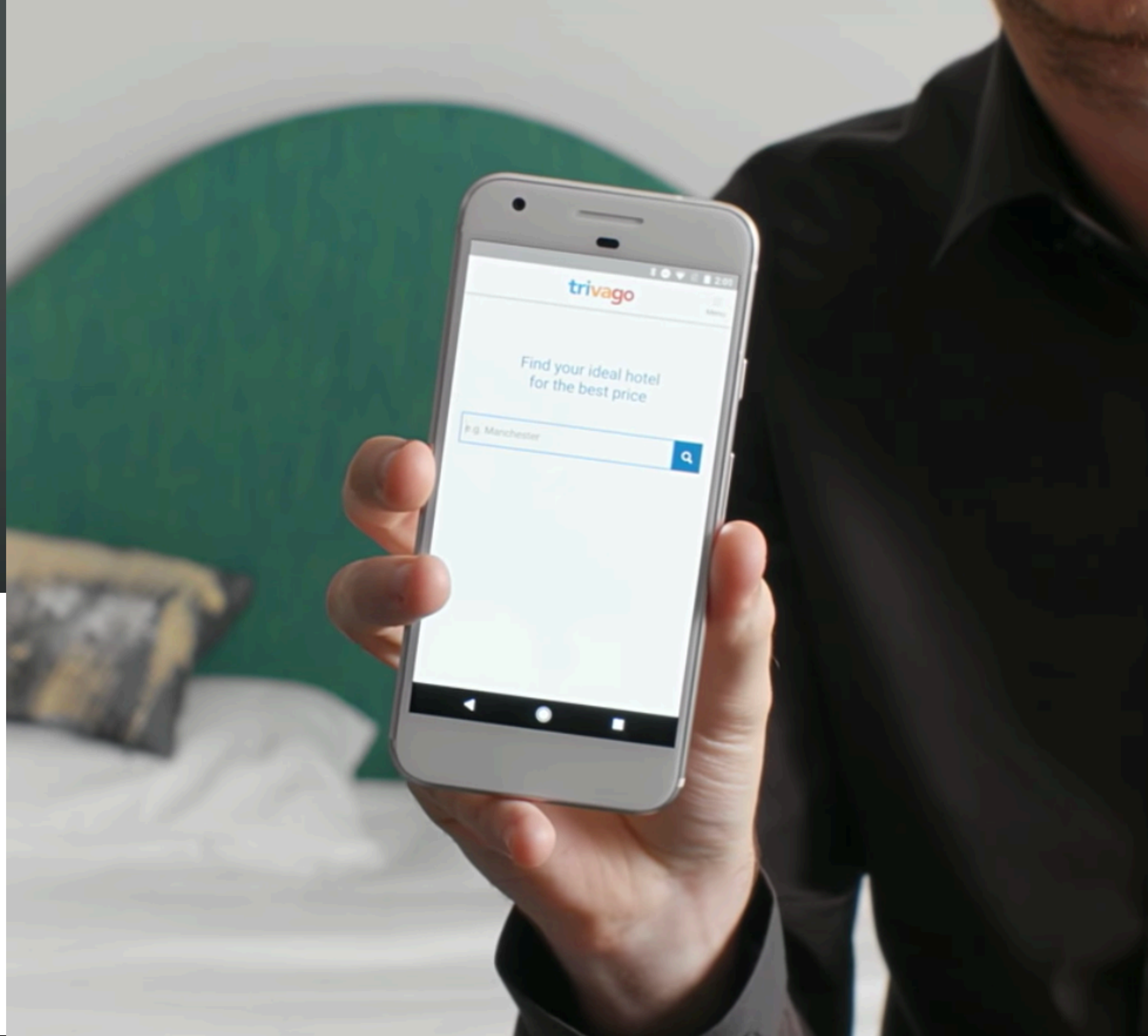
aka.ms/tinder-pwa-2017



Trivago:
97% increase in
click-outs to
hotel offers



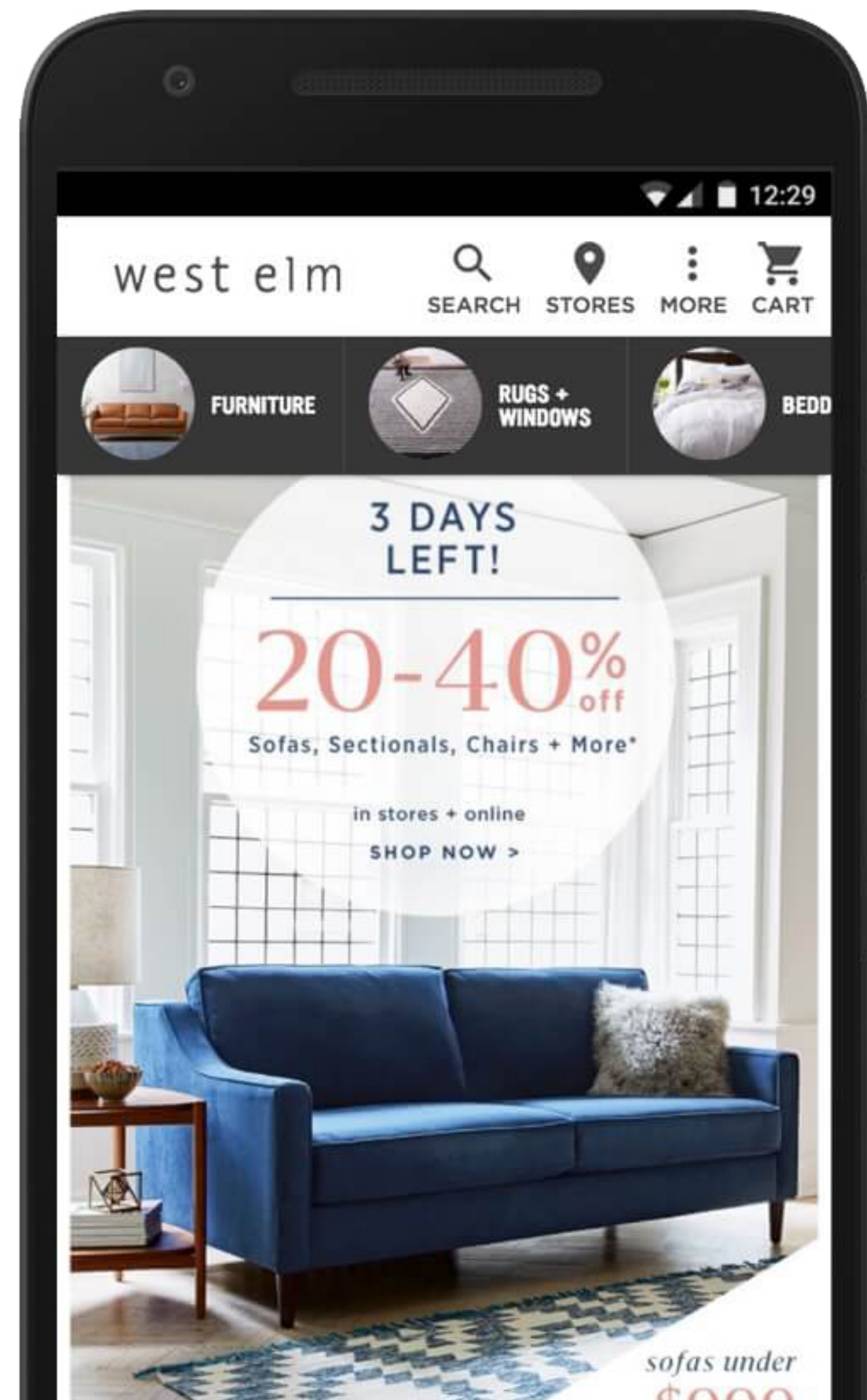
aka.ms/trivago-pwa-2017



West Elm:
15% increase in
time on site
9% increase in
revenue per visit

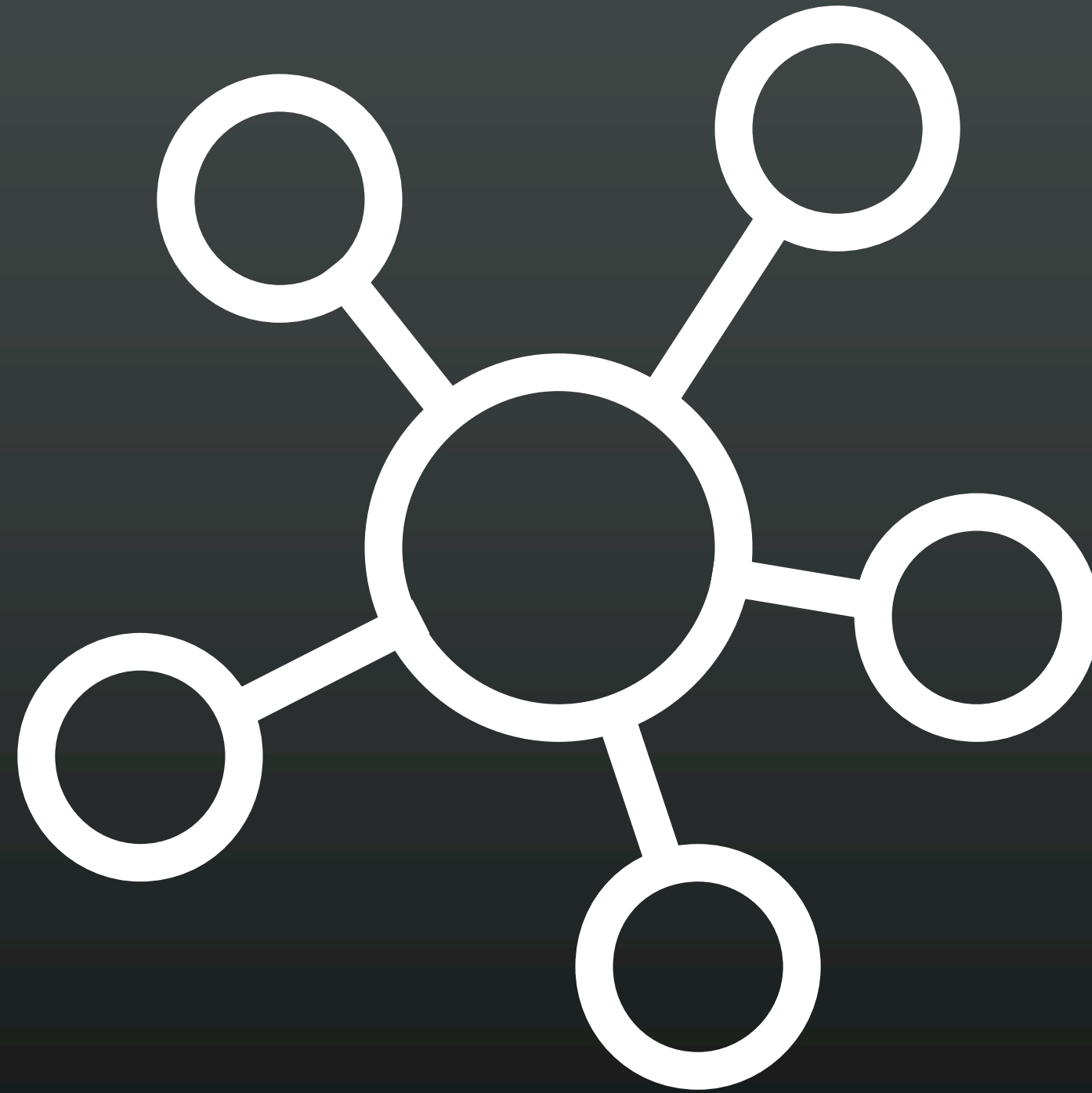
west elm

aka.ms/west-elm-pwa-2017



PWA Stats

Let's talk about Service Worker



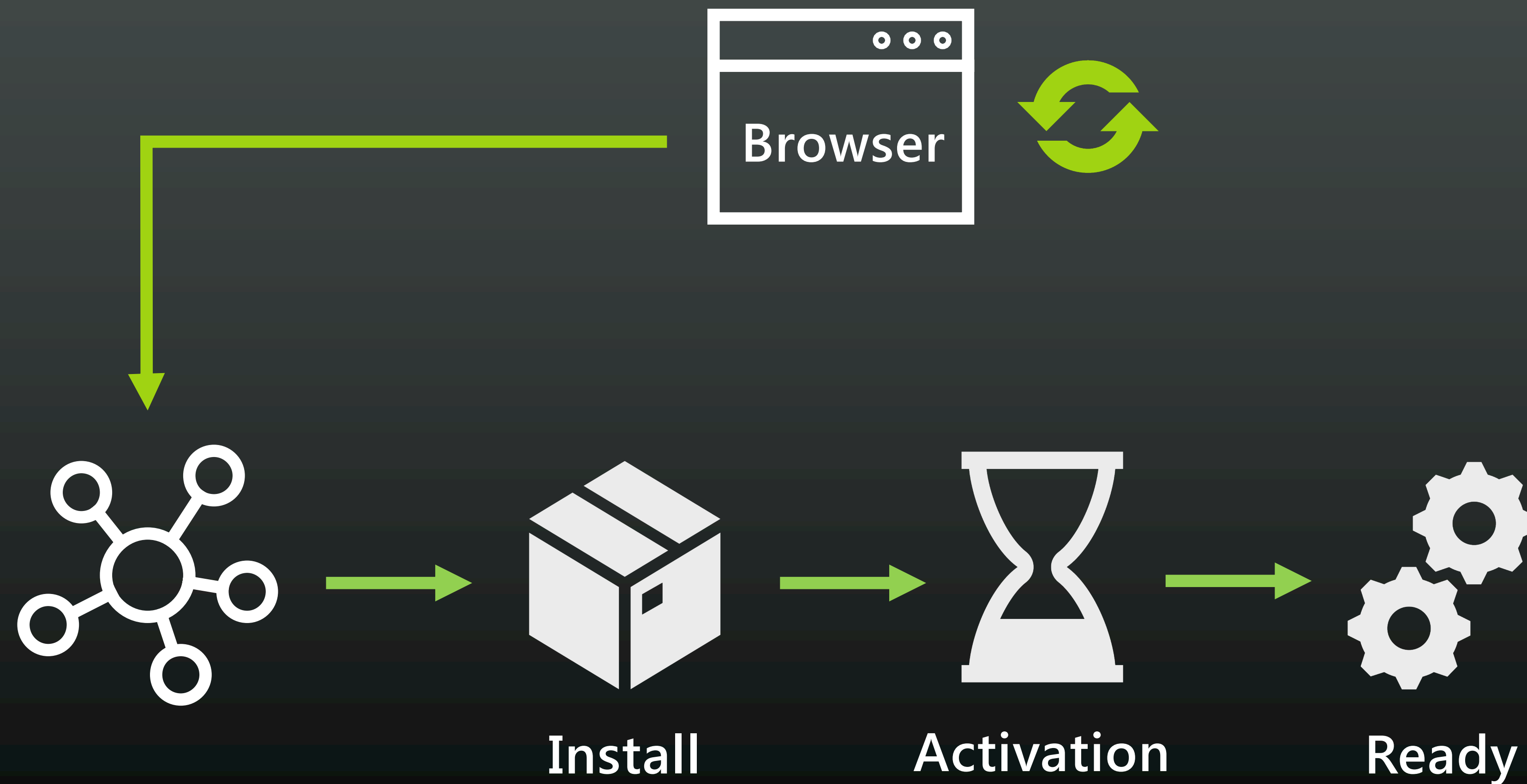
Registering a Service Worker

```
if ( "serviceWorker" in navigator ) {  
    navigator.serviceWorker.register( "/serviceworker.min.js" );  
}
```

Path is important!



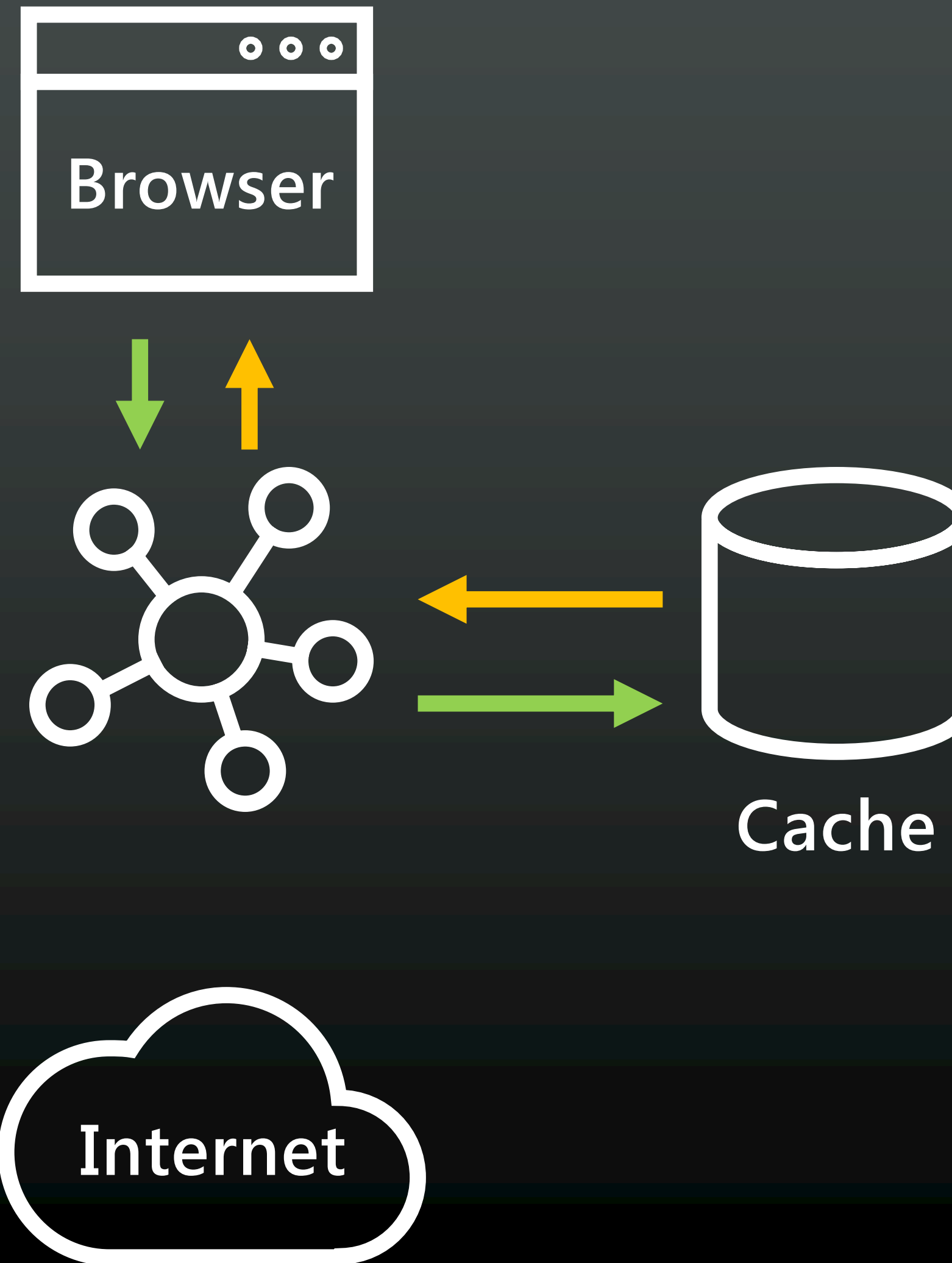
The Service Worker Lifecycle



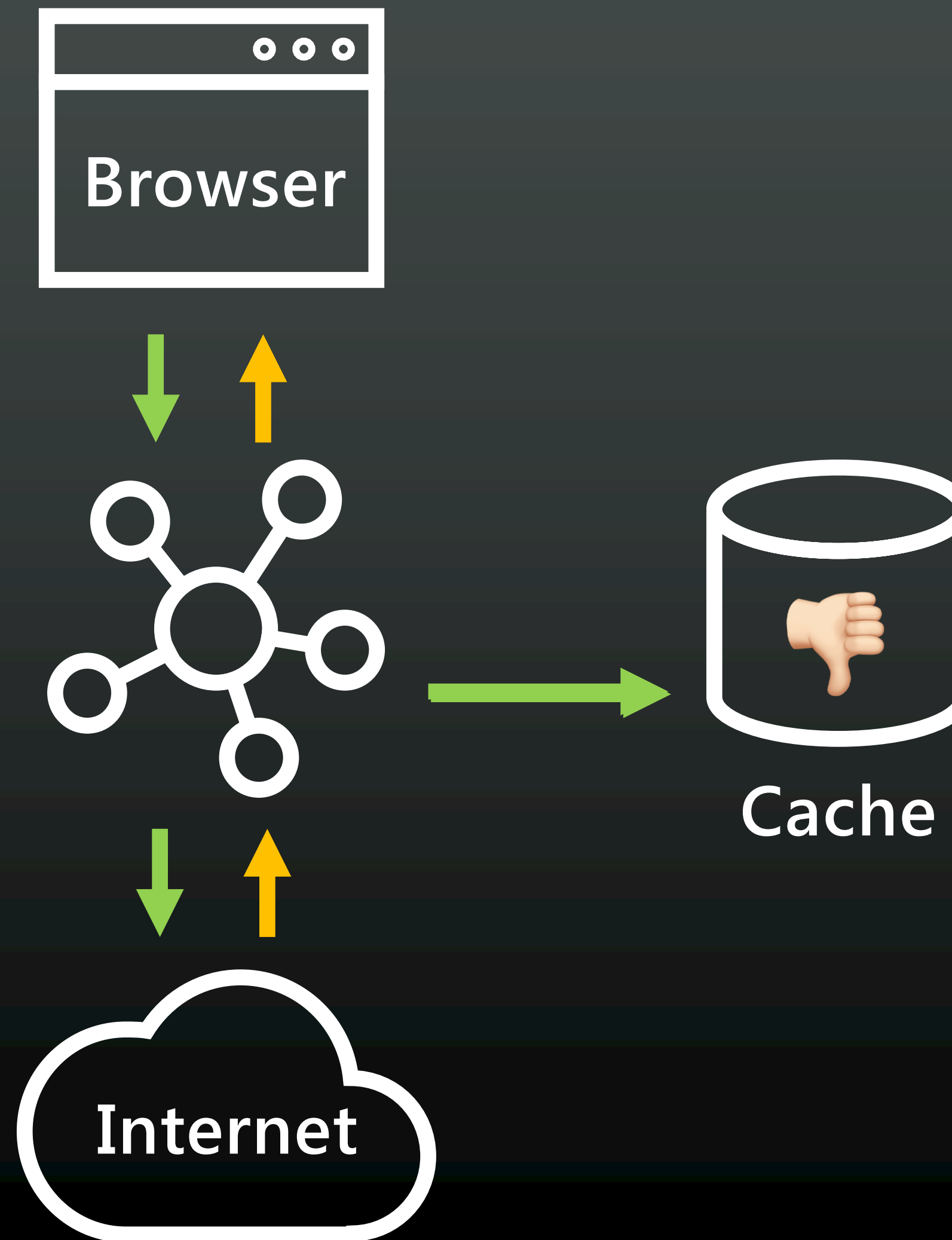
How connections are made



Along comes Service Worker



Along comes Service Worker



PWAs start with a great web
experience and then **enhance**
that experience for performance,
resilience, installation,
and engagement

Progressive Web App Enhancement

PWAs **start with a great web experience** and then enhance that experience for performance, resilience, installation, and engagement

Progressive Web App

Progressive
/prə'gresiv/

happening or developing
gradually or in stages;
proceeding step by step

Step 1

Focus on what matters

IN THIS TEMPLE
AS IN THE HEARTS OF THE PEOPLE
FOR WHOM HE SAVED THE UNION
THE MEMORY OF ABRAHAM LINCOLN
IS ENSHRINED FOREVER



Consider forbes.com circa 2007



“Mobile first” thinking
isn’t just about mobile

The Illusion of Control i X + -

alistapart.com/article/the-illusion-of-control-in-web-design#comments

ALA ALA EE TeamWork TeamWork Translator Links Email MStavel Microsoft OSS Tank Resources Favelets

ARTICLES EVENTS TOPICS WRITE FOR US

A LIST APART

The Illusion of Control in Web Design

by [Aaron Gustafson](#) · April 26, 2018

Published in [Code](#)

and engaging web experiences. We scrutinize every detail of an
ers getting the animation swing just right. We refactor our
actions of a second off load times. We control absolutely
everything we can, but the harsh reality is that we control less than we think.

Last week, two events reminded us, yet again, of how right Douglas Crockford was when he declared the web “the most hostile software engineering environment imaginable.” Both were serious enough to take down an entire site—actually hundreds of entire sites, as it turned out. And both were avoidable.

In understanding what we control (and what we don’t), we will build resilient, engaging products for our users.

What happened?

The first of these incidents involved the launch of Chrome 66. With that release, Google implemented a security patch with serious implications for folks who weren’t paying attention. You might recall that [quite a few questionable SSL certificates issued by Symantec Corporation’s PKI began to surface](#) early last year. Apparently, Symantec had

A Book Apart:
Brief books for people who make websites.

An Event Apart:
3 days of design, code, and content
for web & UX designers & devs.

6 comments

Share this on

Twitter Facebook Google+

Become a patron

11:27 AM
5/1/2018

Remember that text is the
first interface


IN THIS TEMPLE
AS IN THE HEARTS OF THE PEOPLE
FOR WHOM HE SAVED THE UNION
THE MEMORY OF ABRAHAM LINCOLN
IS ENSHRINED FOREVER



Is there anything missing
that would help users be
more successful?

IN THIS TEMPLE
AS IN THE HEARTS OF THE PEOPLE
FOR WHOM HE SAVED THE UNION
THE MEMORY OF ABRAHAM LINCOLN
IS ENSHRINED FOREVER





Step 2

Use markup that supports the core experience

The words we choose matter,
but the markup we use
matters equally



What does it mean?

```
<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>
```

This is self-contained content

```
<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>
```

There's a tag for that: **article**

```
<article 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>
</article>
```


This is the title of the post

```
<article 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>
</article>
```

There's a tag for that: h1-h6

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <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>
</article>
```


Various properties of the post

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <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>
</article>
```

There's an element for that: **dl**

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <dl class="entry__meta">
    <dt>Published</dt> <dd>24 May 2017</dd>
    <dt>Reading Time</dt> <dd>25 minutes</dd>
  </dl>
  <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>
</article>
```

Bonus: `time`

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <dl class="entry__meta">
    <dt>Published</dt> <dd><time>24 May 2017</time></dd>
    <dt>Reading Time</dt> <dd>25 minutes</dd>
  </dl>
  <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>
</article>
```


Bonus: time

```
<time datetime="2017-05-24">  
  24 May 2017</time>
```

```
<time datetime="2017-05-24T11:13:24">  
  24 May 2017</time>
```

```
<time datetime="2017-05-24T11:13:24-04:00">  
  24 May 2017</time>
```

"Flow" content with line breaks

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <dl class="entry__meta">
    <dt>Published</dt> <dd><time ...>24 May 2017</time></dd>
    <dt>Reading Time</dt> <dd>25 minutes</dd>
  </dl>
  <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>
</article>
```


"Flow" content, divided

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <dl class="entry__meta">
    <dt>Published</dt> <dd><time ...>24 May 2017</time></dd>
    <dt>Reading Time</dt> <dd>25 minutes</dd>
  </dl>
  <div class="entry__content">
    <div>I had the great pleasure of delivering a...</div>
    <div>I do a lot of traveling and it's...</div>
  </div>
</article>
```

This is meaningful content

```
<article class="entry">
  <h1 class="entry__title">Progressive Web Apps and
    the Windows Ecosystem</h1>
  <dl class="entry__meta">
    <dt>Published</dt> <dd><time ...>24 May 2017</time></dd>
    <dt>Reading Time</dt> <dd>25 minutes</dd>
  </dl>
  <div class="entry__content">
    <p>I had the great pleasure of delivering a talk...</p>
    <p>I do a lot of traveling and it's...</p>
  </div>
</article>
```


*With CSS it all looks the same
anyway, so why should I care?*



Readability

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

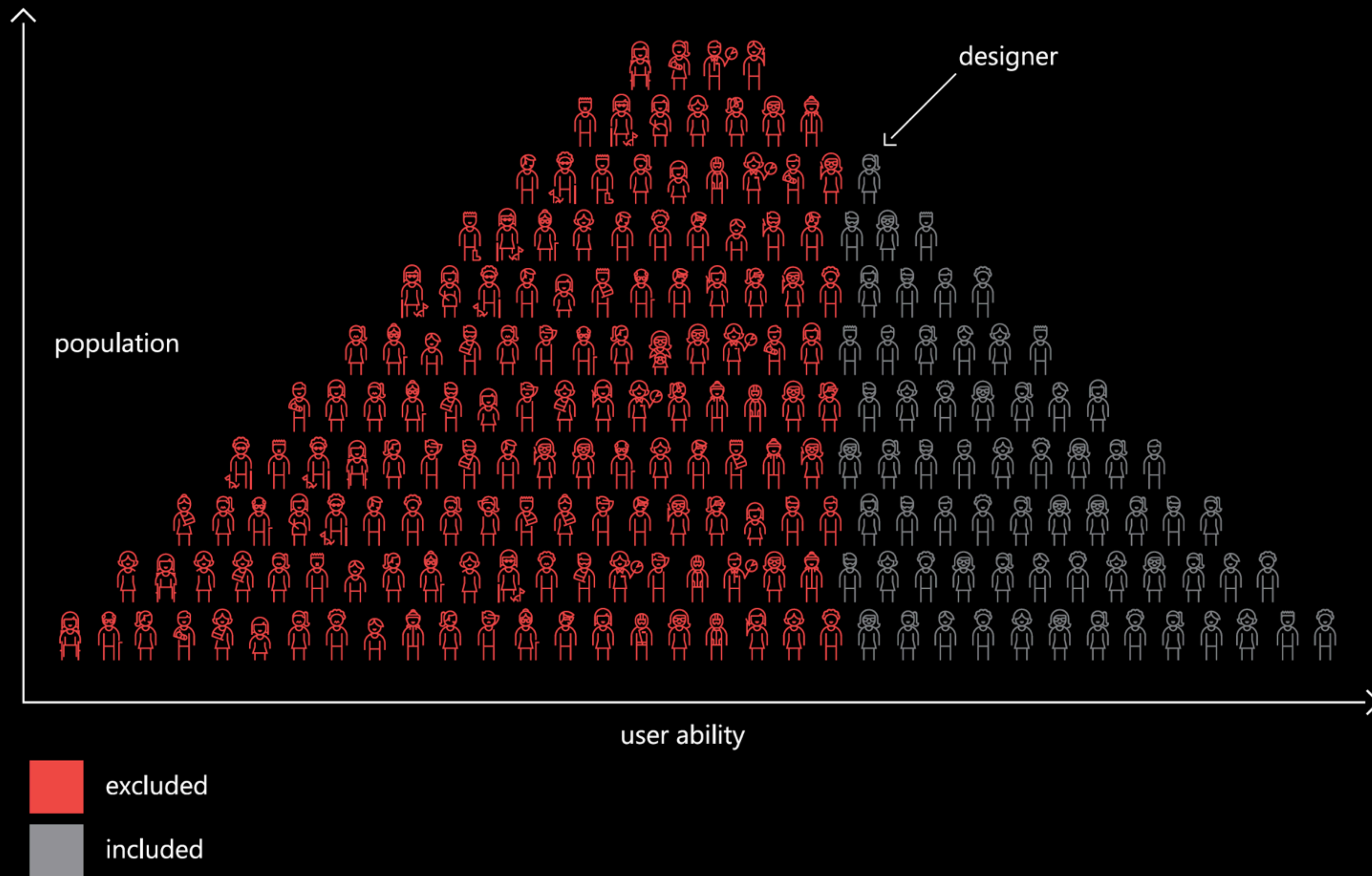
24 May 2017

Reading Time

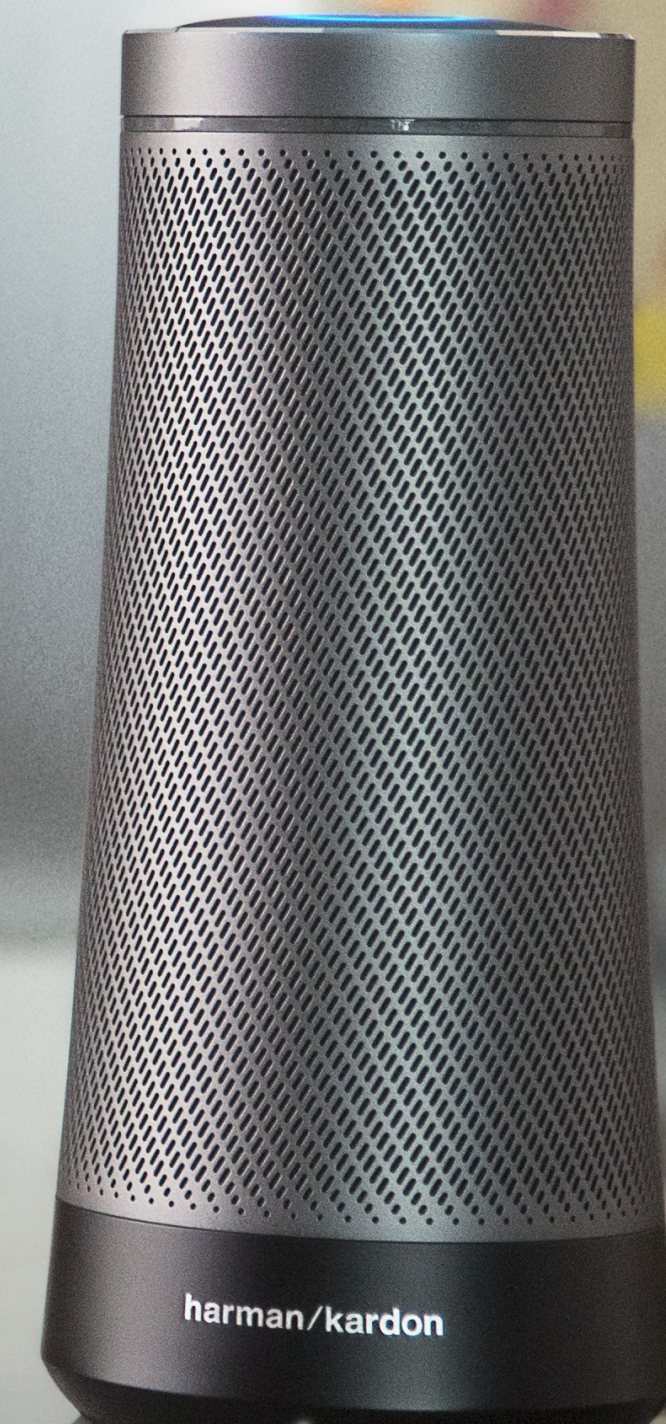
25 minutes

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

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



Hey Cortana, read me the top three headlines in today's New York Times



Access via semantics:

```
function extractHeadlines( response ){
  var $html = document.createElement('div'),
      $headings, i=0, headlines=[];

  $html.innerHTML = response.contents;

  $headings = $html.querySelector('#top-new')
               .querySelectorAll('article h1, article h2, article h3');
  heading_count = $headings.length;

  while (headlines.length < 3) {
    let $link = $headings[i].querySelector('a');
    if ($link && $link.href) {
      headlines.push({
        title: $headings[i].innerText.trim(),
        link: $link.href
      });
    }
    i++;
  }
  console.log( headlines );
}
```


Access via semantics:

```
function extractHeadlines( response ){
  var $html = document.createElement('div'),
      $headings, i=0, headlines=[];

  $html.innerHTML = response.contents;

  $headings = $html.querySelector('#top-new')
               .querySelectorAll('article h1, article h2, article h3');
  heading_count = $headings.length;

  while (headlines.length < 3) {
    let $link = $headings[i].querySelector('a');
    if ($link && $link.href) {
      headlines.push({
        title: $headings[i].innerText.trim(),
        link: $link.href
      });
    }
    i++;
  }
  console.log( headlines );
}
```




A LIST APART

Northwestern
PROFESSIONAL STUDIES

Prepare for leadership roles at the intersection of design and technology in Northwestern's online MS in Information Design & Strategy program.

Conversational Semantics

by [Aaron Gustafson](#) · August 30, 2018

Published in [HTML](#), [Accessibility](#)

More about semantics
for “headless” UIs

As customer support chat bots become the norm, we have to think about how our content looks but how it could sound. We can—and should—use HTML and ARIA to make our content structured, sensible, and most importantly, meaningful.

Content, confined

Most bots and digital assistants work from specially-coded data sets, APIs, and models, but there are more than 4.5 billion pages of content on the web, trapped, in many cases, within our websites. Articles, stories, blog posts, educational materials, books, and marketing messages—all on the web, but in many cases unusable in a non-visual

Northwestern
PROFESSIONAL STUDIES

Prepare for leadership roles at the

9 comments

Share this on

aka.ms/conversational-semantics



Articles



Books



Events



Jobs



Membership

 Topics

MAY 23, 2016 • [17 COMMENTS](#)

Developing Dependency Awareness

[Coding](#) ⁵⁸⁷ # [CSS](#) ²⁴³ # [JavaScript](#) ¹⁸⁶ # [jQuery](#) ⁴⁰

I'm sure you've heard the proverb, "A chain is only as strong as its weakest link," probably many times. Its written origin dates back to the 18th century, but I wouldn't be surprised if it was much, much older. And though the work we do has little to do with

aka.ms/dependency-awareness

Let's say you needed a button...

Sign Up

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

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

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

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


Let's compare

Pattern	Display	Semantics	Focusable?	Activate By	Submits Forms
<code>input[type=submit]</code>	button	button	Yes	Mouse, touch, ENTER, SPACE	Yes
<code>button[type=submit]</code>	button	button	Yes	Mouse, touch, ENTER, SPACE	Yes
<code>a</code>	link	Named generic	Yes	Mouse, touch, ENTER	No
<code>div</code>	block	Not exposed	No	N/A	No

UX gaps that need to be filled

Pattern	Display	Semantics	Focusable?	Activate By	Submits Forms
<code>input[type=submit]</code>	button	button	Yes	Mouse, touch, ENTER, SPACE	Yes
<code>button[type=submit]</code>	button	button	Yes	Mouse, touch, ENTER, SPACE	Yes
<code>a</code>	link	Named generic	Yes	Mouse, touch, ENTER	No
<code>div</code>	block	Not exposed	No	N/A	No

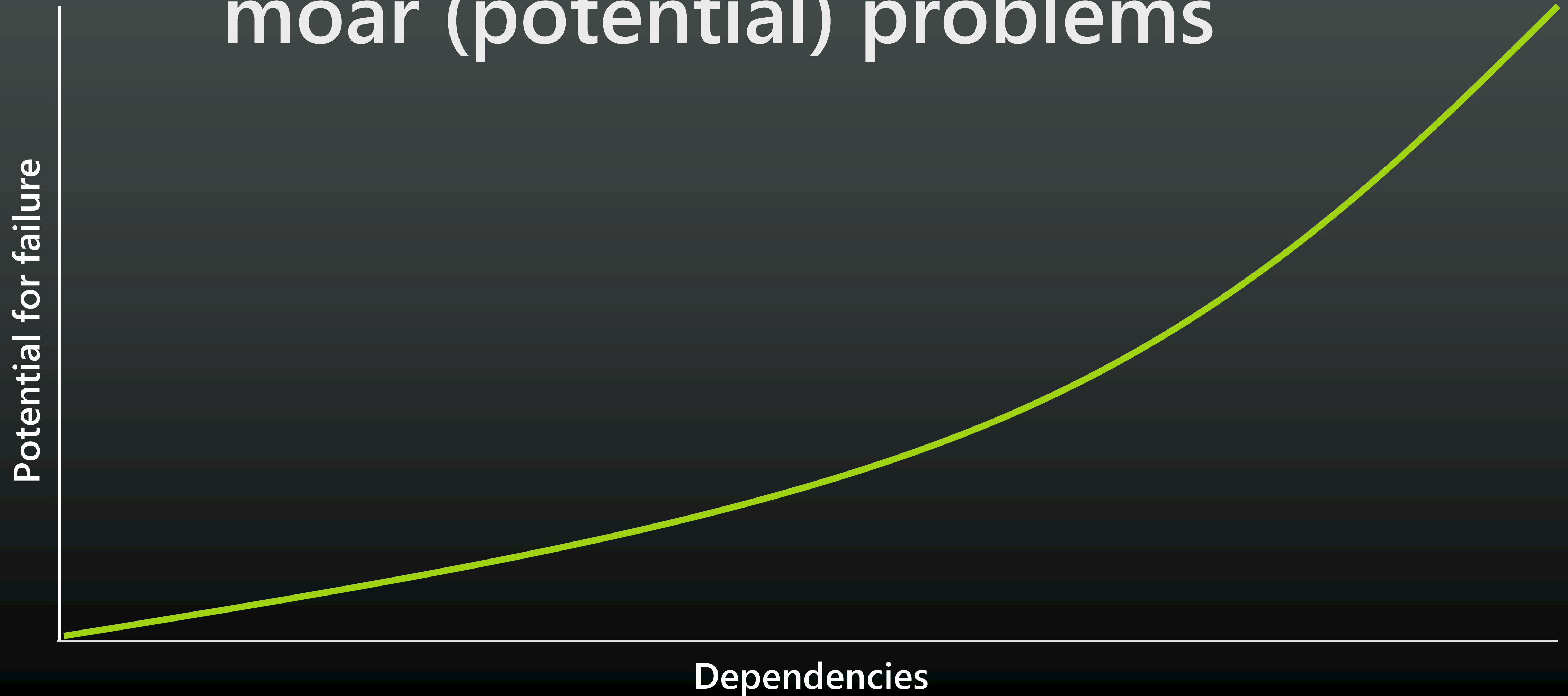
Moar dependencies

Pattern	Display	Semantics	Focusable?	Activate By	Submits Forms
<code>input[type=submit]</code>	None	None	None	None	None
<code>button[type=submit]</code>	None	None	None	None	None
<code>a</code>	CSS	ARIA	None	JavaScript	JavaScript
<code>div</code>	CSS	ARIA	HTML	JavaScript	JavaScript

Moar dependencies

Pattern	Display	Semantics	Focusable?	Activate By	Submits Forms
<code>input[type=submit]</code>	None	None	None	None	None
<code>button[type=submit]</code>	None	None	None	None	None
<code>a</code>	CSS	ARIA	None	JavaScript	JavaScript
<code>div</code>	CSS	ARIA	HTML	JavaScript	JavaScript

Moar dependencies, moar (potential) problems



Disaster averted



Michael Spellacy

@Spellacy

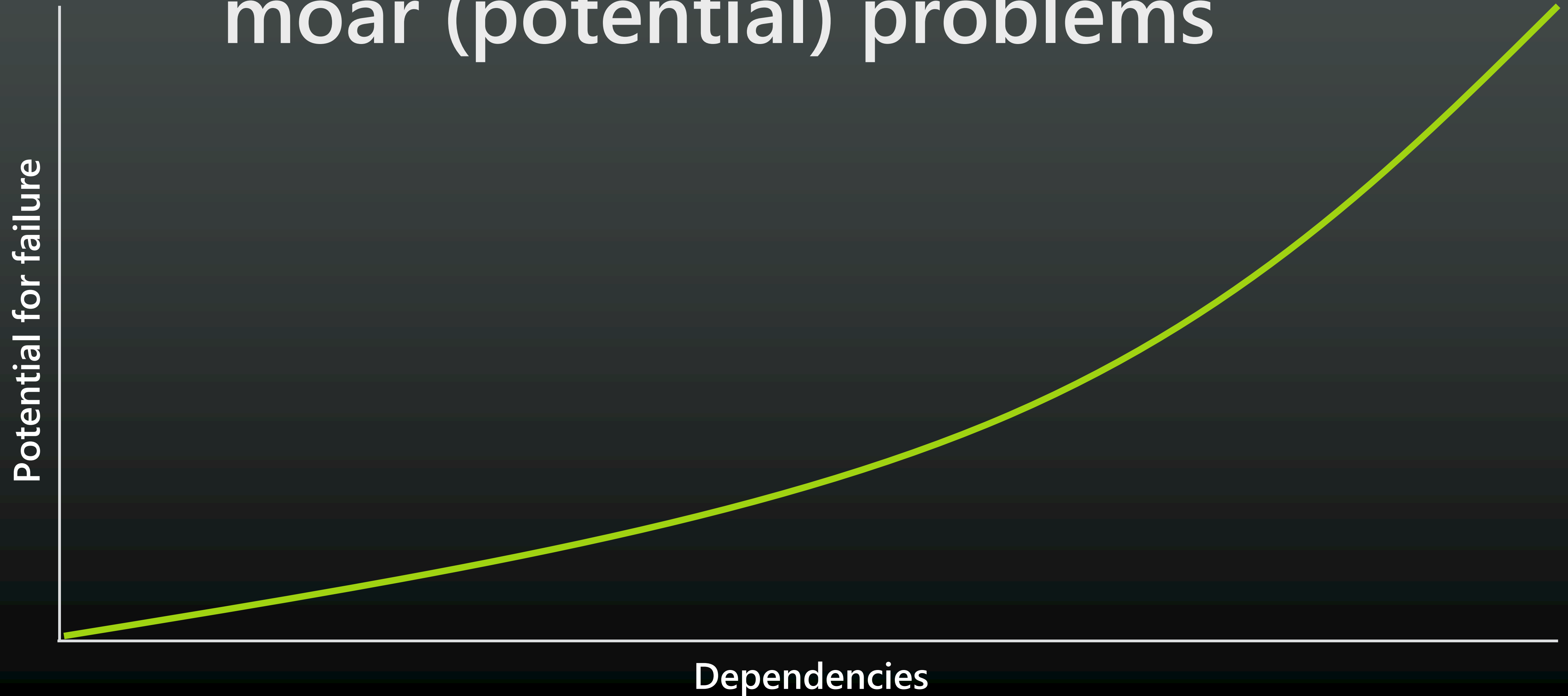
Follow



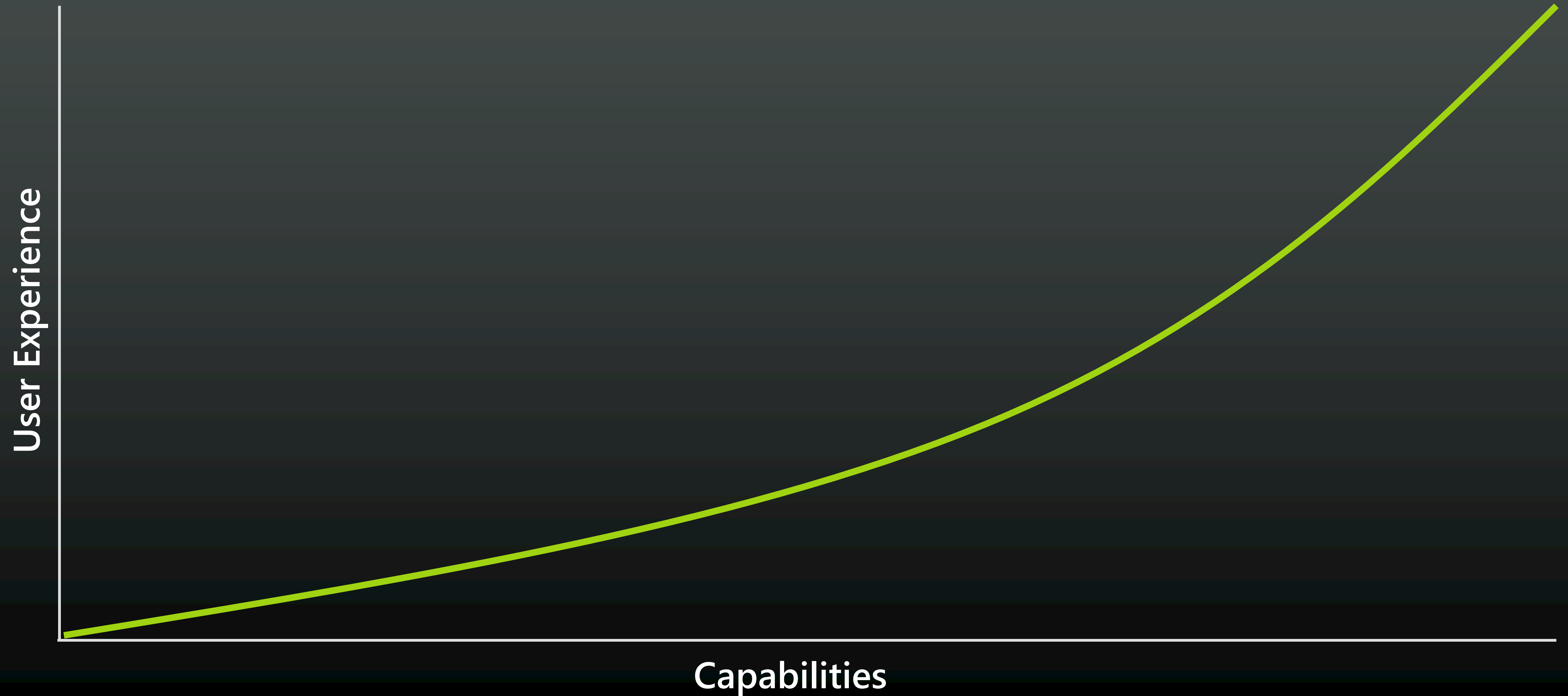
Do you think progressive enhancement is a waste of time? Think again! Chrome 66 just knocked out SSL on a CDN that hosted CSS and JS for 200 of my employer's sites and most of them still work with good ol' HTML! [@AaronGustafson](#) would be proud! :-)

10:15 PM - 18 Apr 2018

Moar dependencies, moar (potential) problems



Enhance the experience



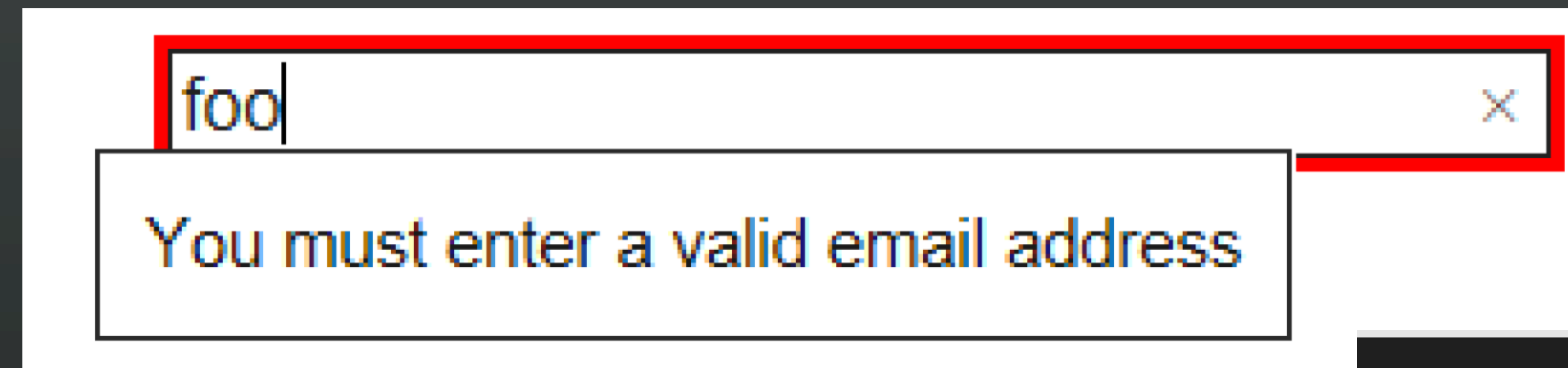
Enhancing UX with markup

```
<input type="email" name="email" id="email"  
  required aria-required="true">
```



Enhancing UX with markup

```
<input type="email" name="email" id="email"  
      required aria-required="true">
```

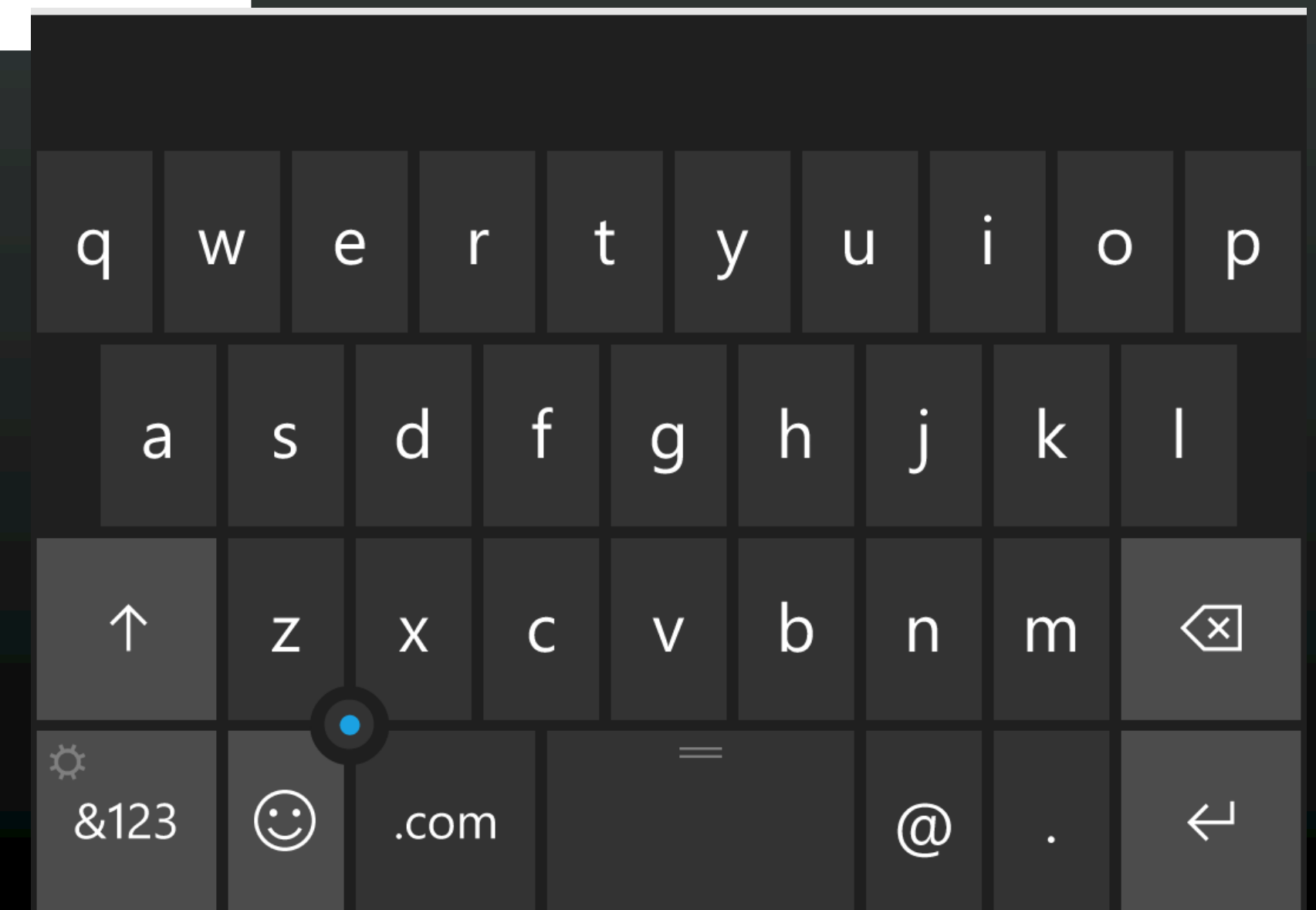


foo

You must enter a valid email address

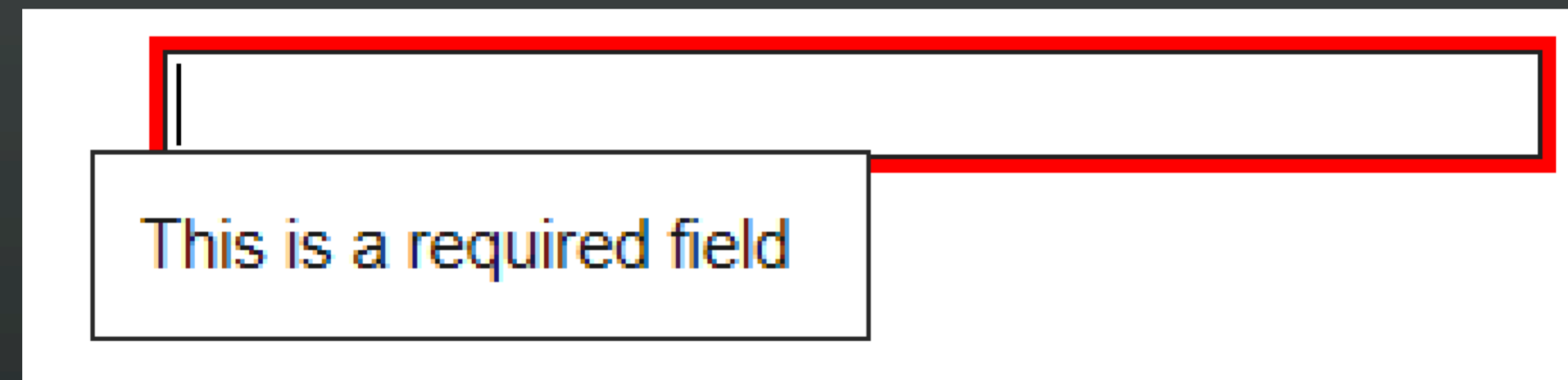
Experience deltas

1. Support for email input type?
2. Validation algorithm implemented?
3. Virtual keyboard?



Enhancing UX with markup

```
<input type="email" name="email" id="email"  
  required aria-required="true">
```



This is a required field

Experience deltas

1. Support for HTML validation?

Enhancing UX with markup

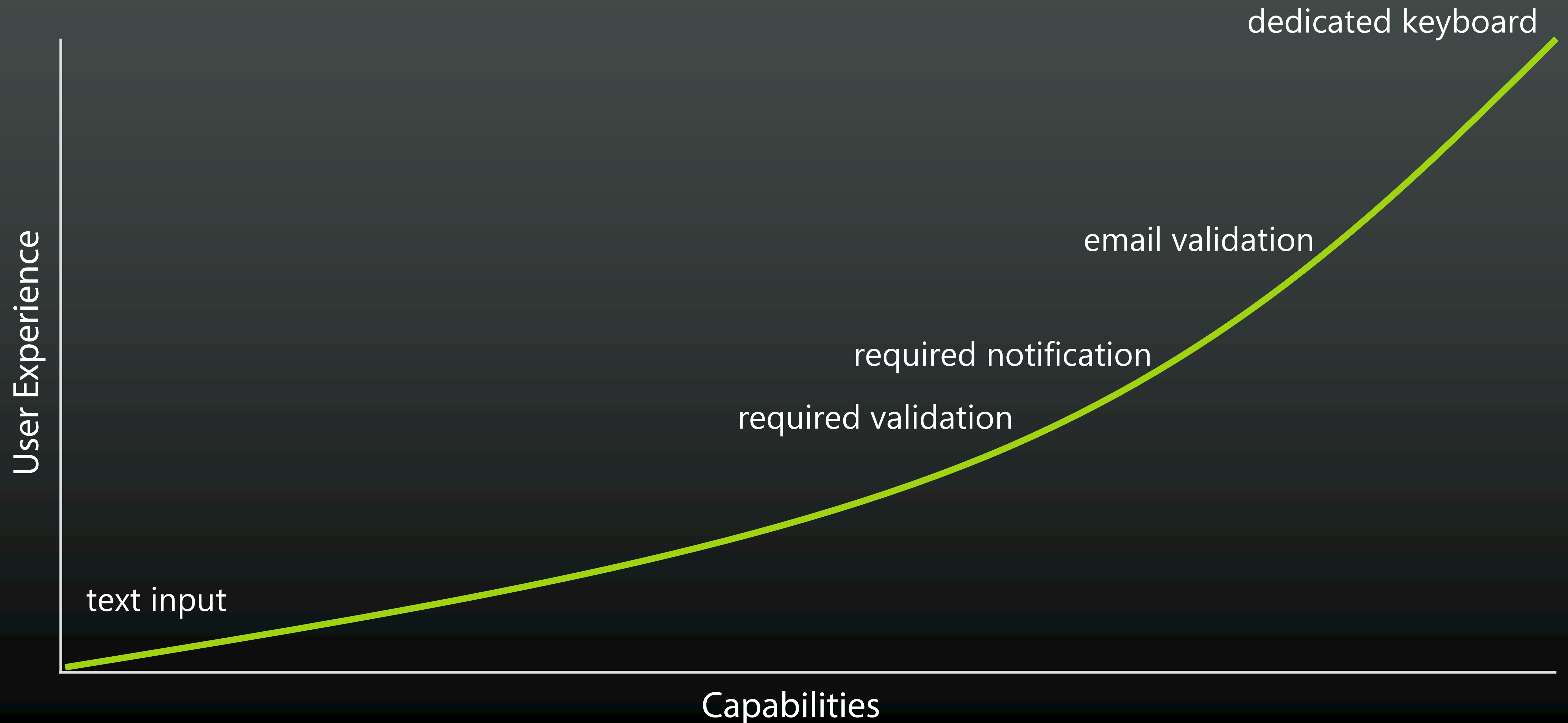
```
<input type="email" name="email" id="email"  
      required aria-required="true">
```



Experience deltas

1. Browser exposure of aria-required property?
2. Assistive tech implementation of aria-required?

Enhance the experience



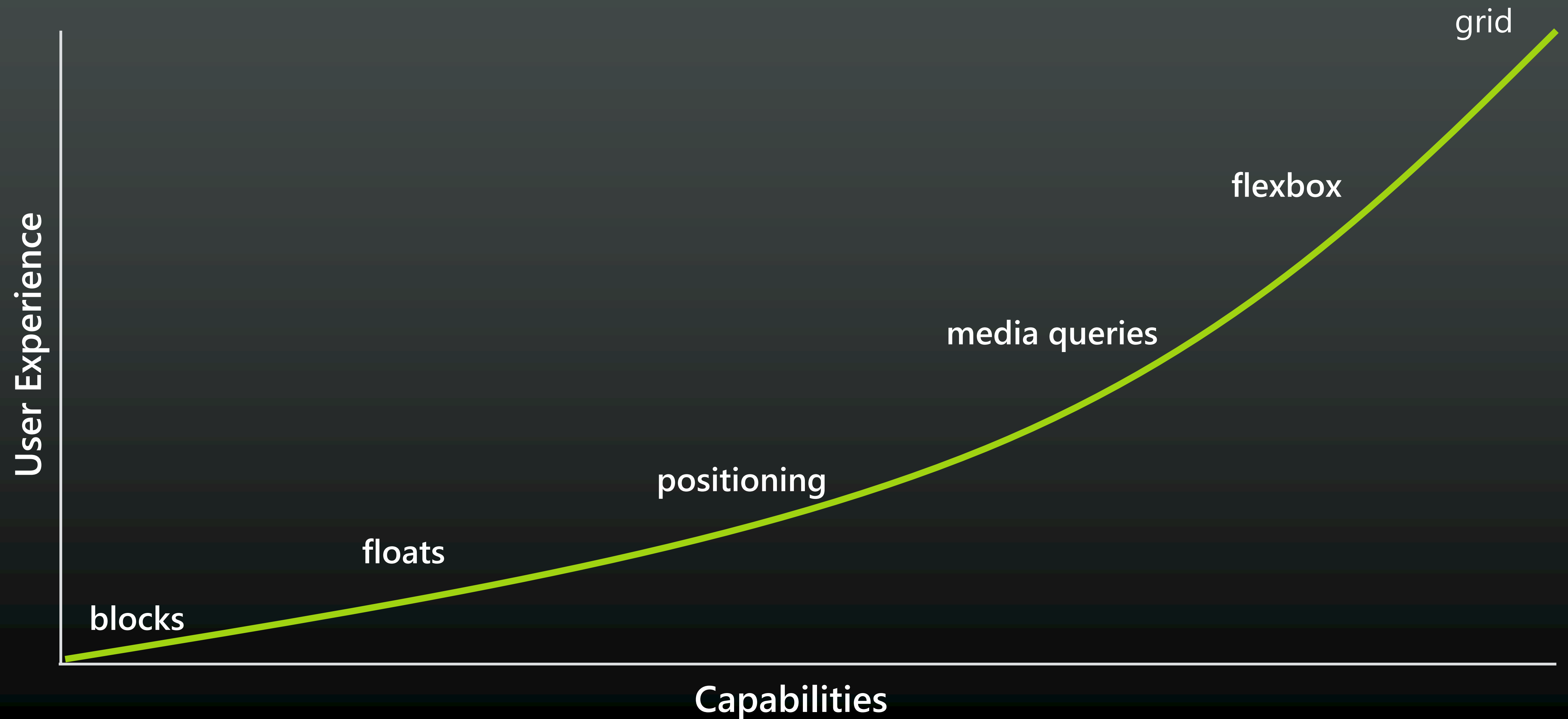
When you think of user experience as a continuum that scales with capabilities, a progressive approach to interfaces is both elegant and powerful.



Step 3 Design in support of the core experience



Enhance the experience



Enhance!

ay!



Basic, but ok!

Gridbyexample

Progressive Enhancement

Grid Garden

Progressive Enhancement Demo

Leverage the power of CSS Grid Layout!

Read [this article](#) for details on how to use CSS Grid Layout today.

I've been amazed at how often those outside the discipline of design assume that what designers do is decoration—likely because so much bad design simply is decoration.

Good design isn't.

Good design is problem solving.

— Jeff Veen



Tools for graphic design

Alignment

Proportion

Balance

Proximity

Contrast

Repetition

Emphasis

Rhythm

Gestalt

Unity

Harmony

White Space

Movement

Tools for graphic design

Alignment

Balance

Contrast

Emphasis

Gestalt

Harmony

Movement

Proportion

Proximity

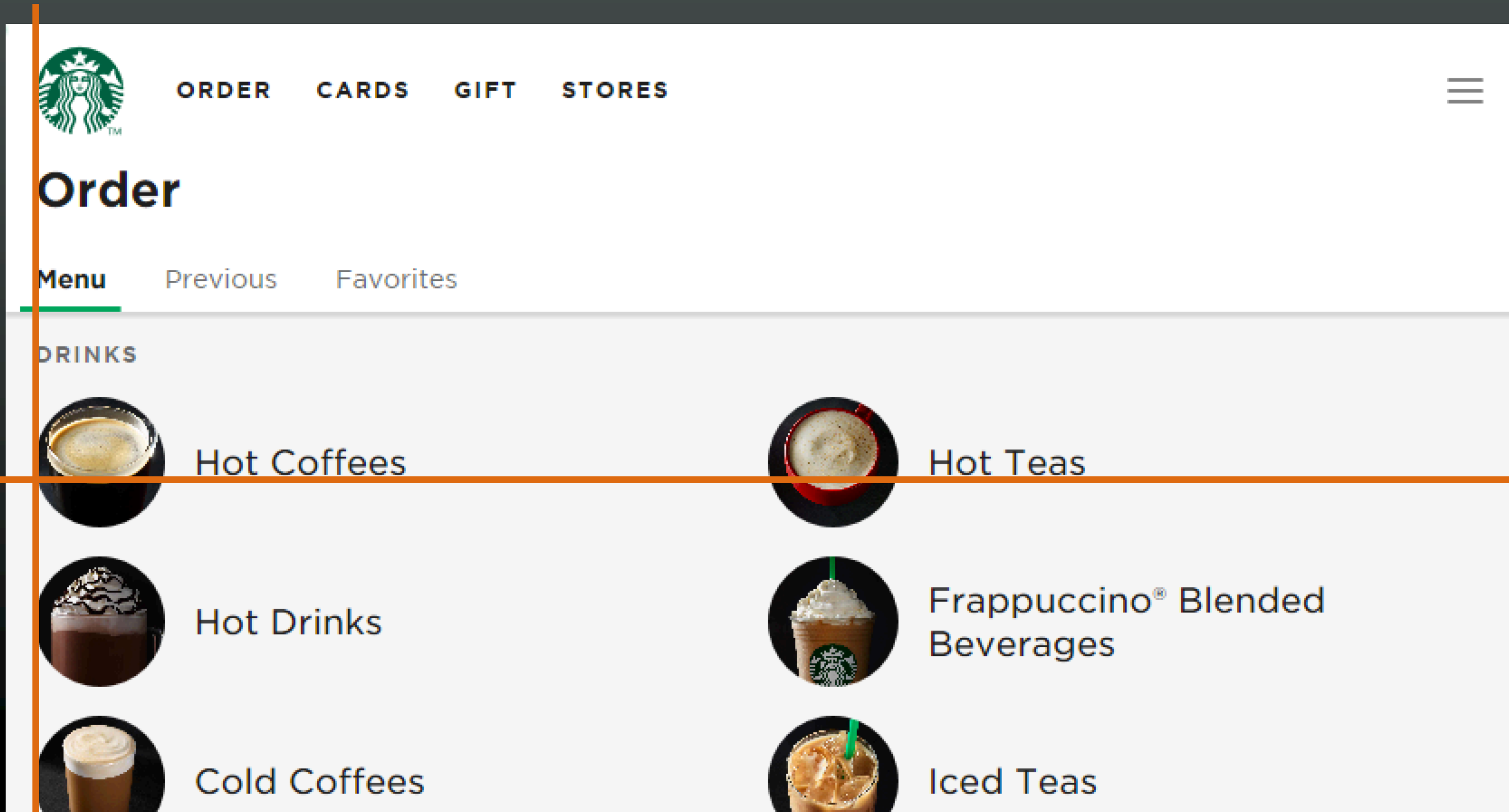
Repetition

Rhythm

Unity

White Space

Alignment



Contrast

Medium

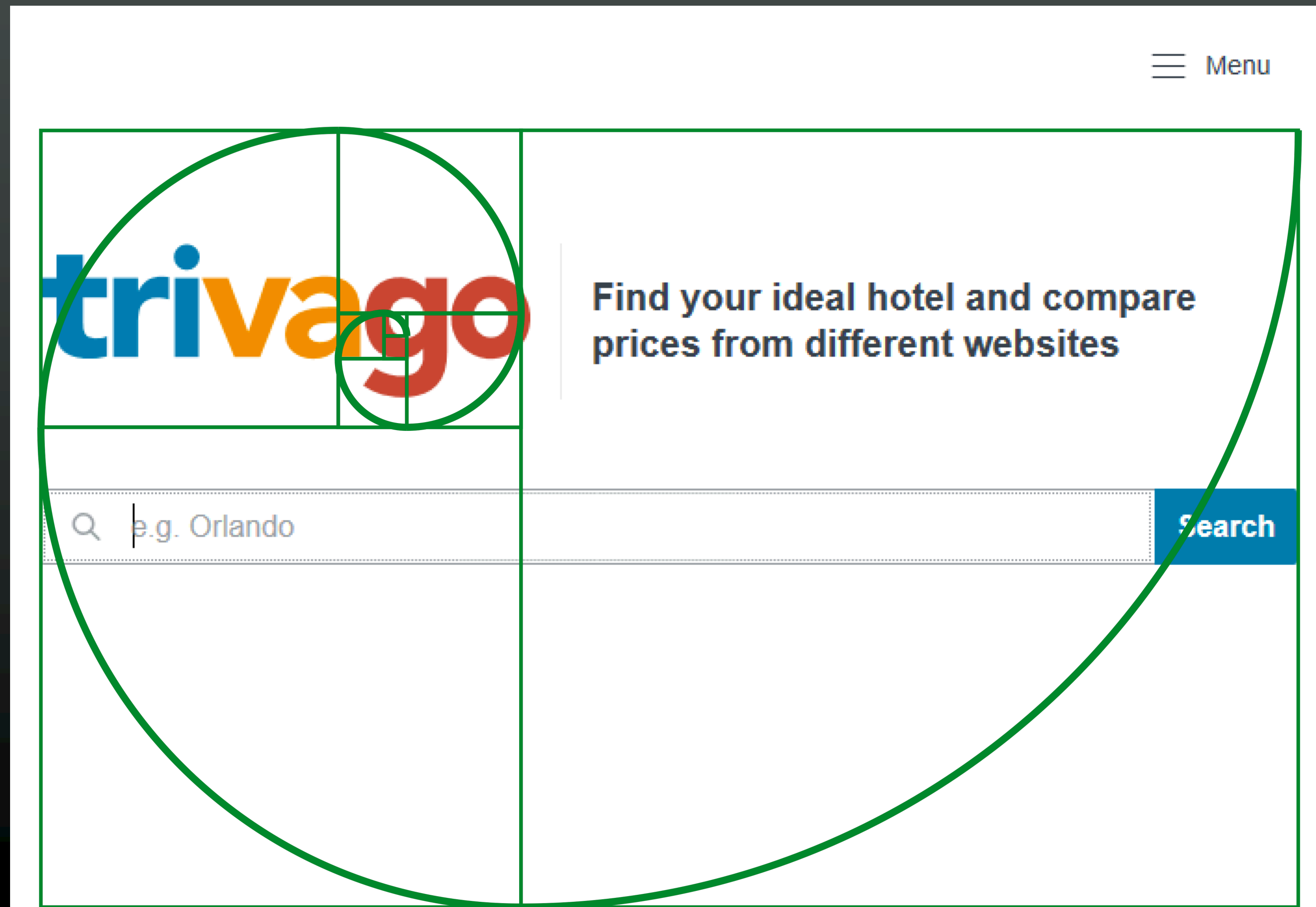
MEMBER FEATURE STORY

Believing Women Means Believing Their Pain


A notoriously dangerous birth control device reveals the extent to which the medical establishment disbelieves women's pain




Proportion



Proximity



A cartoon fox mascot wearing a white t-shirt with "CAR FOX" printed on it and tan pants. The mascot is standing on the left side of the form.



A red tag with the word "FREE" in white, hanging from a string.

Create FREE Account

EMAIL

PASSWORD

- Minimum 8 Characters
- 1 Capital Letter
- 1 Lowercase Letter
- 1 Number

Create FREE Account

Rhythm

Lorem ipsum dolor sit amet, consectetur adipisicing elit. Quasi reprehenderit sint obcaecati reiciendis voluptas voluptate excepturi recusandae ab accusamus deleniti facilis, illo placeat harum, iusto ratione. Ullam laborum voluptas et!

24px

24px

72px

This is a header

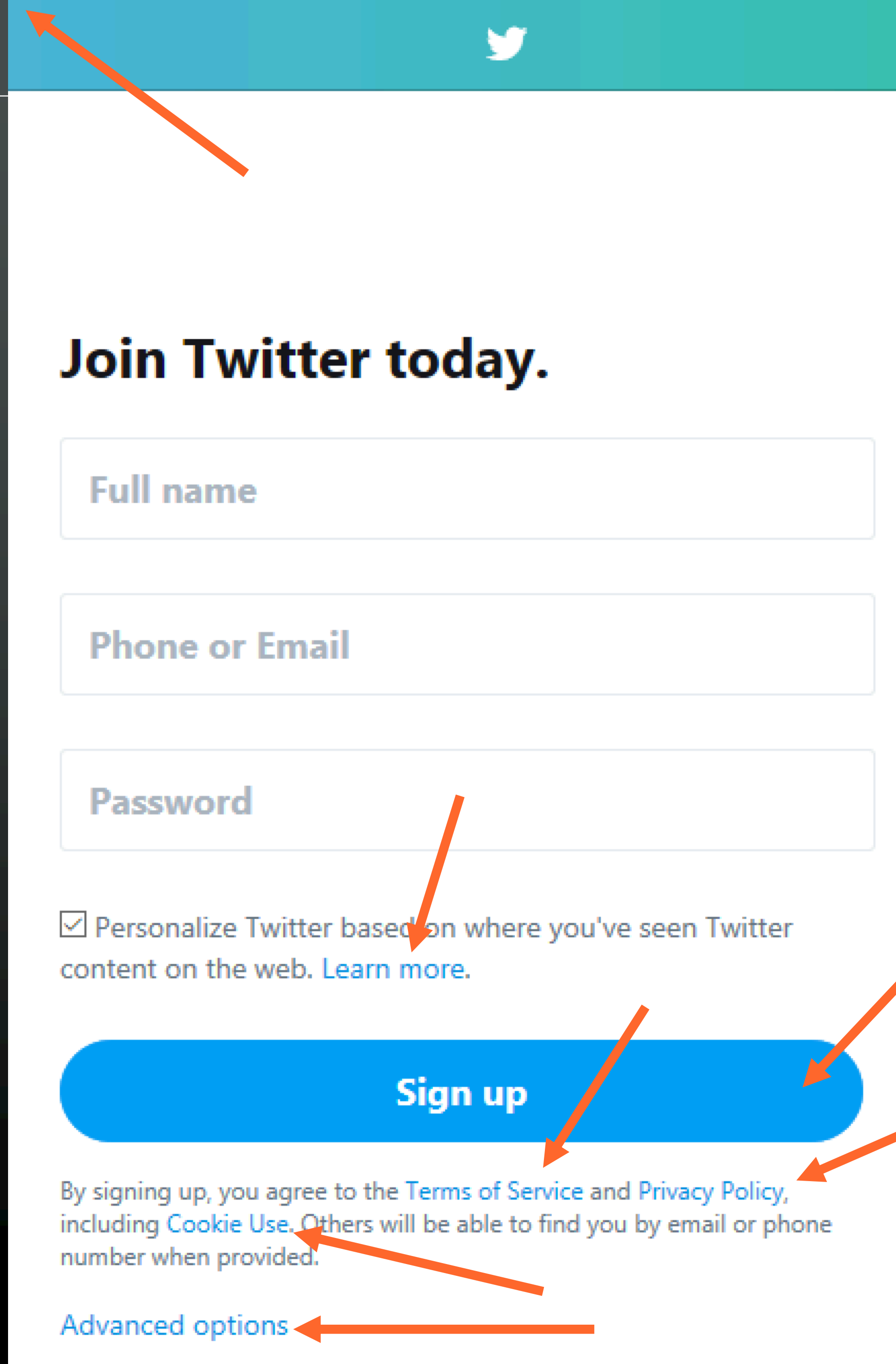
24px

24px


Lorem ipsum dolor sit amet, consectetur adipisicing elit. Quasi reprehenderit sint obcaecati reiciendis voluptas voluptate excepturi recusandae ab accusamus deleniti facilis, illo placeat harum, iusto ratione. Ullam laborum voluptas et!

@AaronGustafson

Unity



The image shows a Twitter sign-up form with several orange arrows pointing to specific elements: one to the Twitter logo in the top header, one to the 'Full name' input field, one to the 'Phone or Email' input field, one to the 'Password' input field, one to the 'Sign up' button, one to the 'Personalize Twitter' checkbox, one to the 'Advanced options' link, and one to the terms and conditions text.



Join Twitter today.

Full name

Phone or Email

Password

☒ Personalize Twitter based on where you've seen Twitter content on the web. [Learn more.](#)

Sign up

By signing up, you agree to the [Terms of Service](#) and [Privacy Policy](#), including [Cookie Use](#). Others will be able to find you by email or phone number when provided.

[Advanced options](#)

Unique design considerations

Screen size

Resolution

Brightness

Color density

User preference

Network speed & quality

Assistive technology

Unique design considerations

Screen size

👉 Responsive layouts

Resolution

👉 SVG, responsive images

Brightness

👉 Contrast

Color density

👉 Color choice, media queries

User preference

Network speed & quality

👉 Responsive images, system fonts

Assistive technology

Unique design considerations

Screen size

Resolution

Brightness

Color density

User preference

Network speed & quality

Assistive technology

Examples of user preference

Larger or smaller fonts

```
@media (min-width: 32em) { ... }
```

High contrast colors

```
@media (-ms-high-contrast: active) { ... }
```

```
@media (-ms-high-contrast: white-on-black) { ... }
```

```
@media (-ms-high-contrast: black-on-white) { ... }
```

Reduced motion

```
@media (prefers-reduced-motion: reduce) { ... }
```

Assistive technologies

- Vision
 - Screen magnifiers
 - Screen readers
 - Braille printers & refreshable braille displays
 - High contrast settings
- Hearing
 - Captions & subtitles
- Motor/mobility
 - Speech recognition
 - Mouse settings
 - Keyboards & keyboard overlays
 - Eye tracking

Don't rely on color
alone to convey
important information

Confirm

Cancel

Confirm

Cancel

Good contrast
ensures your
content is readable

contrast ratio

Background:

white

8.52

Text color: hsla(200,0%,0%,.7)

↔ Swap colors

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

**Explicit connections
ensure everyone can
follow references**

```
<a href="#figure-3-3">Figure  
3.3</a> shows the lodging  
article in Safari with only the  
default browser styles applied.
```

...

```
<figure id="figure-3-3">
```

...

```
</figure>
```

Explicit connections
ensure everyone can
follow references

```
<a href="#figure-3-3">Figure  
3.3</a> shows the lodging  
article in Safari with only the  
default browser styles applied.
```

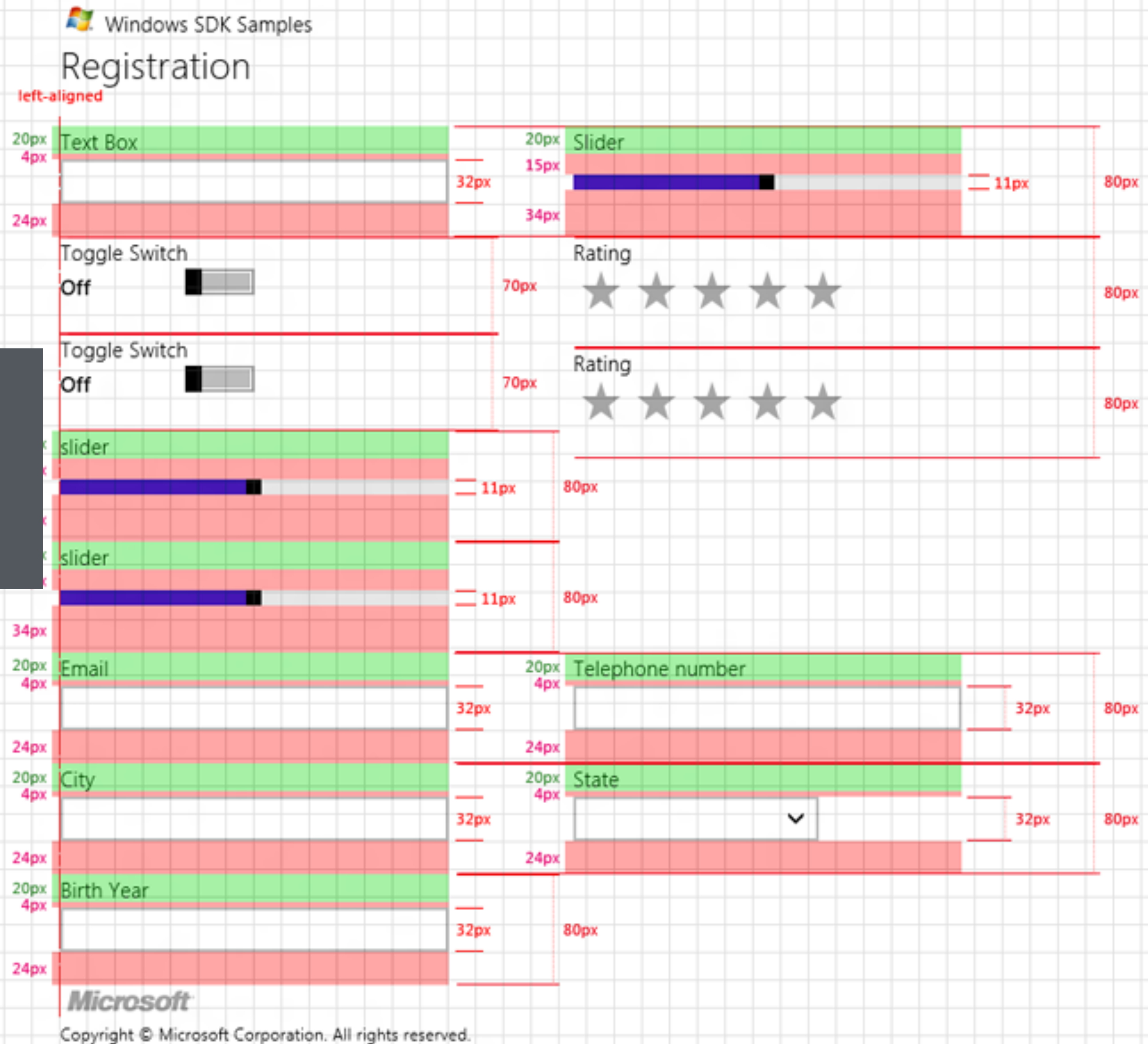
...

```
<figure id="figure-3-3">
```

...

```
</figure>
```


Provide space around interactive elements



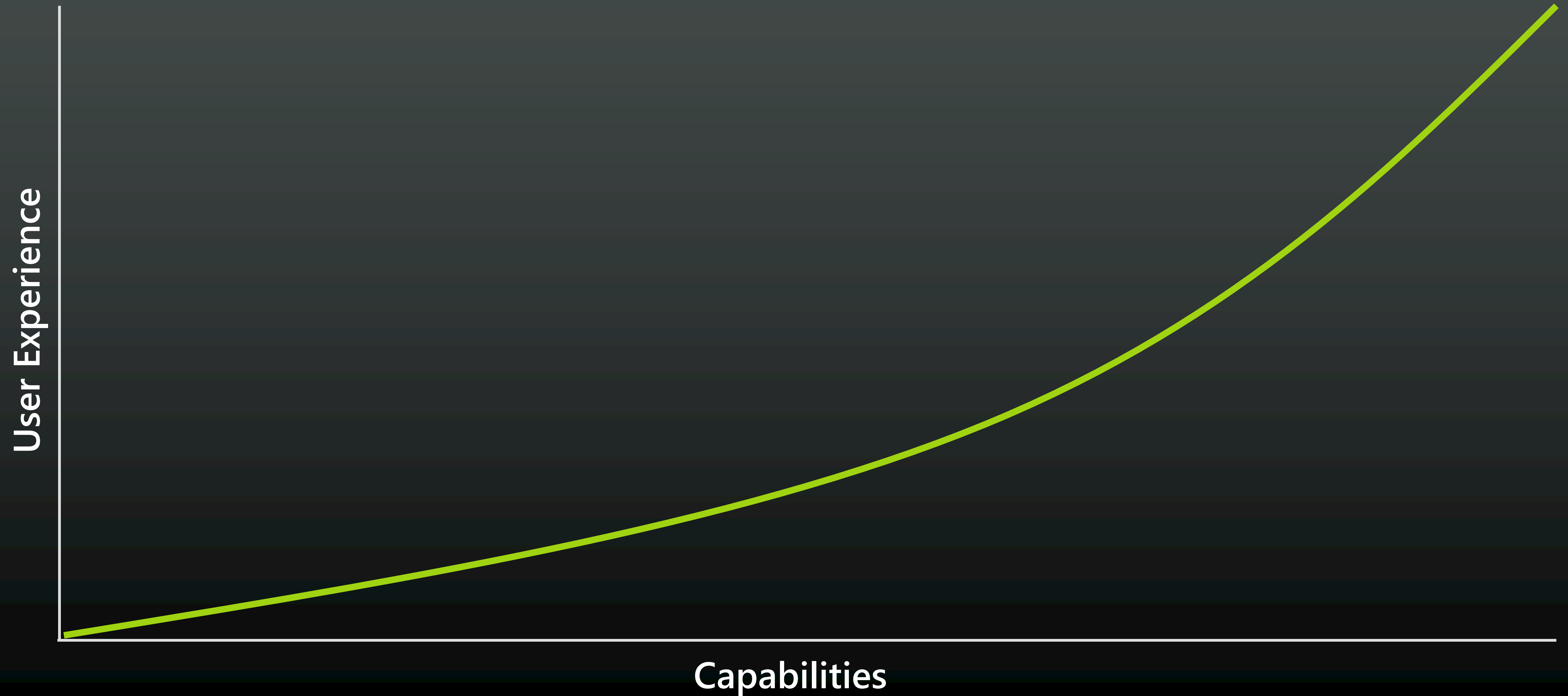
Consider what
your design
leaves unsaid

```
<a href="#">Finish Reading</a>
```


Consider what
your design
leaves unsaid

```
<a href="..."  
  aria-label="You can  
    finish reading “The Web  
    Should Just Work for  
    Everyone” in less than  
    10 minutes”  
>Finish Reading</a>
```

Enhance the experience



Enhancing design in CSS

```
p {  
  color: green;  
  color: rgba(0, 255, 0, .8);  
}
```

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
p {  
  color: green;  
color: rgba(0, 255, 0, .8);  
}
```

Older browsers without RGBa support, ignore the second rule

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
p {  
  color: green;  
  color: rgba(0, 255, 0, .8);  
}
```

Modern browsers with RGBa support, overwrite the first rule

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
h1:has(+ p) {  
  color: green;  
}
```

(That selects h1s that have adjacent sibling paragraphs.)

Passwords can be a hassle

Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
h1:has(+ p) {  
color: green;  
}
```

Browsers that don't support :has()
ignore the entire rule set

Passwords can be a hassle

Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Beware the comma!

```
div:hover .extra-stuff,  
div:focus-within .extra-stuff {  
    /* reveal it */  
}
```


Beware the comma!

```
div:hover .extra-stuff,  
div:focus-within .extra-stuff {  
  
/* reveal it */  
  
}
```

Browsers that don't support :focus-within

Beware the comma!

```
div:hover .extra-stuff,  
div:focus-within .extra-stuff {  
    /* reveal it */  
}
```

Browsers that do support :focus-within

Enhancing design in CSS

```
h1:has(+ p) {  
  color: green;  
}
```

As browsers support :has(),
matching h1s will turn green

Passwords can be a hassle

Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
@media only screen {  
  p {  
    color: green;  
  }  
}
```

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
@media only screen {  
  p {  
    color: green;  
  }  
}
```

Browsers without media query support ignore the block

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
@media only screen {  
  p {  
    color: green;  
  }  
}
```

**Browsers with media query support
apply it**

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
@supports (display: grid) {  
  p {  
    color: green;  
  }  
}
```

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
@supports (display: grid) {  
  p {  
    color: green;  
  }  
}
```

Browsers that don't grok @supports ignore the block

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.

Enhancing design in CSS

```
@supports (display: grid) {  
  p {  
    color: green;  
  }  
}
```

Browsers that understand
@supports, but don't support grid
ignore it

Passwords can be a hassle.
Most people don't create
strong passwords or make
sure to maintain a different
one for every site. People
create easy-to-remember
passwords and typically use
the same passwords across all
of their accounts.

Enhancing design in CSS

```
@supports (display: grid) {  
  p {  
    color: green;  
  }  
}
```

Browsers that understand
@supports and grid apply it

Passwords can be a hassle. Most people don't create strong passwords or make sure to maintain a different one for every site. People create easy-to-remember passwords and typically use the same passwords across all of their accounts.



When it comes to HTML & CSS,
browsers ignore what they don't understand



When it comes to HTML & CSS,
browsers ignore what they don't understand

And new specs smartly override
conflicting syntax

Enhance!

ay!



Basic, but ok!

Gridbyexample

Progressive Enhancement

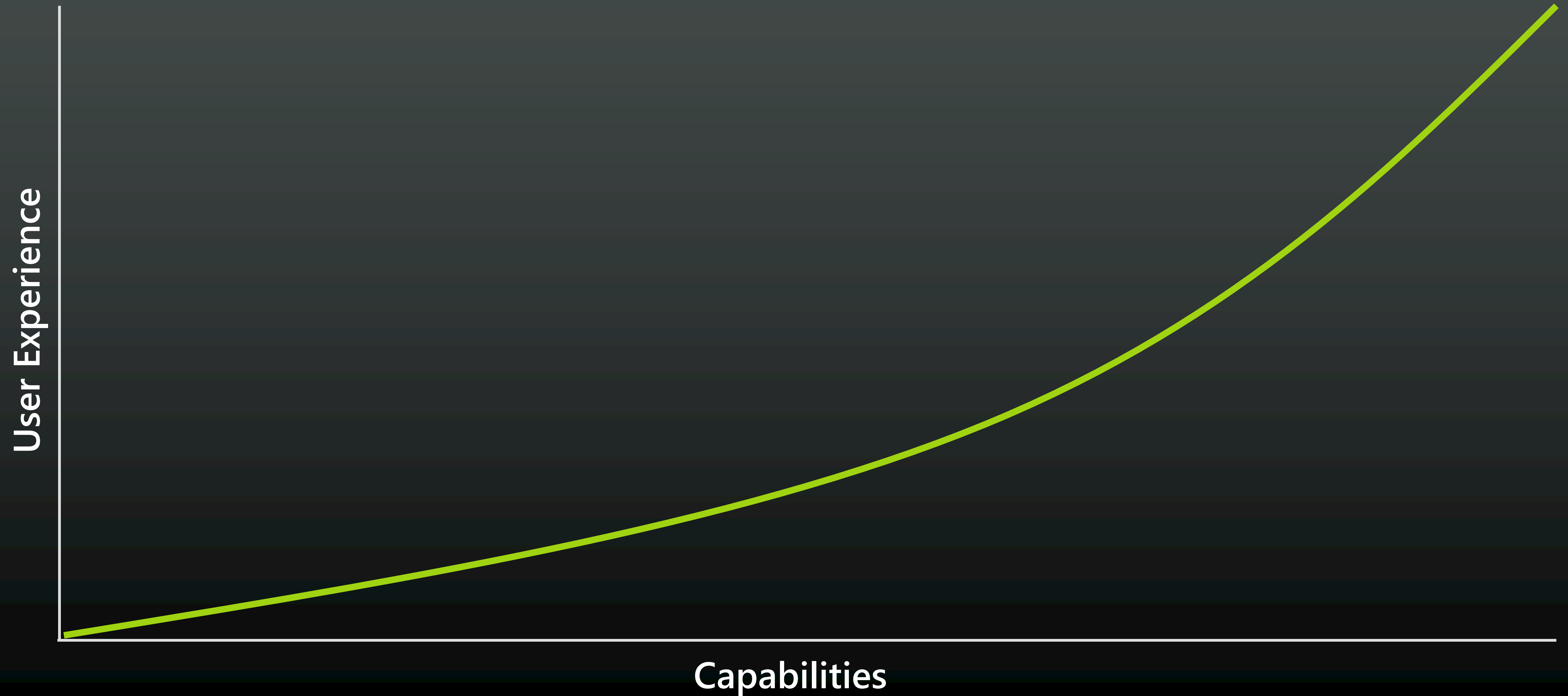
Grid Garden

Progressive Enhancement Demo

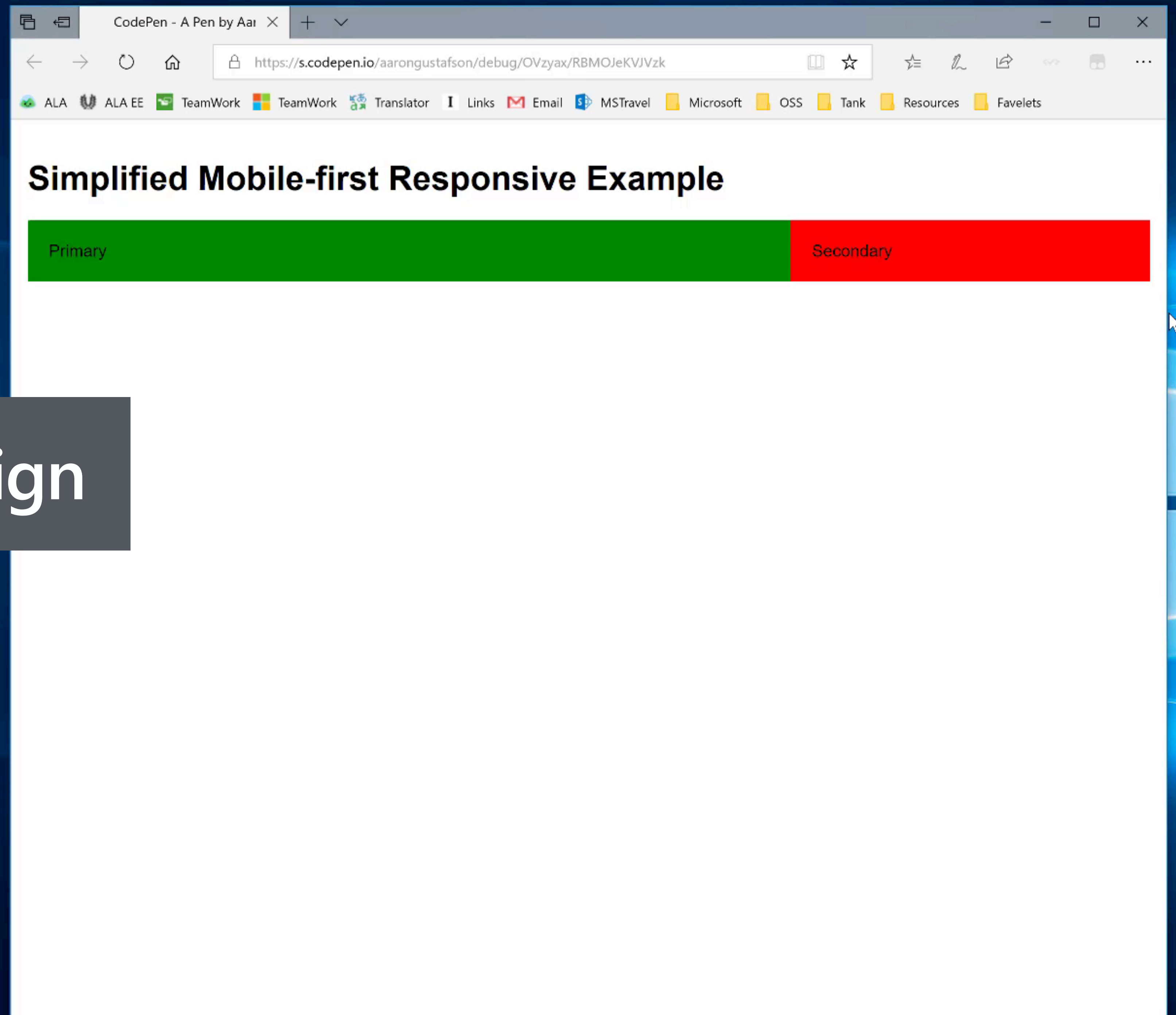
Leverage the power of CSS Grid Layout!

Read [this article](#) for details on how to use CSS Grid Layout today.

Enhance the experience



“Mobile first” design



“Desktop first”

```
.primary {  
    float: left;  
  
    width: 68%;  
}  
  
.secondary {  
    float: right;  
  
    width: 32%;  
}  
  
@media (max-width:599px) {  
    .primary, .secondary {  
  
        float: none;  
  
        width: auto;  
    }  
}
```


“Desktop first”

```
.primary {  
    float: left;  
  
    width: 68%;  
}
```

```
.secondary {  
    float: right;  
  
    width: 32%;  
}
```

```
@media (max-width:599px) {  
    .primary, .secondary {  
  
        float: none;  
  
        width: auto;  
    }  
}
```

“Desktop first”

```
.primary {  
  float: left;  
  
  width: 68%;  
}
```

```
.secondary {  
  float: right;  
  
  width: 32%;  
}
```

```
@media (max-width:599px) {  
  .primary, .secondary {  
  
    float: none;  
  
    width: auto;  
  }  
}
```


“Mobile first”

```
@media (min-width:600px) {  
  .primary {  
    float: left;  
    width: 68%;  
  }  
  .secondary {  
    float: right;  
    width: 32%;  
  }  
}
```

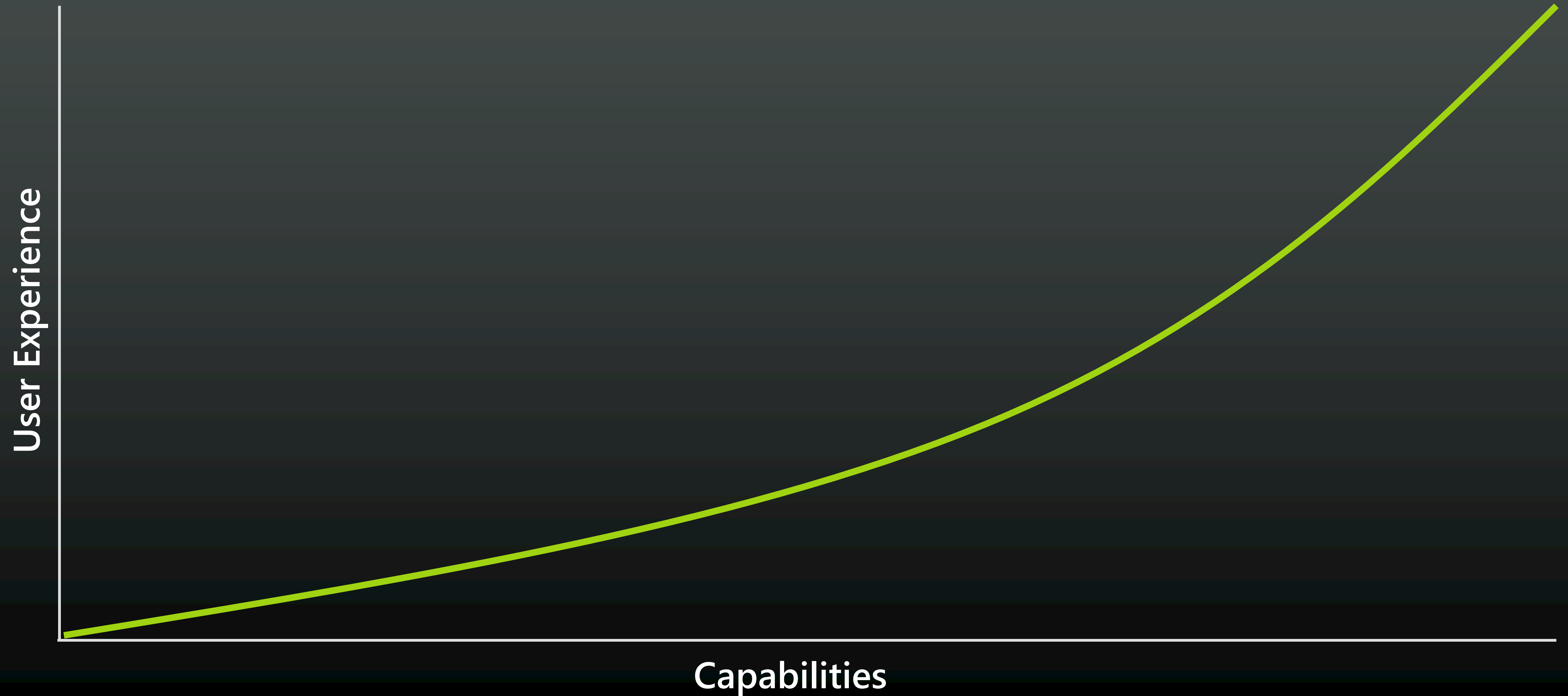
“Mobile first”

```
@media (min-width:600px) {  
  .primary {  
    float: left;  
    width: 68%;  
  }  
  .secondary {  
    float: right;  
    width: 32%;  
  }  
}
```


Also “mobile first”

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

Enhance the experience



Step 4

Improve the core experience with JavaScript



When it comes to HTML & CSS,
browsers ignore what they
don't understand



When it comes to HTML & CSS,
browsers ignore what they
don't understand

Sadly, that's not the case
with JavaScript



Got let?

```
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>';
```


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?

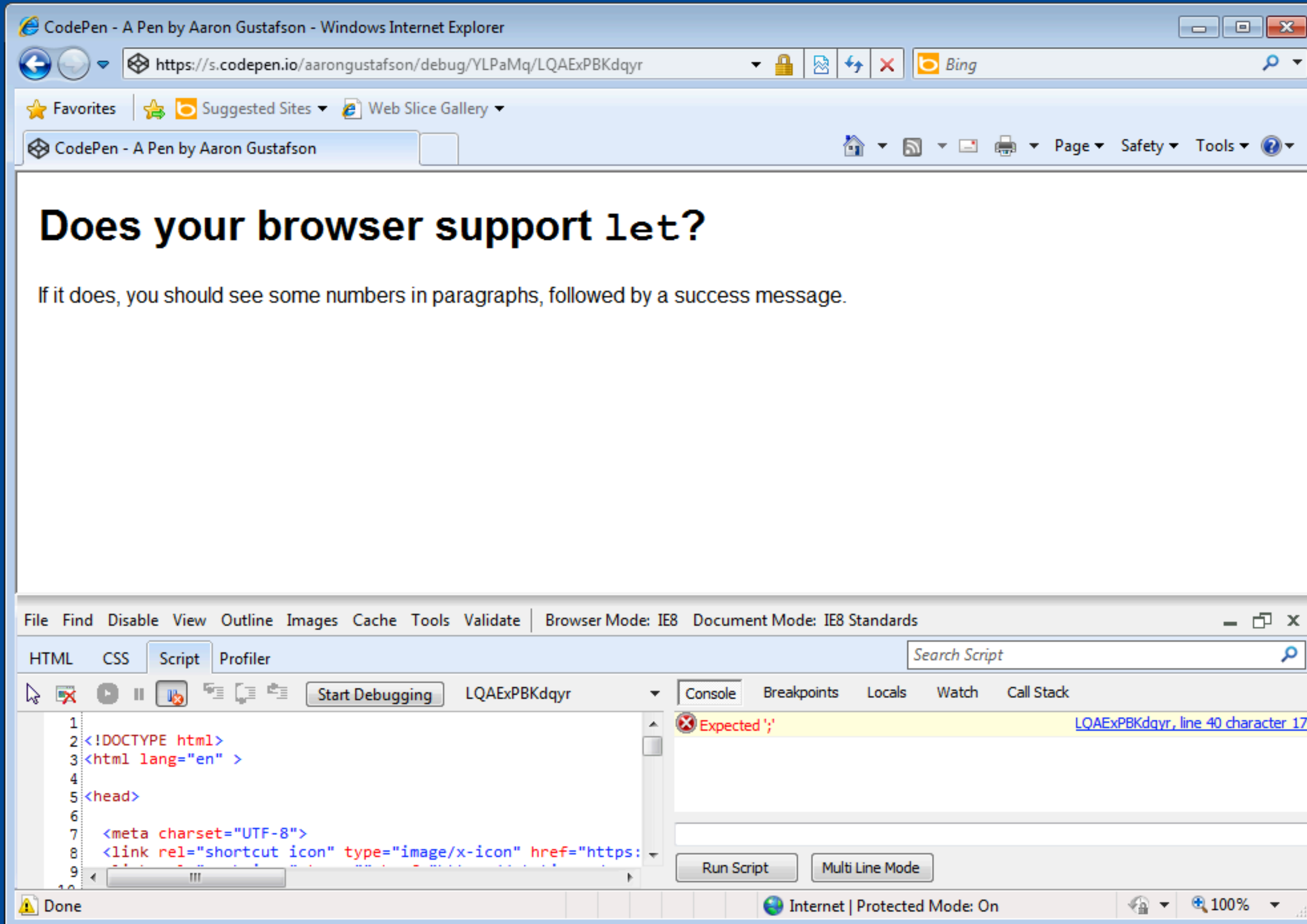
1

2

3

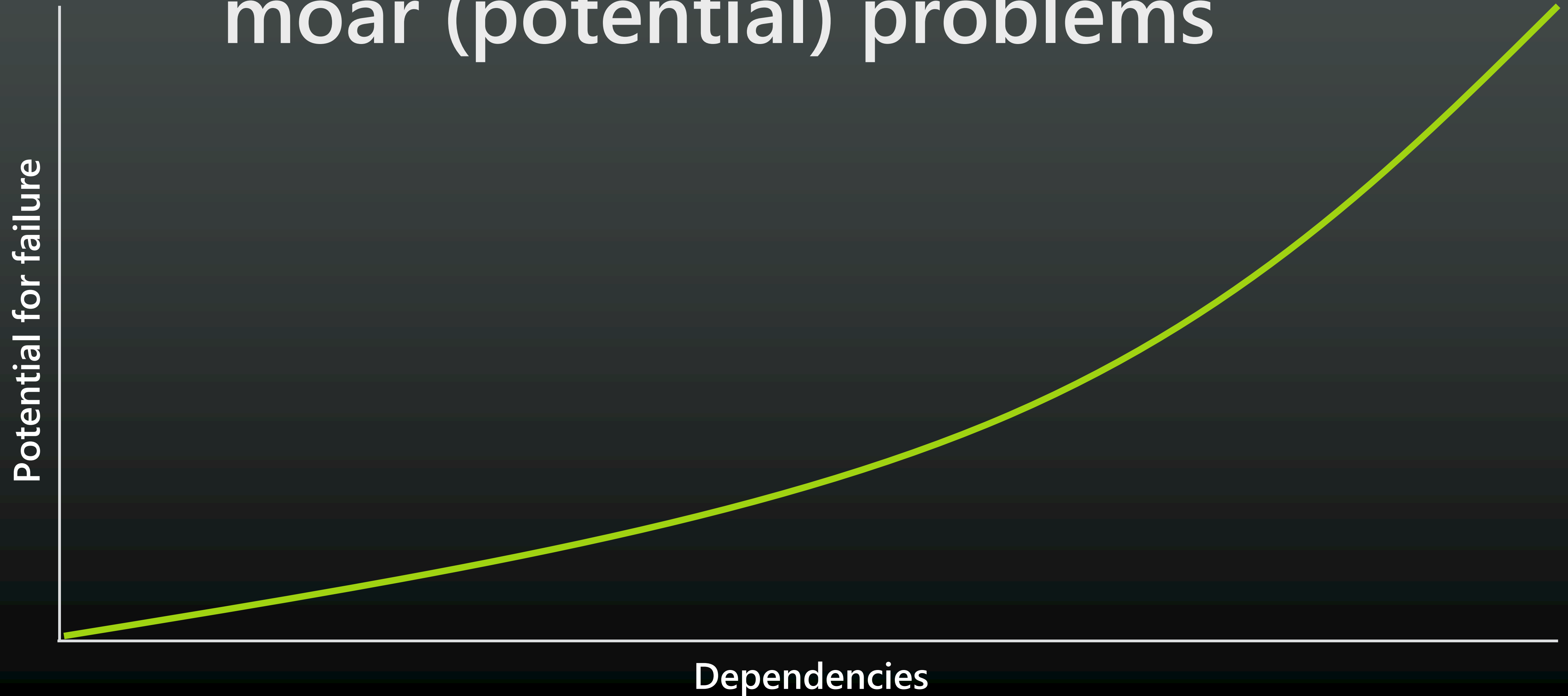
4

Success!



aka.ms/js-let-down

Moar dependencies, moar (potential) problems



Removing jQuery from GitHub.com frontend



mislav



koddsson



muan



keithamus



September 06, 2018

We have recently completed a milestone where we were able to drop jQuery as a dependency of the frontend code for GitHub.com. This marks the end of a gradual, years-long transition of increasingly decoupling from jQuery until we were able to completely remove the library. In this post, we will explain a bit of history of how we started depending on jQuery in the first place, how we realized when it was no longer needed, and point out that—instead of replacing it with another library or framework—we were able to achieve everything that we needed using standard browser APIs.

Why jQuery made sense early on

GitHub.com pulled in [jQuery 1.2.1](#) as a dependency in late 2007. For a bit of context, that was a year before Google released the first version of their Chrome browser. There was no standard way to query DOM elements by a CSS selector, no standard way to animate visual styles of an element, and the [XMLHttpRequest interface](#) pioneered by Internet

Removing jQuery from GitHub.com frontend

by  keithamus · September 06, 2018

As part of our refined approach to building frontend features on GitHub.com, we focused on getting away with regular HTML foundation as much as we could, and only adding JavaScript behaviors as progressive enhancement. As a result, even those web forms and other UI elements that were enhanced using JS would usually also work with JavaScript disabled in the browser.

Why jQuery made sense early on

GitHub.com pulled in [jQuery 1.2.1](#) as a dependency in late 2007. For a bit of context, that was a year before Google released the first version of their Chrome browser. There was no standard way to query DOM elements by a CSS selector, no standard way to animate visual styles of an element, and the [XMLHttpRequest interface](#) pioneered by Internet

Removing jQuery from GitHub.com frontend

by  keithamus · September 05, 2018

As part of our refined approach to building frontend features on GitHub.com, we **focused on getting away with regular HTML foundation as much as we could, and only adding JavaScript behaviors as progressive enhancement**. As a result, even those web forms and other UI elements that were enhanced using JS would usually also work with JavaScript disabled in the browser.

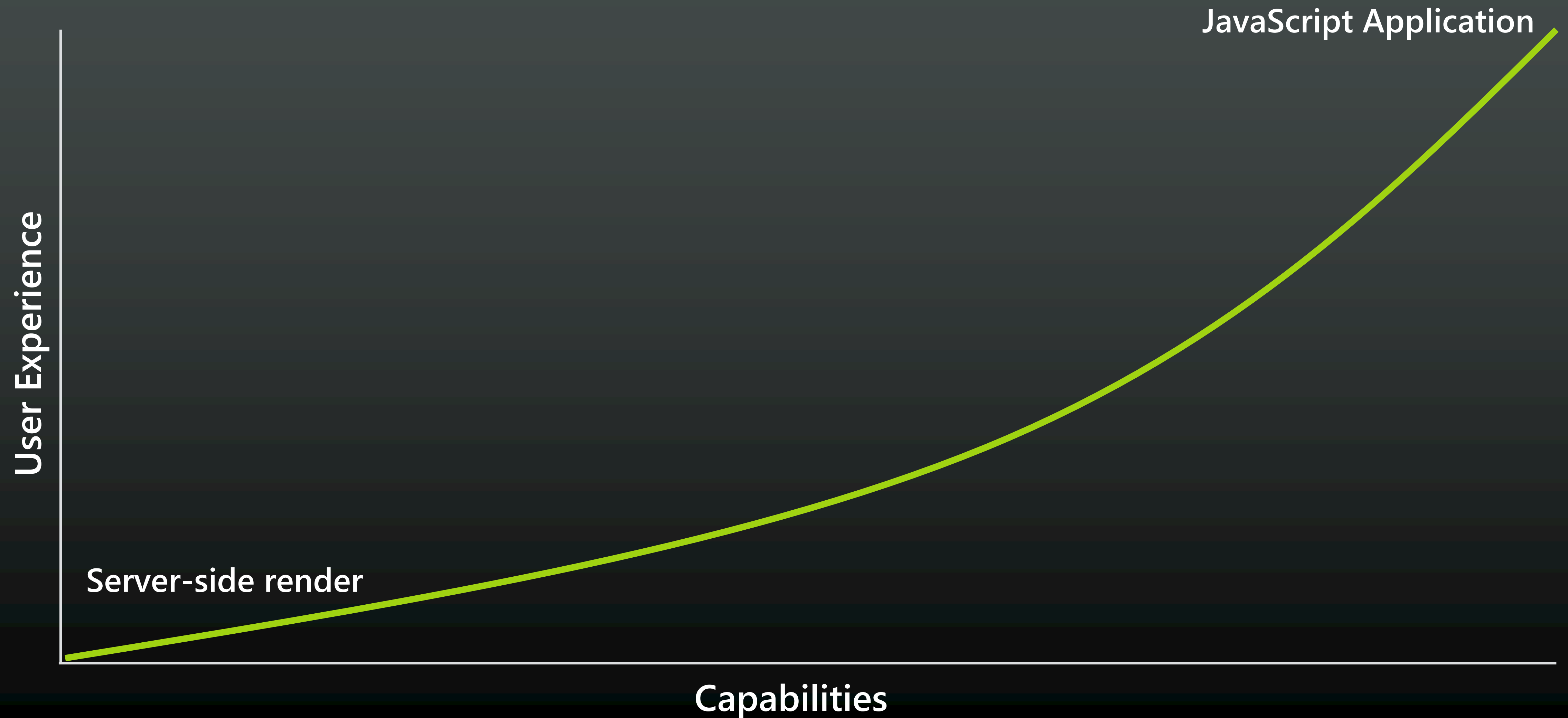
Why jQuery made sense early on

GitHub.com pulled in [jQuery 1.2.1](#) as a dependency in late 2007. For a bit of context, that was a year before Google released the first version of their Chrome browser. There was no standard way to query DOM elements by a CSS selector, no standard way to animate visual styles of an element, and the [XMLHttpRequest interface](#) pioneered by Internet

We can and should use JavaScript,
but thoughtfully & intentionally



Enhance the experience

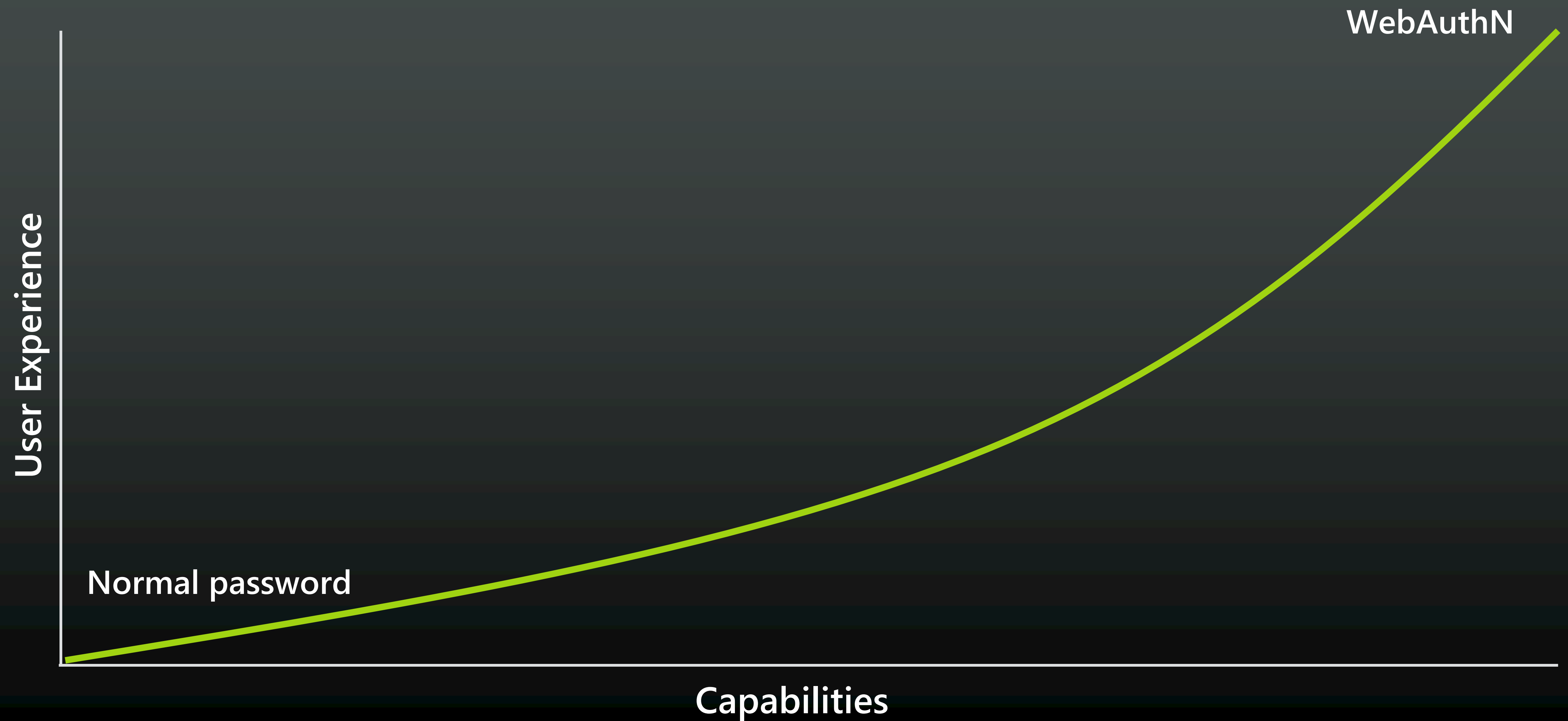




Detecting support

```
if ( navigator.credentials ) {  
    // Actual logic goes here  
}
```


Enhance the experience



*Wait, but don't Progressive
Web Apps and Service
Workers require JavaScript?!*



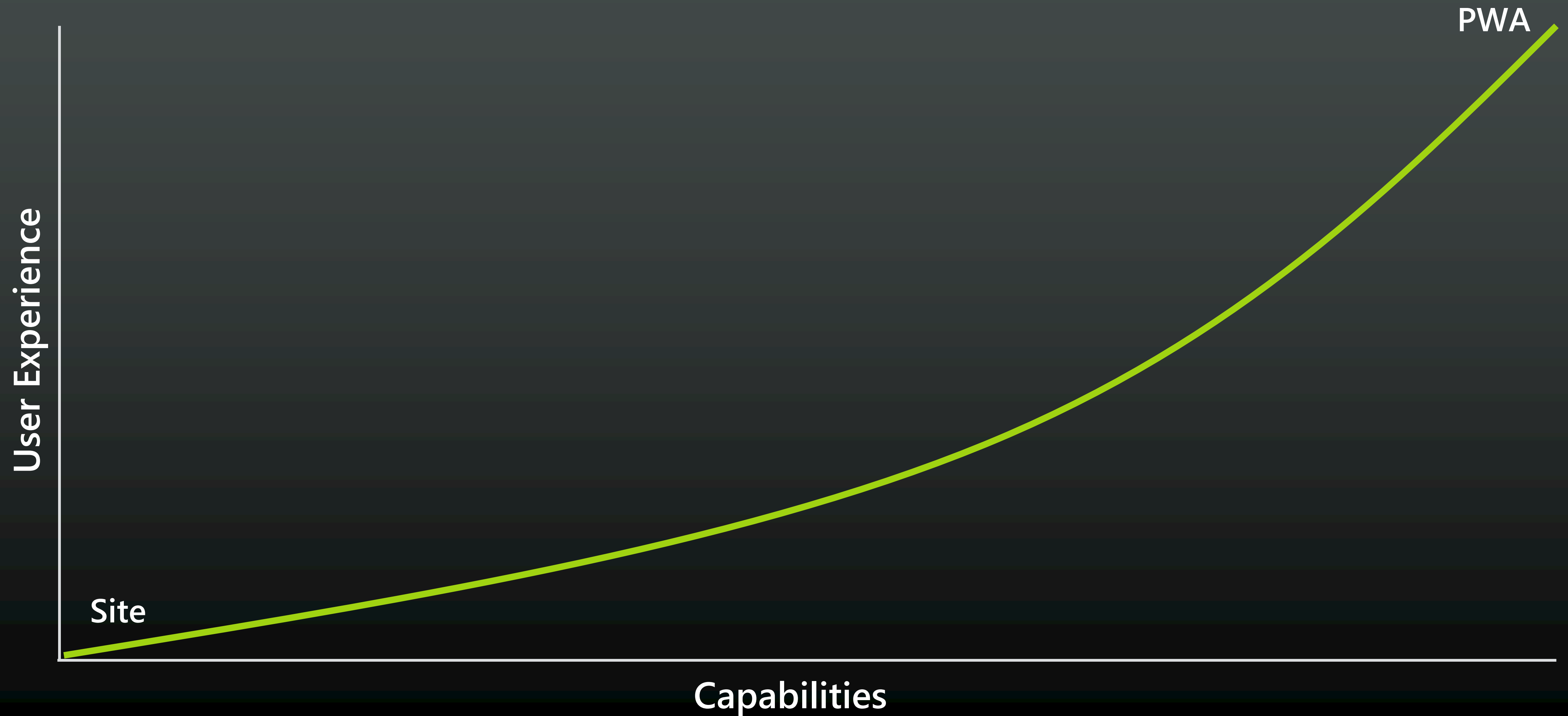
Registering a Service Worker

```
if ( navigator.serviceWorker ) {  
  navigator.serviceWorker.register('/serviceworker.js')  
    .then(function(registration) {  
      console.log('Success!', registration.scope);  
    })  
    .catch(function(error) {  
      console.error('Failure!', error);  
    });  
}
```

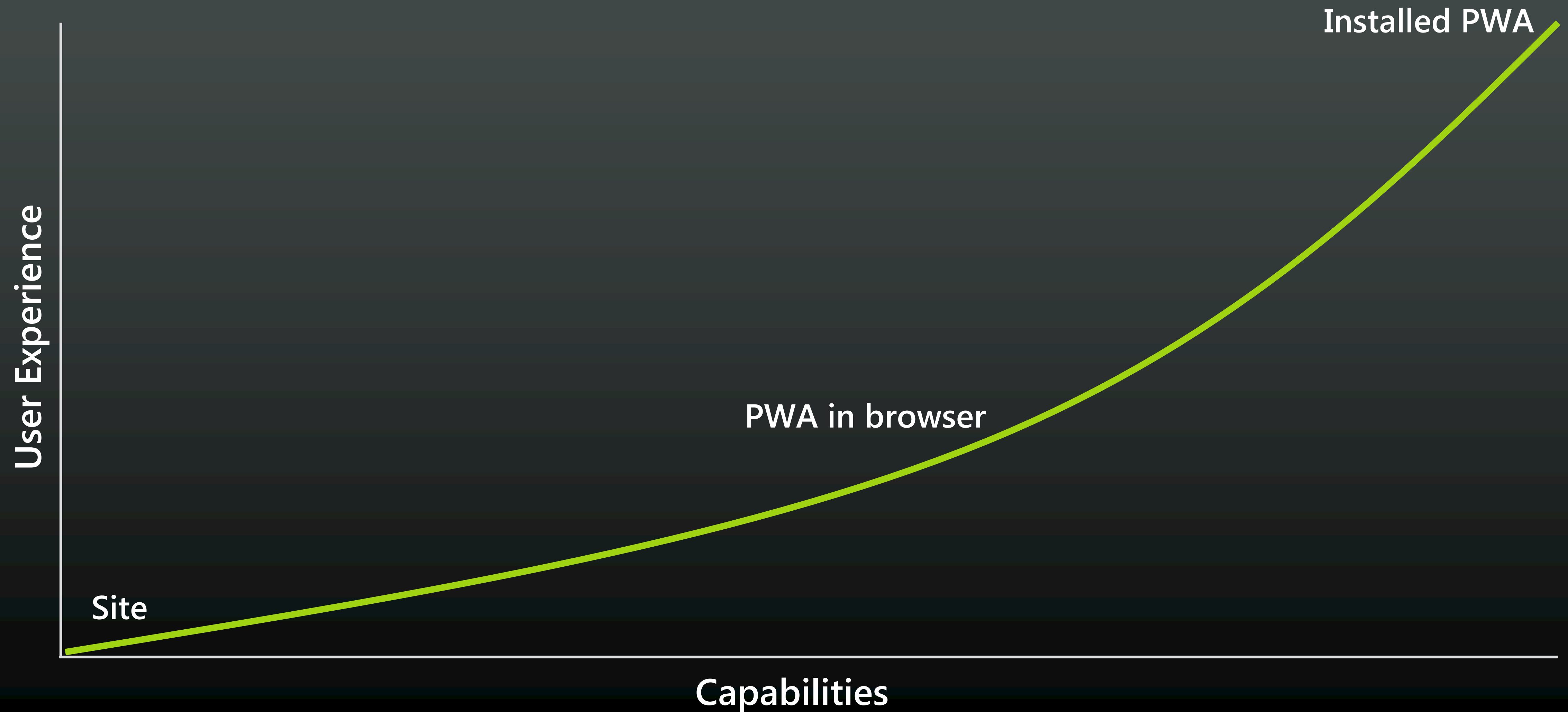
Object detection FTW!

```
if ( navigator.serviceWorker ) {  
  navigator.serviceWorker.register('/serviceworker.js')  
    .then(function(registration) {  
      console.log('Success!', registration.scope);  
    })  
    .catch(function(error) {  
      console.error('Failure!', error);  
    });  
}
```

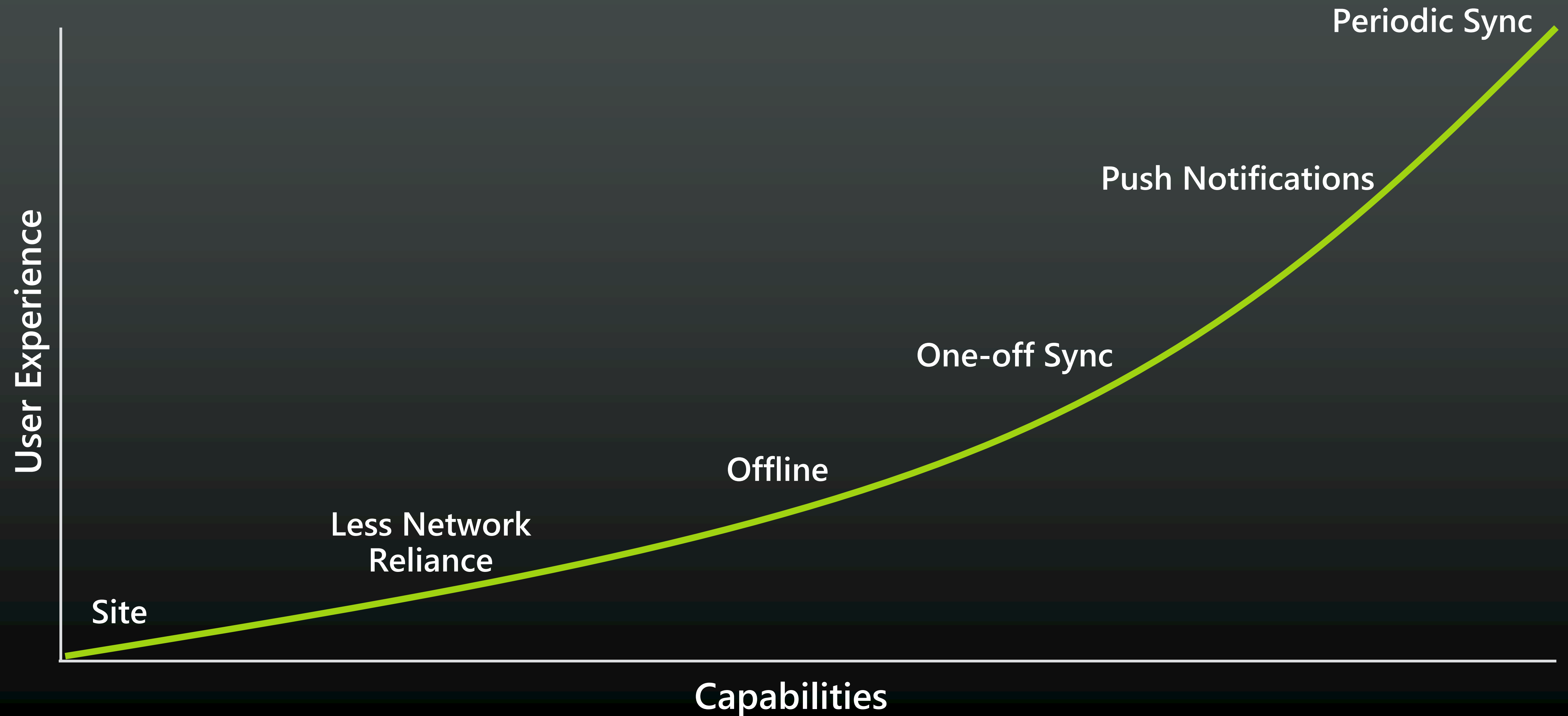

Enhance the experience



Enhance the experience



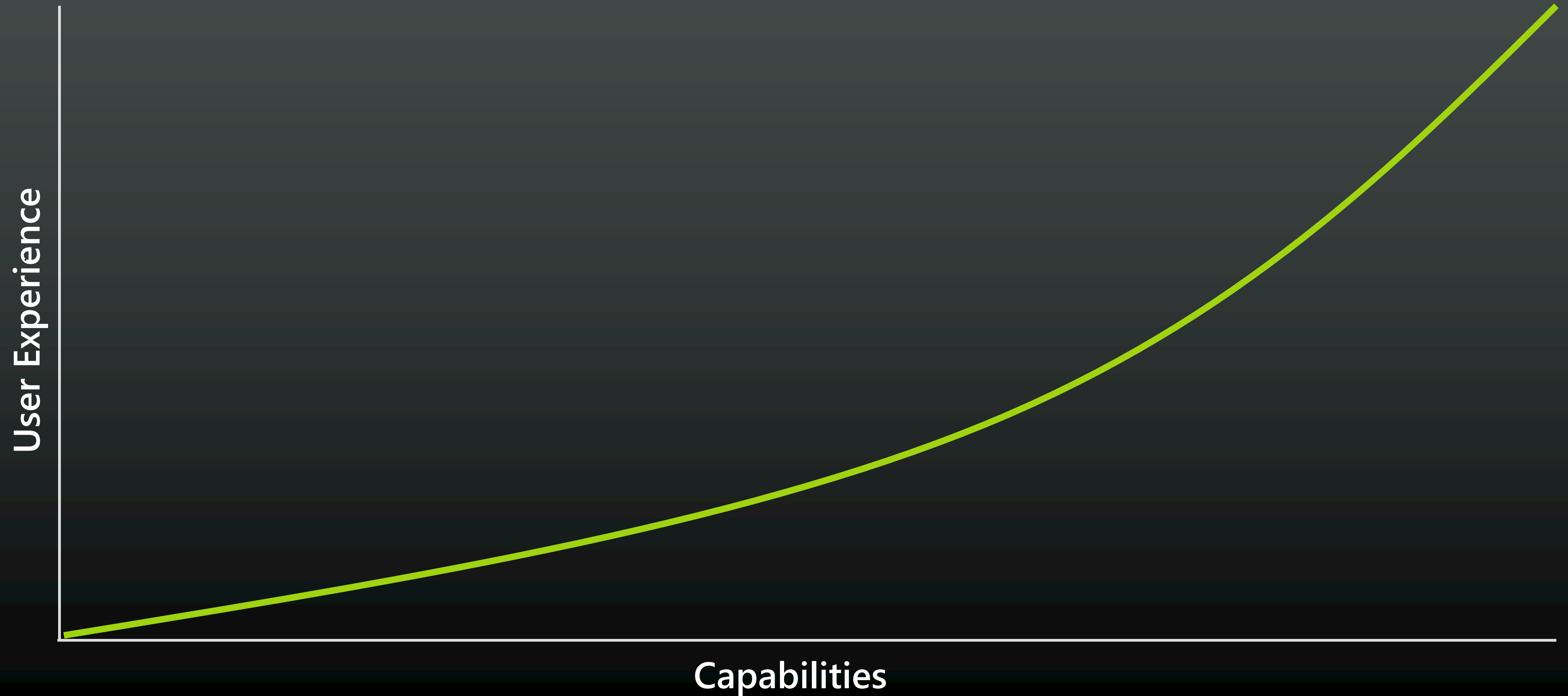
Enhance the Service Worker



We can and should use JavaScript,
but thoughtfully & intentionally



Enhance the experience



PWAs start with a great web experience and then enhance that experience for performance, resilience, installation, and engagement

PWAs **start with a great web experience** and then enhance that experience for performance, resilience, installation, and engagement



Focus
Design

Markup
JavaScript

Thank you!

@AaronGustafson

aaron-gustafson.com

noti.st/AaronGustafson

