h5r: The best of the Modern Web

Sam Thorogood – March 2015

Background

Who is this person?

Sam Thorogood

Developer Programs Engineer at Google Australia

- From 2012-2014, was a lead on **Google Maps for iOS**
- Previously worked on Wave, App Engine, Drive, Google Keep, Chrome

Goals at Google?

☰ ☃ ♨

Aeons ago...

Qualifications, if you will

- During University, I ran shared hosting

  supporting **PHP5** (!)
- Worked writing signup flows in PHP for wholesale ISPs

What is the Modern Web?

Web 2.0?

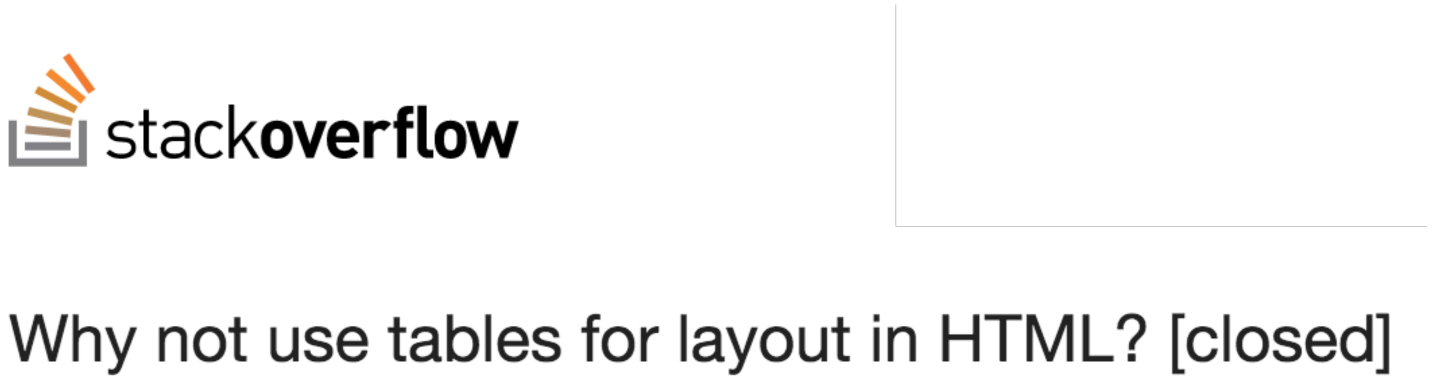
*"The client-side (Web browser) technologies used in Web 2.0 development include Ajax and JavaScript frameworks such as **YUI Library**, **Dojo Toolkit**, **MooTools**, **jQuery**, **Ext JS** and **Prototype JavaScript Framework**. Ajax programming uses JavaScript and the Document Object Model to update selected regions of the page area without undergoing a full page reload."*

Wikipedia, March 2015

But in 2004, browsers were simple

Primitives were limited

But this is actually from 2011


stackoverflow

Why not use tables for layout in HTML? [closed]

http://stackoverflow.com/questions/83073/why-not-use-tables-for-layout-in-html

Ajax in 2004

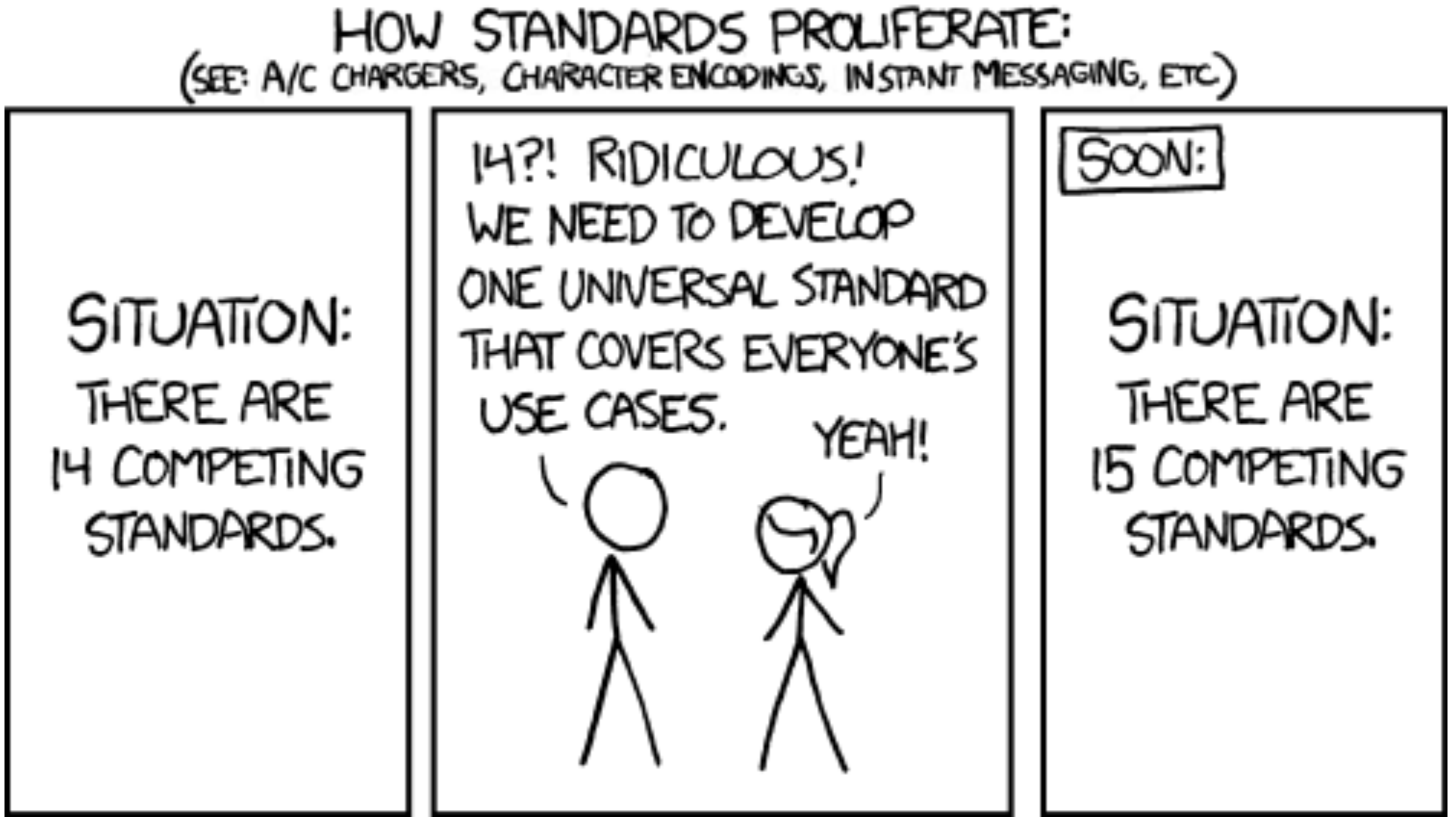
And not to mention, the first hit for "ajax"

```
var xmlhttp;
if (window.XMLHttpRequest)
  {// code for IE7+, Firefox, Chrome, Opera, Safari
  xmlhttp=new XMLHttpRequest();
  }
else
  {// code for IE6, IE5
  xmlhttp=new ActiveXObject("Microsoft.XMLHTTP");
  }

xmlhttp.open("POST","ajax_test.asp",true);
xmlhttp.setRequestHeader("Content-type","application/x-www-form-urlencoded");
xmlhttp.send("fname=Henry&lname=Ford");

xmlhttp.onreadystatechange = function() {
  if (xmlhttp.status == ...
```

http://www.w3schools.com/ajax/


HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)
SITUATION: THERE ARE 14 COMPETING STANDARDS.
14?! RIDICULOUS! WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE'S USE CASES.
YEAH!
SOON:
SITUATION: THERE ARE 15 COMPETING STANDARDS.

http://xkcd.com/927/

W3C®

WHATWG

So in 2015+...

Many standards!

```
fetch('/ajax_test', {
  method: 'post',
  body: new FormData(form)
}).then(function(response) {  // via chained Promise
  console.info(response.text());
});

// or at least...
var x = new XMLHttpRequest();
x.onload = function() {
  console.info(x.responseText);
};
x.open('POST', '/ajax_test', true);
x.send(new FormData(form));
```

What is the web fighting?

History

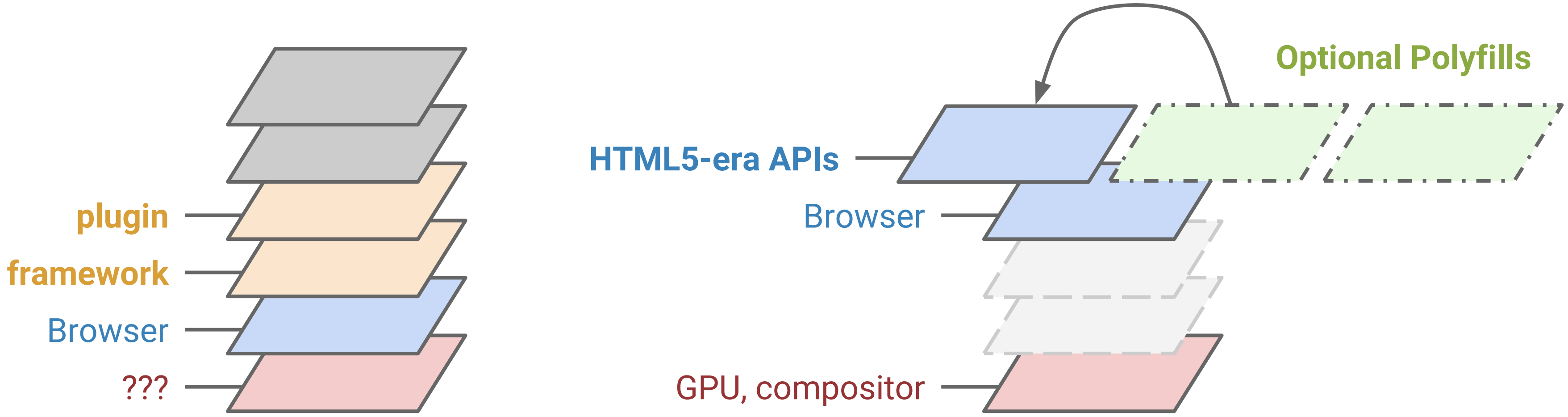
Microsoft Internet Explorer 6

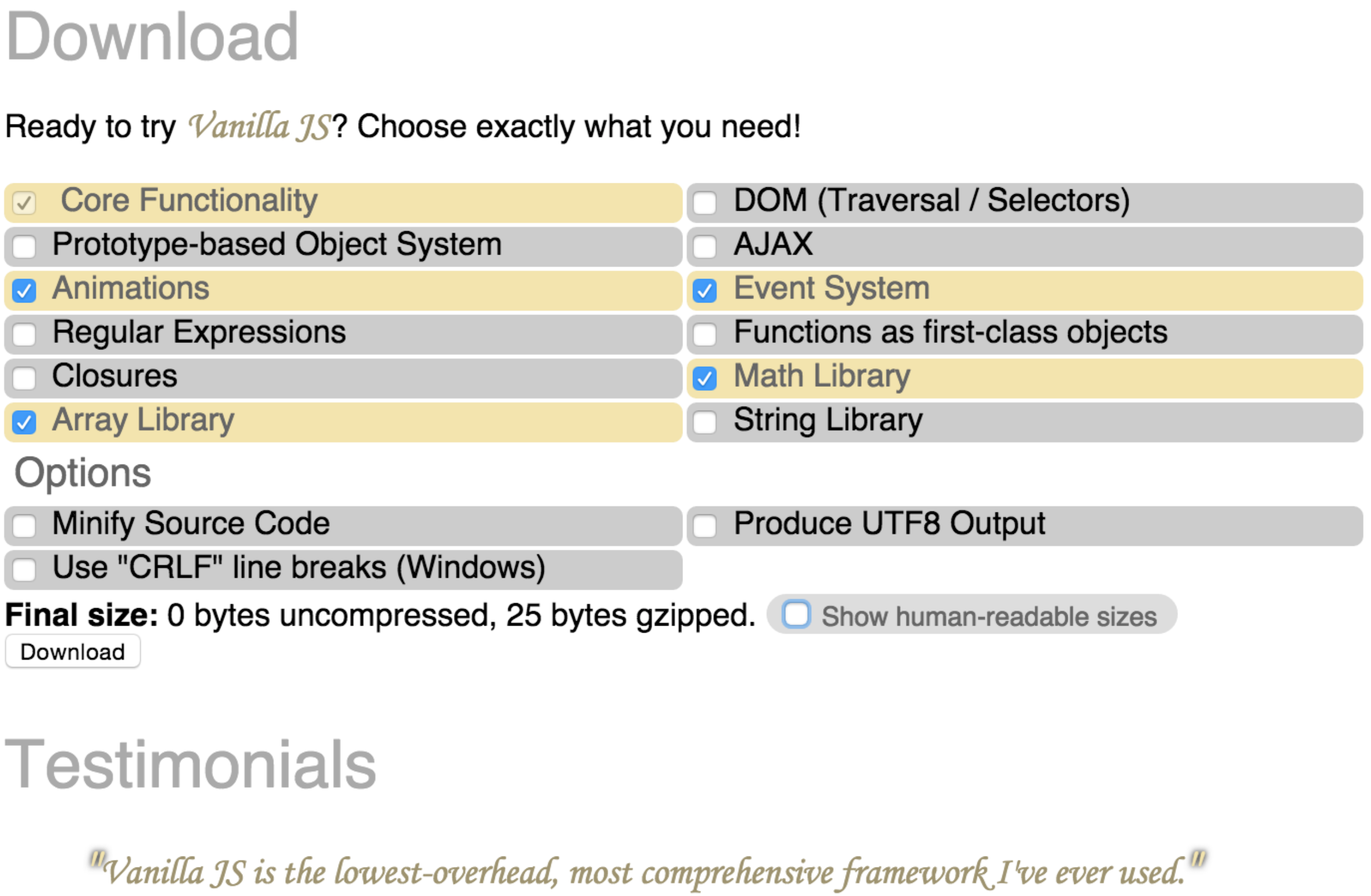
jQuery
write less, do more.

`$( "li" );`	321,493 ±1.85% 0.33% slower
`document.querySelectorAll( "li" );`	339,802 ±7.29% fastest

Your abstractions are bad and you should feel bad

aka: why import frameworks just for $ or applying styling rules





Download

Ready to try *Vanilla JS*? Choose exactly what you need!

[✓ Core Functionality]	☐ DOM (Traversal / Selectors)
☐ Prototype-based Object System	☐ AJAX
[✓ Animations]	[✓ Event System]
☐ Regular Expressions	☐ Functions as first-class objects
☐ Closures	[✓ Math Library]
[✓ Array Library]	☐ String Library

Options

☐ Minify Source Code	☐ Produce UTF8 Output
☐ Use "CRLF" line breaks (Windows)	

Final size: 0 bytes uncompressed, 25 bytes gzipped. ☐ Show human-readable sizes

Download

Testimonials

"Vanilla JS is the lowest-overhead, most comprehensive framework I've ever used."

contents

In the beginning there was window.setTimeout

And it was pretty rubbish

Manual callbacks

"Best"

Demo

```
var start = +new Date();
var end = start + 5000;
var duration = end - start;

(function updateAnimation() {
  var now = +new Date();
  var ratio = (now - start) / duration;

  elem.style.transform = 'translate(' + ratio * 100 + 'px)';

  if (now < end) {
    window.setTimeout(updateAnimation, 1000 / 60);
  }
}());
```

Using requestAnimationFrame

Spec in 2011, implemented 2013+

85%+

Demo

```
var start = +new Date();
var end = start + 5000;
var duration = end - start;

(function updateAnimation() {
  var now = +new Date();
  var ratio = (now - start) / duration;

  elem.style.transform = 'translate(' + ratio * 100 + 'px)';

  if (now < end) {
    window.requestAnimationFrame(updateAnimation);
  }
}());
```

Great!

But...

- Runs neatly on frame boundaries
- Only when the window is visible
- But lots of imperative overhead
- Still uses the main thread: target of 60fps/16ms

- Also good for deferring arbitrary other work

  … although there is the Page Visibility API

Web Animations

Deserves a place in your toolbox

```
var duration = 5000;
var player = elem.animate([
  {transform: 'translate(0px)'},
  {transform: 'translate(100px)'}
], duration);

// and support cool extras...
player.onfinish = function() {
  console.info('sunny now!');
  cloud.parentNode.removeChild(cloud);
};

// later, pause and scrub
player.pause();
player.currentTime = 200;
```

40%

Polyfill

Demo

Google Developers

Interactive HTML Elements

Just three so far

Since "Interactive HTML" is hard to Google for

Demo

- **Dialog (40%)**

Dialog support (but really modal dialog support)

- **Details & Summary (65%)**

no-JavaScript widget for showing/hiding element contents

- **Menu & MenuItem (12%)**

defining context menus for right-click

But in practice

Some fallback sanely, some do not

```
<details>
     <summary>More Information</summary>
     <p>
Just visible on older browsers.
     </p>
</details>
```

```
<dialog id="test">Modal Me</dialog>
<script>
     test.showModal();  // ???
     // later
     test.close();
</script>
```

Standards bodies also make obvious things

Demo

Finally!

```
<article hidden>
     <p>
I'll never be shown! Except maybe IE11 and below.
     </p>
</article>

<style>

/** Except it's actually just implemented by... */
*[hidden] { display: none; }

/** So you can just overwrite it :( */
article { display: block; }

</style>
```

HTML & CSS

Tables vs divs?

Is this still even the question?

- **What about Semantic Web?**

Fancy term for `div` vs `article`, `aside`, `header` etc

… you should avoid 'divitius'

… and still useful in many contexts (accessibility etc)

- **Flexible Box Layout (85%)**

... although Safari still insists on `-webkit-`

- **Grid Layout, Multi Column Layout**

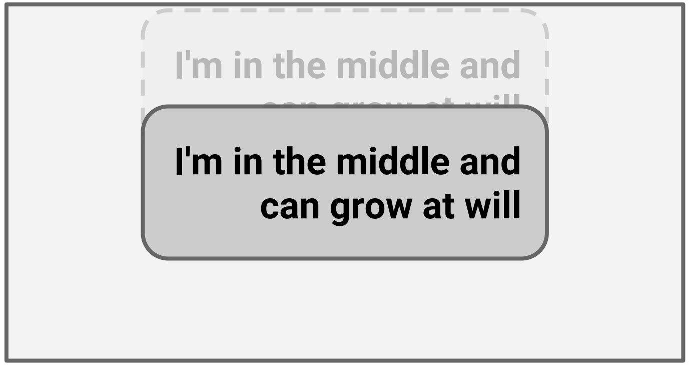
Not well supported (without prefixes/flags), not much movement

So: FlexBox plus ...not-tables

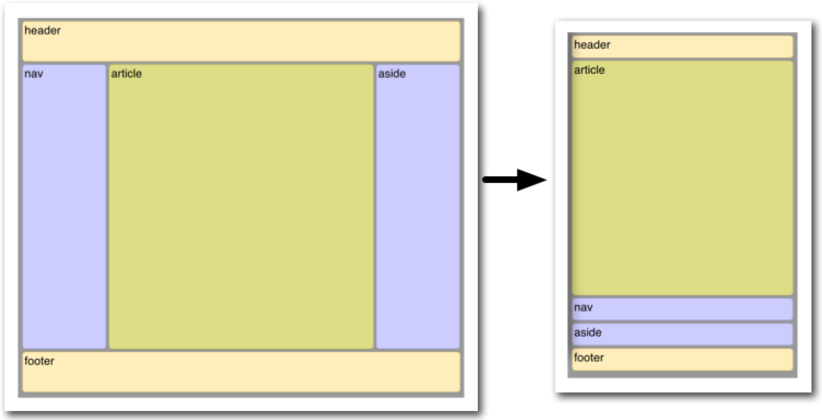
Can just solve odd layout issues

But the polyfill story isn't particularly clear - sane fallbacks?

```
/* align children in center vertical/width */
.middle {
     height: 300px;
     display: flex;
     align-items: center;
     justify-content: center;
     text-align: center;  /* fallback? */
}
```


I'm in the middle and can grow at will
I'm in the middle and can grow at will

Mozilla guide



Woefully ignored CSS features

And how!

- **calc (85%)**

Calculate dimensions across different unit types.

```
width: calc(100px - 20px);    /* boring */
width: calc(100% - 32px);     /* better */
width: calc(85.2% + 1em / 2); /* awesome */
```

- **currentColor (93%)**

Specify the current color as e.g., the background color.

```
color: blue; background: currentColor;
```

- **box-sizing (96%+)**

Include border inside dimensions.

```
box-sizing: border-box;
```

Web Components

*Web Components are **a set of standards** currently being produced by Google engineers as **a W3C spec** that allow for the creation of reusable widgets … the components model **allows for encapsulation and interoperability** of individual HTML elements.*

Wikipedia, March 2015

Conservative users today

Every GitHub page: Time Elements

```
<time datetime="2014-08-05T04:31:10Z" is="time-ago">Aug 4, 2014</time>
```

- Provides a sensible fallback ("Aug 4, 2014")
- Upgrades to something useful via Custom Elements

renders as **"7 months ago"**

- Probably a bit too encapsulated
    - Replacing text with text
    - Would be odd if replaced with... `<div><span>blah</span></div>`

What are they?

Should feel like native elements

Good

`<my-button></my-button>`

Bad

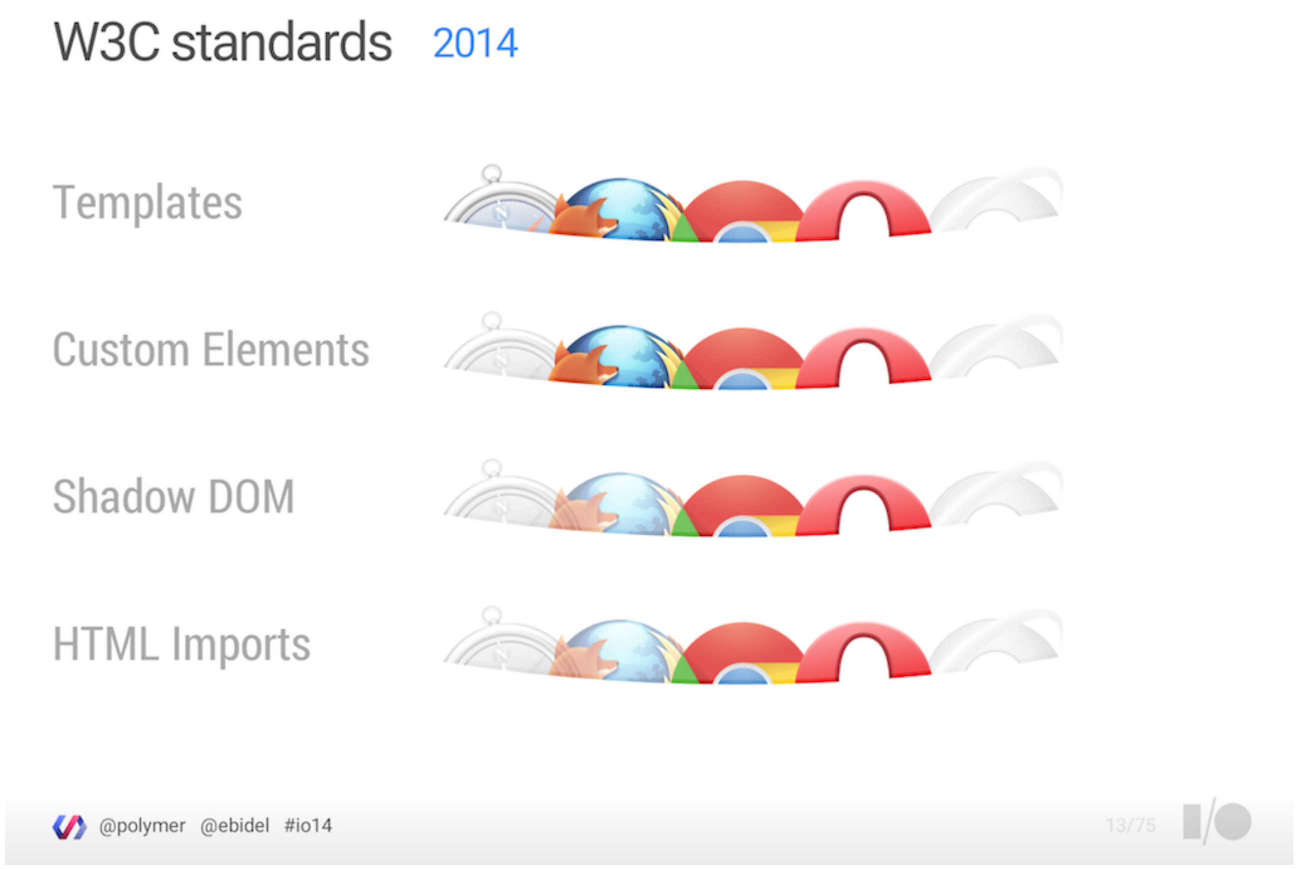
`<my-application></my-application>`

```
var MyButton = document.registerElement('my-button', {
  prototype: Object.create(HTMLElement.prototype, {
    createdCallback: function() {
      this.innerHTML = 'Click Me!';
    }
  })
});
```

x-pokemon, mobile-first

Support levels

A bit lackluster



W3C standards 2014

Templates

Custom Elements

Shadow DOM

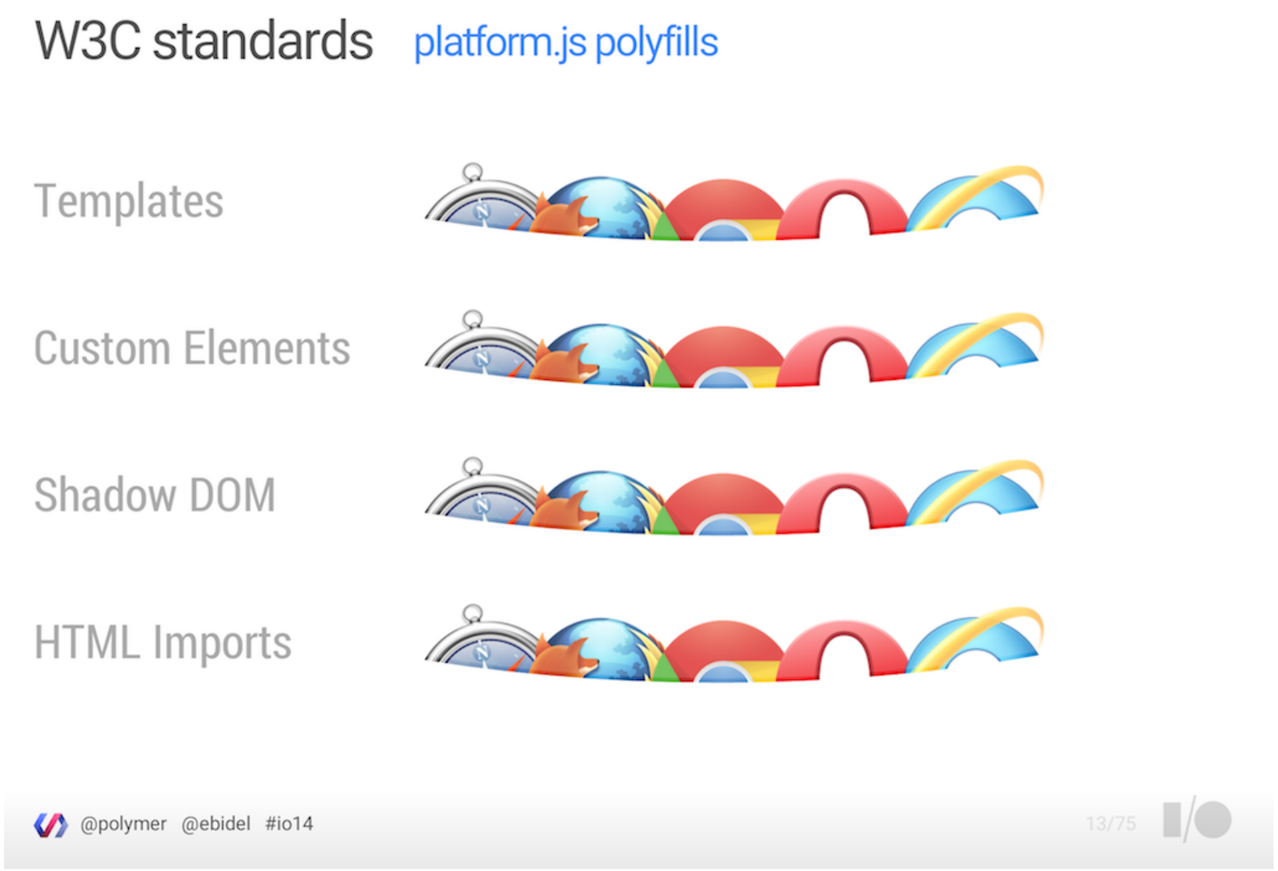
HTML Imports

@polymer @ebidel #io14

13/75

Polyfills to the rescue

...



W3C standards platform.js polyfills

Templates

Custom Elements

Shadow DOM

HTML Imports

@polymer @ebidel #io14

13/75

Google vs the world

Compare and contrast

- Betting on Shadow DOM

  … expensive to polyfill

  … but better for composition

- **Other approaches**: render to 'real' DOM, use templates

Composing elements becomes tricky, and page elements have no meaning

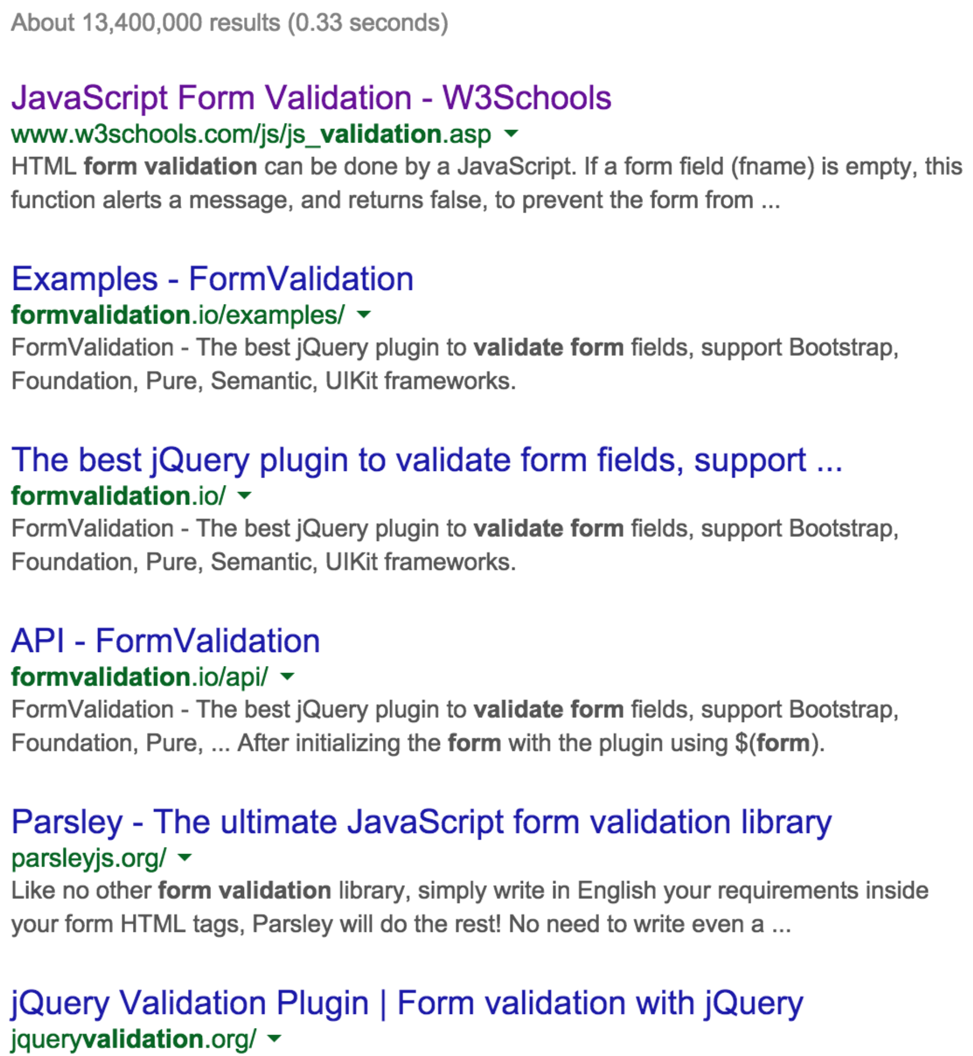
```
<my-image></my-image> <!-- becomes -->
<div class="myImageName"><img … /></div>

<!-- so what about -->
<my-container><my-image></my-image></my-container>
```

Google Developers

Form Validation

Don't overthink it!



About 13,400,000 results (0.33 seconds)

JavaScript Form Validation - W3Schools
www.w3schools.com/js/js_**validation**.asp
HTML **form validation** can be done by a JavaScript. If a form field (fname) is empty, this function alerts a message, and returns false, to prevent the form from ...

Examples - FormValidation
formvalidation.io/examples/
FormValidation - The best jQuery plugin to **validate form** fields, support Bootstrap, Foundation, Pure, Semantic, UIKit frameworks.

The best jQuery plugin to validate form fields, support ...
formvalidation.io/
FormValidation - The best jQuery plugin to **validate form** fields, support Bootstrap, Foundation, Pure, Semantic, UIKit frameworks.

API - FormValidation
formvalidation.io/api/
FormValidation - The best jQuery plugin to **validate form** fields, support Bootstrap, Foundation, Pure, ... After initializing the **form** with the plugin using $(**form**).

Parsley - The ultimate JavaScript form validation library
parsleyjs.org/
Like no other **form validation** library, simply write in English your requirements inside your form HTML tags, Parsley will do the rest! No need to write even a ...

jQuery Validation Plugin | Form validation with jQuery
jquery**validation**.org/

```
<input type="text"
required />
```

Google is also a culprit

Angular anyone?

```
<!-- Angular -->
<input name="username" type="text"
     ng-model="user.username"
     placeholder="Username" required />
<div class="field-message"
     ng-messages="frm.username.$error"
     ng-if='frm.username.$dirty'
     ng-cloak>
     <div ng-message="required">
          Username is required
     </div>
</div>
```

```
<!-- HTML Forms -->
<input name="username" type="text"
     placeholder="Username" required />
<div class="warning">
     Username is required
</div>

<style>
input + .warn { visibility: hidden }
input:invalid + .warn {
     visibility: visible;
     color: red;
}
</style>
```

Validation options

Not all options, but some

Validation	**Approach**
Length	`maxlength`, `minlength`
Specific pattern	`pattern` as regex
Required	`required`, works on text and checkbox/radio
Numeric options	`min`, `max` and `step` (can be 'any' for float)
Hint for invalid value	special behaviour of `title` (spec)

- DOM events available, plus `.checkValidity` call

Final thoughts

Google Developers

Pick and choose your support

And you can polyfill away your worries: good abstraction!

Polyfill

Microsoft® Internet Explorer 5.2 for Mac®
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5.2.3 (5815.1)

Links

http://www.futureinsights.com/home/the-state-of-the-componentised-web.html

http://blog.jhades.org/why-angular-is-not-only-for-single-page-web-apps/

https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Flexible_boxes

https://css-tricks.com/snippets/css/a-guide-to-flexbox/

Reference:

http://caniuse.com/

http://html5please.com/

https://www.chromestatus.com/metrics/feature/popularity

https://www.chromestatus.com/metrics/css/popularity

thank

you

google.com/+SamThorogood

@samthor

Appendix

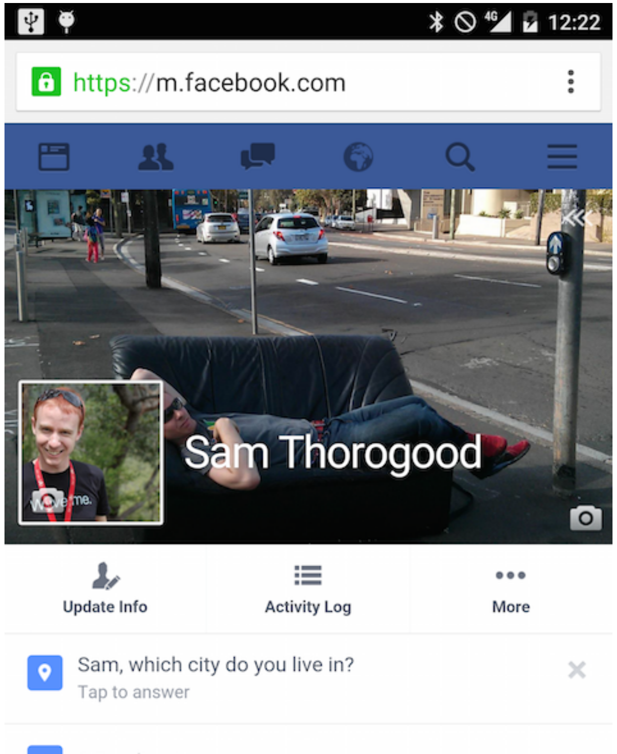
Scrubbable Clouds

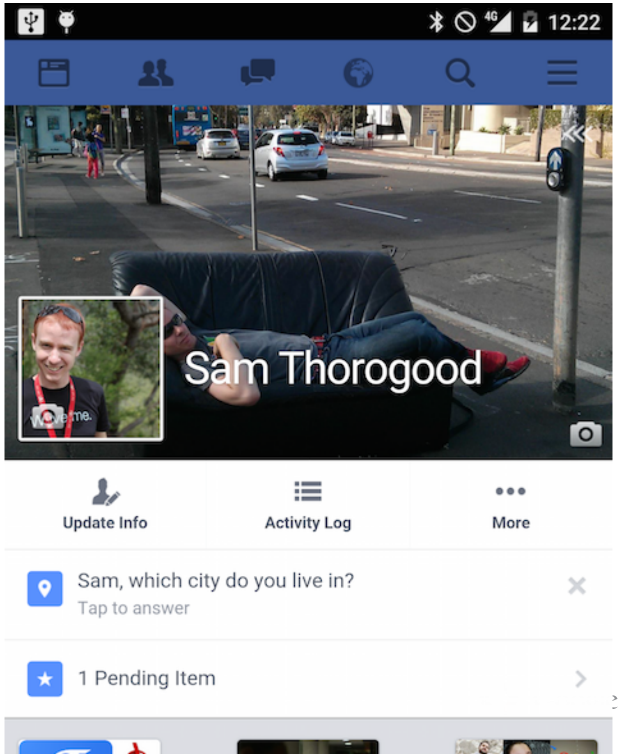
Putting it all together

Demo

```
var player = cloud.animate({ … });
players.push(player);
// ...
var startEvent, startTime;
document.addEventListener('mousedown', function(event) {
  startEvent = event;
  startTime = players[0].currentTime;
  players.forEach(function(p) { p.pause(); });
});
document.addEventListener('mousemove', function(event) {
  if (!startEvent) return;
  var delta = startEvent.offsetX - event.offsetX;
  var updateTime = startTime + delta;
  players.forEach(function(p) { p.currentTime = updateTime; });
});
```

Service Worker & App Install


12:22
https://m.facebook.com
Sam Thorogood
Update Info
Activity Log
More
Sam, which city do you live in?
Tap to answer


12:22
Sam Thorogood
Update Info
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Sam, which city do you live in?
Tap to answer
1 Pending Item