Microsoft

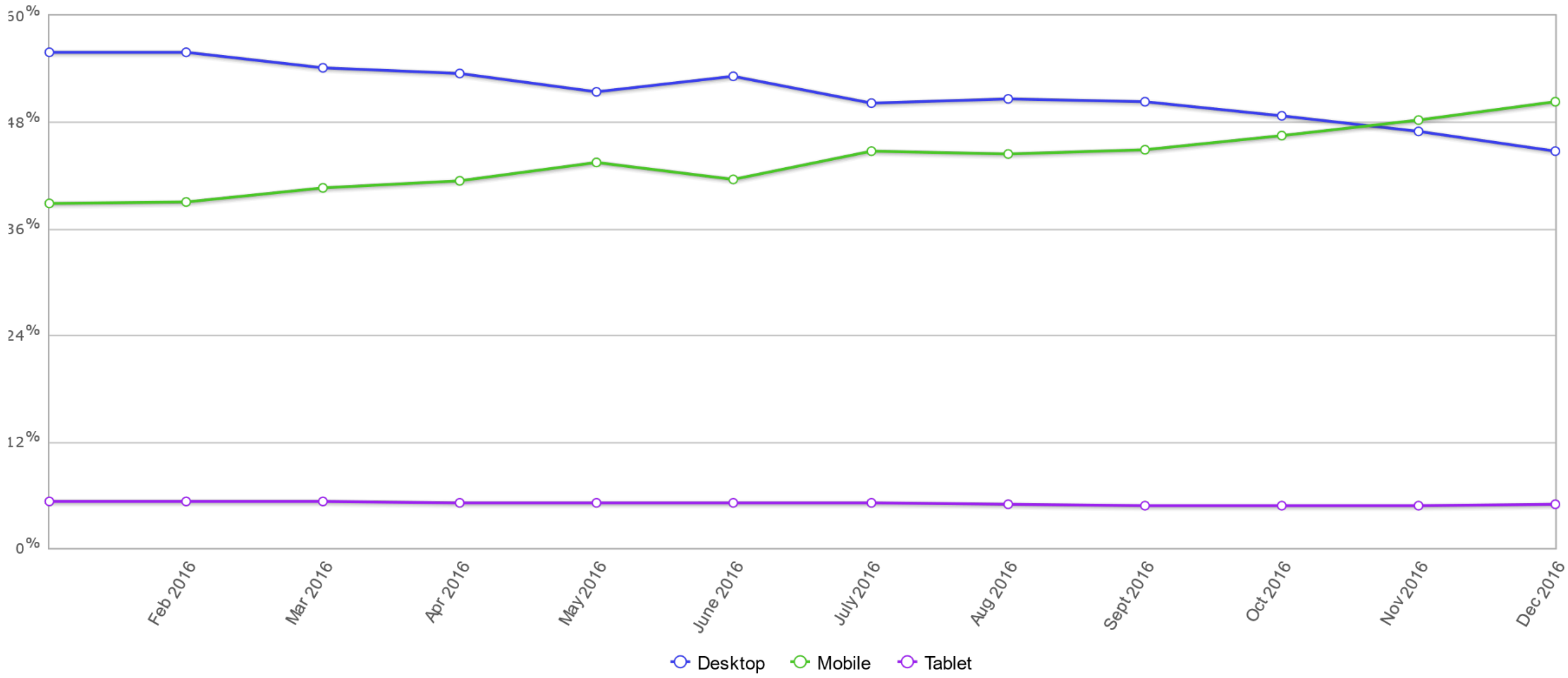
Designing for Everyone: Building Great Web Experiences for Any Device

Aaron Gustafson

BRK2411

In October of 2016, mobile ate the desktop…

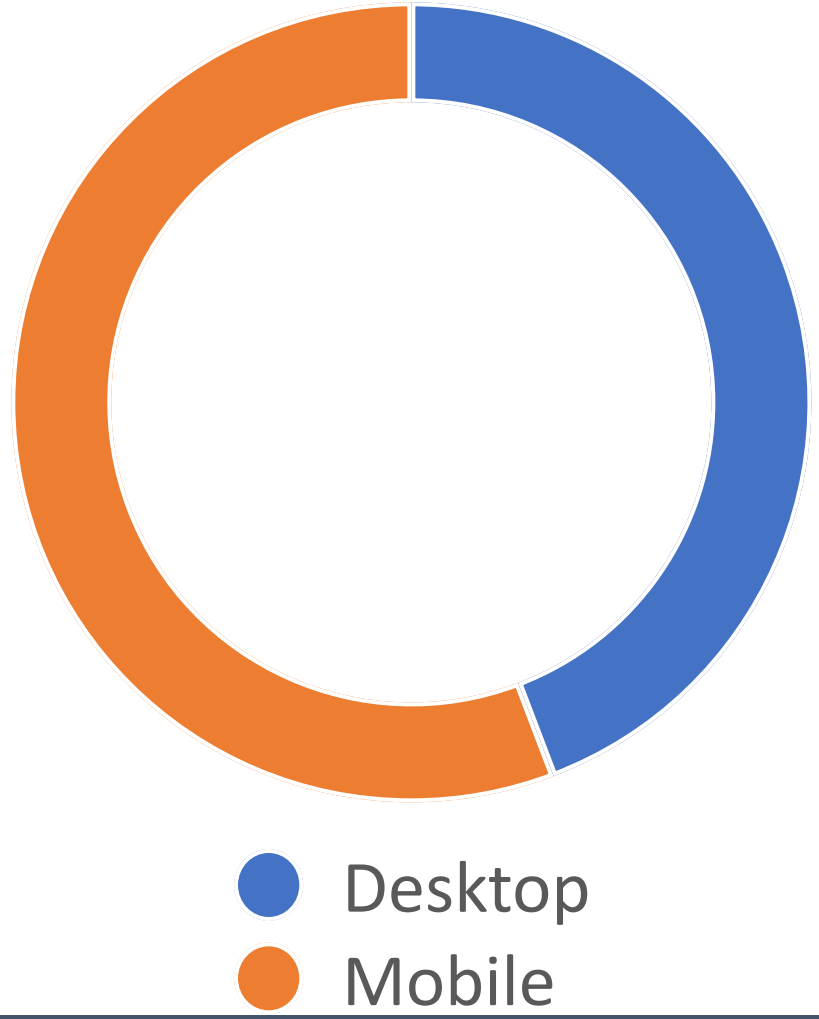
Mobile traffic overtakes desktop globally



https://aka.ms/desktop-v-mobile-2016

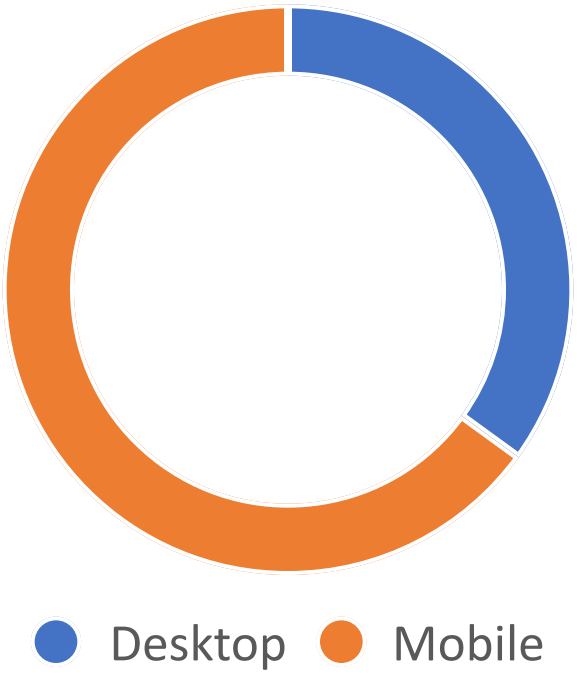
Mobile accounts for 56% of all traffic*

*Based on 77 billion website visits.

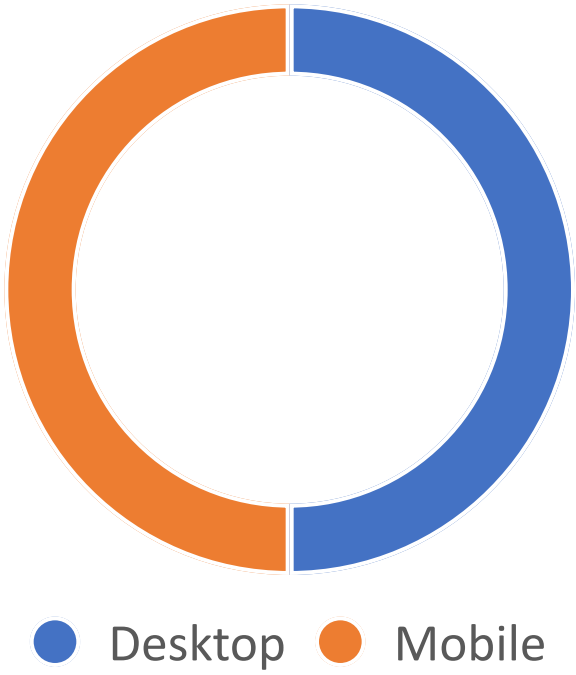


But the numbers differ by industry

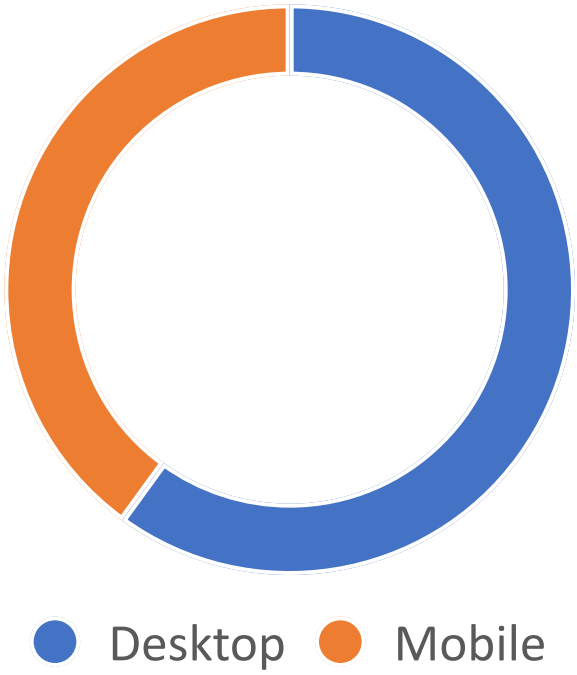
Food



News

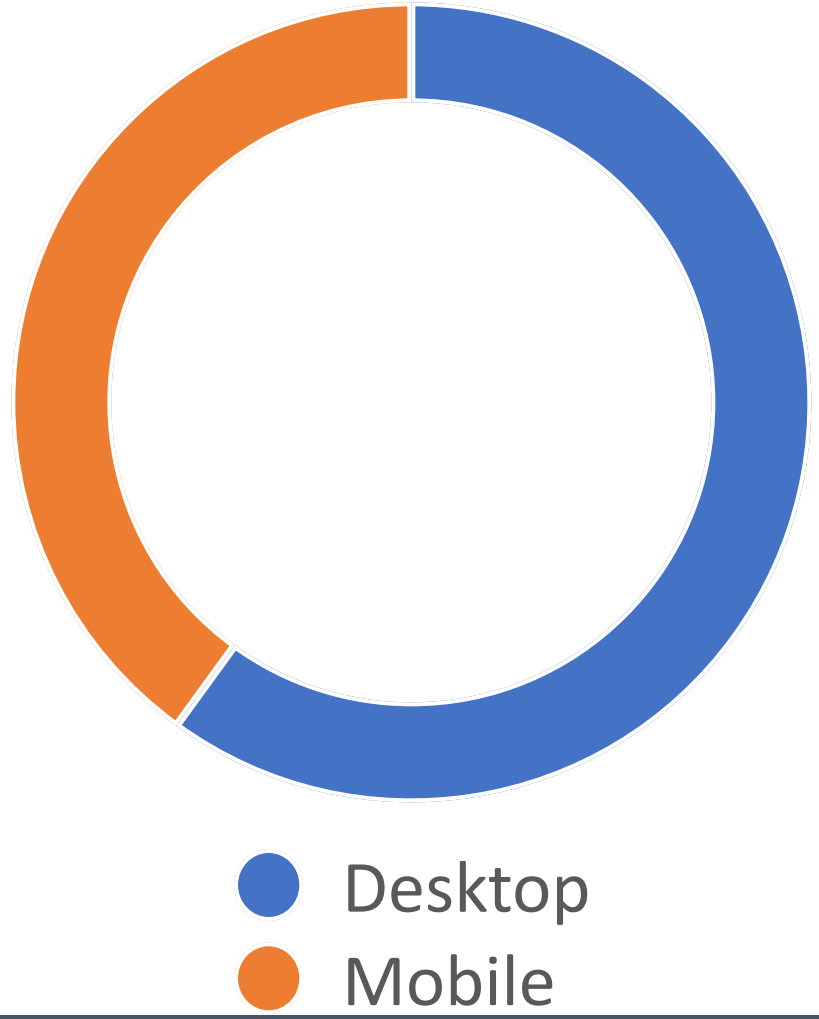


Finance



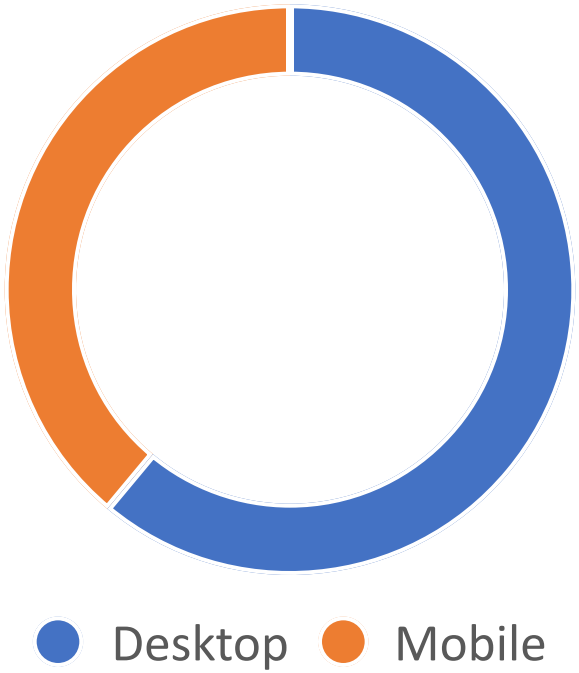
Desktop users spend more time on sites (60%)*

*Based on 39 trillion seconds.

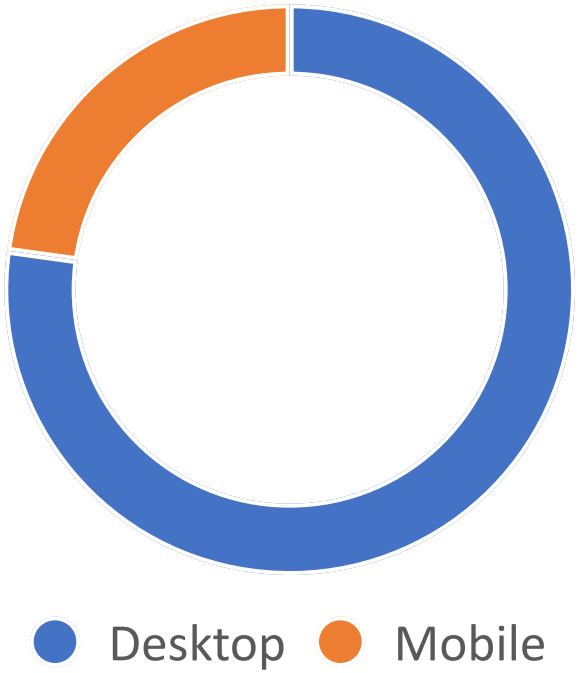


Anywhere from 10-300%

Food



News



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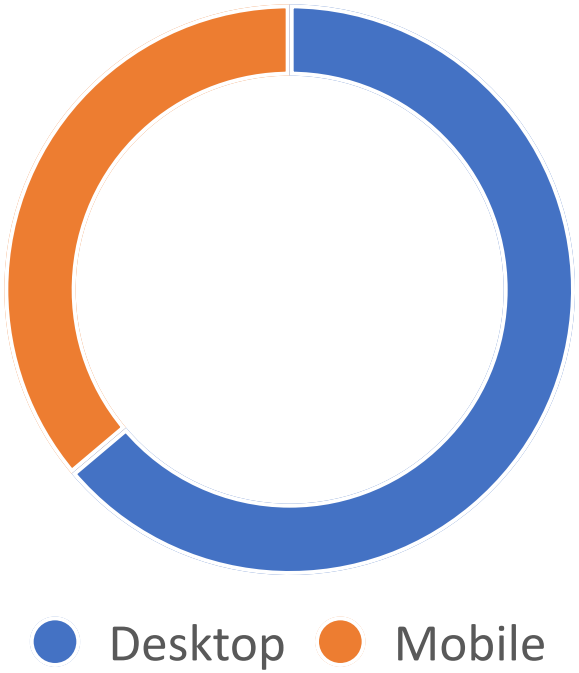
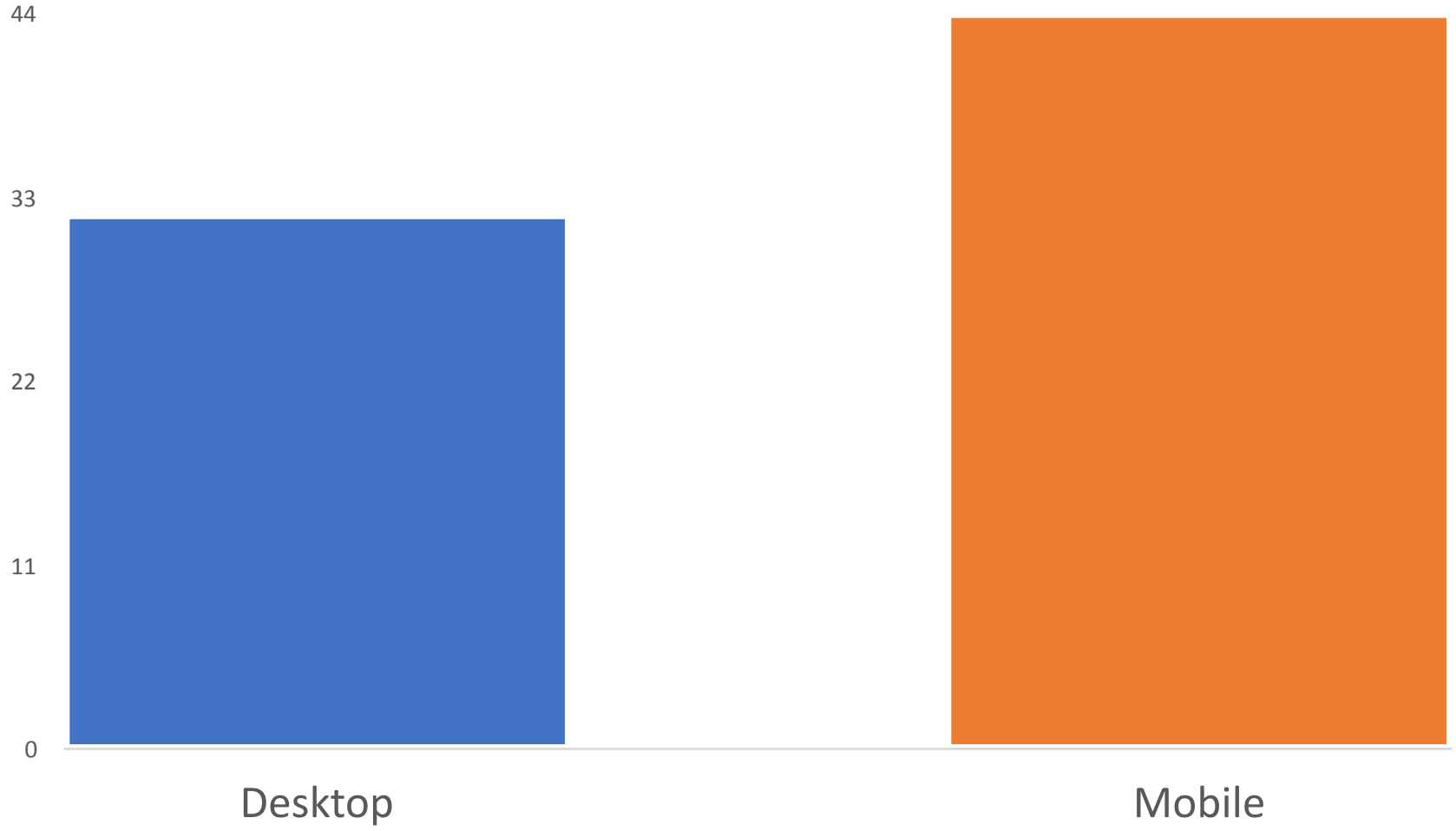


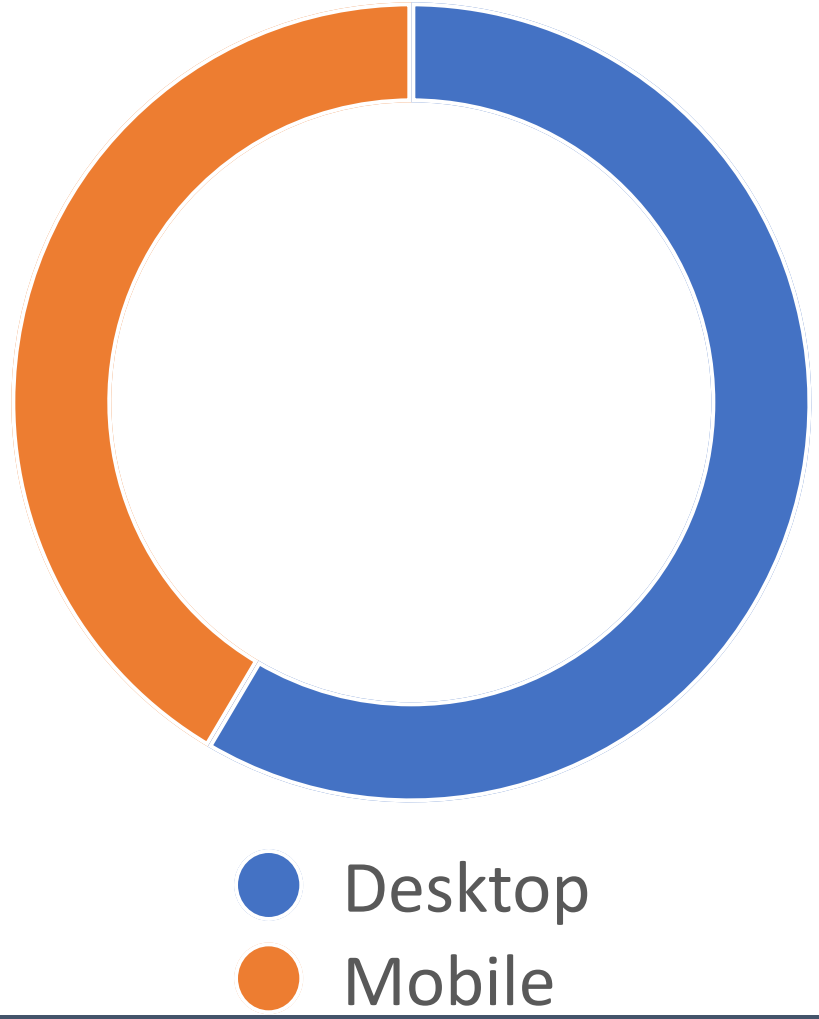
Bounce rates on mobile are 40% higher than desktop*

*Based on 584 billion page views.



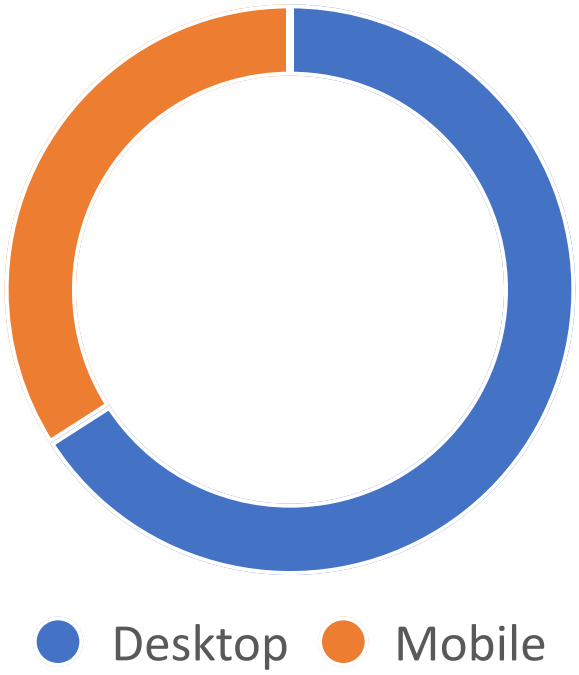
Desktop users view more pages (59%)

*Based on 584 billion page views.

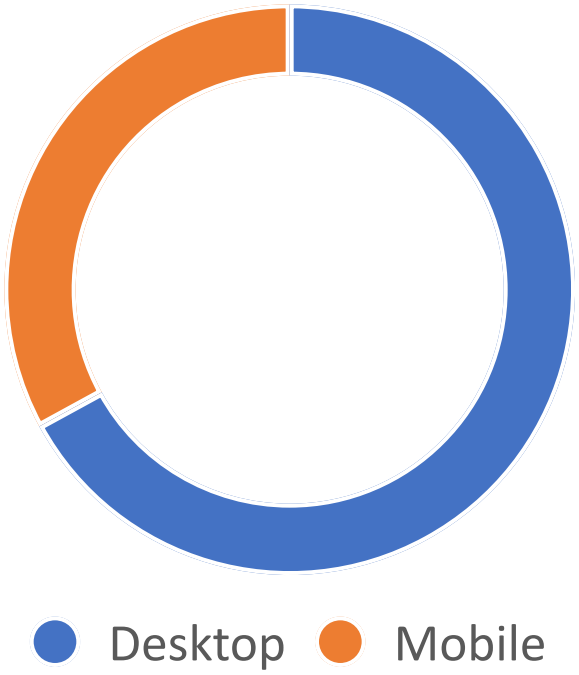


Anywhere from 1.5x to 3x more pages per visit

Food



News



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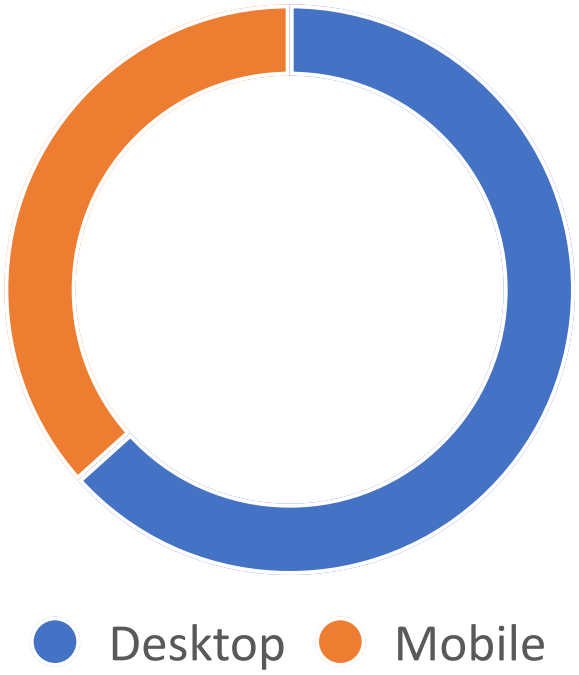
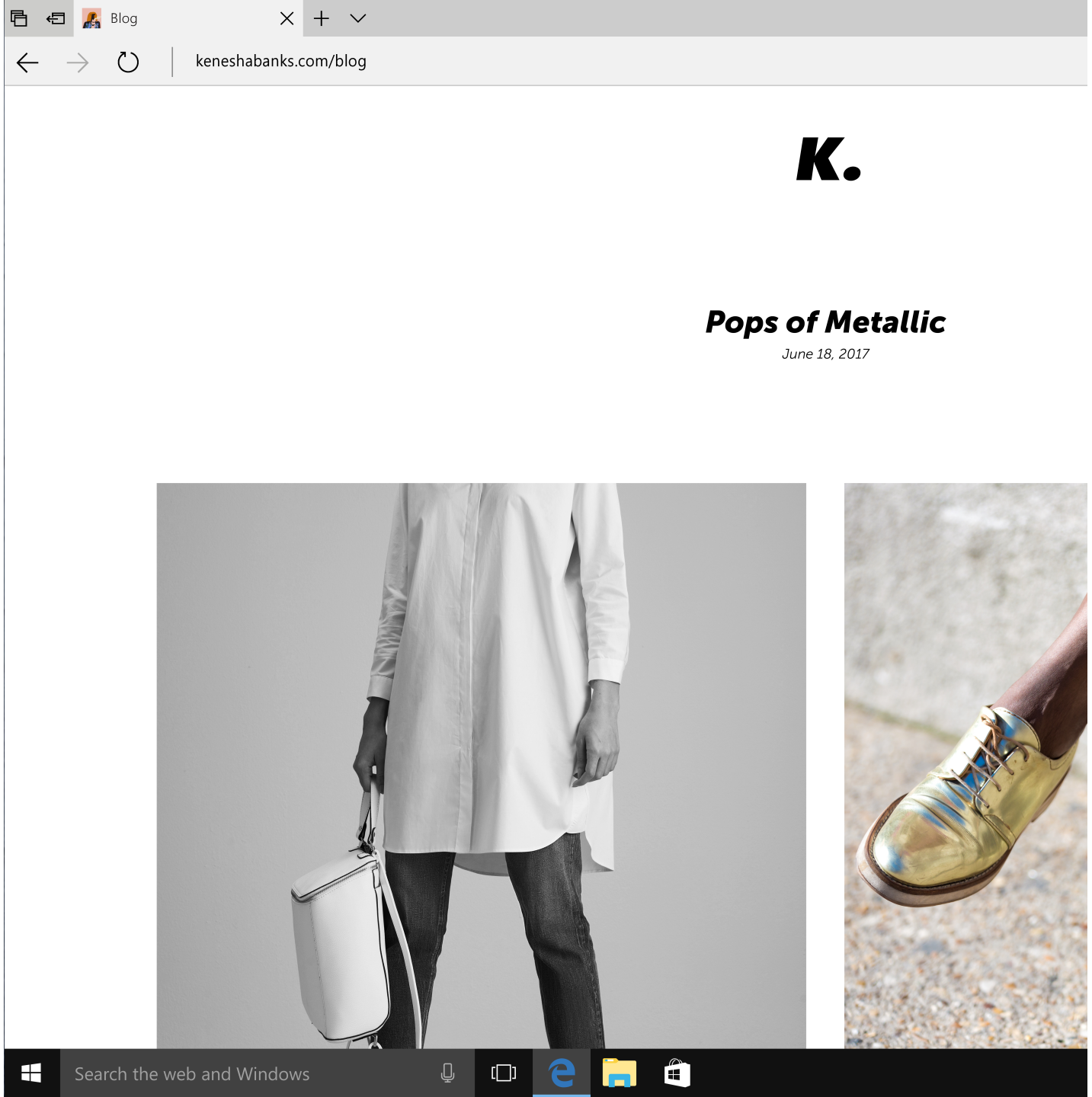


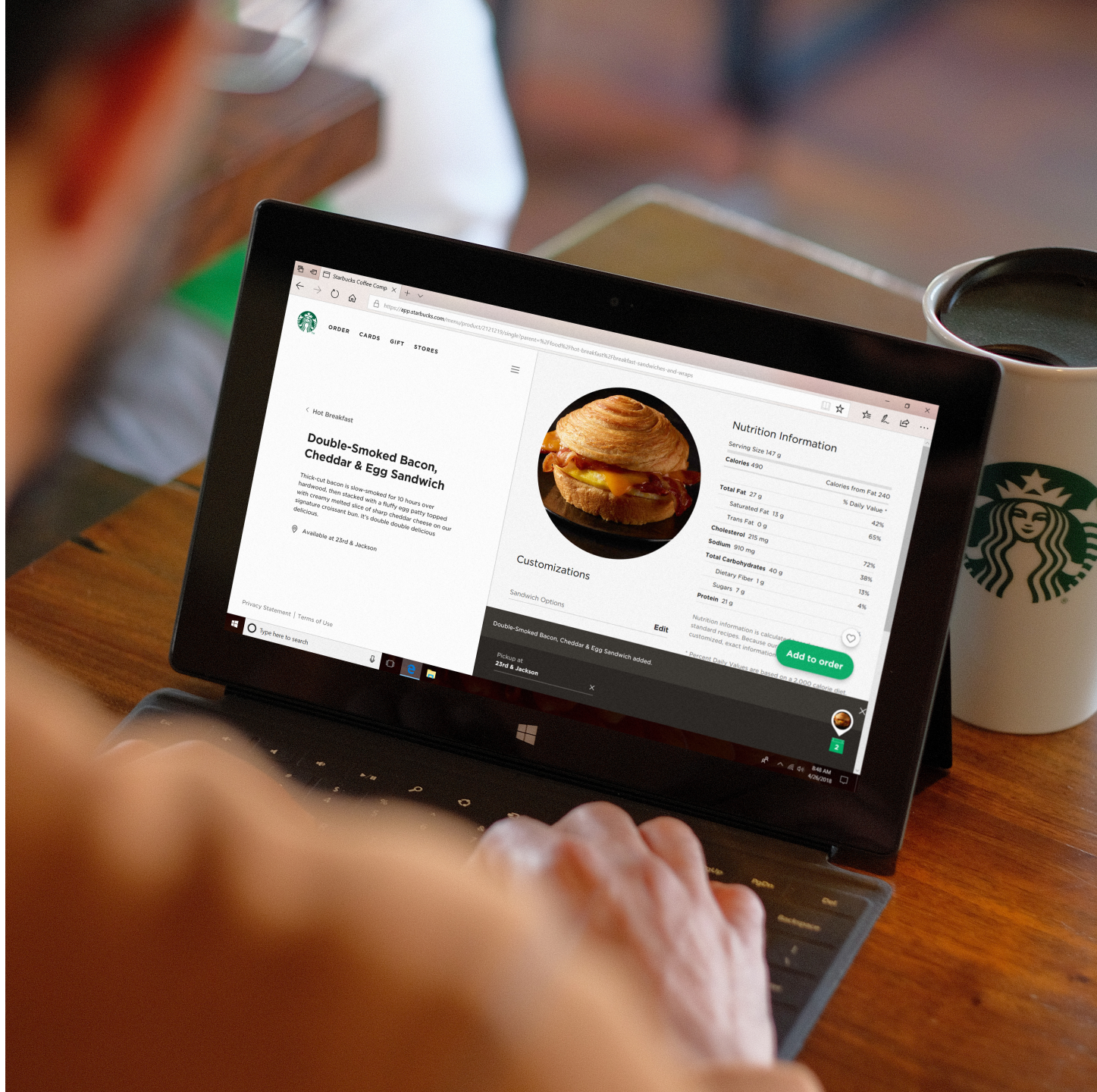
The “desktop” experience matters

Web browsing is the #1 user activity on PCs



The “desktop” experience matters, even for Progressive Web Apps

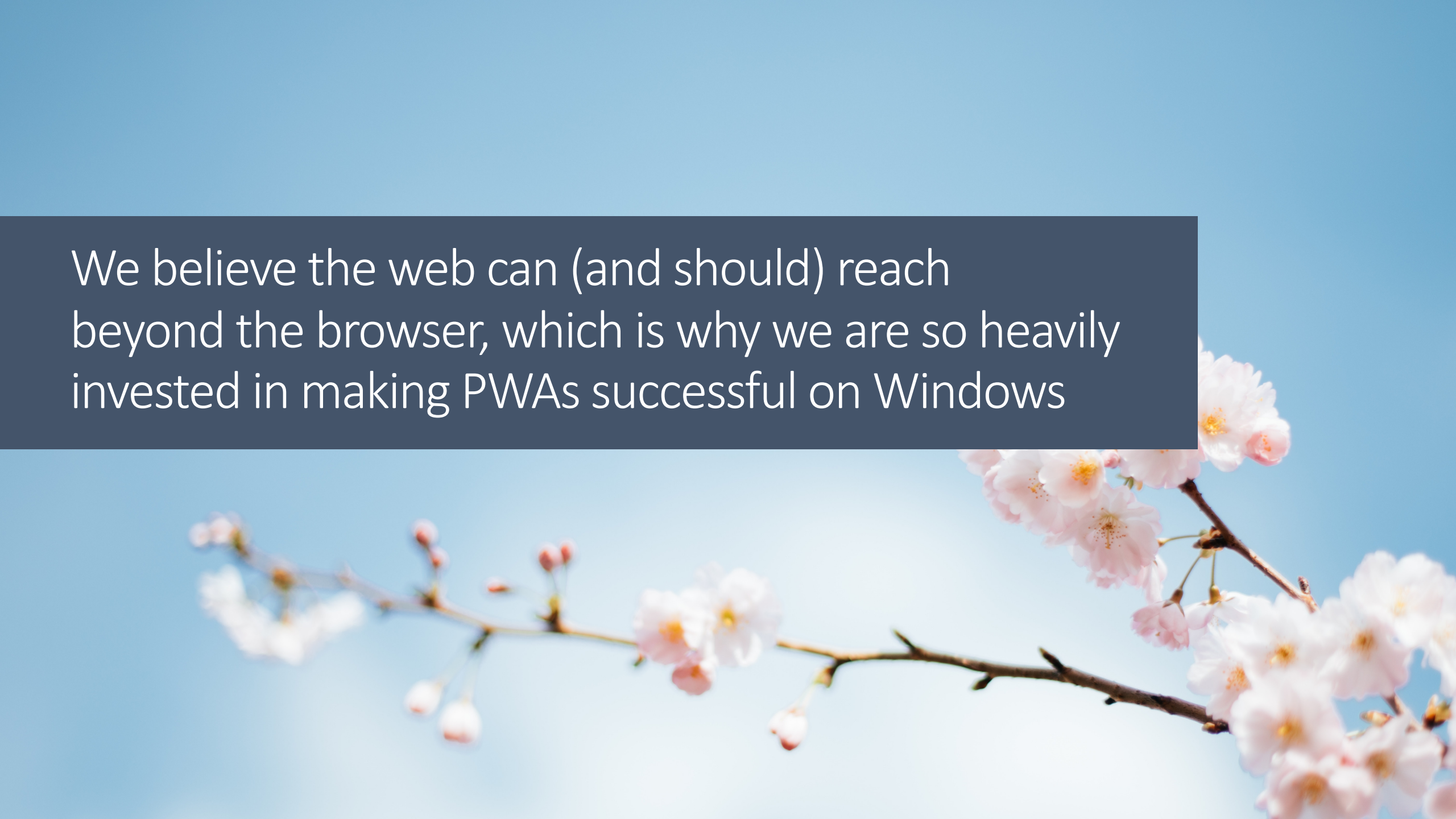
40% of Order Ahead transactions on the Starbucks PWA come from desktop

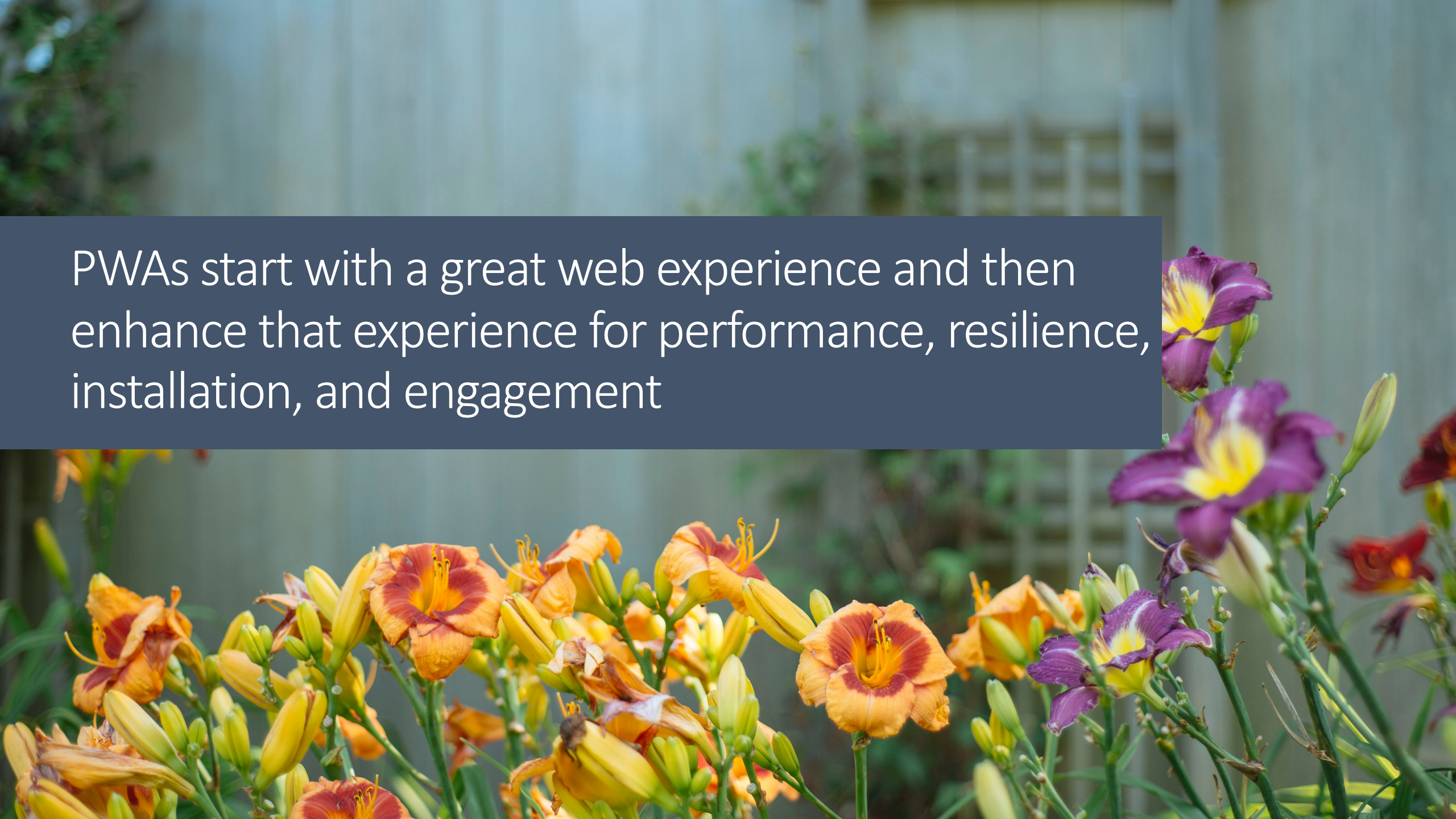


Carnival Cruise Line saw
a 16% opt-in
for Push Notifications
on desktop

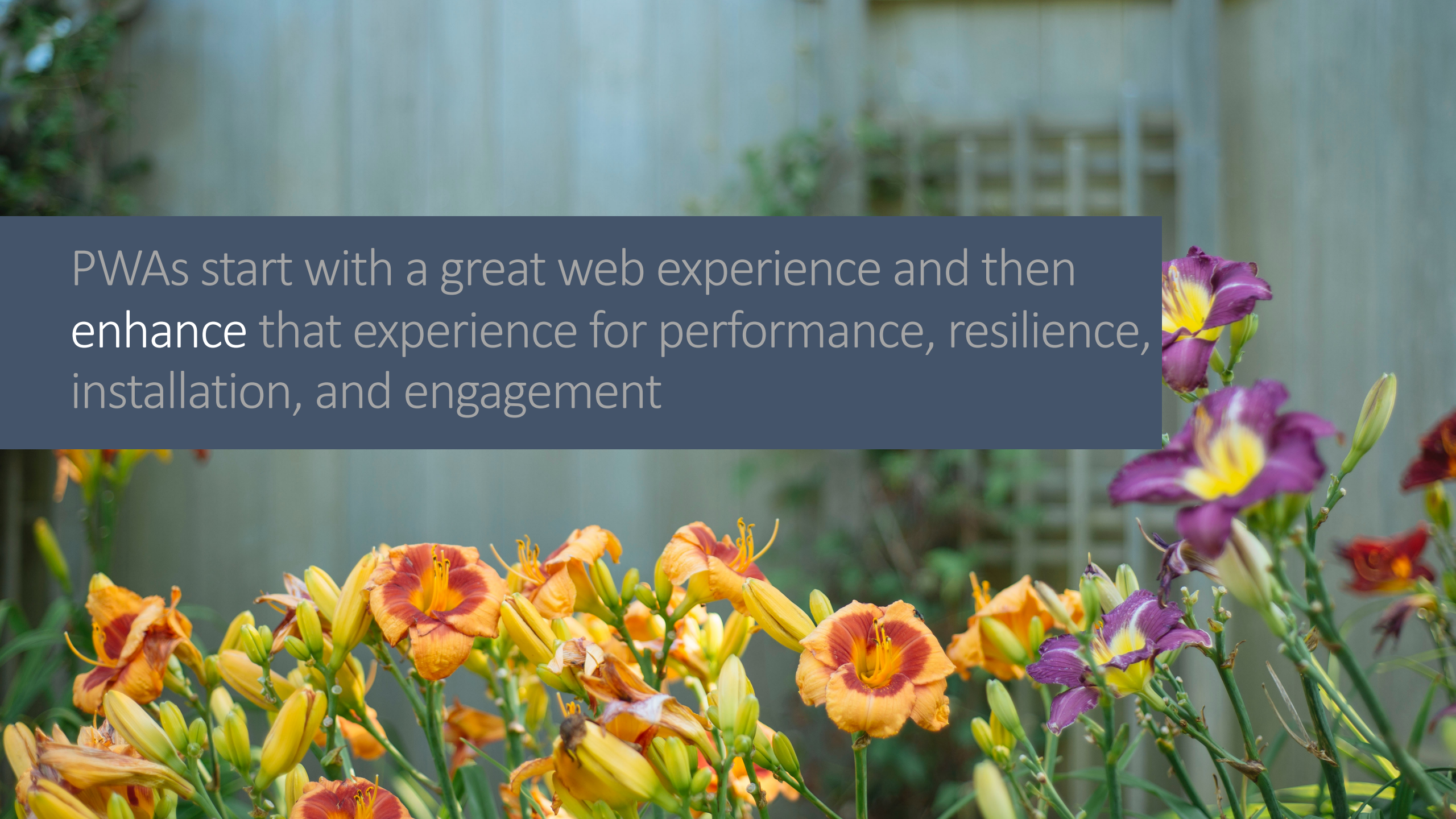
https://aka.ms/carnival-pwa

We believe the web can (and should) reach beyond the browser, which is why we are so heavily invested in making PWAs successful on Windows





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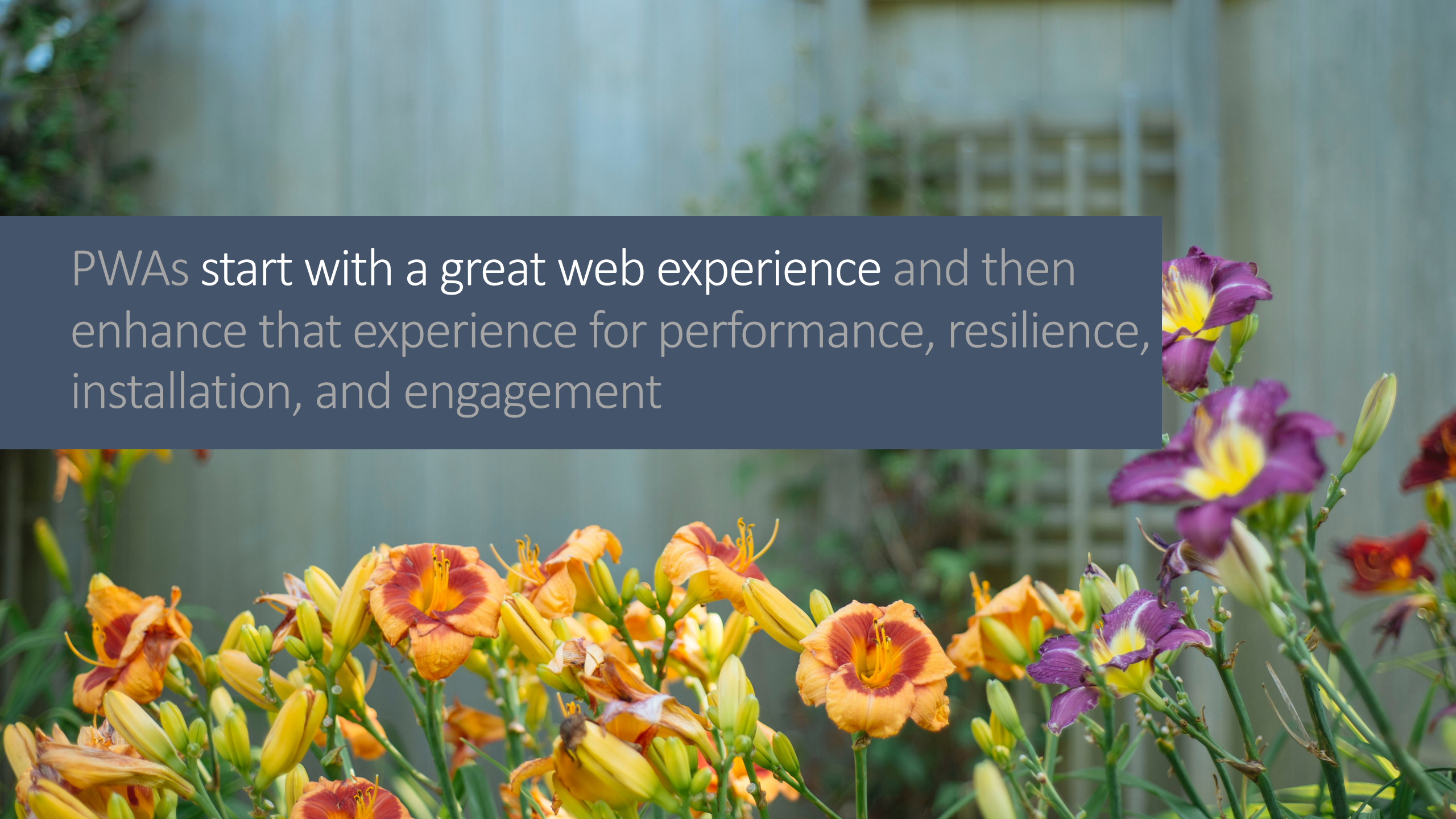
PWAs start with a great web experience and then enhance that experience for performance, resilience, installation, and engagement

Progressive

/prəˈgresiv/

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

Step 1

Focus on what matters

Consider forbes.com circa 2007

“Mobile first” thinking

The Illusion of Control i

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

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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

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

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.

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

6 comments

Share this on

Become a patron

11:27 AM
5/1/2018

Remember that text is the first interface

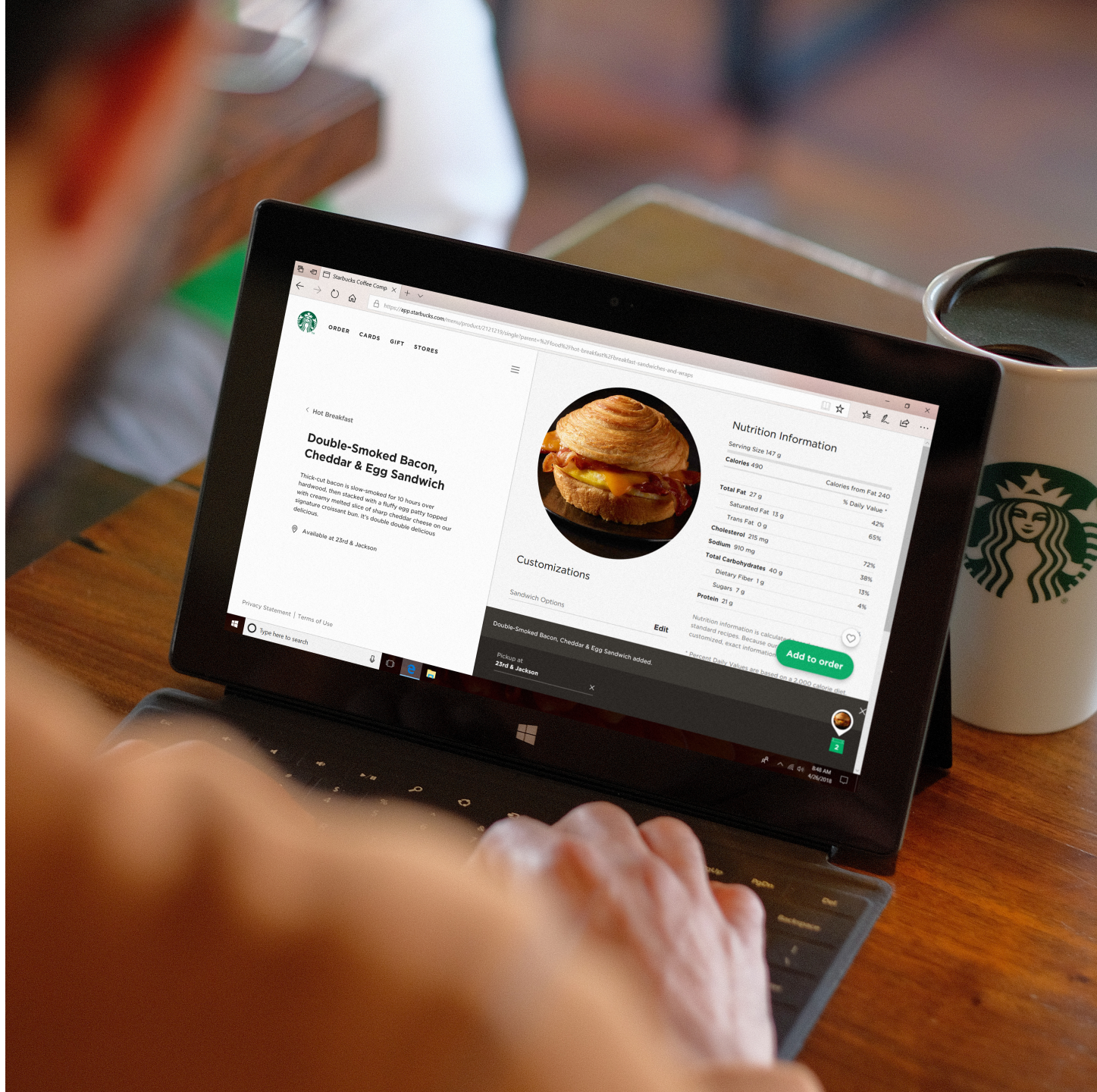
Is there anything missing that would help users be more successful?

Finding Our Focus

Josh Williams
Starbucks

Task first?

Turns out customers like to “do” things with the apps we build

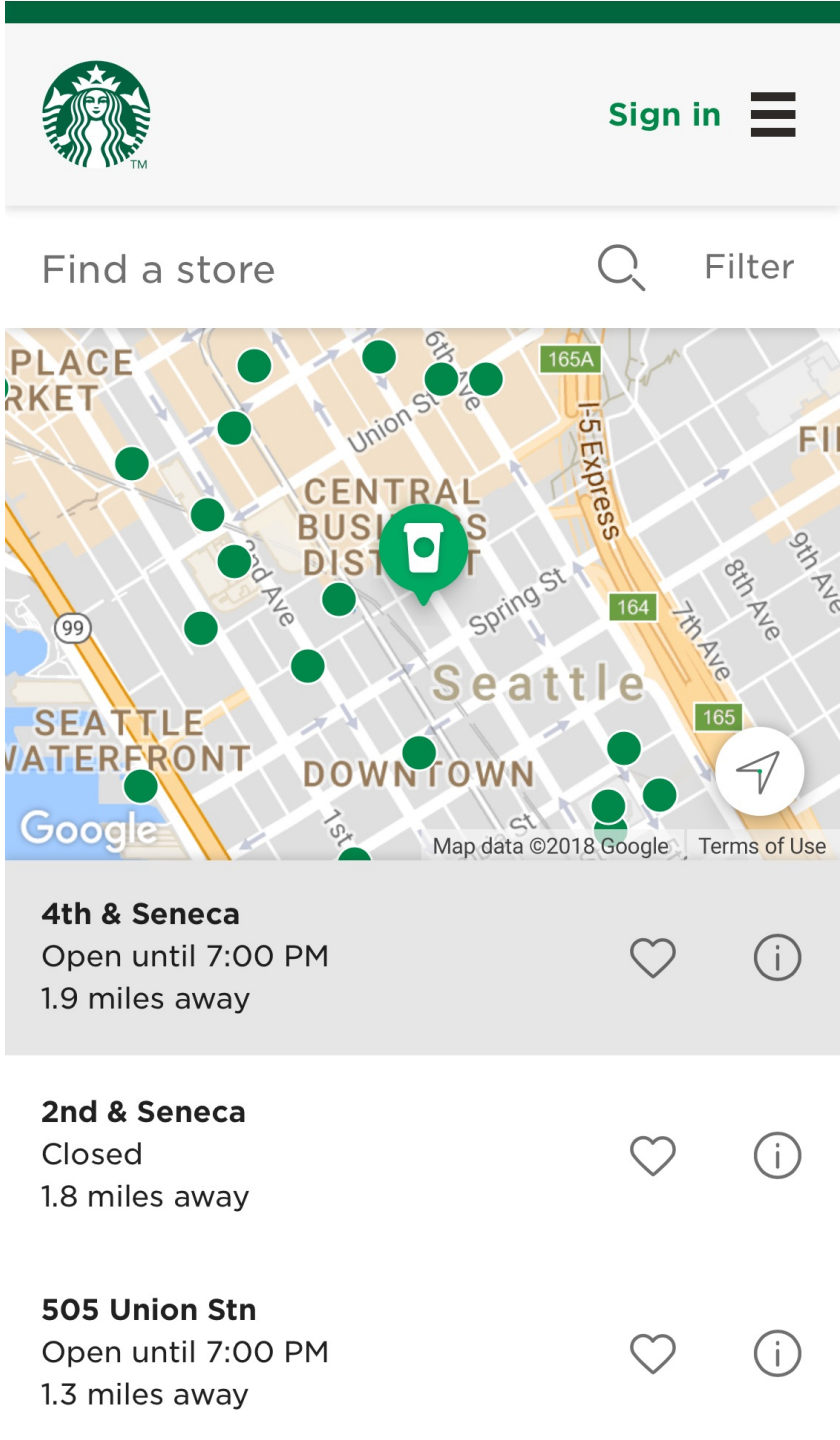


We focused on our key customer journeys

- Enable customers to join the Starbucks Rewards program
- Enable customers to transact via Order Ahead and Barcode Pay
- Enable customers to track progress towards their earned rewards

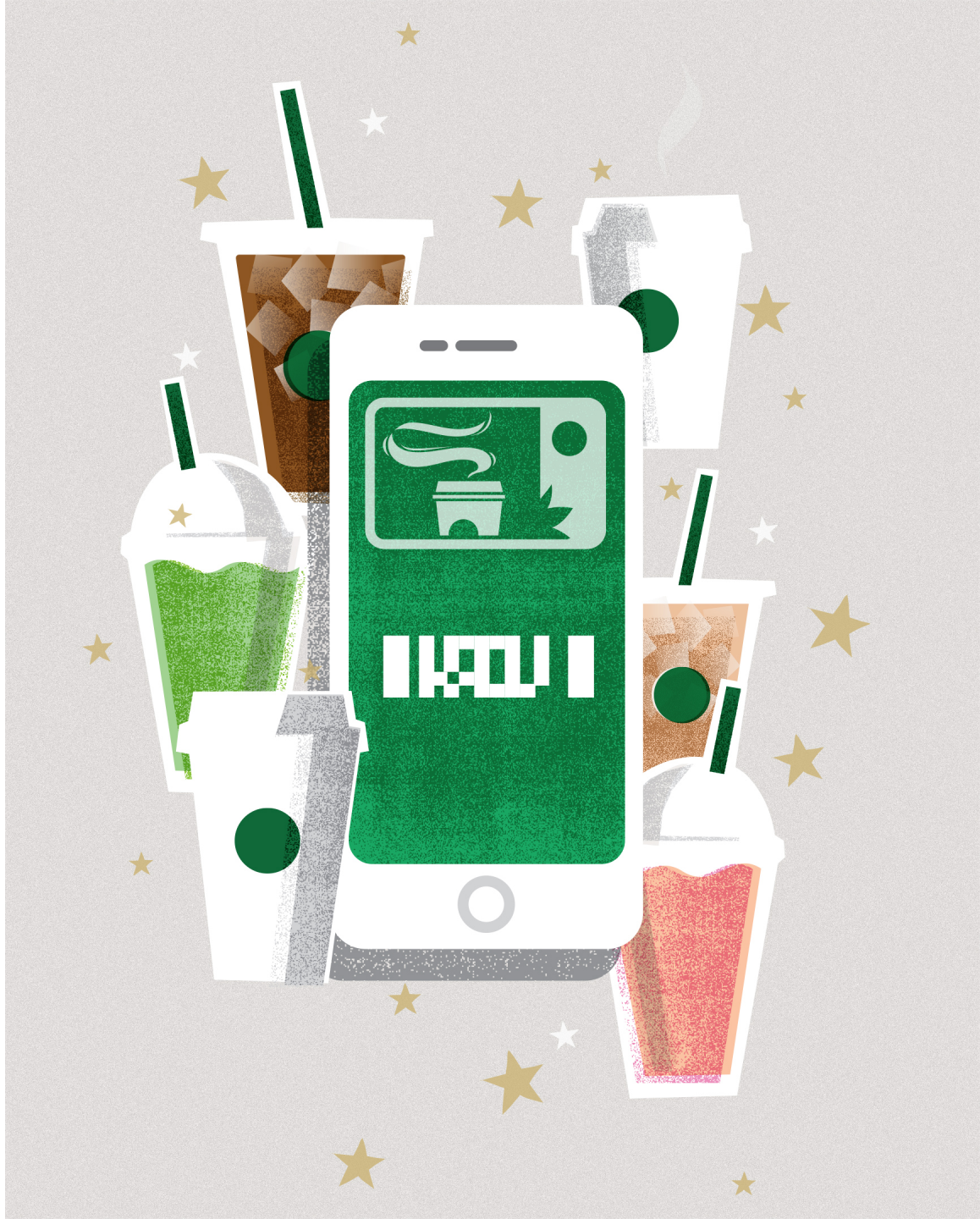
Store Locator was our first actual production “PWA” feature

And it was chromed in the previous site



From there, we were able to add in other key features

- Sign-in and Account Create
- Barcode pay
- eGift and Account management
- etc.



ORDER CARDS GIFT

Good morning, Joshua. ☀️

1238

9 free drink or food Rewards

Collect 12 more Stars for another Reward

125 125 125 125 125

125 125 125 125 113

Enter a star code

Hit refresh on iced tea 🌺

Premium teas with fruit & botanical blends and a little sweetness.

Order

Pay

Finding Our Focus

Josh Williams
Starbucks

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 **div** marks up a piece of self-contained content

```
<div class="entry">
  <div class="entry__title">Progressive Web Apps and
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  </div>
</div>
```

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

```
<article class="entry">
  <div class="entry__title">Progressive Web Apps and
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  </div>
</article>
```

This **div** is the title of the blog post

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

These **`div`** elements define various properties of the post

```
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</article>
```

There's an element for the: **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>
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```

Bonus: **time**

```
<article class="entry">
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  </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>
```

This is “flow” content with line breaks

```
<article class="entry">
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    the Windows Ecosystem</h1>
  <dl class="entry__meta">
    <dt>Published</dt> <dd><time …>24 May 2017</time></dd>
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  </div>
</article>
```

This is “flow” content with generic divisions

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```

That is meaningful content

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  </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…

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Published
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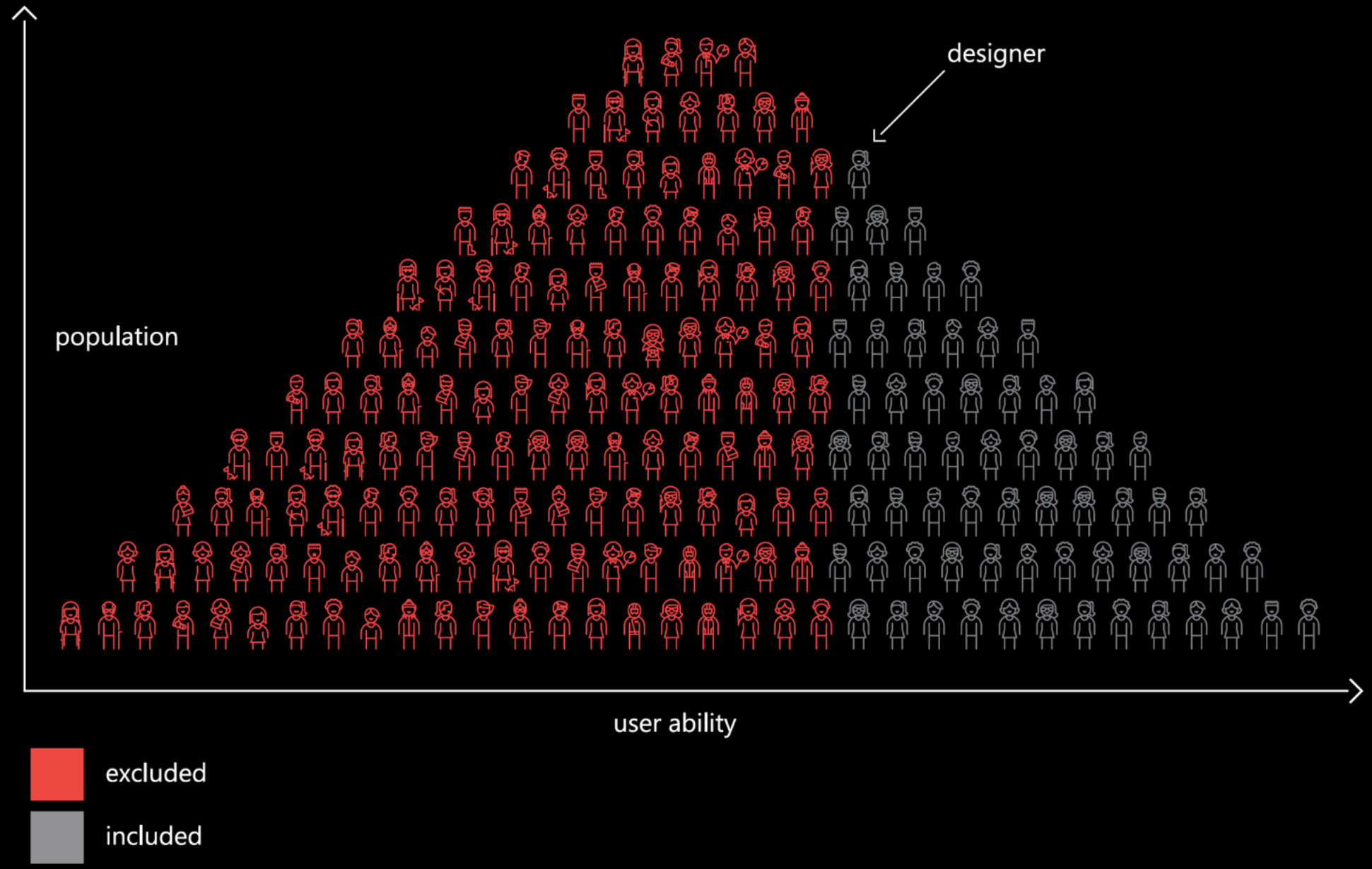
designer
population
user ability
excluded
included

Hey Cortana, read me the top three headlines in today’s New York Times
harman/kardon

Accessing content via semantics:

```
function extractHeadlines( response ){
  var $html = document.createElement('div'),
      $headings, i=0, headlines=[];
  $html.innerHTML = response.contents;
  $headings = $html.querySelector('#top-news')
                .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 );
}
```

Accessing content via semantics:

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}
```

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

https://aka.ms/dependency-awareness

Let’s say you needed to code a button…

```
<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
`input[type=submit]`	button	button	Yes	Mouse, touch, ENTER, SPACE	Yes
`button[type=submit]`	button	button	Yes	Mouse, touch, ENTER, SPACE	Yes
`a`	link	Named generic	Yes	Mouse, touch, ENTER	No
`div`	block	Not exposed	No	N/A	No

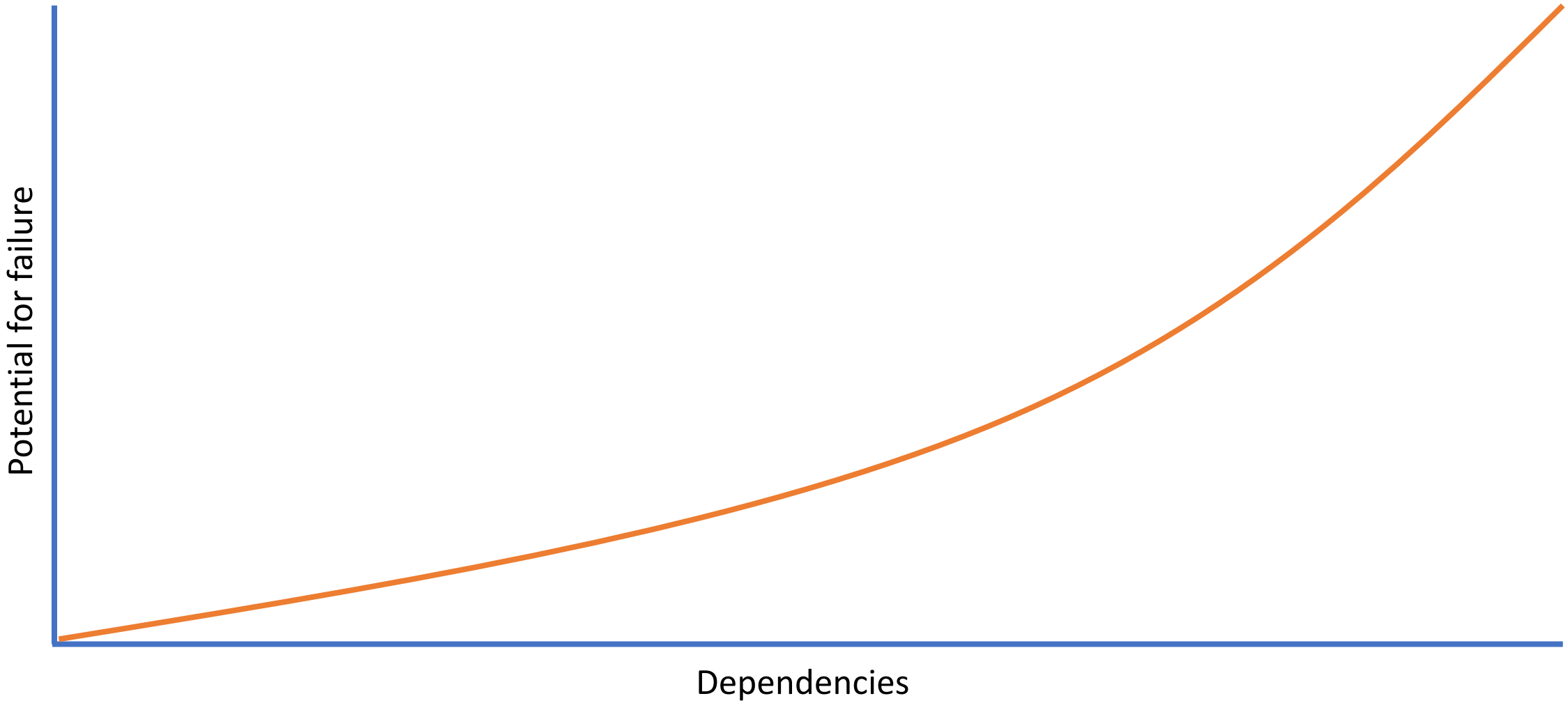
UX gaps that need to be filled

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

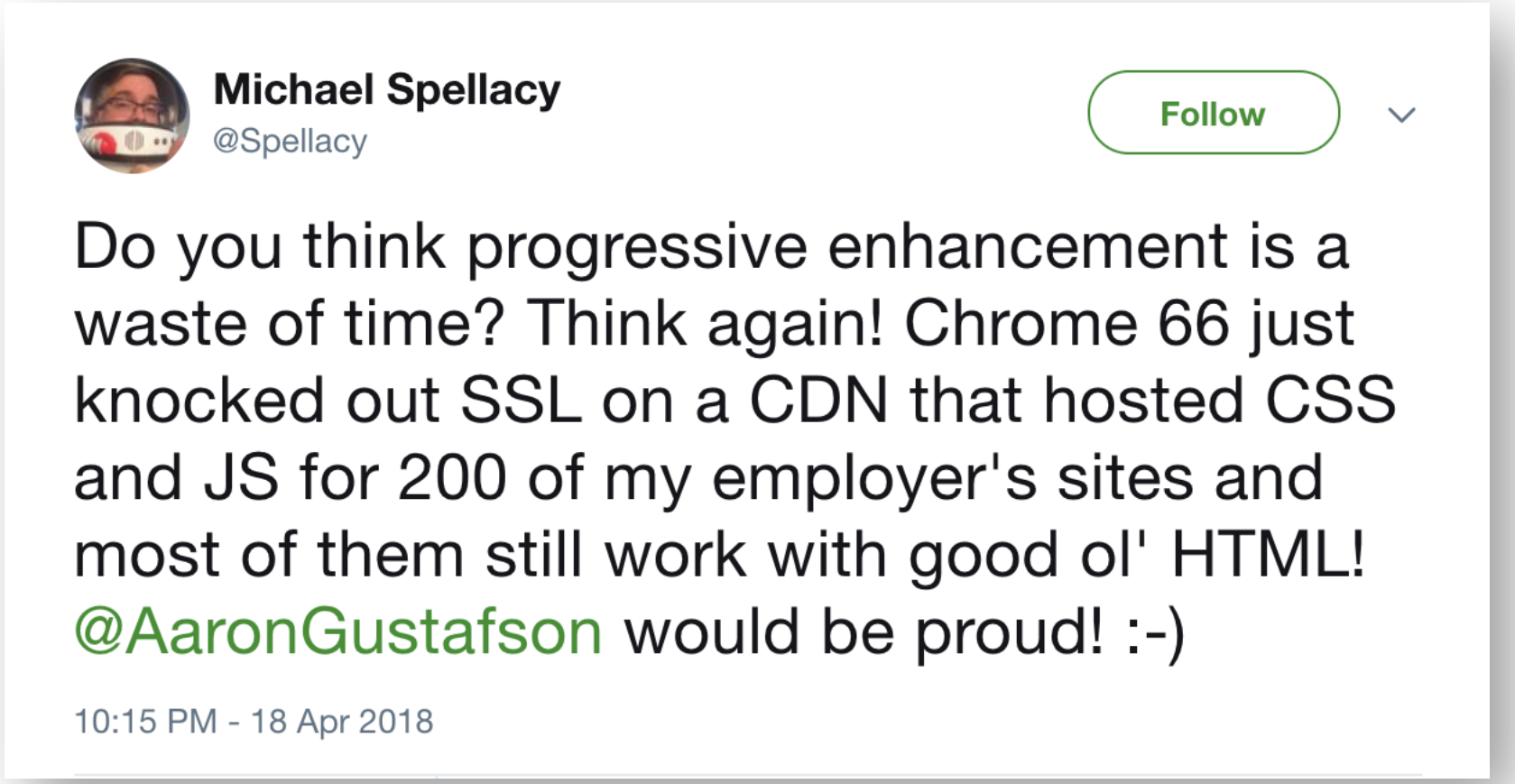
Filling those gaps introduces dependencies

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

More dependencies, more (potential) problems



Disaster averted



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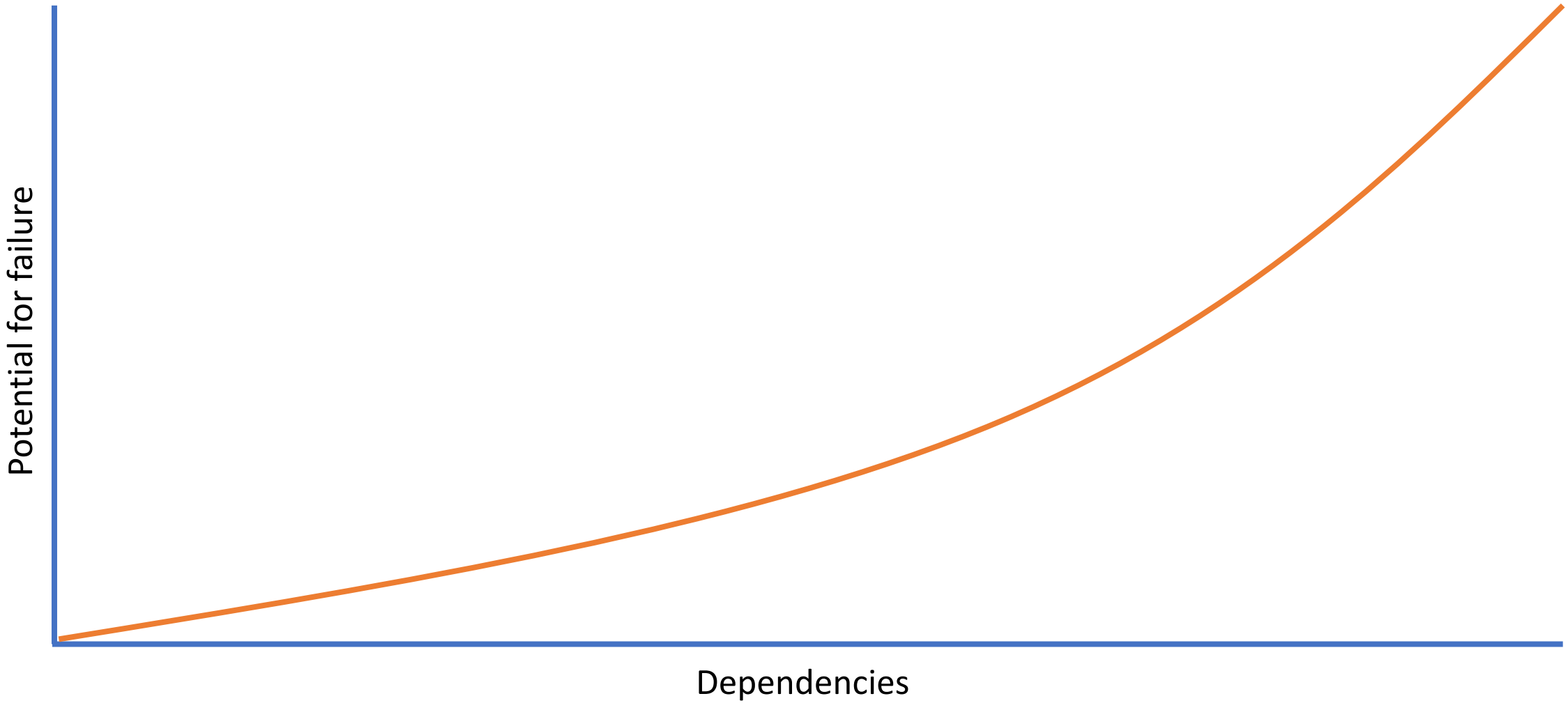
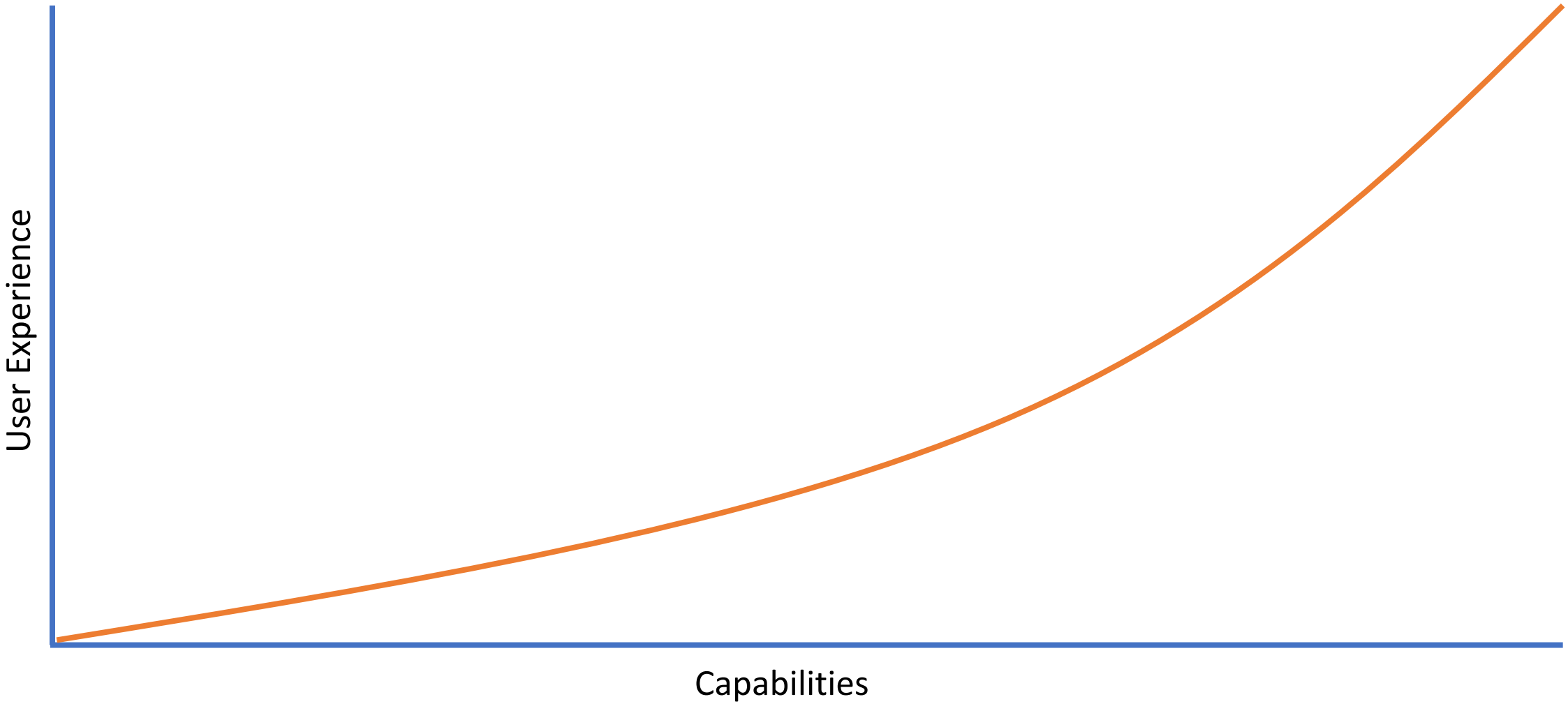
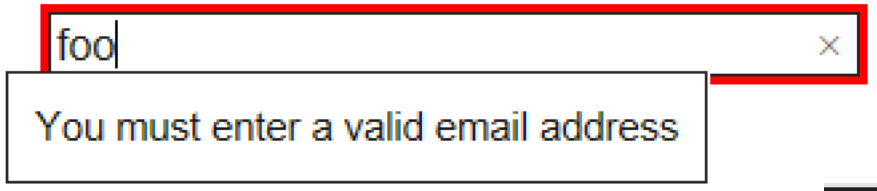


Enhance the experience



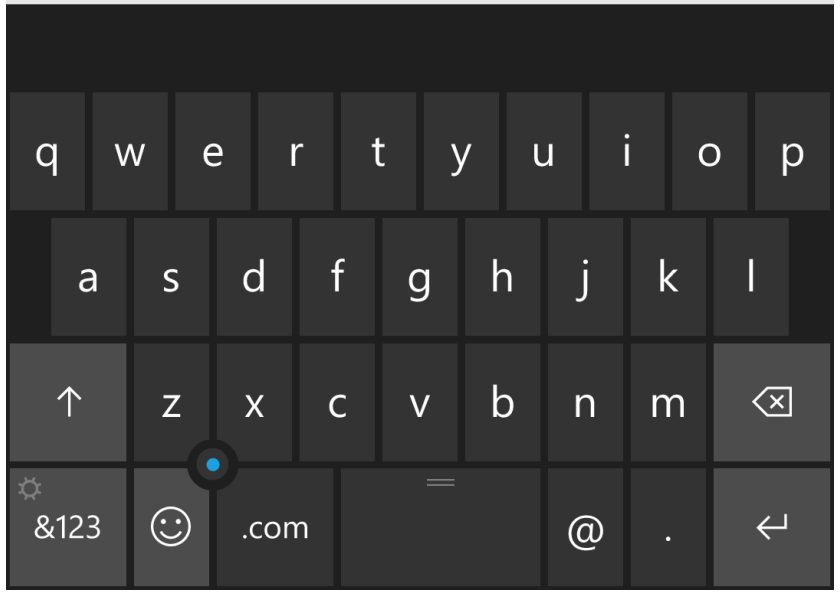
Enhancing UX with markup

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



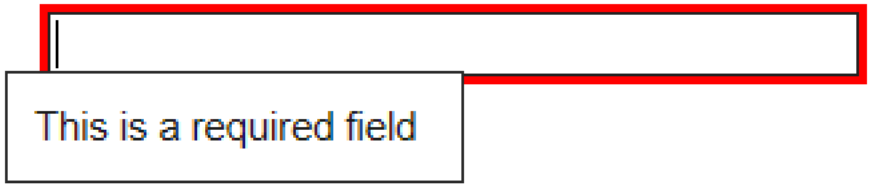
Experience deltas

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">
```



Experience deltas

1. Support for HTML validation?

Enhancing UX with markup

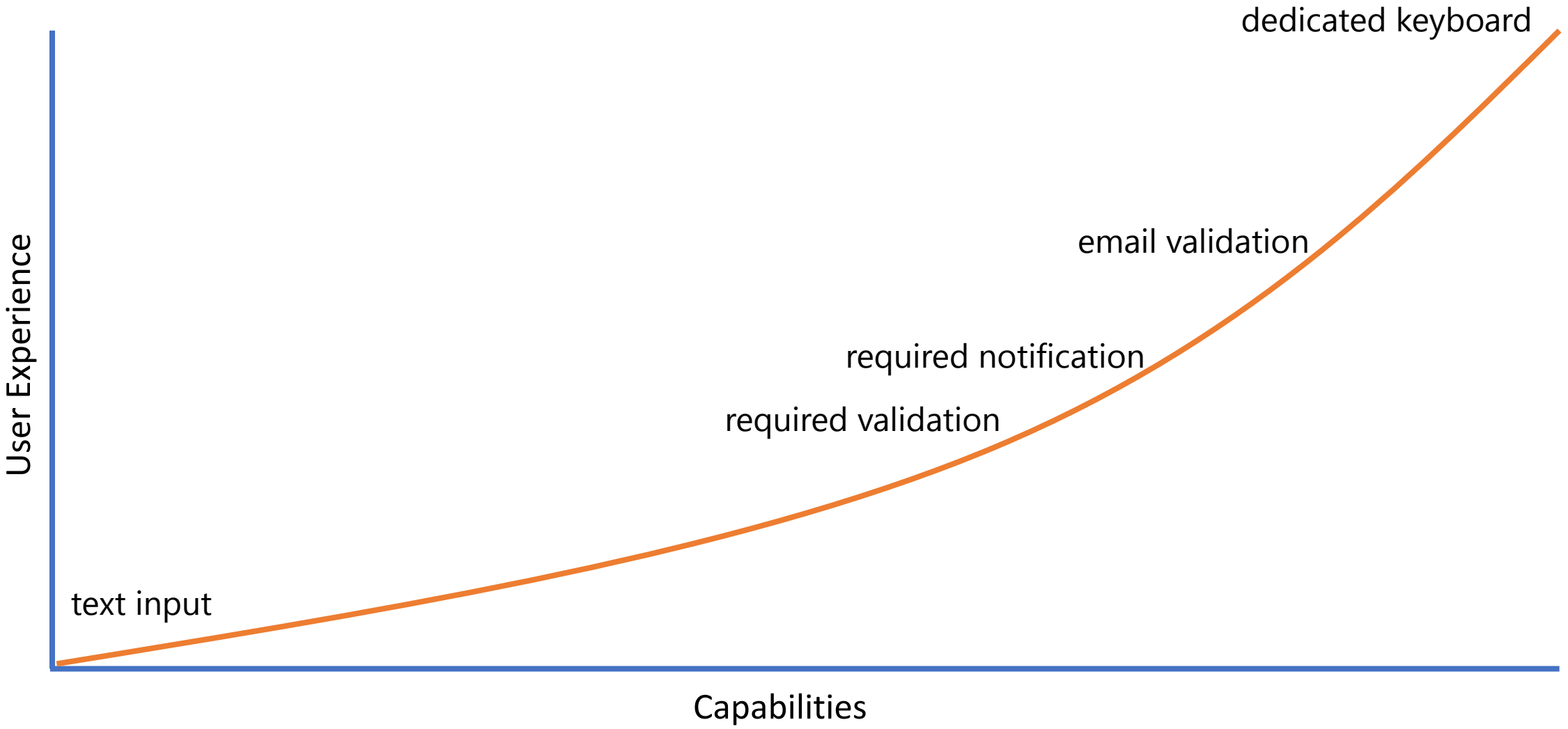
```
<input type="email" name="email" id="email"
       required aria-required="true">
```

Experience deltas

1. Browser exposure of aria-required property?

2. Assistive tech implementation of aria-required?

Enhance the experience

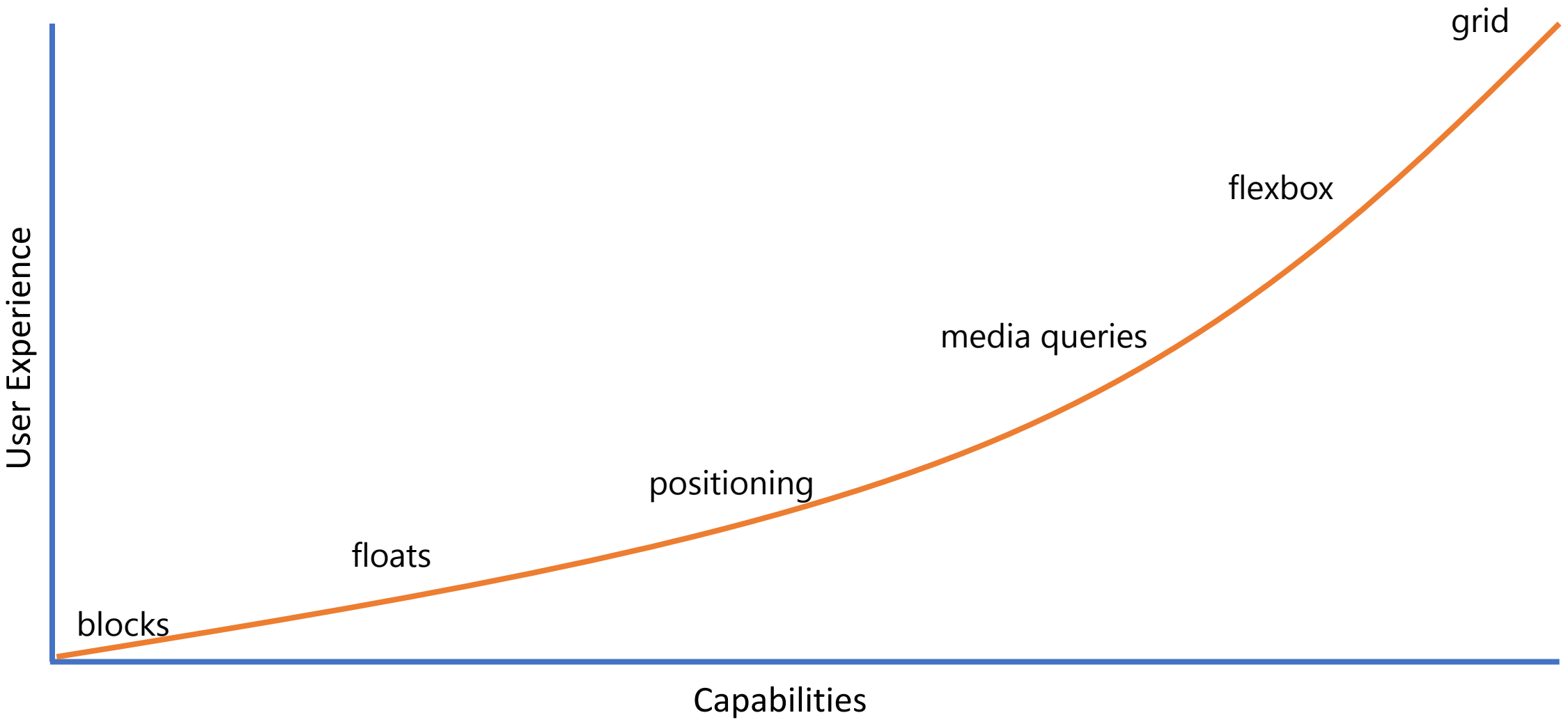


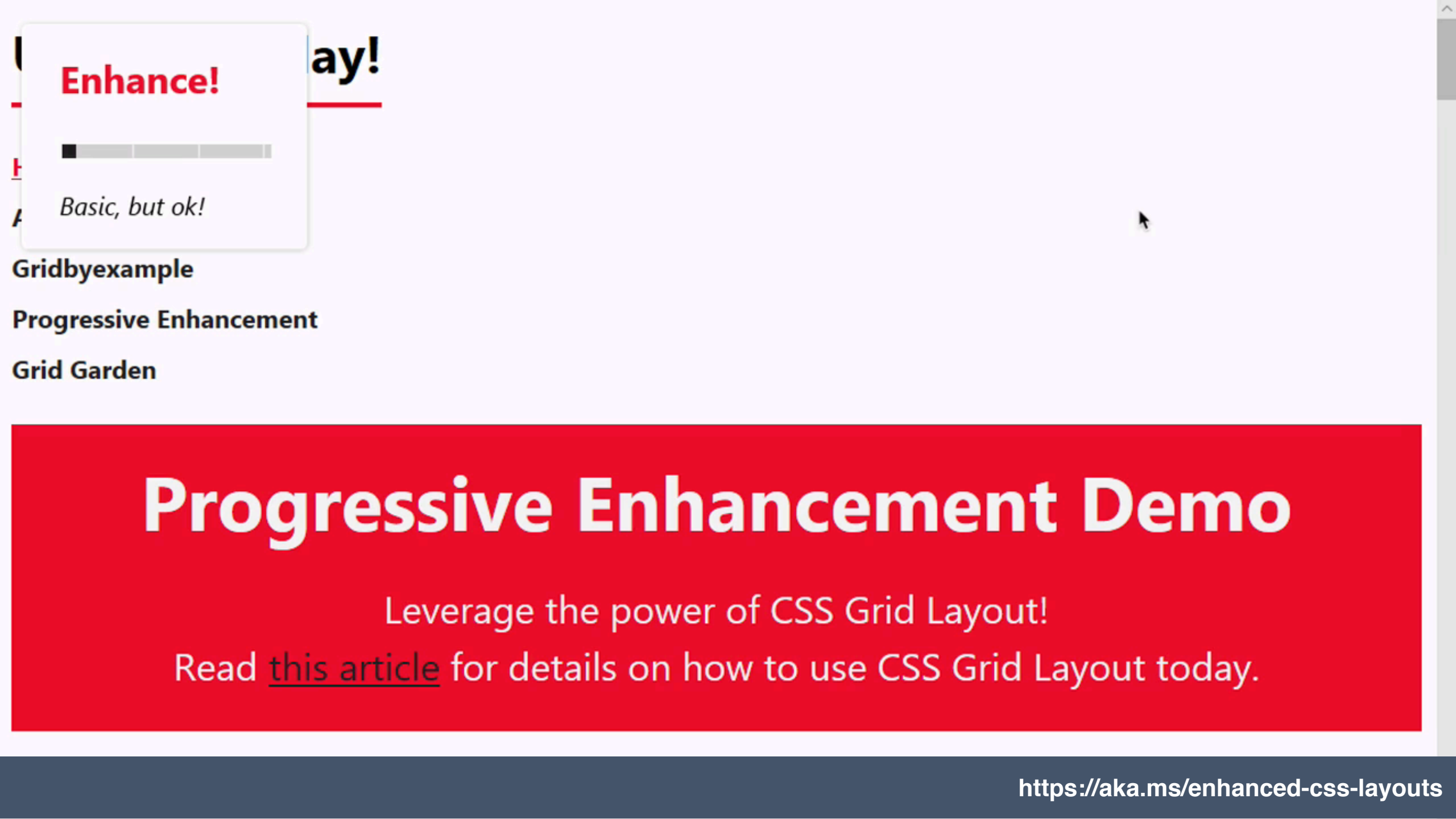
When you think of user experience as a continuum that scales with capabilities, a progressive approach to interfaces is both elegant and powerful.

Step 3

Design in support of the core experience

Enhance the experience




ay!
Enhance!
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.
https://aka.ms/enhanced-css-layouts

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

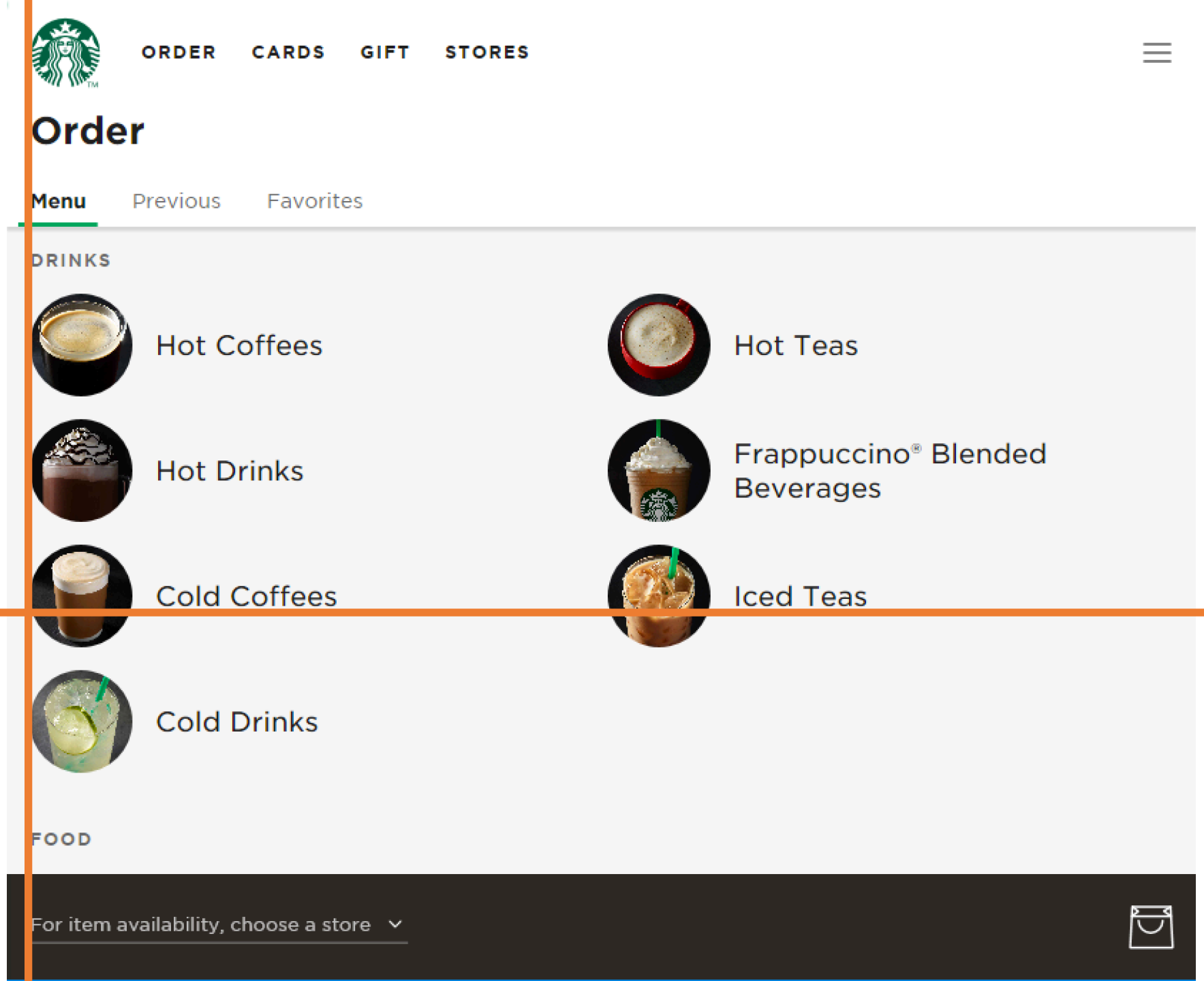
Tools for graphic design

- Alignment
- Balance
- Contrast
- Emphasis
- Gestalt
- Harmony
- Movement
- Proportion
- Proximity
- Repetition
- Rhythm
- Unity
- White Space

Tools for graphic design

- Alignment
- Balance
- Contrast
- Emphasis
- Gestalt
- Harmony
- Movement
- Proportion
- Proximity
- Repetition
- Rhythm
- Unity
- White Space

Alignment


ORDER
CARDS
GIFT
STORES
Order
Menu
Previous
Favorites
DRINKS
Hot Coffees
Hot Teas
Hot Drinks
Frappuccino® Blended Beverages
Cold Coffees
Iced Teas
Cold Drinks
FOOD
For item availability, choose a store

Contrast

Medium

MEMBER FEATURE STORY

Believing Women Means Believing Their Pain

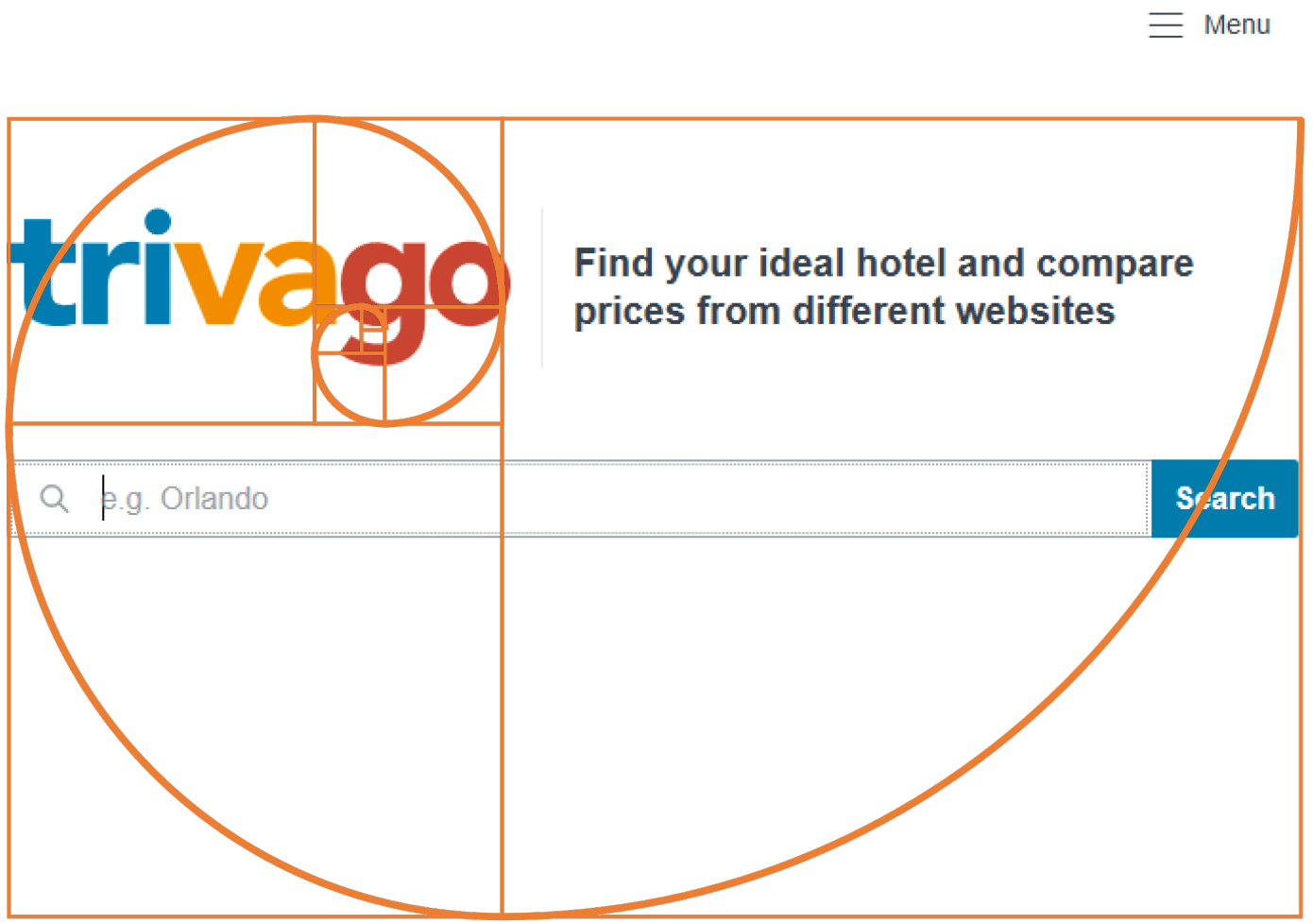
A notoriously dangerous birth control device reveals the extent to which the medical establishment disbelieves women's pain

Sady Doyle Follow

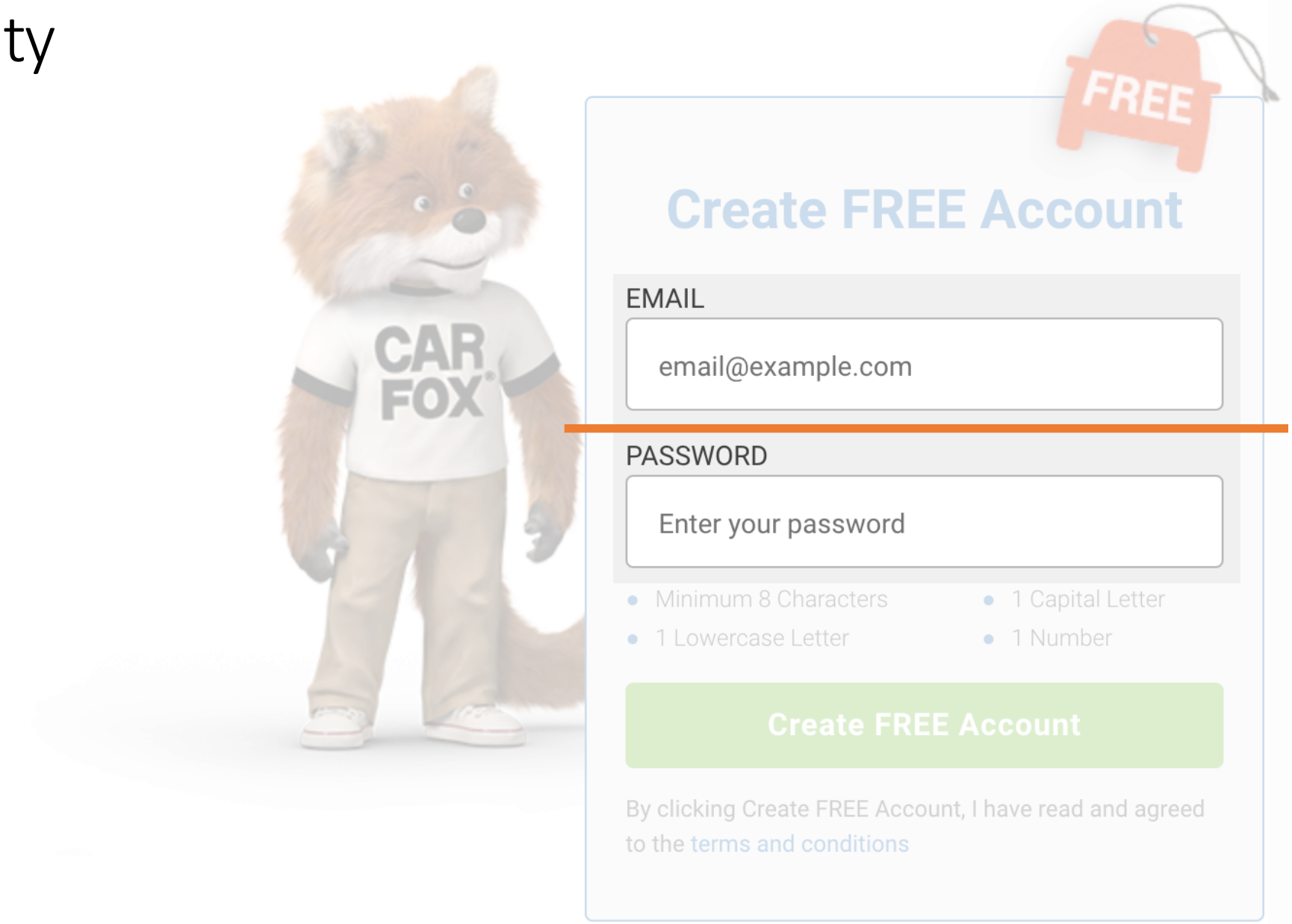
Apr 16 · ★ 5 min read

Melissa Davis Gilbert with her husband before her surgery in 2017. Gilbert has had the Essure device for about 10 years, and her symptoms — pelvic pain, fatigue, rashes, joint swelling — have gotten worse. In deciding to remove the device, it would mean she would have to get a hysterectomy. Photo by Katherine Frey/The Washington Post via Getty Images

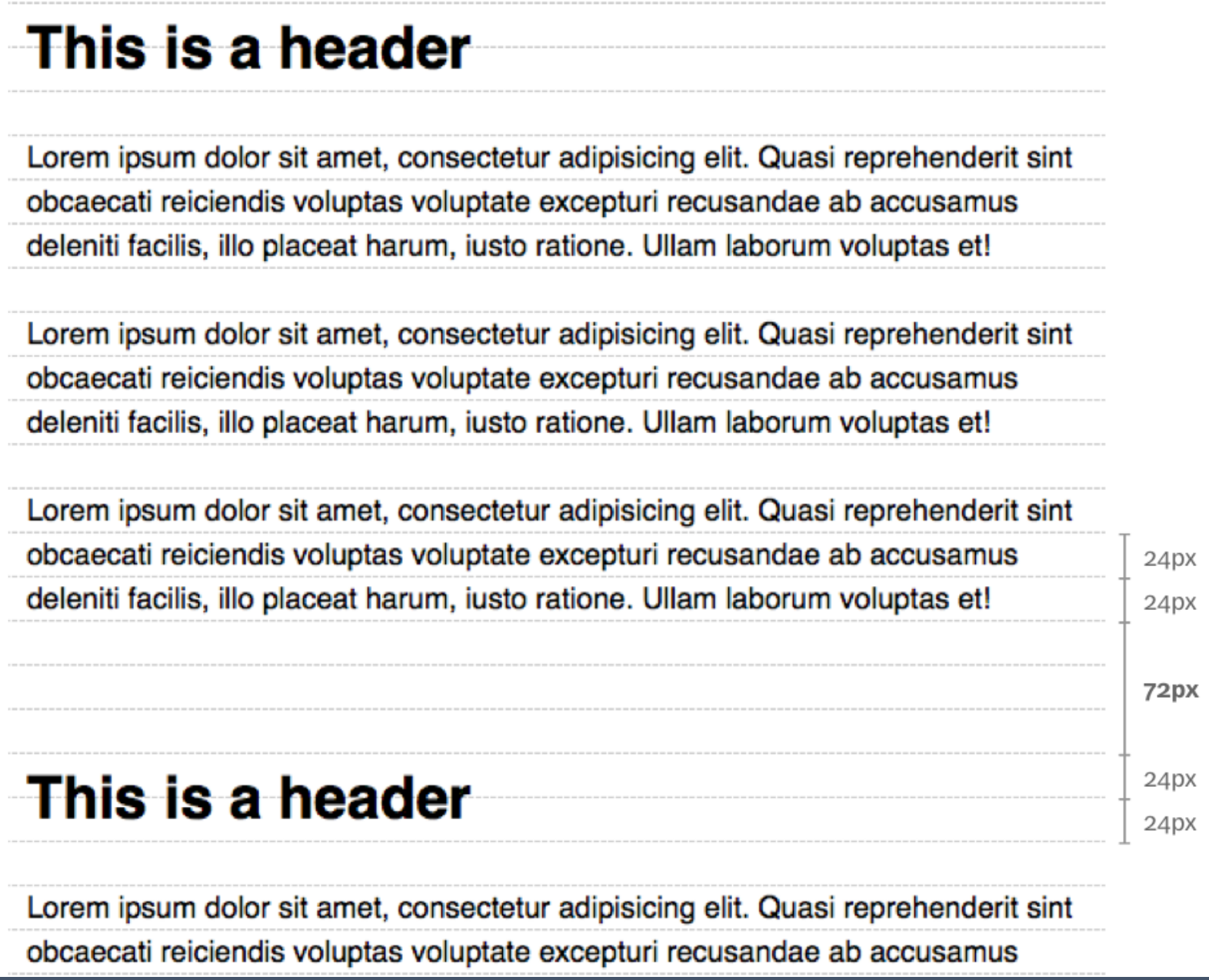
Proportion


Menu
trivago
Find your ideal hotel and compare prices from different websites
e.g. Orlando
Search

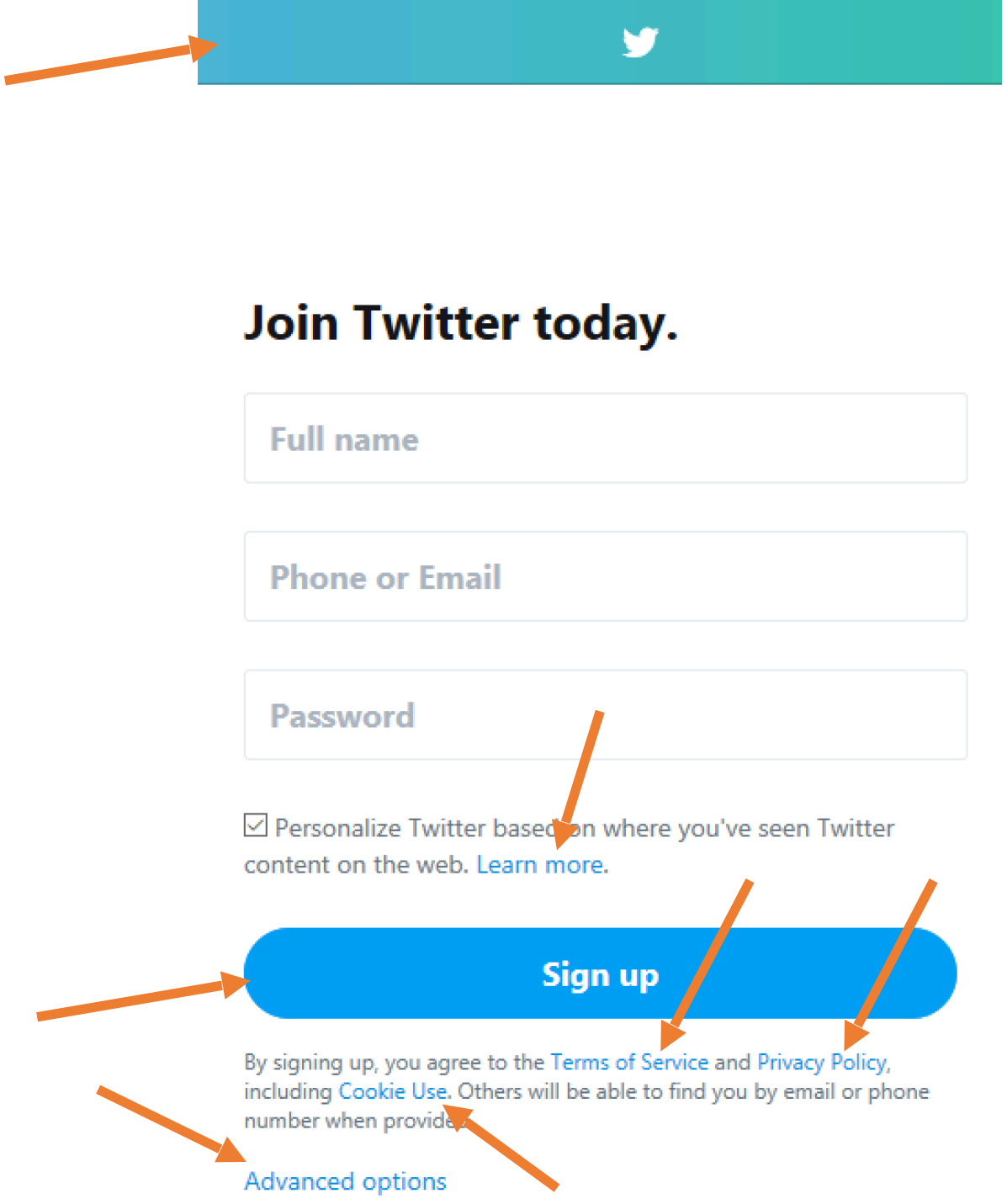
Proximity


FREE
Create FREE Account
EMAIL
email@example.com
PASSWORD
Enter your password
Minimum 8 Characters
1 Capital Letter
1 Lowercase Letter
1 Number
Create FREE Account
By clicking Create FREE Account, I have read and agreed to the terms and conditions

Rhythm


This is a header
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!
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!
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

Unity


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 provide
Advanced options

Design considerations unique to the web

- Screen size
- Resolution
- Brightness
- Color density
- User preference
- Network speed & quality
- Assistive technology

Design considerations unique to the web

- Screen size
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Design considerations unique to the web

🕐 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	

Design considerations unique to the web

- 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

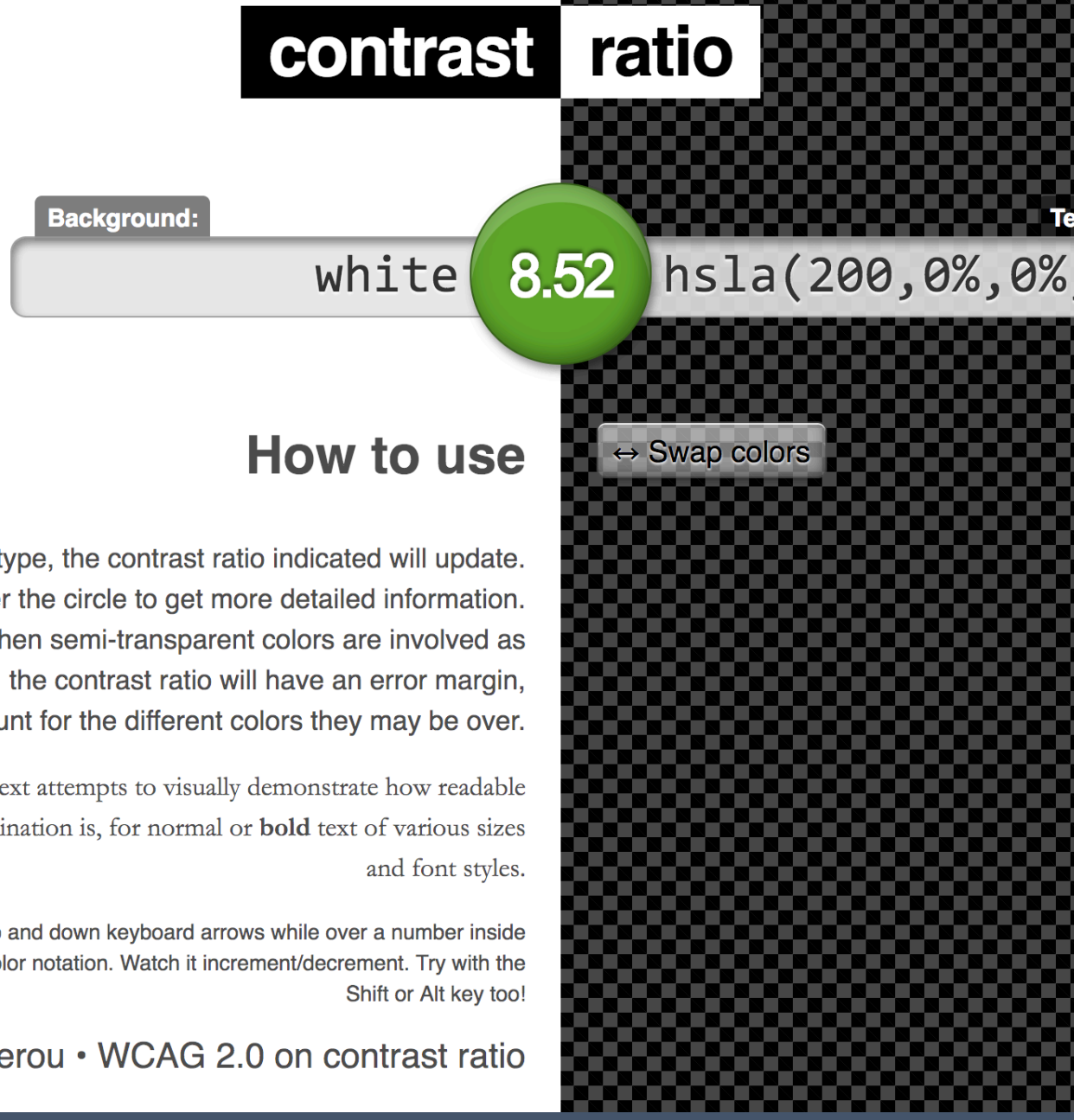
```
@media screen and (prefers-reduced-motion: reduce) { … }
```

Assistive technologies

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

Don’t rely on color alone to convey important information

Good contrast ensures your content is readable



https://aka.ms/color-contrast

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>
```

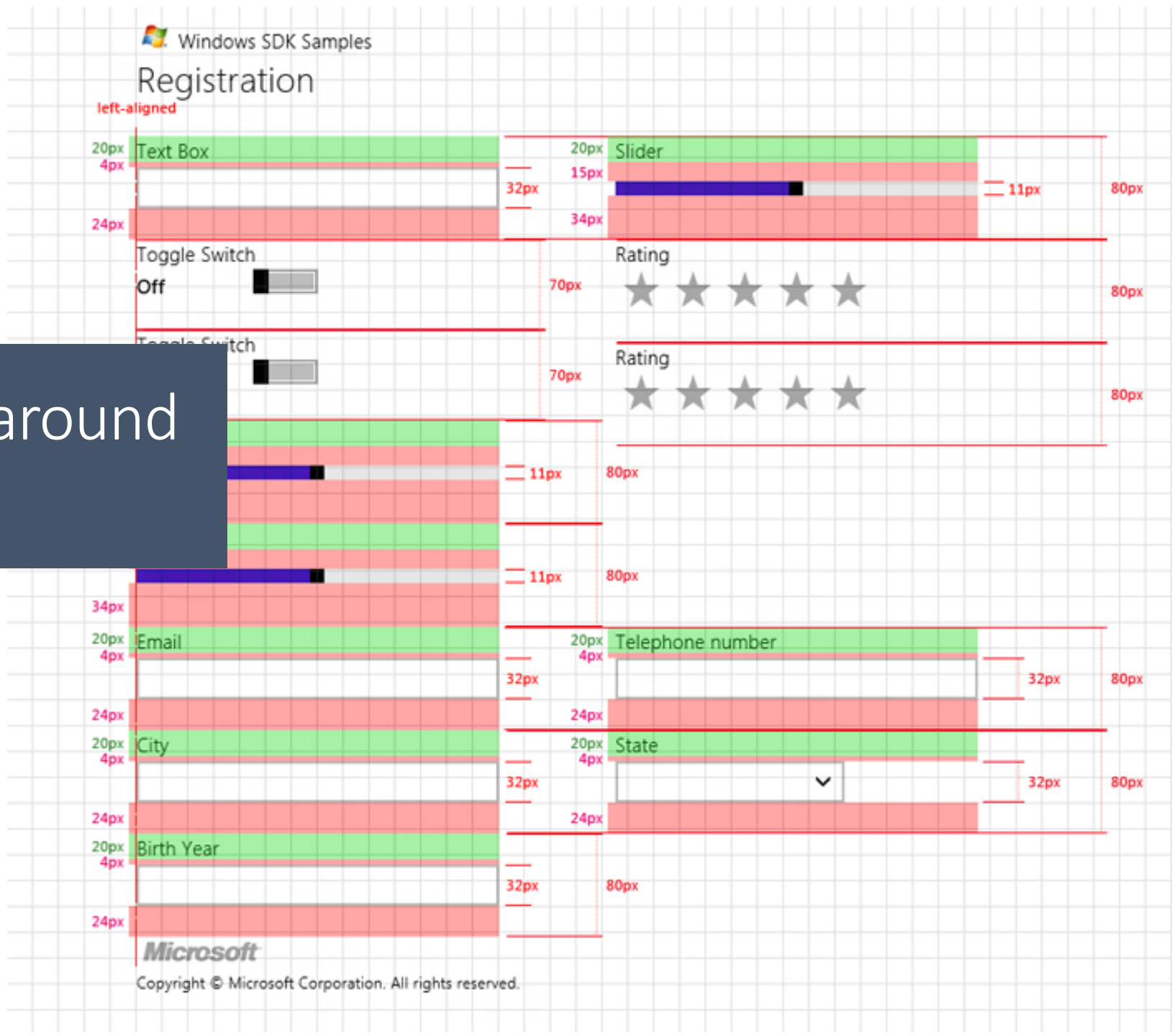
Explicit connections ensure everyone can follow references

```
<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 ample space around interactive elements



Consider what your design leaves unsaid

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

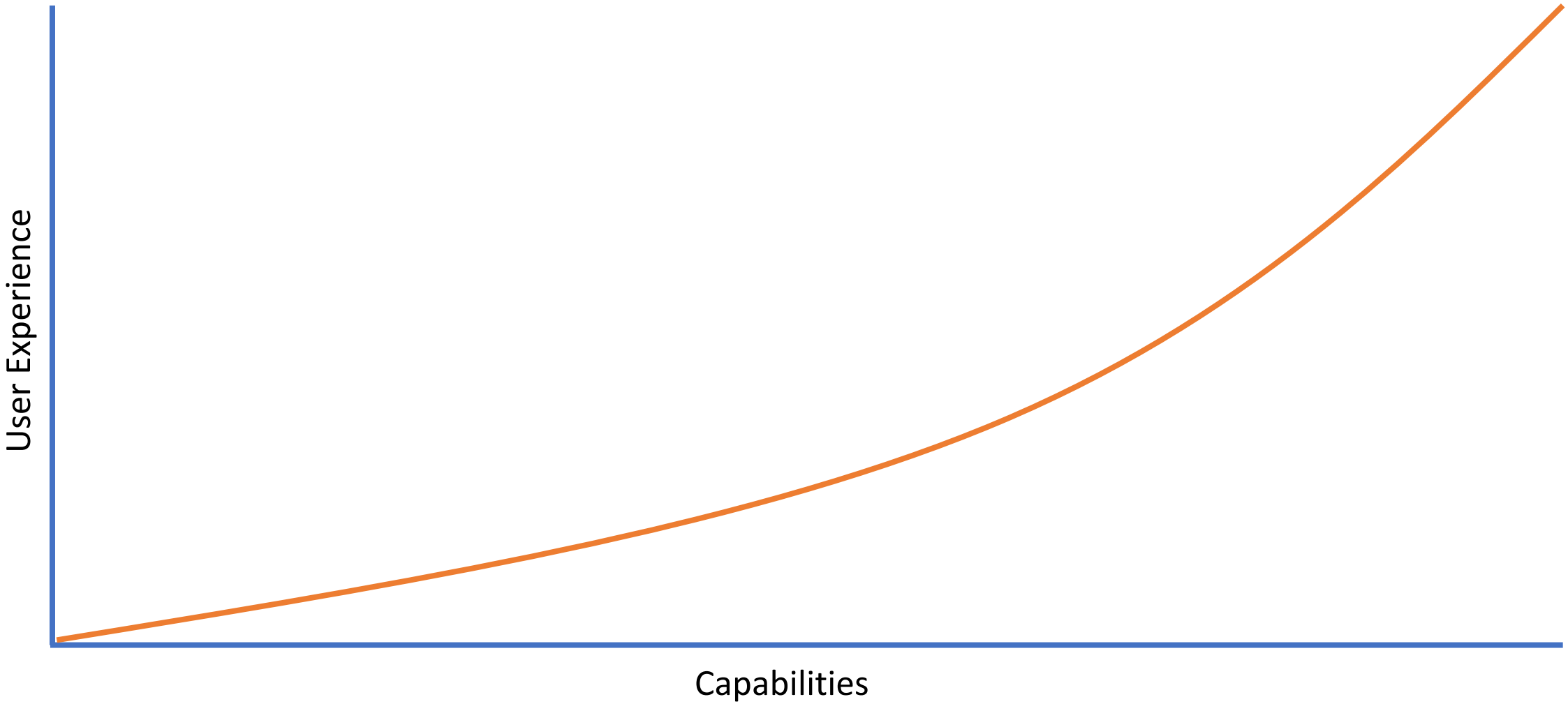
Consider what your design leaves unsaid

```
<a href="…">
  <b class="hidden">You can</b>
  finish reading
  <b class="hidden">“The Web
    Should Just Work for
    Everyone” in less than
    10 minutes</b>
</a>
```

Consider what your design leaves unsaid

```
<a href="…">
  <b class="hidden">You can</b>
  finish reading
  <b class="hidden">“The Web
    Should Just Work for
    Everyone” in less than
    10 minutes</b>
</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

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p {
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}
```

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.

Older browsers without RGBa support, ignore the second rule

Enhancing design in CSS

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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.

Modern browsers with RGBa support, overwrite the first rule

Enhancing design in CSS

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

Passwords can be a hassle

(That selects h1s that have adjacent sibling paragraphs.)

Enhancing design in CSS

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

Passwords can be a hassle

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

Enhancing design in CSS

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

Passwords can be a hassle

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

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

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```

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.

Browsers without media query support ignore the block

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.

Browsers with media query support apply it

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

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  }
}
```

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.

Browsers that don’t grok @supports ignore the block

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.

Browsers that understand @supports, but don’t display grid ignore it

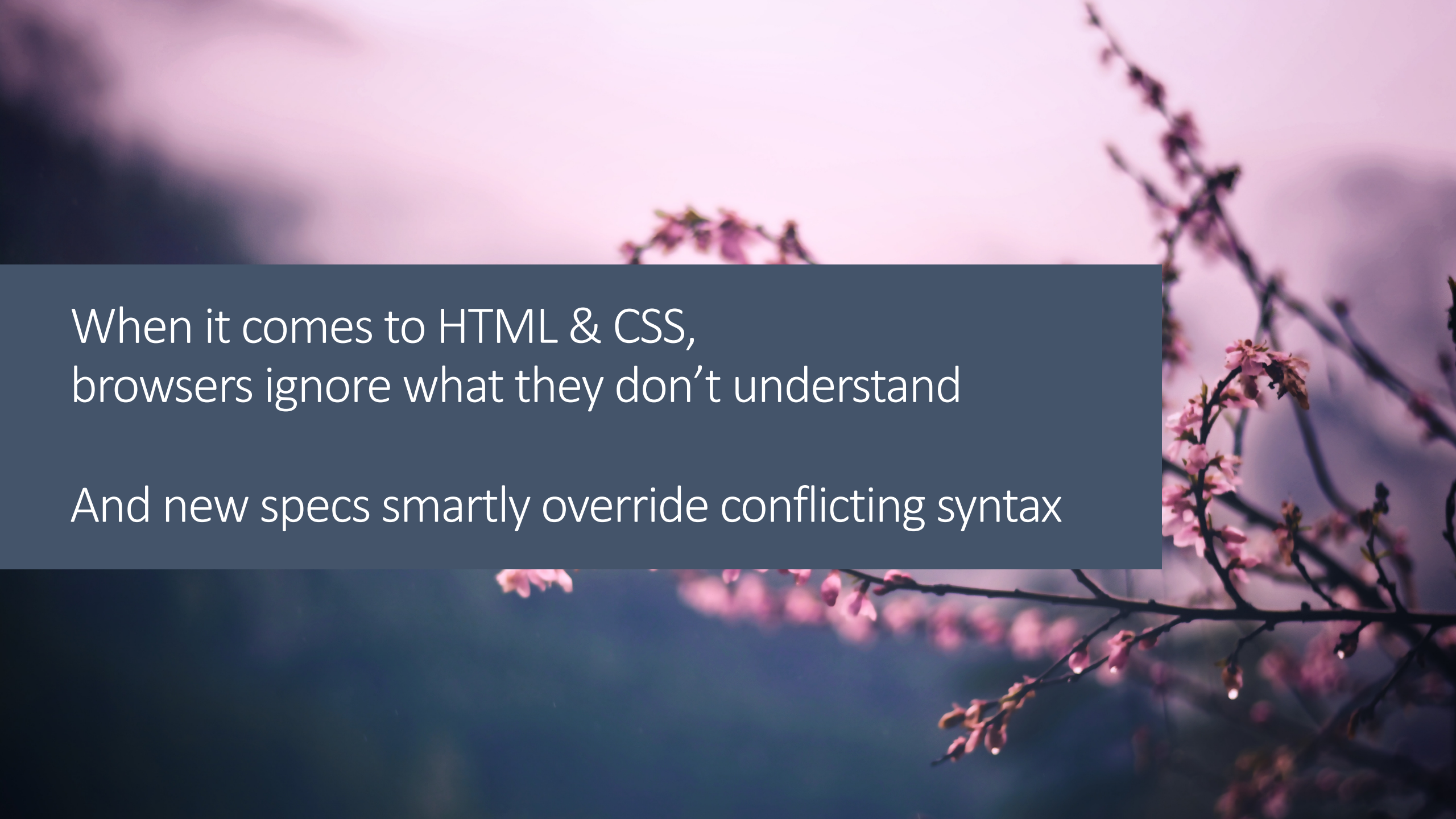
Enhancing design in CSS

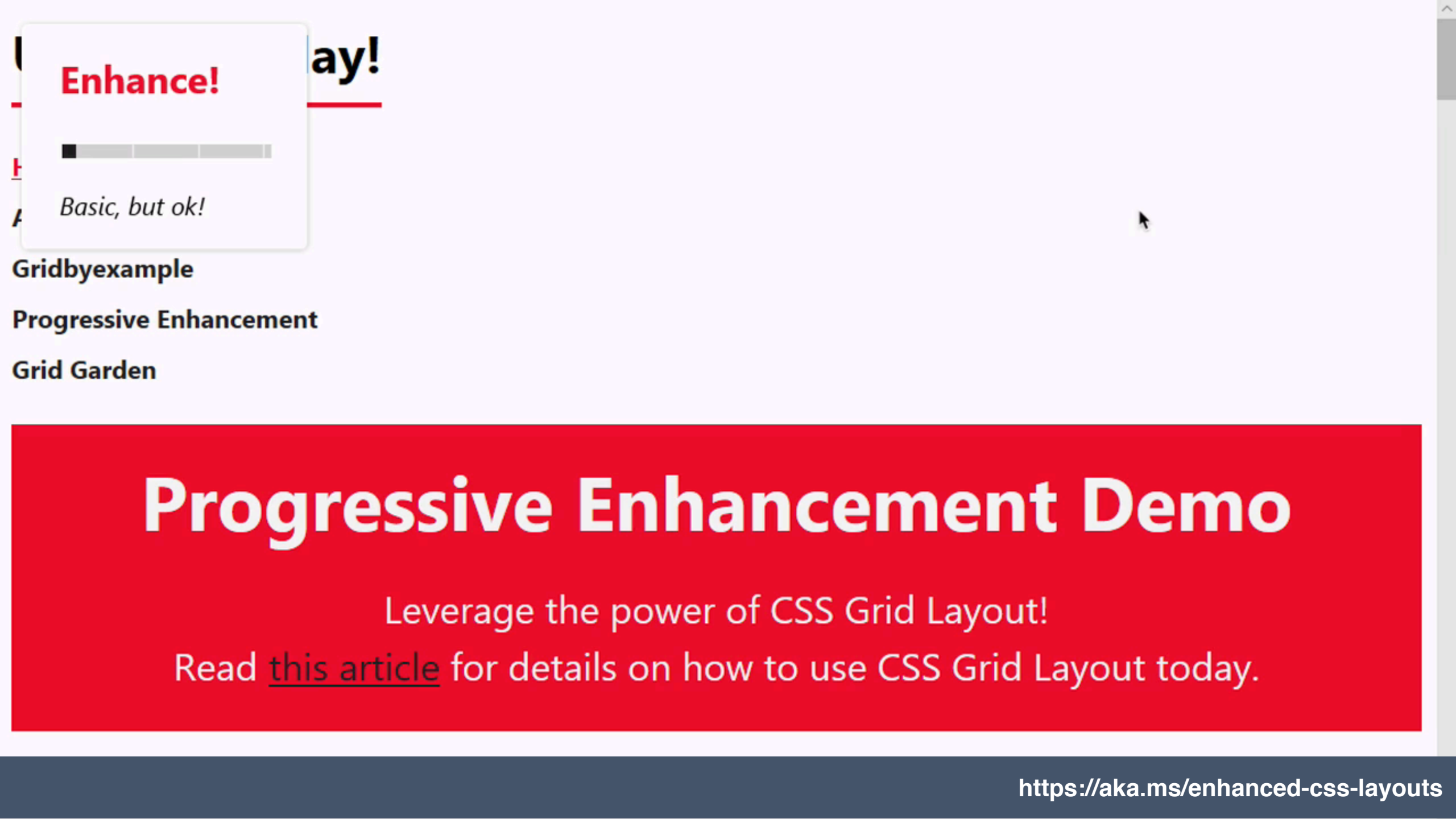
```
@supports (display: grid) {
  p {
    color: green;
  }
}
```

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.

Browsers that understand @supports and grid apply it

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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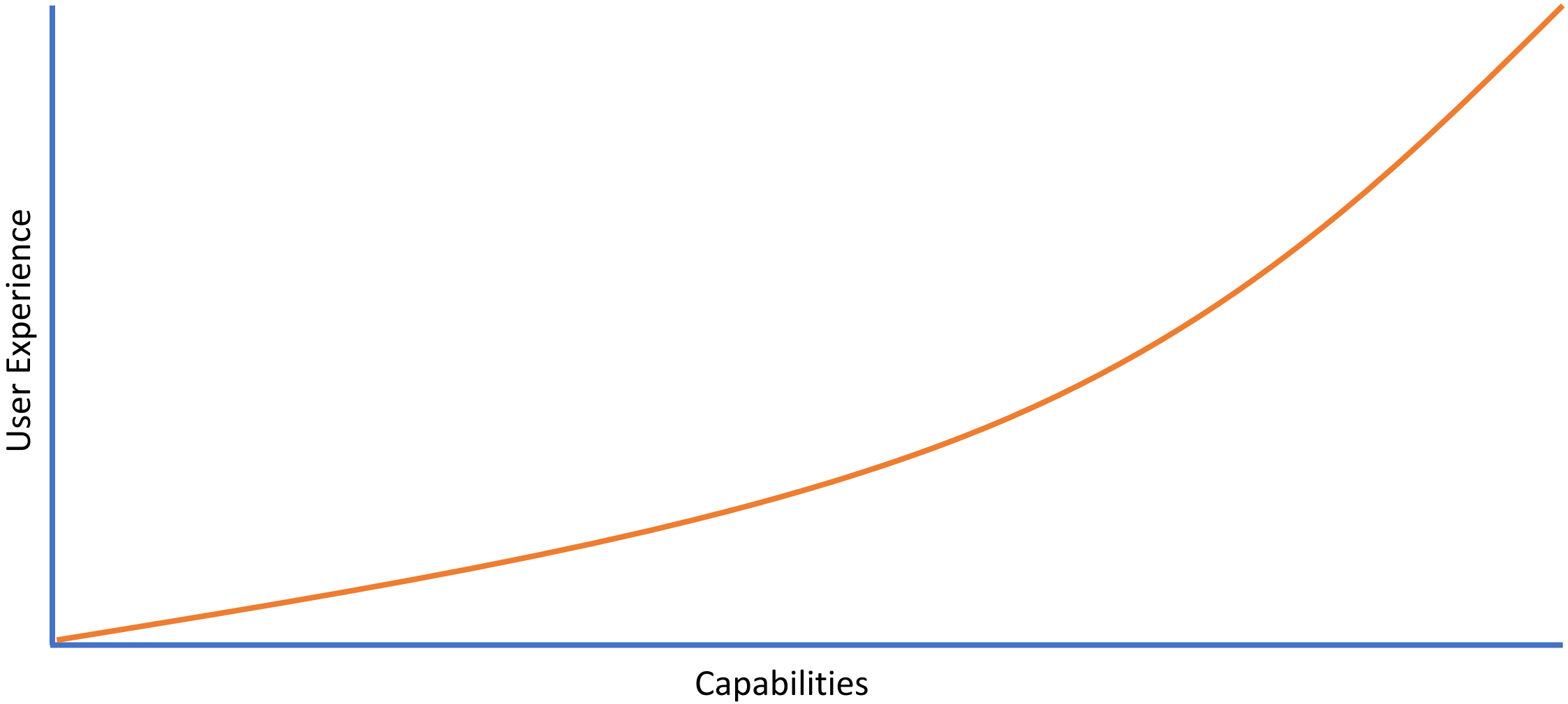
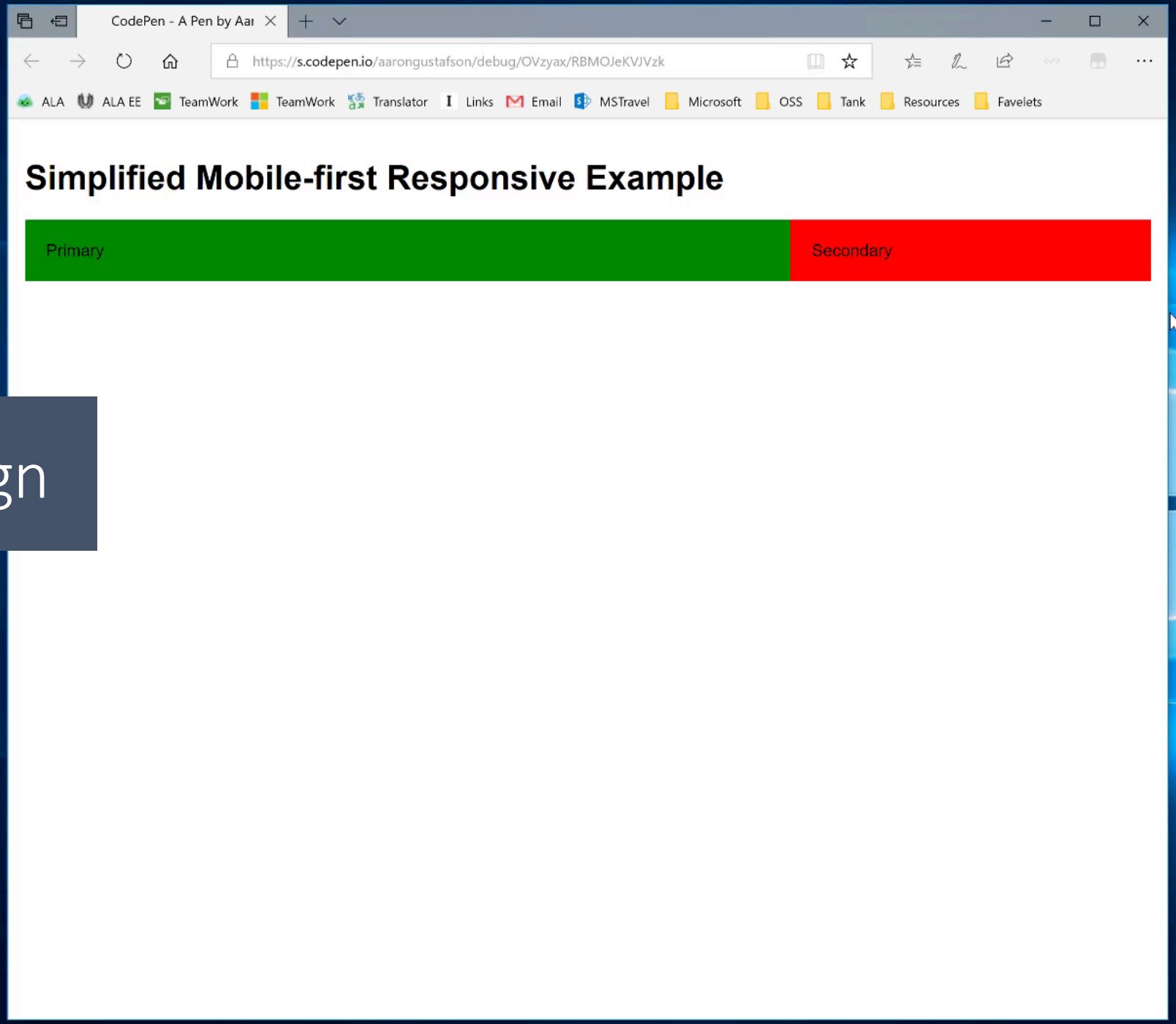
Enhance!
Basic, but ok!
Gridbyexample
Progressive Enhancement
Grid Garden
Progressive Enhancement Demo
Leverage the power of CSS Grid Layout!
Read this article for details on how to use CSS Grid Layout today.
https://aka.ms/enhanced-css-layouts

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;
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}
```

“Desktop first”

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  float: right;
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@media (max-width:599px) {
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    float: none;
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  }
}
```

“Mobile first”

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

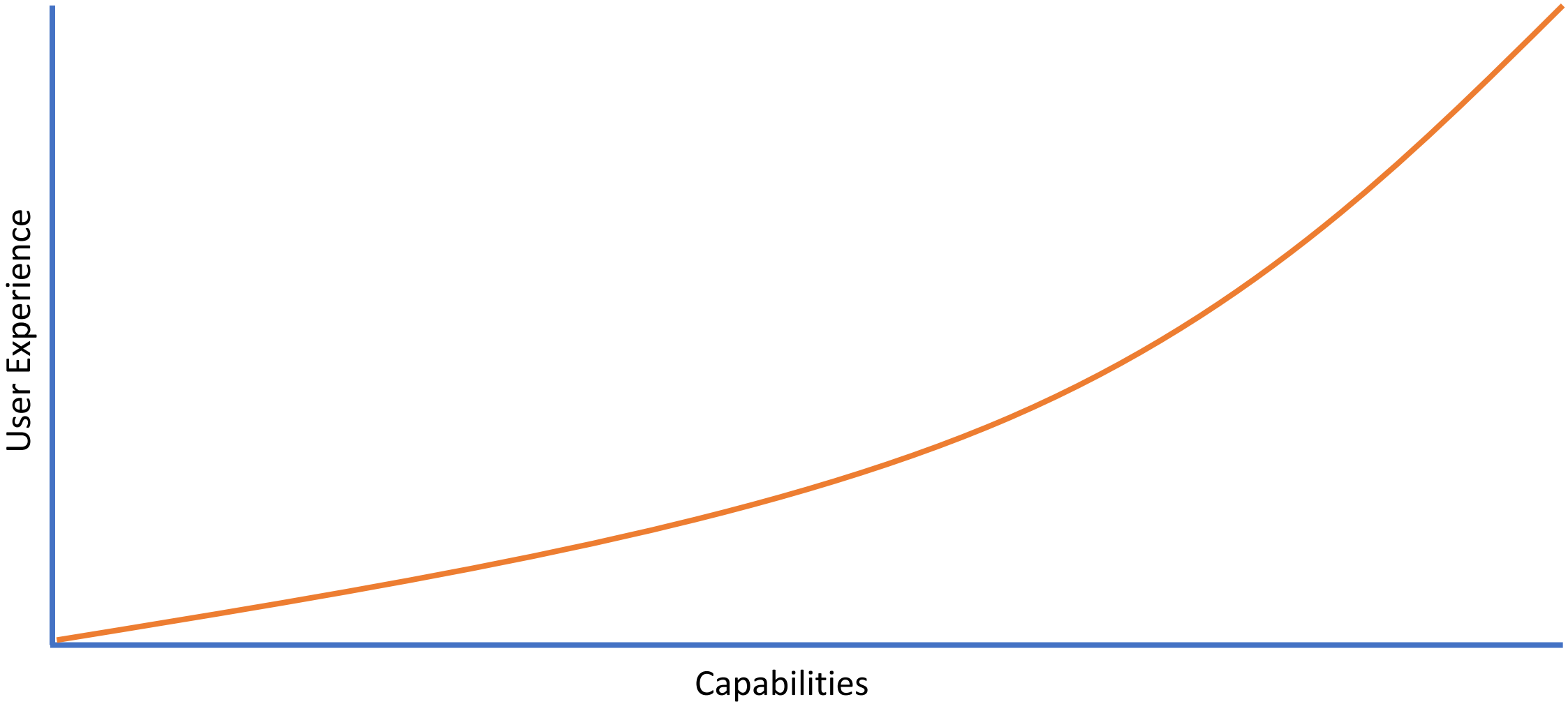
“Mobile first”

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

Other ways to design “mobile first”

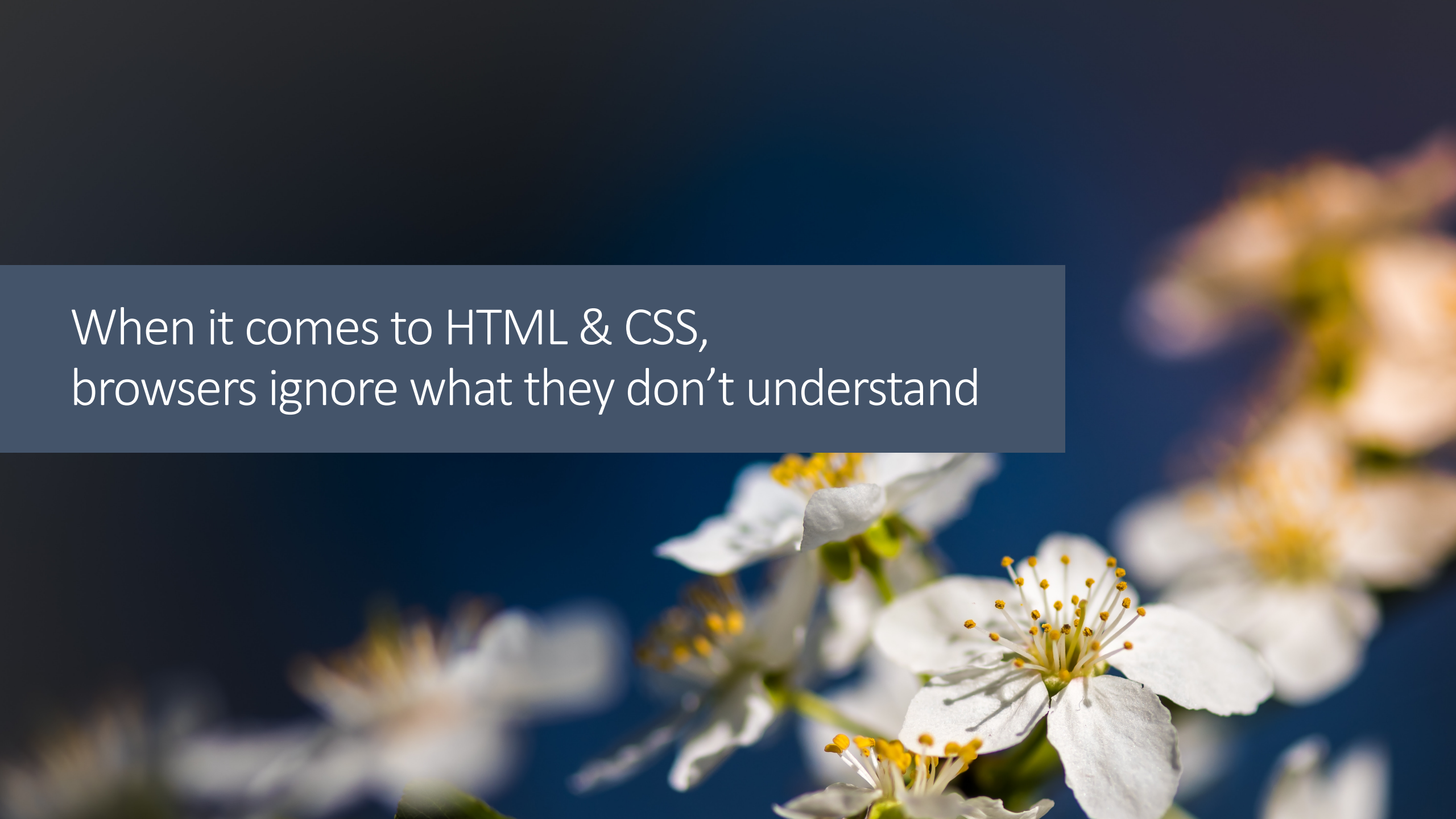
- Selectively deliver advances styles
- Isolate large CSS images in min-width media queries
- Don’t hide content images using CSS
- Use responsive images
- Prefer system fonts
- `font-display: optional`

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

What happens when a browser doesn't understand **`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?

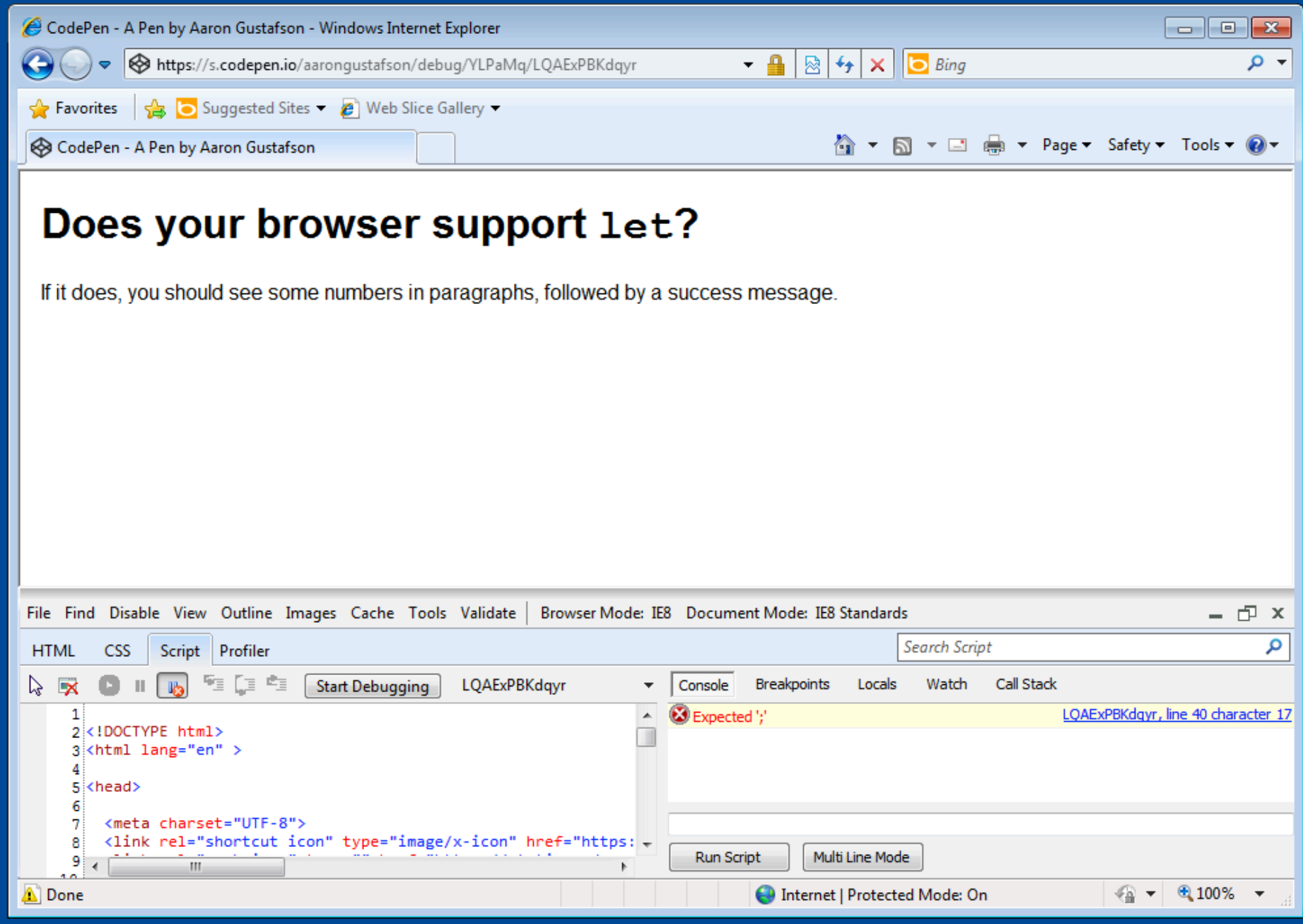
1

2

3

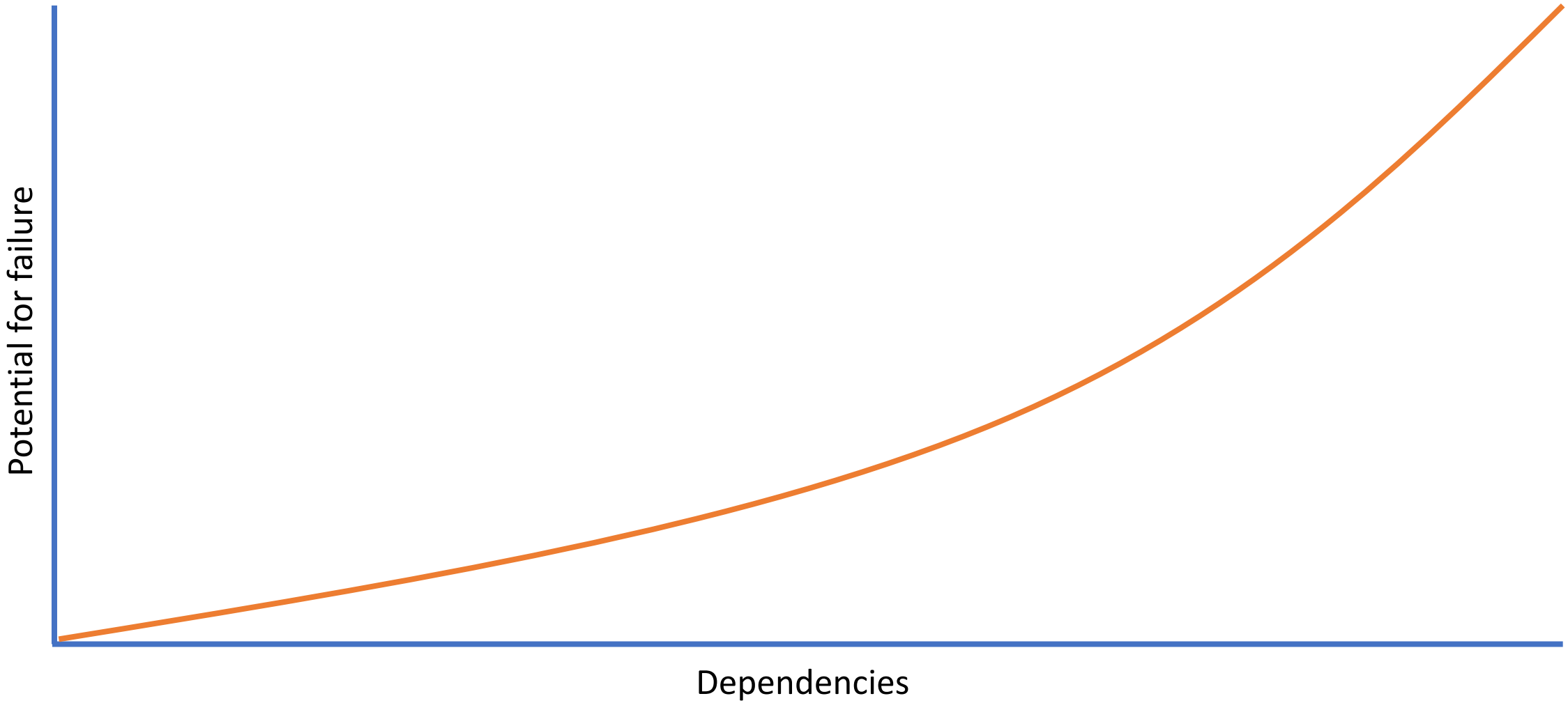
4

Success!



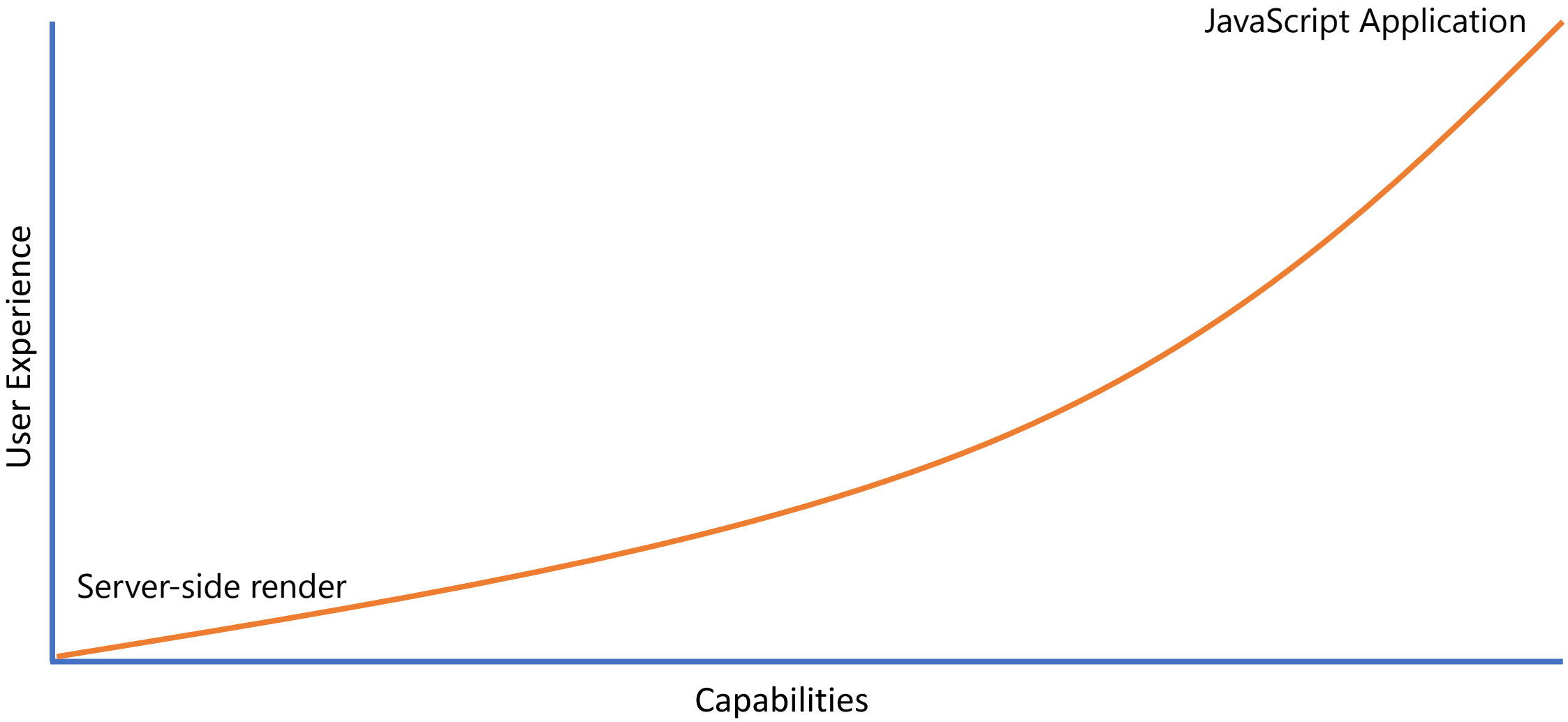
https://aka.ms/js-let-down

More dependencies, more (potential) problems



We can and should use JavaScript,
but thoughtfully & intentionally

Enhance the experience



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Weather

Hawaii volcano erupts; county issues evacuation orders

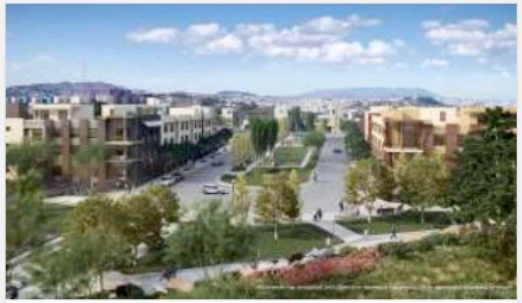
Associated Press

Seattle, Washington

53 °F Partly Cloudy
50.0%

Fri	Sat	Sun	Mon	Tue
60° 52°	67° 57°	71° 55°	70° 55°	74° 57°

Data from Foreca | Updated 14 mins ago



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Business Insider

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The Washington Post

NBA

PHI	May 3 103 - 108 FINAL BOS leads 2-0	BOS
CLE	May 3 128 - 110 FINAL CLE leads 2-0	TOR
GS	ESPN 8:00 PM ET May 4 GS leads 2-0	NO

Data from Stats

Feedback

Detecting support

```
if ( navigator.credentials ) {

  // Actual logic goes here

}
```

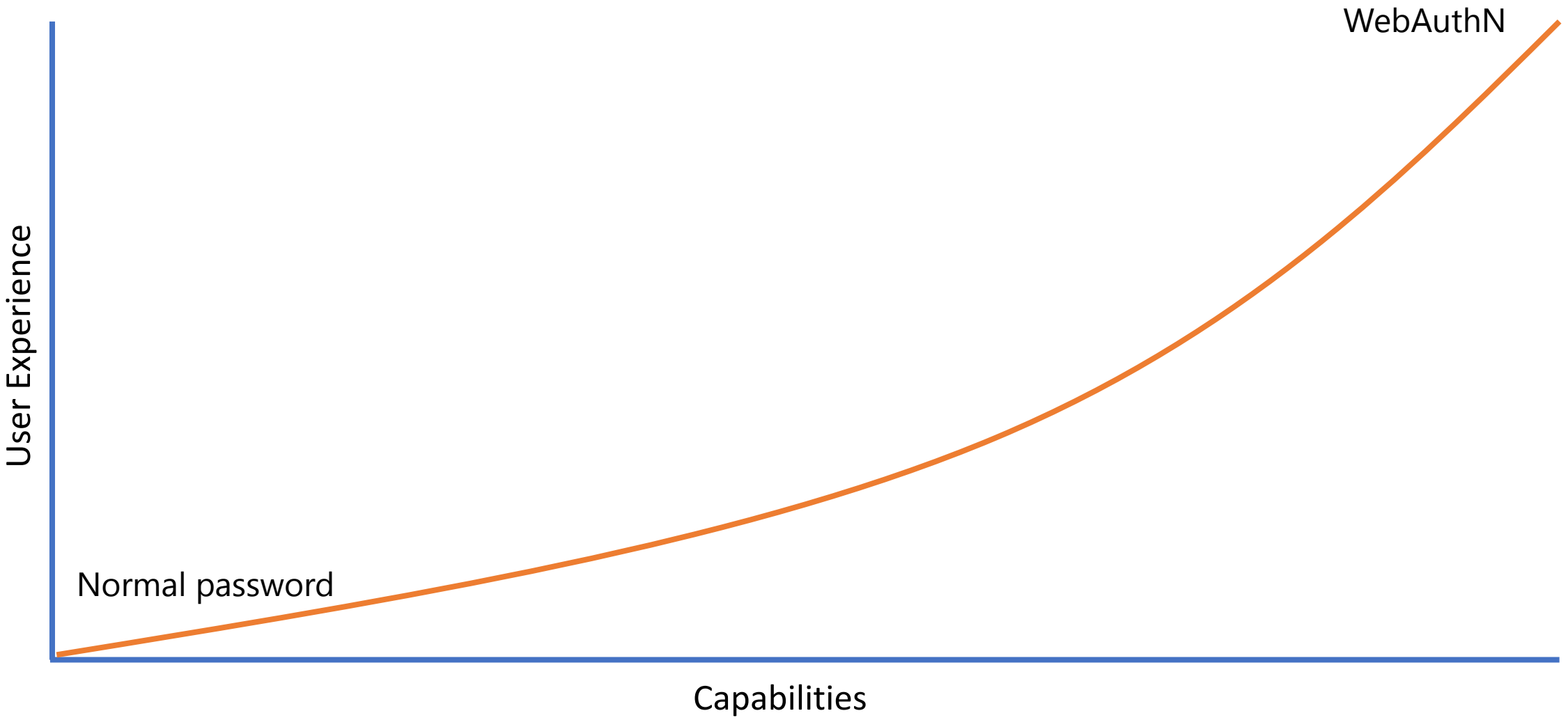
Creating the credential

```
// Create a credential with WebAuthn APIs
navigator.credentials.create({
  publicKey: {
    rp: { /* relying party info */ },
    user: { /* user info */ },
    authenticatorSelection: {
      authenticatorAttachment: "platform"
    },
    pubKeyCredParams: [{
      type: "public-key",
      alg: -257 /* Accept RS256 credentials */
    }],
    // and other required parameters such as challenge, timeout, ...
  }
}).then(attestation => {
  // Send the credential to your server, which decodes it and stores the public key
  sendToServer(attestation);
});
```

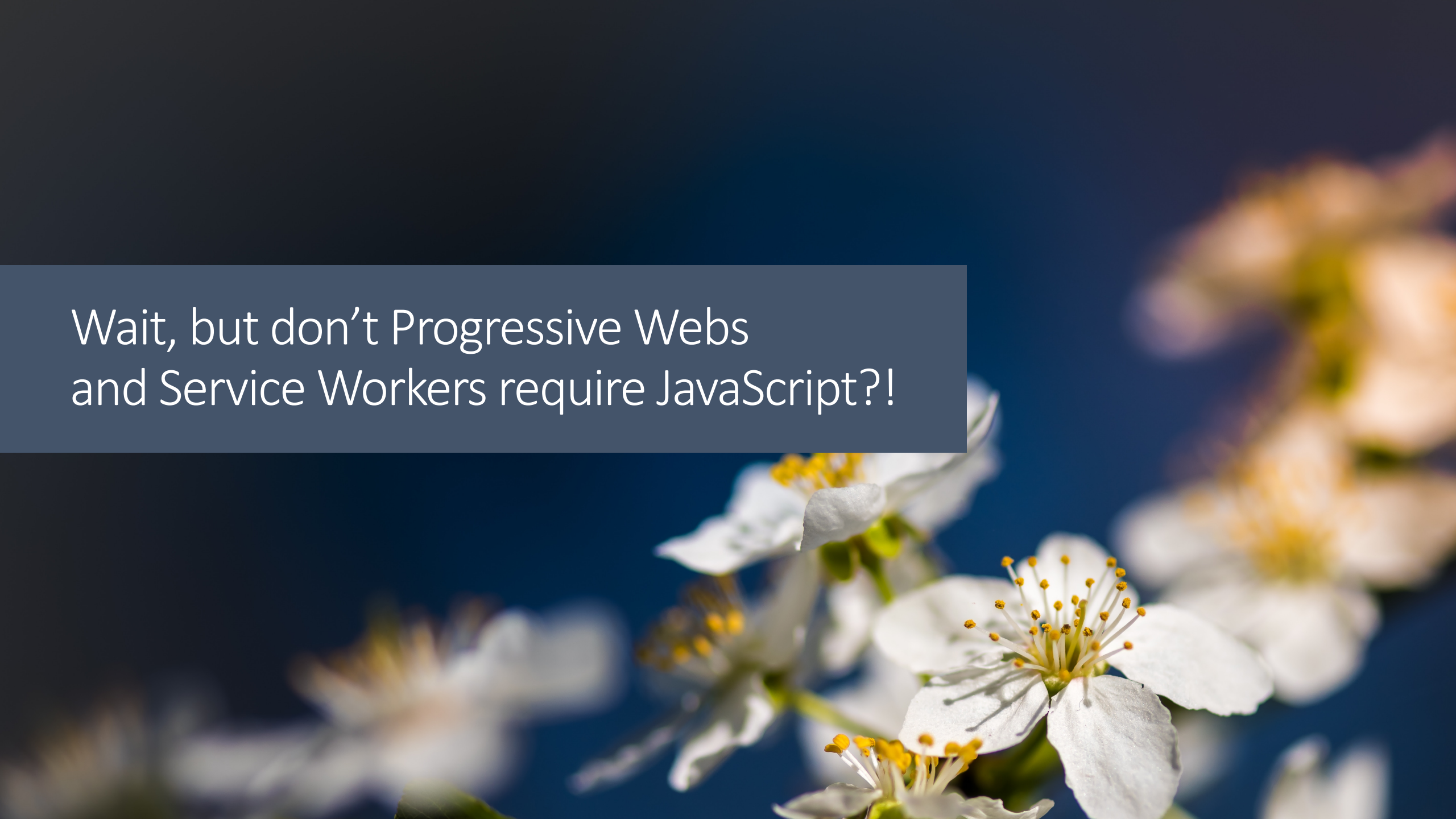
Verifying the credential later

```
// Next time the user visits the page, call the WebAuthn APIs
navigator.credentials.get({
  publicKey: {
    allowCredentials: [{
      type: "public-key",
      id: credentialId // ID of credential(s) previously created
    }]
    // and other required parameters such as challenge, timeout, ...
  }
}).then(assertion => {
  // Send the assertion to your server, which decodes it and ensures the
  // contained signature matches the public key received at credential creation
  sendToServer(assertion);
});
```

Enhance the experience



Wait, but don’t Progressive Webs 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!

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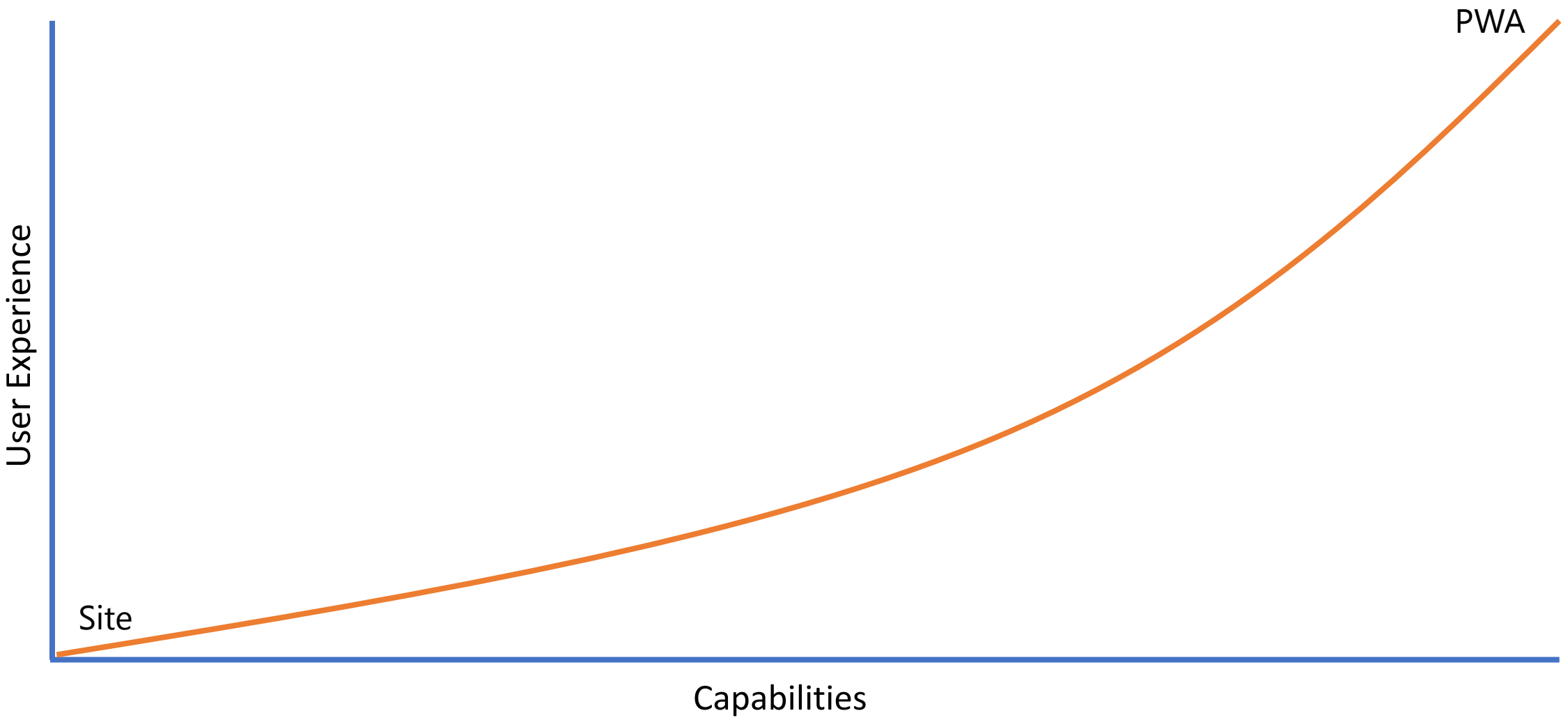

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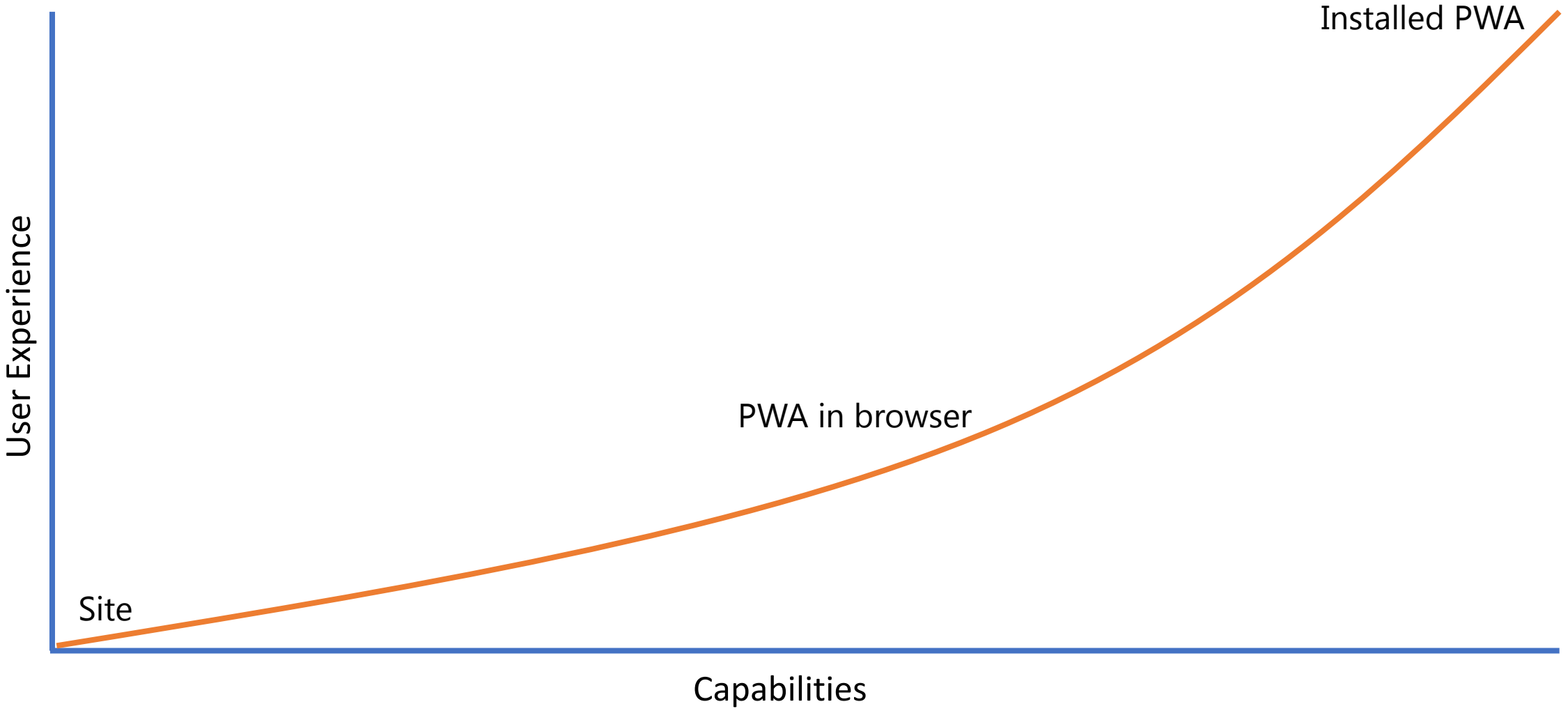
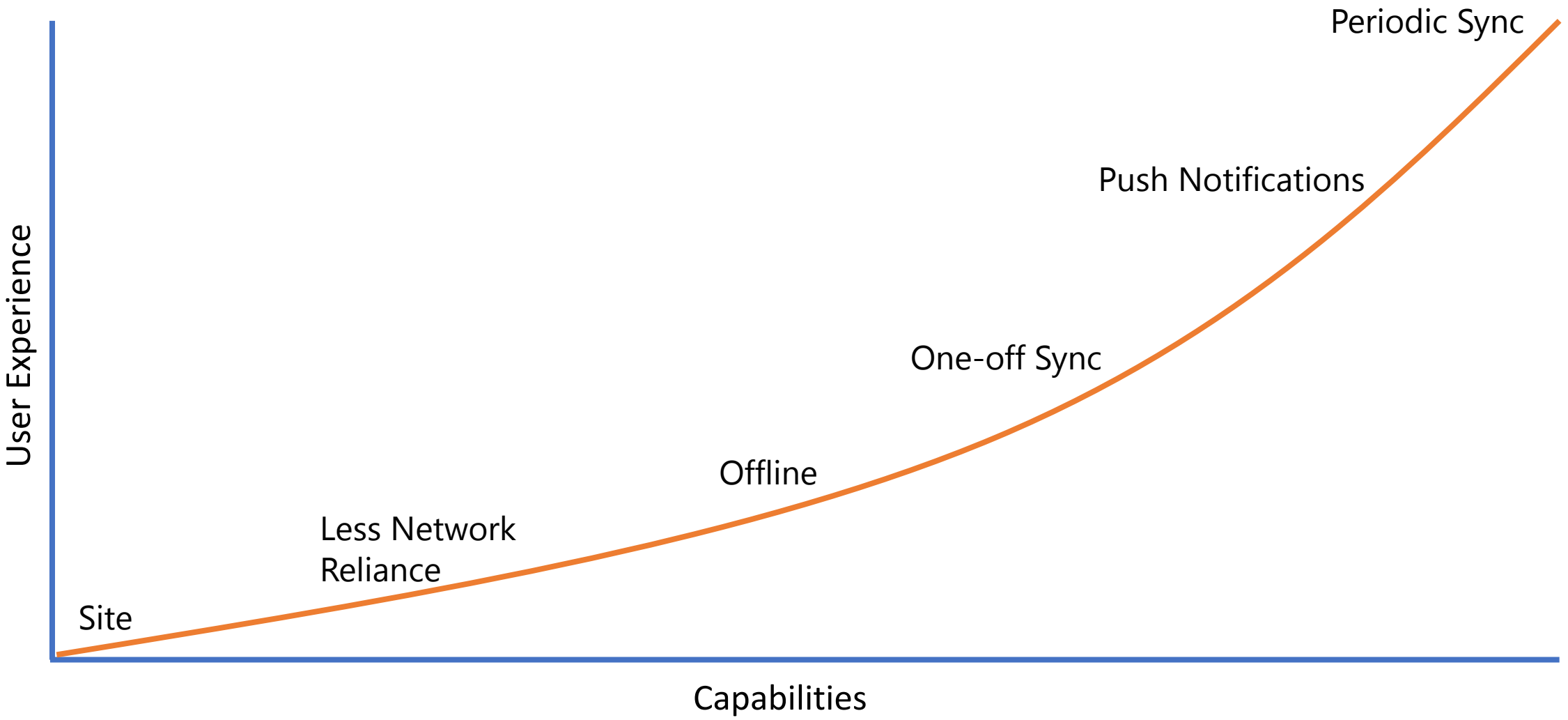
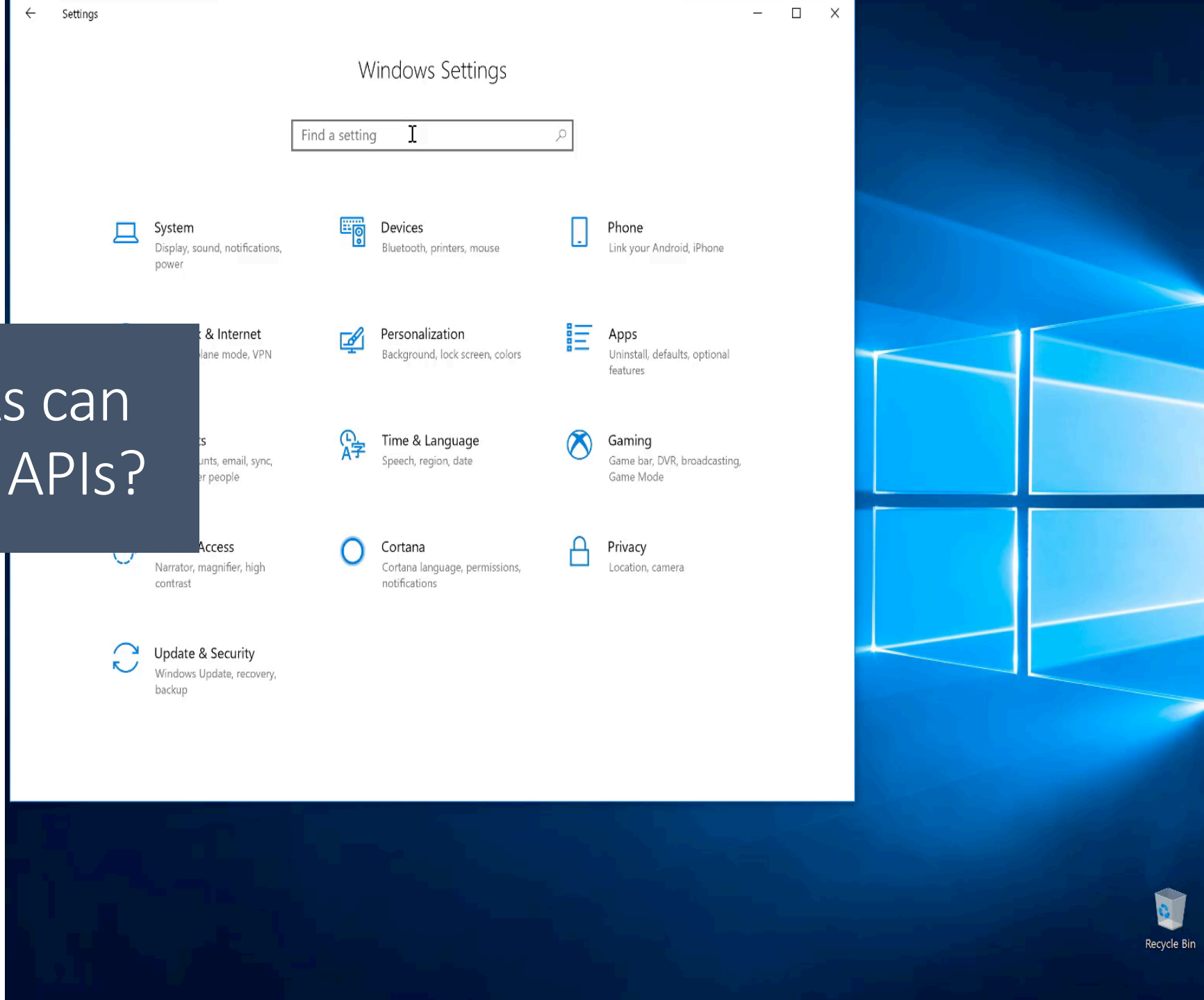


Enhance the Service Worker



Did you know PWAs can enhance via native APIs?



Detecting “dark mode”

```
if (window.Windows) {
  var uiSettings = new Windows.UI
                                .ViewManagement
                                .UISettings();
  var color = uiSettings
                  .getColorValue(
                    Windows.UI
                      .ViewManagement
                      .UIColorType
                      .background
                  );
  if (color.r == 0 && color.g == 0
      && color.b == 0) {
    // changes for Dark Mode
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}
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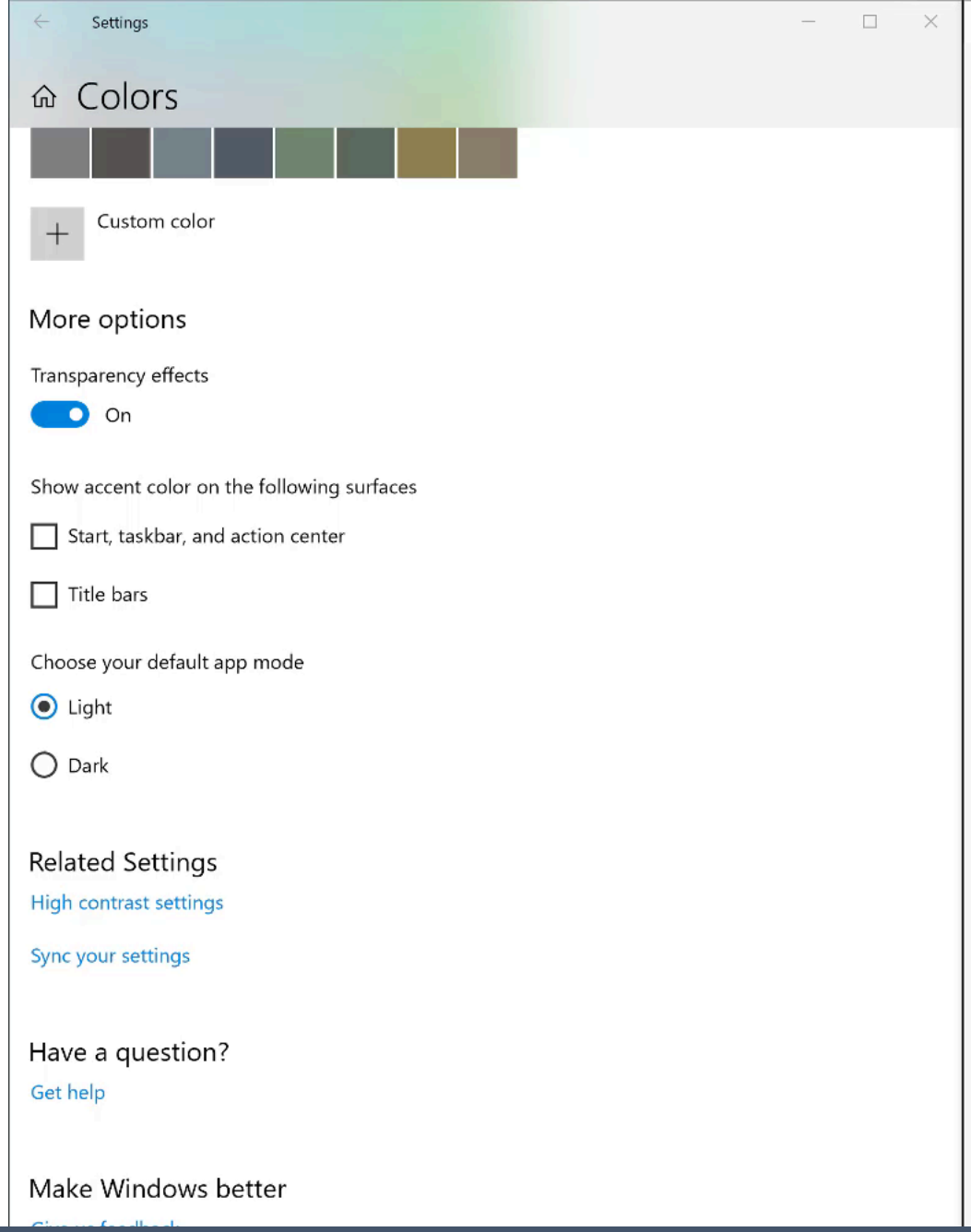
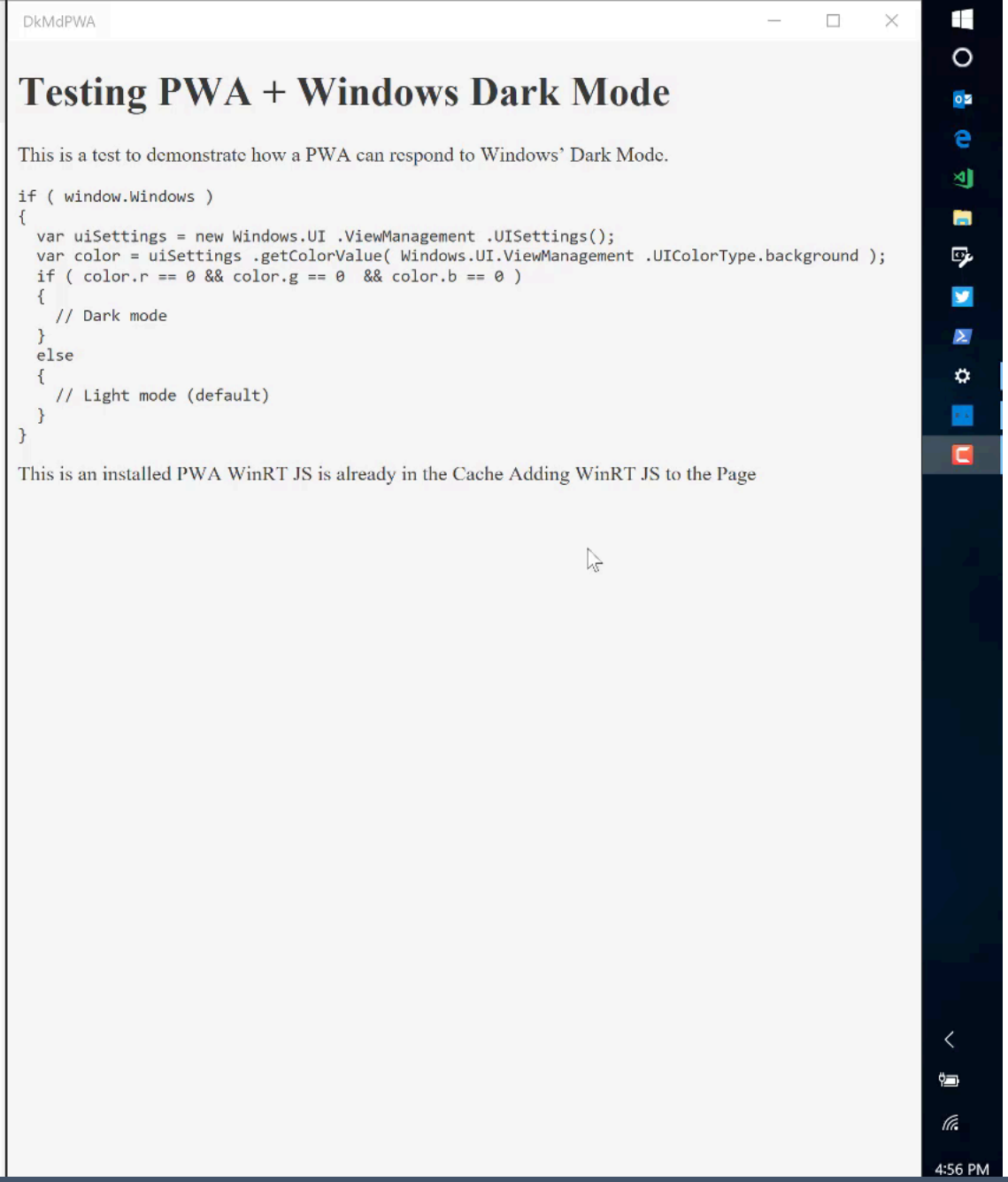
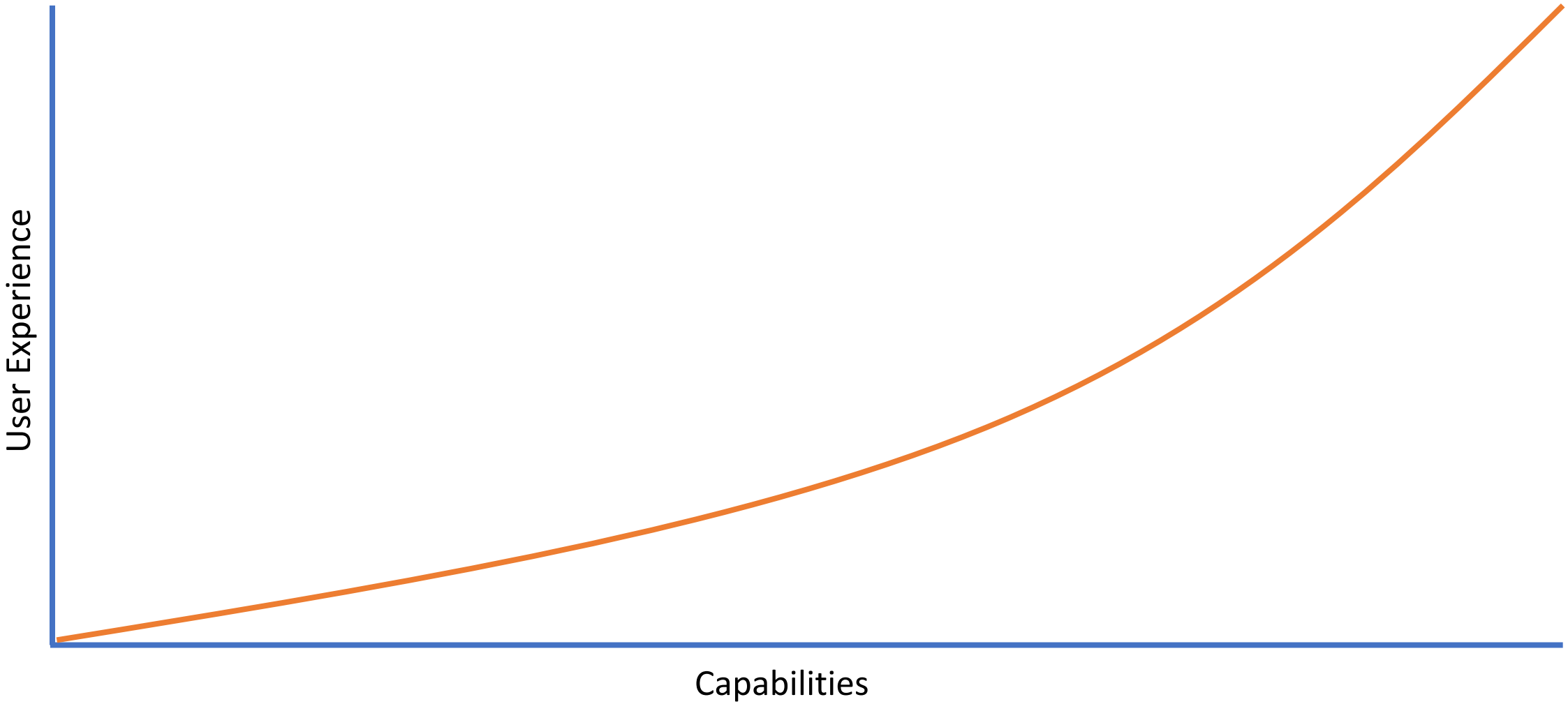


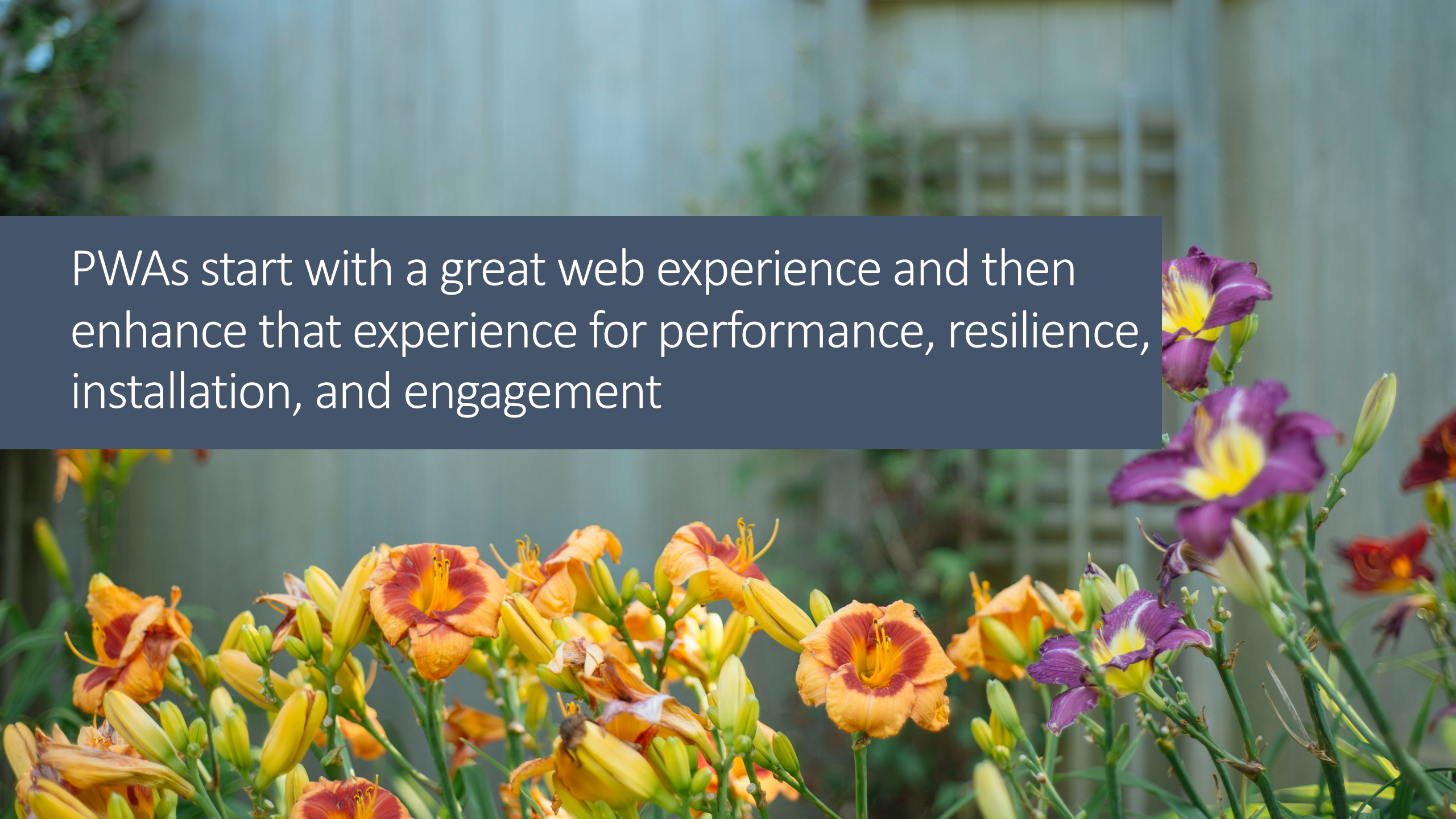


https://aka.ms/dark-mode-pwa-demo

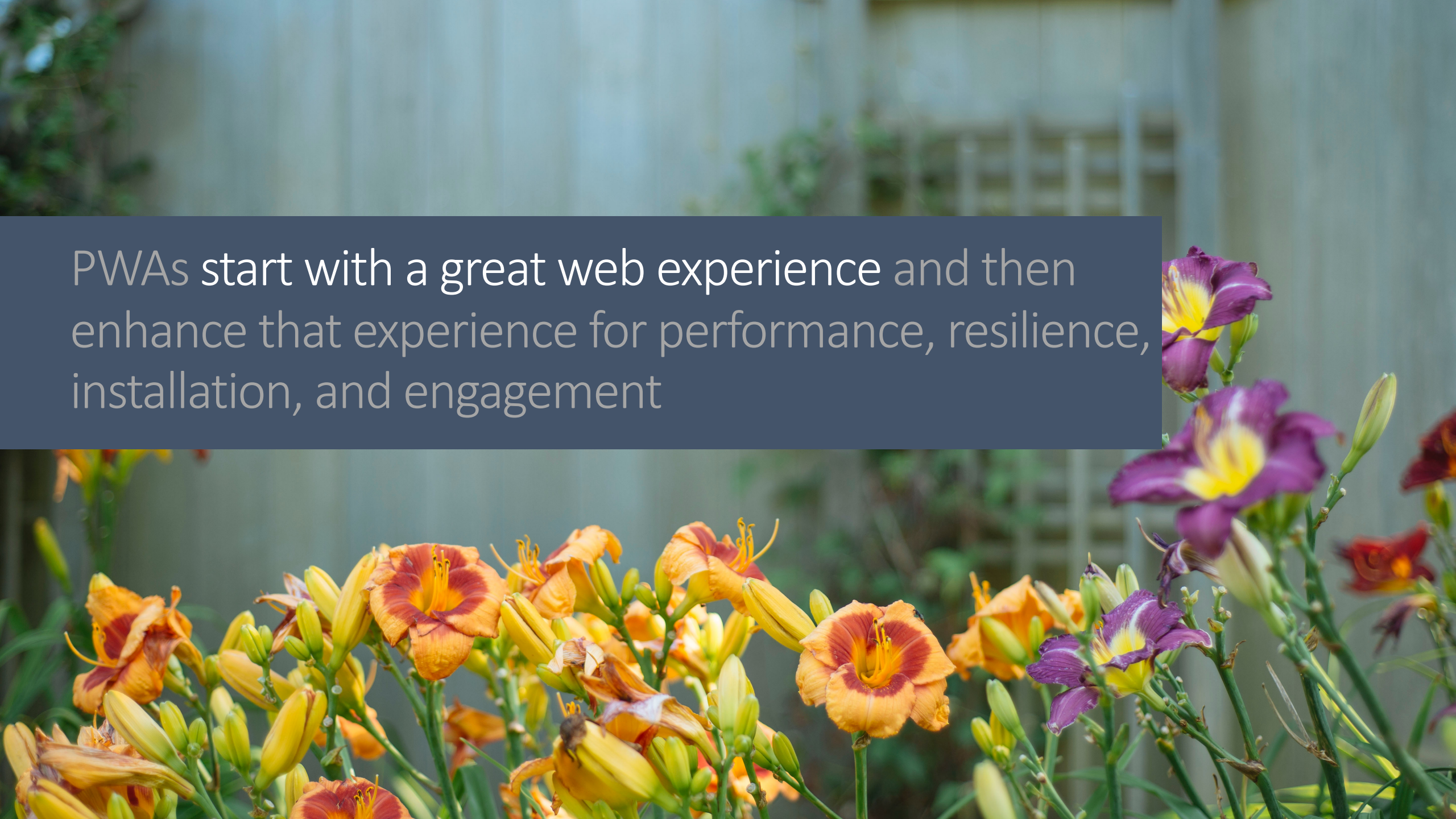
We can and should use JavaScript,
but thoughtfully & intentionally

Enhance the experience





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

Thank you.

@AaronGustafson
@MSEdgeDev
PWABuilder.com

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