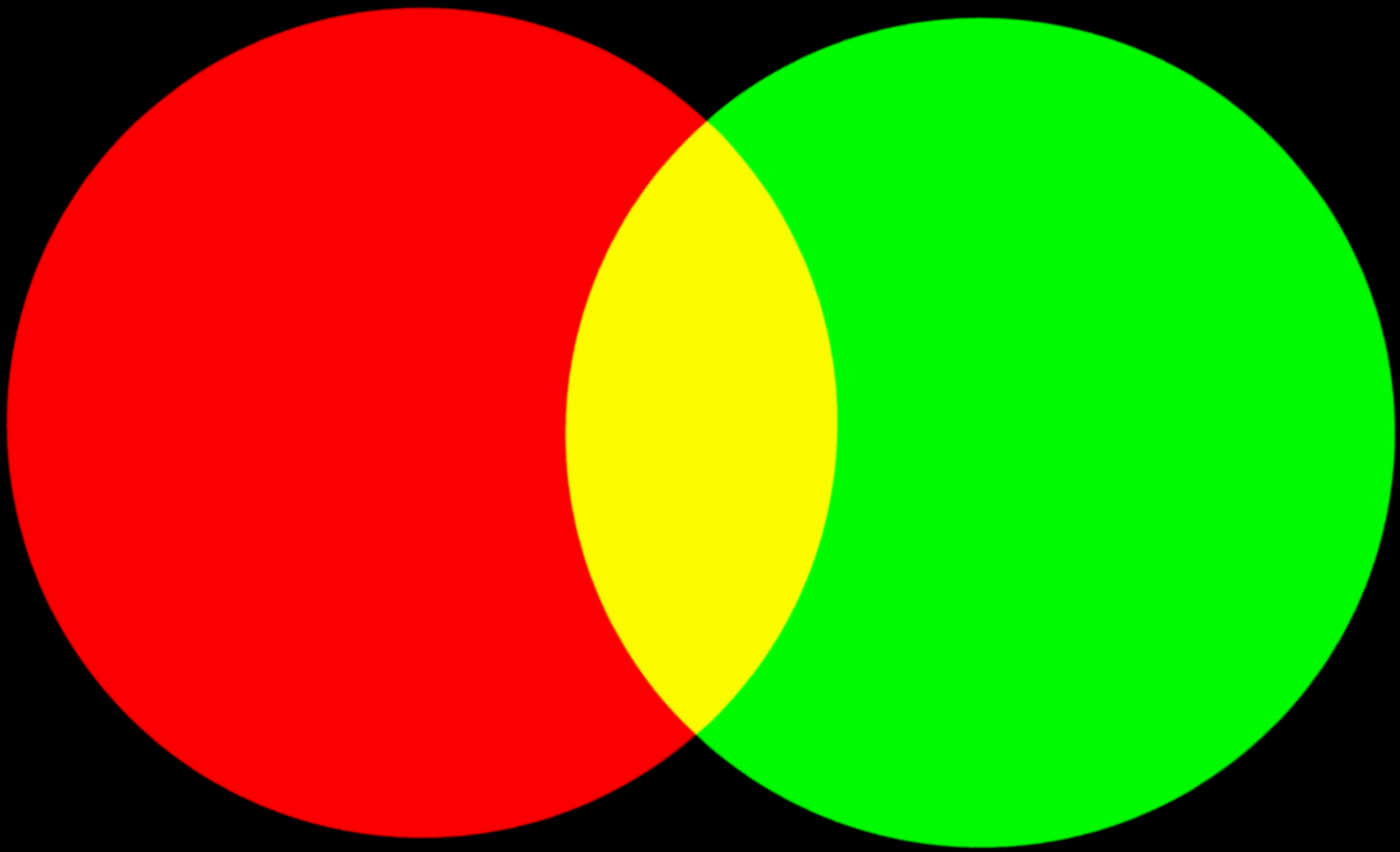
Design+Performance

Steve Souders
@souders

bringing designers & developers closer together




flickr.com/photos/timdorr

flickr.com/photos/easyflow


SpeedCurve
SpeedCurve

Yesenia Perez-Cruz

Philadelphia, PA

https://speakerdeck.com/yeseniaperezcruz/design-decisions-through-the-lens-of-a-performance-budget


I used to be a
reckless designer.

HI DAVE HOLMES! YOU HAVE 1,234,567 POINTS. MY INFO

THE ROAD TRIP IS LIVE!

Follow along as the Flaming Lips attempt to break a world record.

21:10:17 HOURS TO GO | 653 MILES TO GO | 04 SHOWS LEFT

MEMPHIS · CLARKSDALE · OXFORD · JACKSON · HATTIESBURG · BILOXI · BATON ROUGE · NEW ORLEANS

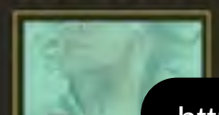
VOTING IS STILL OPEN IN SOME CATEGORIES! ENTER YOUR CODE TO UNLOCK VOTING: Enter Code Here UNLOCK

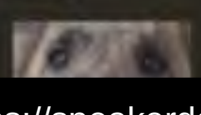
NOW PLAYING:

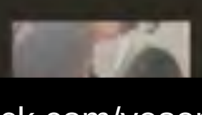
Channel 1: The Bus Route

We're at the fourth stop on our route. Watch

THE LIVE FEEDS:







WINNERS & NEWS | FAN FEED

All Updates | Winners

@OMusicAwards
Lady Gaga has won the title of Best Artist With A Cameraphone! #winners
Just now!

ThatGuyDave
Lovin' Yeah Dog on Camera 3. #omashow
5 minutes ago

TeamTokioHotel
Tokio Hotel better win Fan Army FTW or else I'll cry!!!!!!!!!! #omashow
5 minutes ago

REQUESTS: 136

PAGE WEIGHT: 5.9MB

LOAD TIME: 2M 46S

Server Delays Experiment: Results

	Distinct Queries/User	Query Refinement	Revenue/User	Any Clicks	Satisfaction	Time to Click (increase in ms)
50ms	-	-	-	-	-	-
200ms	-	-	-	-0.3%	-0.4%	500
500ms	-	-0.6%	-1.2%	-1.0%	-0.9%	1200
1000ms	-0.7%	-0.9%	-2.8%	-1.9%	-1.6%	1900
2000ms	-1.8%	-2.1%	-4.3%	-4.4%	-3.8%	3100

- Means no statistically significant change

- Strong negative impacts
- Roughly linear changes with increasing delay
- Time to Click changed by roughly double the delay

bing

KYLE RUSH

HOME ABOUT CONTACT

Meet the Obama campaign's $250 million fundraising platform

Nov 27, 2012

The num

- 6 month life span
- $250 million dollars, 4,276,463 donations
- 81,548,259 pageviews, 17,807,917 unique visitors
- 60% faster time to paint than previous platform
- 240 a/b tests, 49% increase in donation conve

"We made the new platform 60% faster and this resulted in a 14% increase in donation conversions."

http://kylerush.net/blog/meet-the-obama-campaigns-250-million-fundraising-platform/

April 17, 2015
HUFF POST TECH

Google To Favor 'Mobile-Friendly' Sites In Search

AP | By MICHAEL LIEDTKE

Posted: 04/17/2015 8:22 am EDT | Updated: 4 hours ago

*"To stay in Google's good graces, **websites must be designed so they load quickly** on mobile devices."*

SAN FRANCISCO (AP) — Google is about to change the w
that's expected to sway where millions of people shop, e

The revised formula, scheduled to be released Tuesday, will favor websites that Google defines as "mobile-friendly." Websites that don't fit the description will be demoted in Google's search results on smartphones while those meeting the criteria will be more likely to appear at the top of the rankings — a prized position that can translate into more visitors and money.

Although Google's new formula won't affect searches on desktop and laptop computers, it will have a huge influence on how and where people spend their money, given that more people are relying on their smartphones to compare products in stores and look for restaurants. That's why Google's new rating system is being billed by some search experts as "Mobile-geddon."

"Some sites are going to be in for a big surprise when they find a drastic change in the amount of people visiting them from mobile devices," said Itai Sadan, CEO of website-building service Duda.

designers & developers often work in silos

some designs are hard to make fast

being fast is important

Design+Performance

flickr.com/photos/easyflow

small interdisciplinary teams

guiding principles

Speed is more important than design embellishment.

People are filling small gaps in their day with news. It must load fast on all touchpoints.

The design should feel light and nimble, always fresh and up to date. Never heavy, slow to load or clogged up with content.

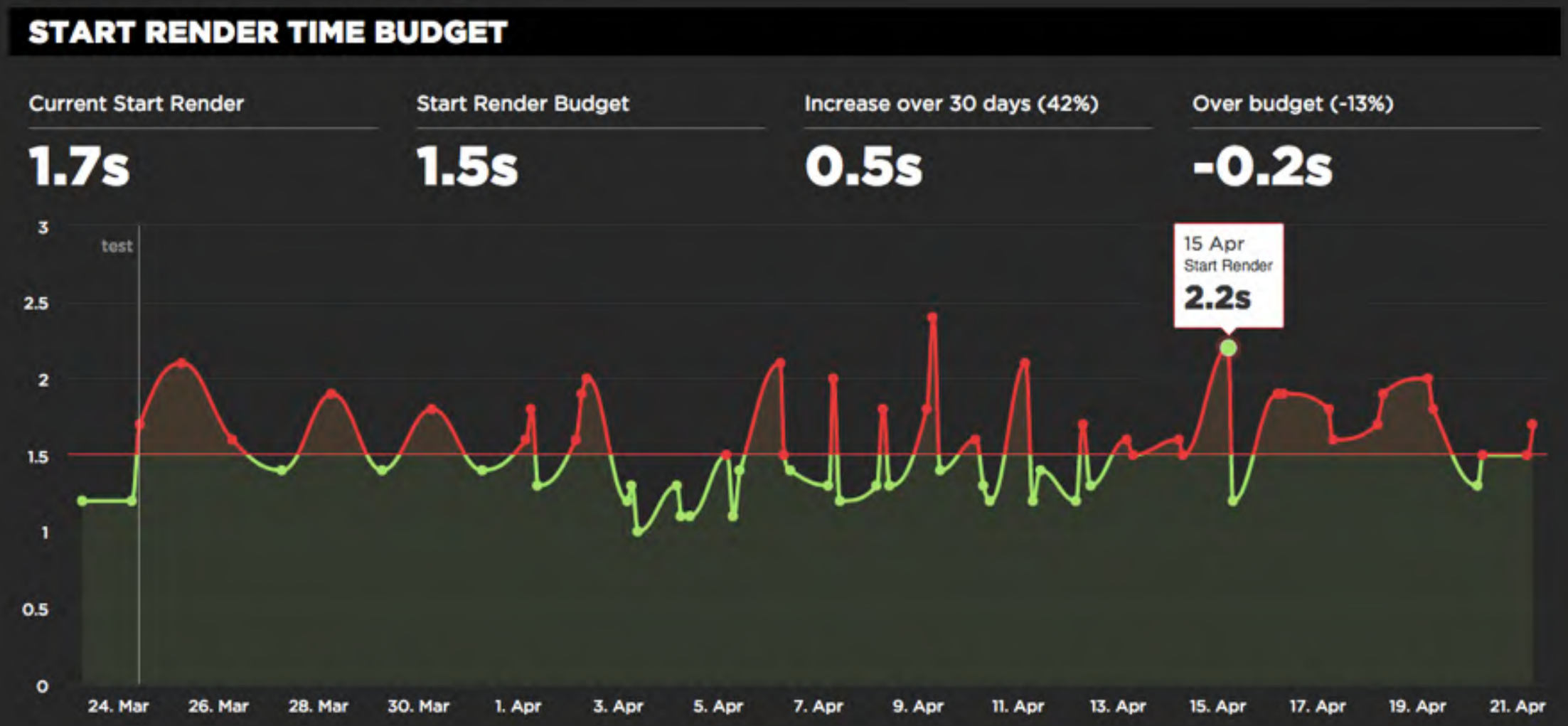
Users expect sites to render in under 2 seconds.

DAN/TBWA

prototype early

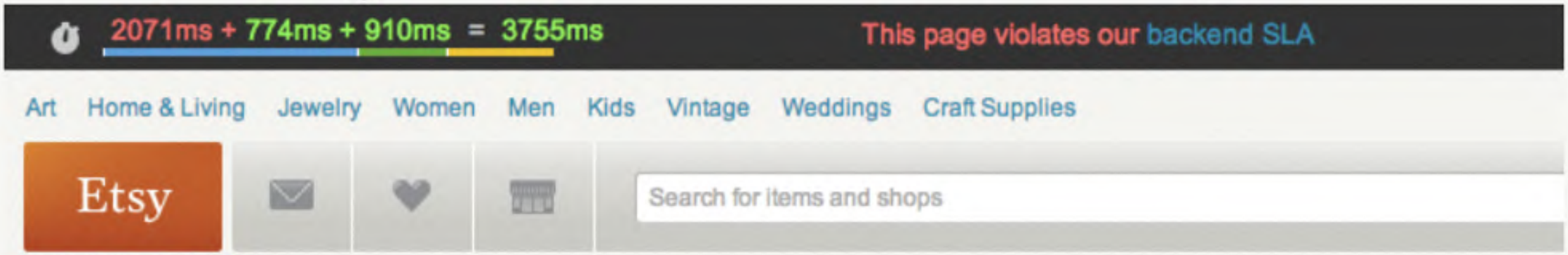
measure performance from the start

performance budgets



surface the data for them

clear baseline for what's acceptable



in-page reminders

show what's beaconed

bookmarklets

Search for:

Search

MOST RECENT POSTS

Joining SpeedCurve
SERIOUS CONFUSION with Resource Timing
Request Timeout
do u webview?
Onload in Onload

View Archive

FEEDS

Posts
Comments

Moving beyond window.onload()

May 13, 2013 9:13 am | 11 Comments

[Originally posted in the 2012 Performance Calendar. Reposting here for folks who missed it.]

There's an elephant in the room that we've been ignoring for years:

window.onload is not the best metric for measuring website speed

We haven't actually been "ignoring" this issue. We ...wledged it, but we haven't coordinated our efforts to come up with a better replacement. Let's do tha...

"window.onload is not the best metric for measuring website speed"

window.onload is so Web 1.0

What we're after is a metric that captures the user's *p*... ..., `perception.ready()` isn't on any browser's roadmap...

Ten years ago, `window.onload` was a good proxy for ... Back then, pages were mostly HTML and images. JavaScript... ...re the delays and blocked rendering they introduce. It wasn't perfect, but `window.onload` was close enough. Plus it had other desirable attributes:

- **standard across browsers** – `window.onload` means the same thing across all browsers. (The only exception I'm aware of is that IE 6–9 don't wait for async scripts before firing `window.onload`, while most other browsers do.)
- **measurable by 3rd parties** – `window.onload` is a page milestone that can be measured by someone other than the website owner, e.g., metrics services like Keynote Systems and tools like Boomerang. It doesn't require website owners to add custom code to their pages.
- **measurable for real users** – Measuring `window.onload` is a lightweight operation, so it can be performed on real user traffic without harming the user experience.

Web 2.0 is more dynamic

Fast forward to today and we see that `window.onload` doesn't reflect the user perception as well as it once did.

overly optimistic

onload: 3.9s

98% ATF rendered: 4.7s

too critical

99% ATF rendered: 2.0s

onload: 9.7s

flickr.com/photos/goincase

WEBPAGETEST

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Need help improving?

Web Page Performance Test for

www.amazon.com/High-Performance-Web-Sites-Essential-ebook/

From: Dulles, VA - **Chrome** - **Cable**
4/19/2015, 5:14:48 PM

A	A	A	B	B	✓
First Byte Time	Keep-alive Enabled	Compress Transfer	Compress Images	Cache static content	Effective use of CDN

Summary | Details | Performance Review | Content Breakdown | Domains | Screen Shot

Tester: IE9302-192.168.103.92
First View only
Test runs: **5**
Re-run the test

Raw page data - Raw object data
Export HTTP Archive (.har)
See in ShowSlow
View Test Log

Performance Results (Median Run)

	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Document Complete			Fully Loaded			
						Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View (Run 3)	9.630s	0.466s	1.093s	1717	3285	9.690s	122	3,414 KB	17.960s	241	4,819 KB	$$$$$

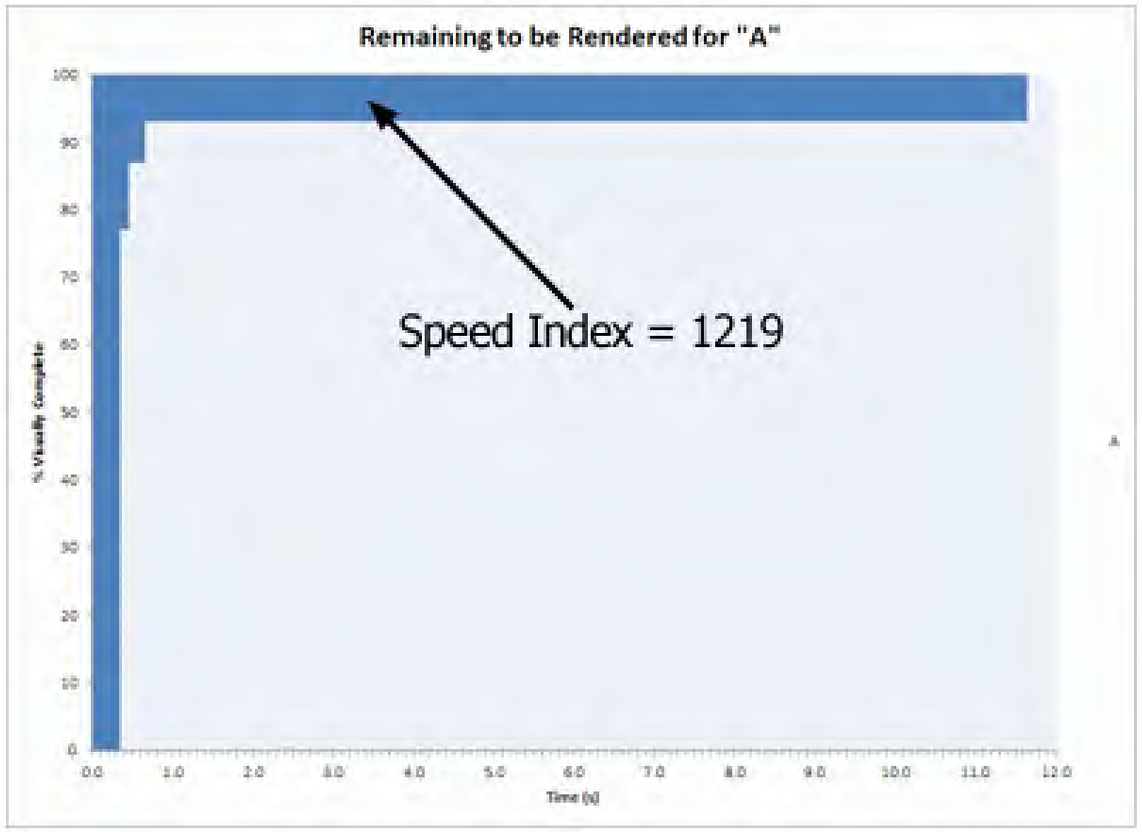
Plot Full Results

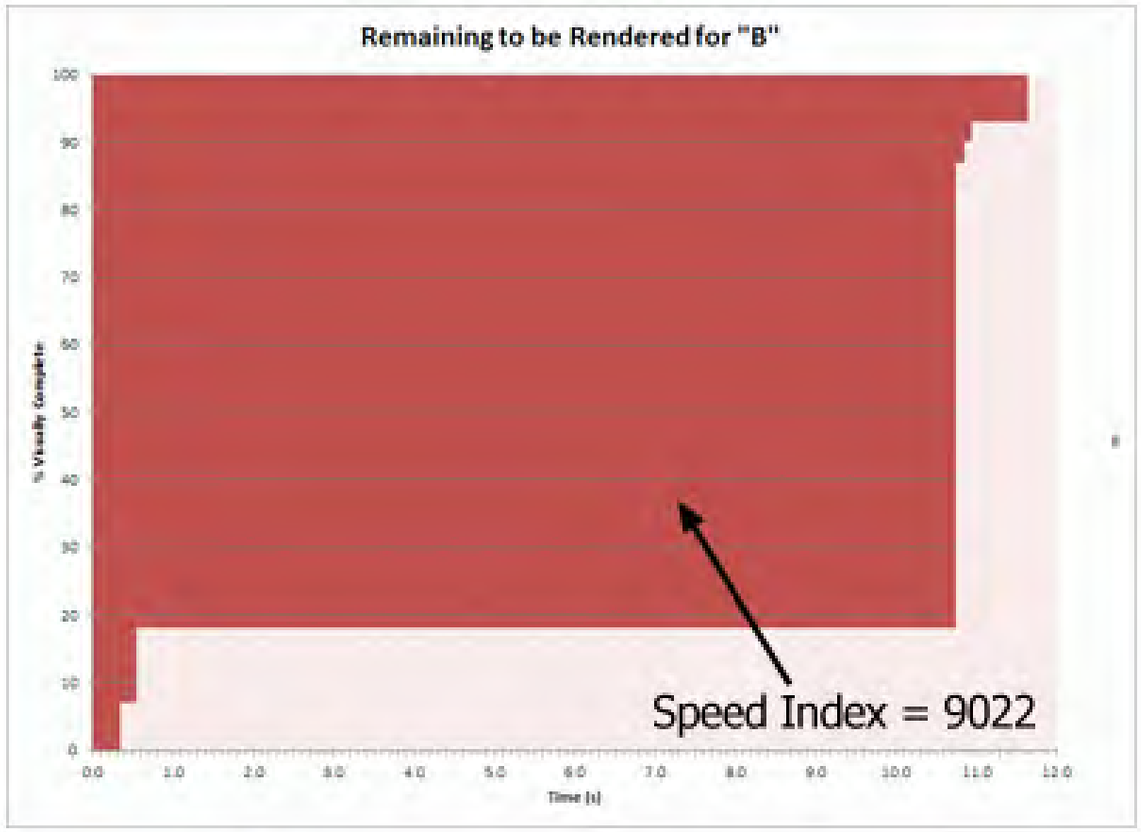
Test Results

Run 1:

Waterfall	Screen Shot	Video
		Filmstrip View - Watch Video

This would be great except for one little detail, it is unbounded. If a page spins for 10 seconds after reaching visually complete the score would keep increasing. Using the "area above the graph" and calculating the unrendered portion of the page over time instead gives us a nicely bounded area that ends when the page is 100% complete and approaches 0 as the page gets faster:



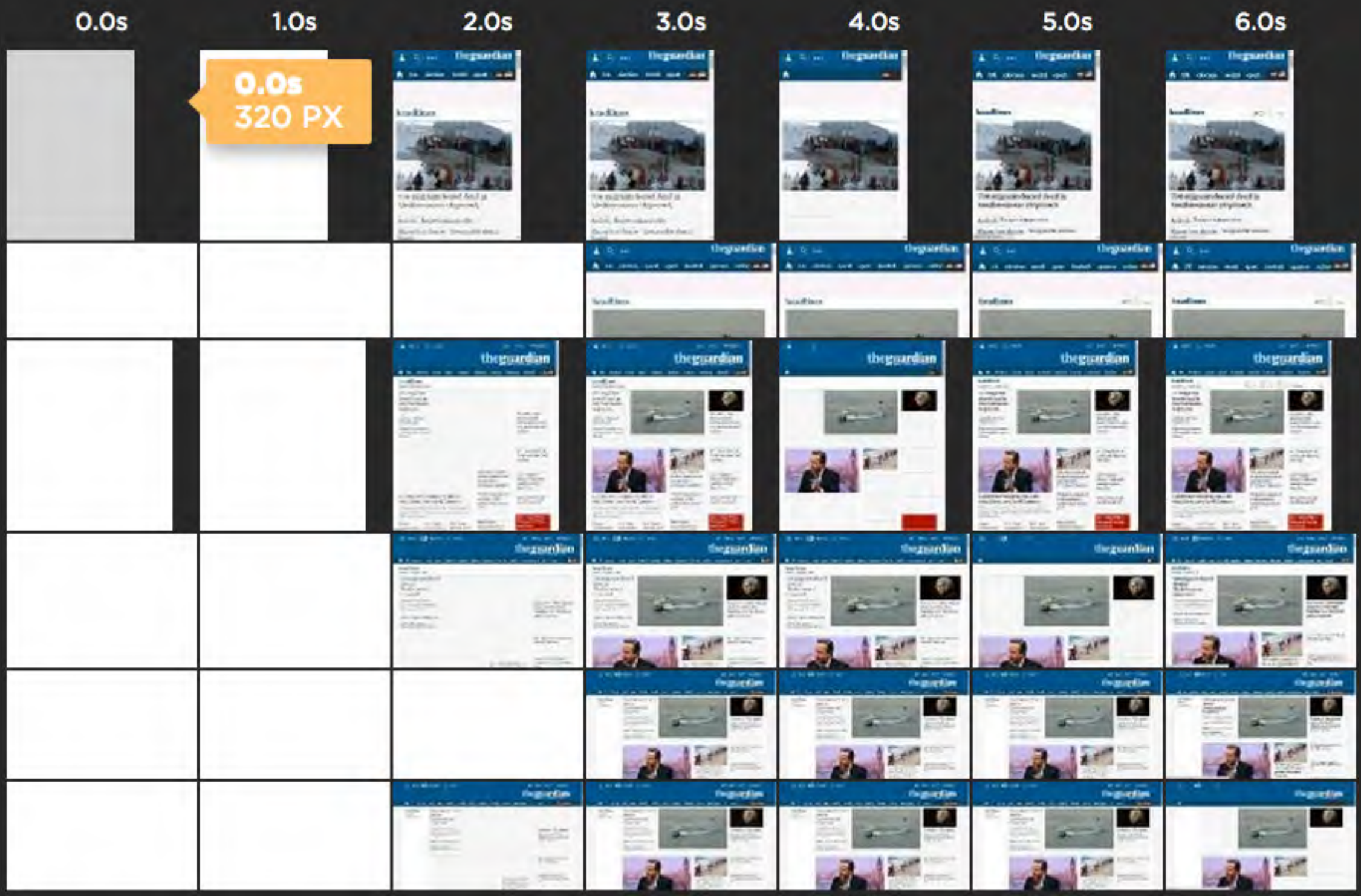


$$\text{Speed Index} = \int_0^{end} 1 - \frac{VC}{100}$$

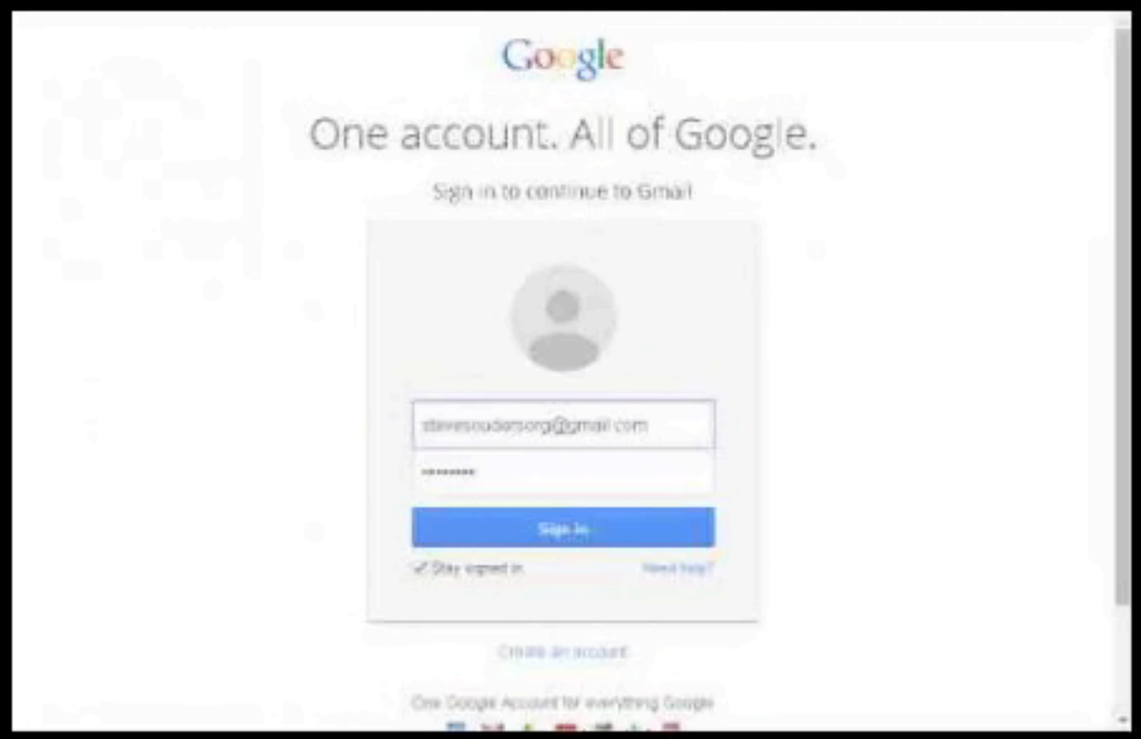
end = end time in milliseconds
VC = % visually complete

The Speed Index is the "area above the curve" calculated in ms and using 0.0-1.0 for the range of visually complete. The calculation looks at each 0.1s interval and calculates ***IntervalScore = Interval * (1.0 - (Completeness/100))*** where ***Completeness*** is the % Visually complete for that frame and ***Interval*** is the elapsed time for that video frame in ms (100 in this case). The overall score is just a sum of the individual intervals:
SUM(IntervalScore)

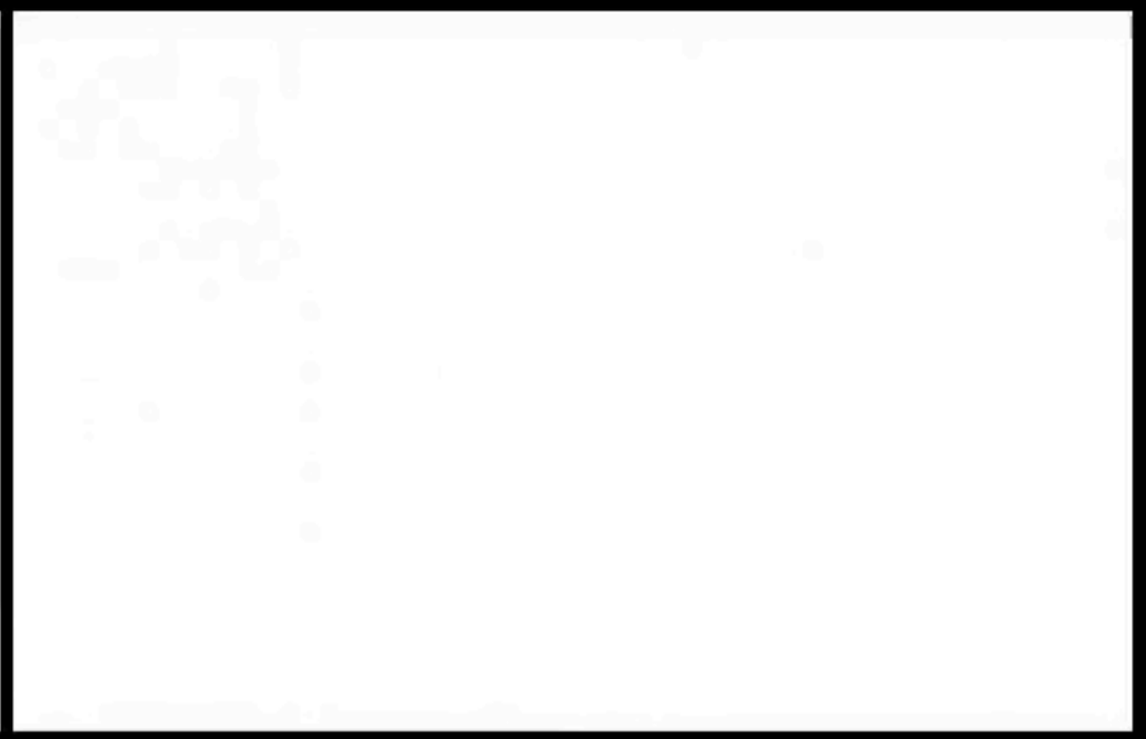
filmstrips



video


Google
One account. All of Google.
Sign in to continue to Gmail
Sign In
Stay signed in
Need help?
Create an account
One Google Account for everything Google

0.0



0.0

custom metrics

define *most important* elements on the page

measure using User Timing

track with RUM *and* synthetic

Improving performance on twitter.com

Tuesday, May 29, 2012 | By Twitter (@twitter) 05/29/2012 - 21:23

Tweet

To connect you to information in real time, it's important for Twitter to be fast. That's why we've been reviewing our entire technology stack to optimize for speed.

When we shipped #NewTwitter in September 2010, we built it around a web application architecture that pushed all of the UI rendering and logic to JavaScript running on our users' browsers and consumed the Twitter REST API directly, in a similar way to our mobile clients. That architecture broke new ground by offering a number of advantages over a more traditional approach, but it lacked support for various optimizations available only on the server.

...

Reducing time to first tweet

Before starting any of this work we added instrumentation to find the performance pain points and identify which categories of users we could serve better. The most important metric we used was "time to first Tweet". This is a measurement we took from a sample of users, (using the Navigation Timing API) of the amount of time it takes from navigation (clicking the link) to viewing the first Tweet on each page's timeline. The metric gives us a good idea of how snappy the site feels

Steve Souders
@Souders

TWEETS	FOLLOWING	FOLLOWERS
5,584	43	26.1K

Gain more followers
Promote your account and get discovered by more people on Twitter. Preview it first below

Trends · Change
- Full House
- #Mobilegeddon
- #RSAC
- #internetbestfriendday
- #RuinThePartyIn5Words
- #TNWEurope
- star wars
- Android Wear
- Apple Watch
- Steve Byrnes

Who to follow · Refresh · View all

Pretty State Machine @kerr... Follow

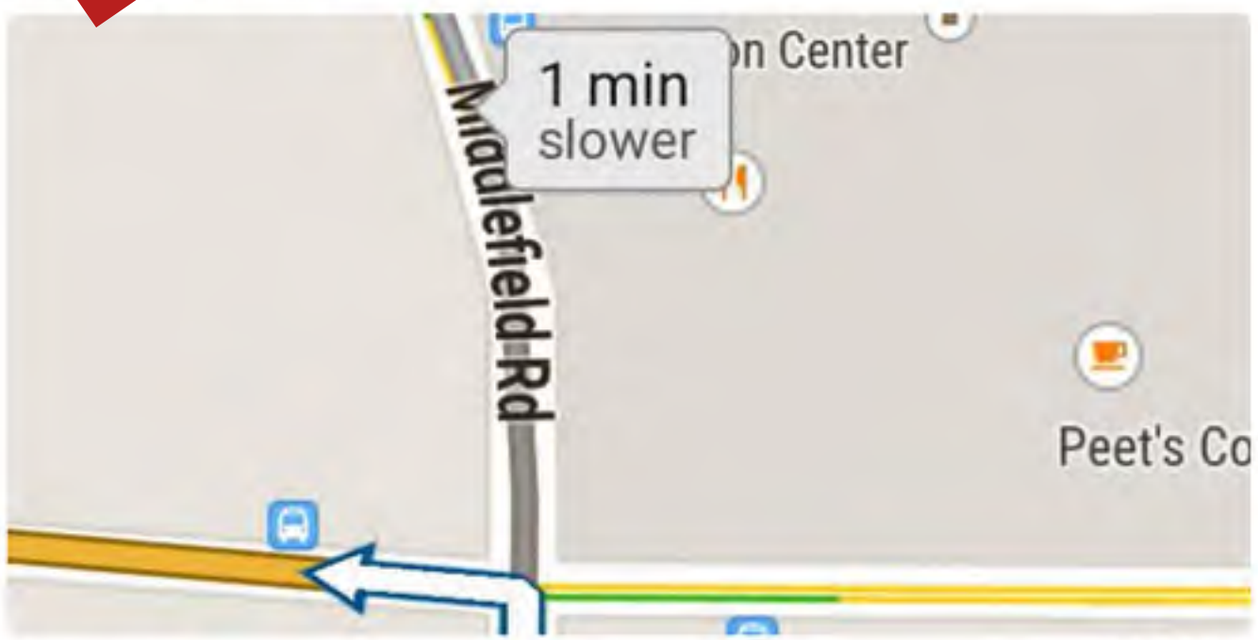
Chad Fowler @chadfowler Follow

Jonah Kowall @jkowall

What's happening?

Eric Lawrence @ericlaw · 45m
If you're going to mangle your JPEG into a 256 color PNG, at least have the decency to use Zopfli to deflate it.

Almaer @dalmaer · 1h
W s my "if only a minute don't keep bugging me" setting @GoogleMaps? #M OfError #ux



1 2 View photo

Yehuda Katz retweeted

James Kyle @thejameskyle · 3h
Breaking News: #ThoughtLeaders still unsure about this new JavaScript thing. @wycats reporting live at the scene.

10 18 View conversation

Fastly @fastly · 2h
Good morning #rsac! We'll be here all week, so come visit us at booth #2736 and hear about how we can help your site.

Image Custom Metric

Steve

stevesouders.com/tests/image-custom-metric.php

```
<script src="3-seconds.js"></script>
<link href="5-seconds.css" rel="stylesheet">
```

Image Custom Metric

```
<img src="1-second.jpg">
```

RESOURCE TIMING:	1516 ms
IMAGE ONLOAD:	3199 ms
MUTATION OBSERVER:	3174 ms
offsetHeight POLLING:	3253 ms
INLINE SCRIPT:	5295 ms

actual image display: ~5200 ms

WEBPAGETEST

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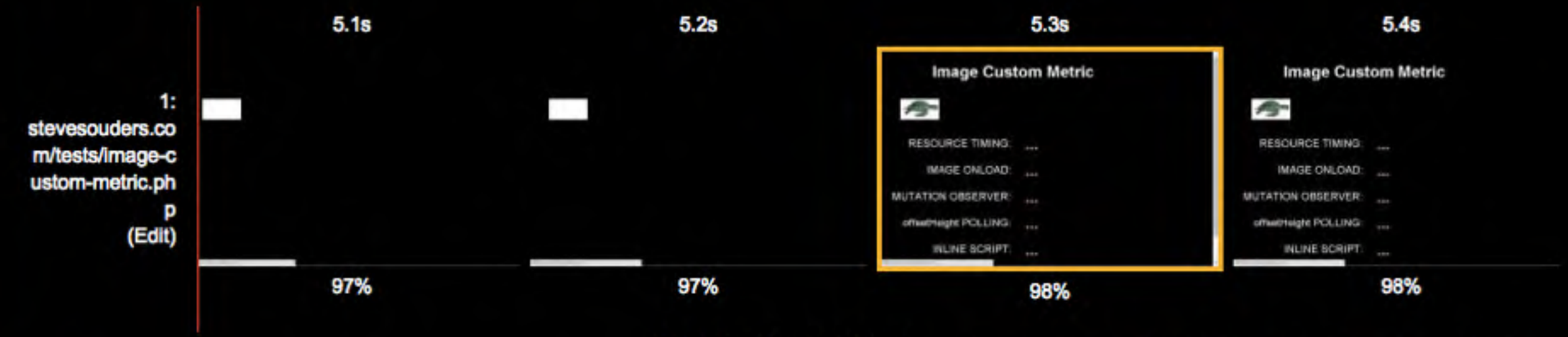
Tested From: Dulles, VA - **Chrome - Cable**



Export filmstrip as an image...

Slow Motion

Create Video

Thumbnail Size: Small / Medium / Large

Thumbnail Interval: 0.1 sec / 0.5 sec / 1 sec / 5 sec

Comparison End Point: Visually Complete / Last Change / Document Complete / Fully Loaded

Advanced customization options...

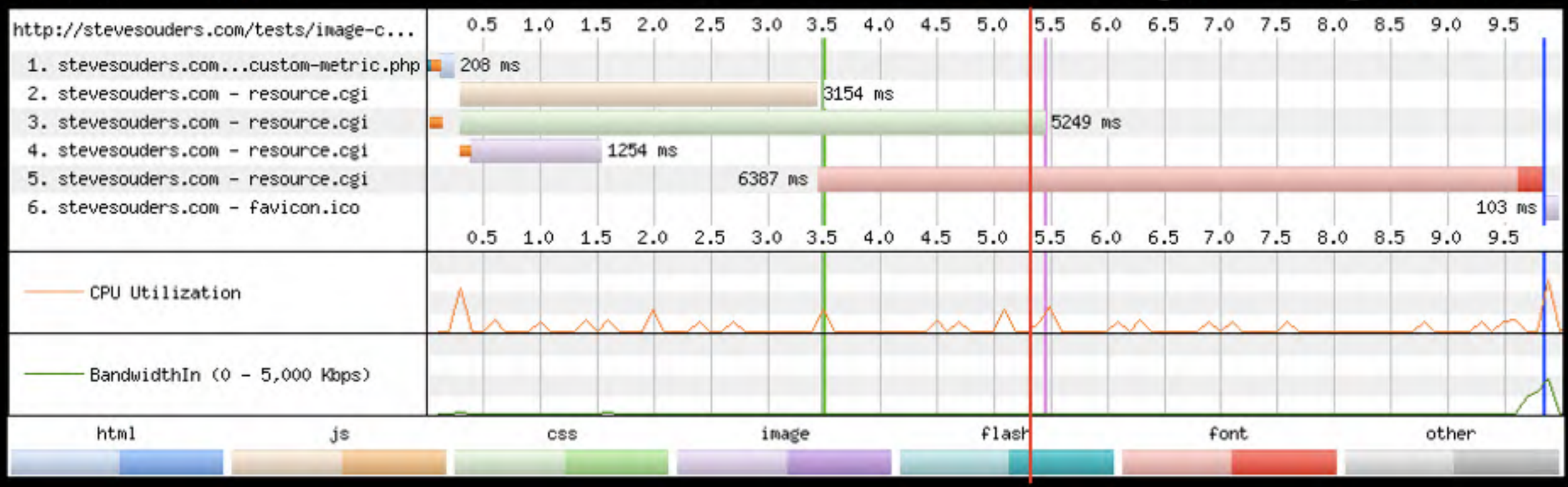


Image Custom Metric

Steve

stevesouders.com/tests/image-custom-metric.php

```
<head>
<script src="3-seconds.js"></script>
<link href="5-seconds.css" rel="stylesheet">
</head>
```

Image Custom Metric

```
<img src="1-second.jpg">
```

RESOURCE TIMING: 1516 ms

IMAGE ONLOAD: 3199 ms

MUTATION OBSERVER: 3174 ms

offsetHeight / CLIENT: 5295 ms

```
performance
   .getEntriesByName("hero.jpg")[0]
     .duration
```

actual image display: ~5200 ms

Image Custom Metric

stevesouders.com/tests/image-custom-metric.php

Steve

```
<head>
<script src="3-seconds.js"></script>
<link href="5-seconds.css" rel="stylesheet">
</head>
```

Image Custom Metric

```
<img src="1-second.jpg">
```

RESOURCE TIMING: 1516 ms

IMAGE ONLOAD: 3199 ms

MUTATION OBSERVER: 3174 ms

offsetHeight POLLING: 3230 ms

ONE SCRIPT: 5295 ms

actual image display: 5200 ms

```
<img src="hero.jpg"
  onload=
    "performance.mark('hero')">
```

Image Custom Metric

Steve

stevesouders.com/tests/image-custom-metric.php

```
<head>
<script src="3-seconds.js"></script>
<link href="5-seconds.css" rel="stylesheet">
</head>
```

Image Custom Metric

```
<img src="1-second.jpg">
```

RESOURCE TIMING: **1516 ms**

IMAGE ONLOAD: **3199 ms**

MUTATION OBSERVER: **3174 ms**

```
var observer =
  new MutationObserver(obsCallback);

observer.observe(document,
  { childList: true, attributes: true,
    subtree: true });
```

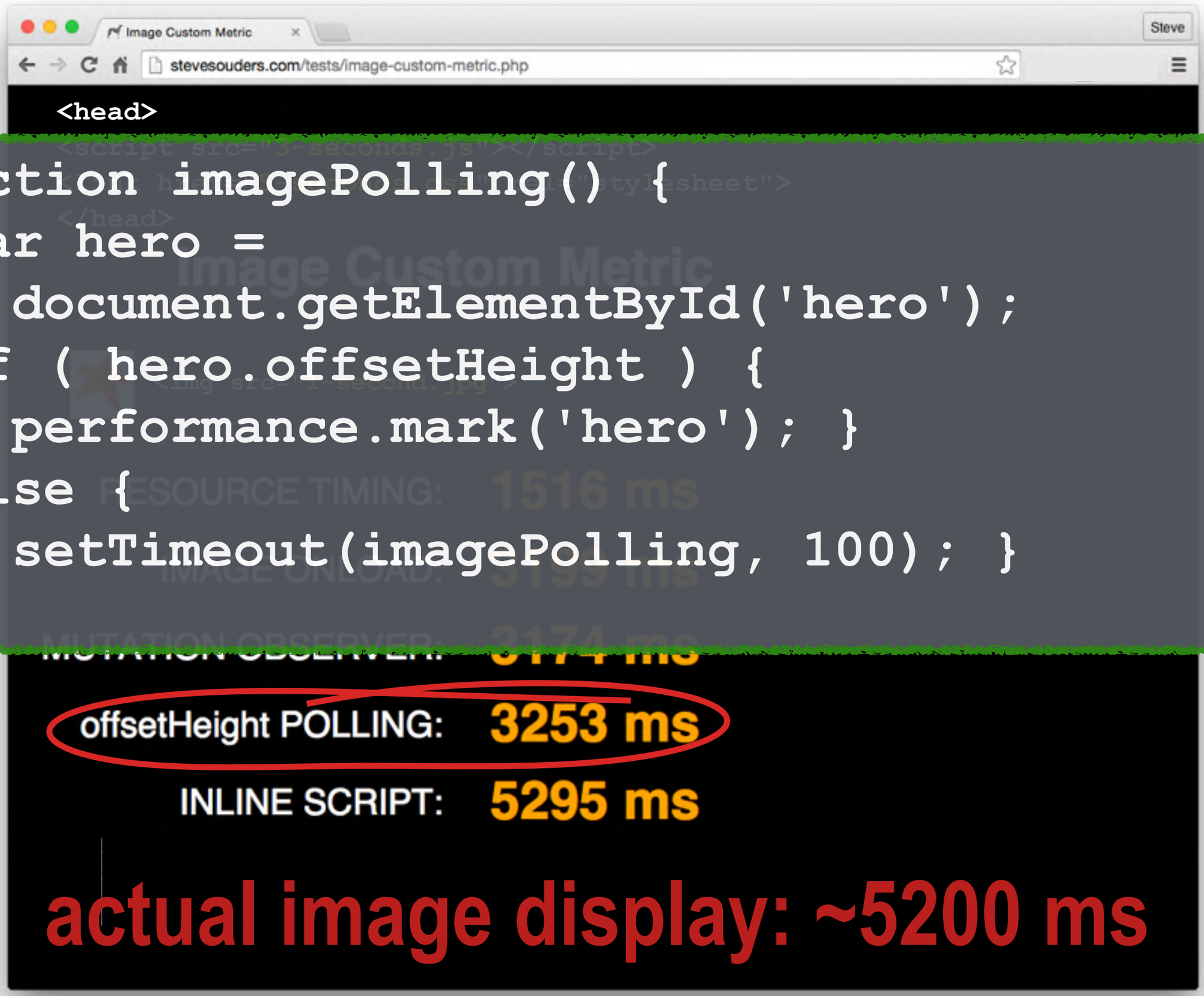


Image Custom Metric
Steve
stevesouders.com/tests/image-custom-metric.php
<head>
function imagePolling() {
var hero =
document.getElementById('hero');
if (hero.offsetHeight) {
performance.mark('hero'); }
else {
setTimeout(imagePolling, 100); }
}
offsetHeight POLLING: 3253 ms
INLINE SCRIPT: 5295 ms
actual image display: ~5200 ms

Image Custom Metric

stevesouders.com/tests/image-custom-metric.php

Steve

```
<head>
<script src="3-seconds.js"></script>
<link href="5-seconds.css" rel="stylesheet">
</head>
```

Image Custom Metric

```
<img src="1-second.jpg">
```

```
<img src="hero.jpg">
<script>
performance.mark("hero");
</script>
```

RESOURCE TIMING: 5216 ms

IMAGE ONLOAD: 3199 ms

MUTATION OBSERVER: 3174 ms

offsetHeight POLLING: 3253 ms

INLINE SCRIPT: 5295 ms

actual image display: ~5200 ms

Image Custom Metric

Steve

stevesouders.com/tests/image-custom-metric.php?s=7

```
<head>
<script src="3-seconds.js"></script>
<link href="5-seconds.css" rel="stylesheet">
</head>
```

Image Custom Metric

```
<img src="7-seconds.jpg">
```

RESOURCE TIMING: **7510 ms**

IMAGE ONLOAD: **7244 ms**

MUTATION OBSERVER: **3161 ms**

offsetHeight POLLING: **3232 ms**

~~INLINE SCRIPT: 5184 ms~~

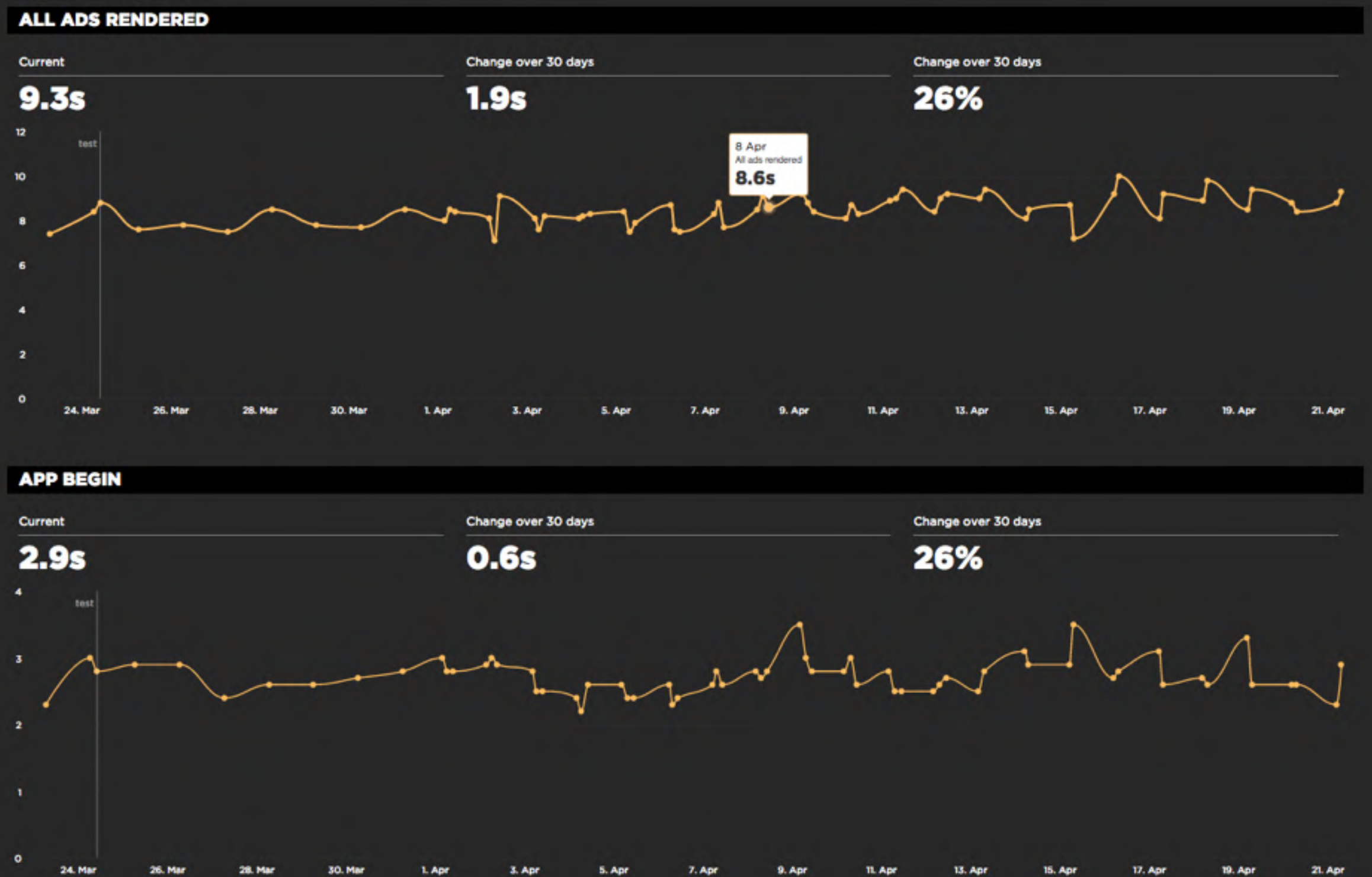
when is image displayed?

max(image onload, inline script)

```
<img src="hero.jpg"
  onload="performance.mark('hero1')">
```

```
<script>
performance.mark("hero2");
</script>
```

custom metrics



takeaways

small, interdisciplinary teams

guiding principles

prototype early

measure performance from the start

performance budgets

UX metrics: start render, Speed Index

filmstrips, video

custom metrics

O'REILLY®

Designing for Performance

WEIGHING AESTHETICS AND SPEED

Lara Callender Hogan

Ticket prices will increase on **May 1, 2015**

Update: HTTPS - The S stands for User Experience

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discount code: "souders25"

Velocity

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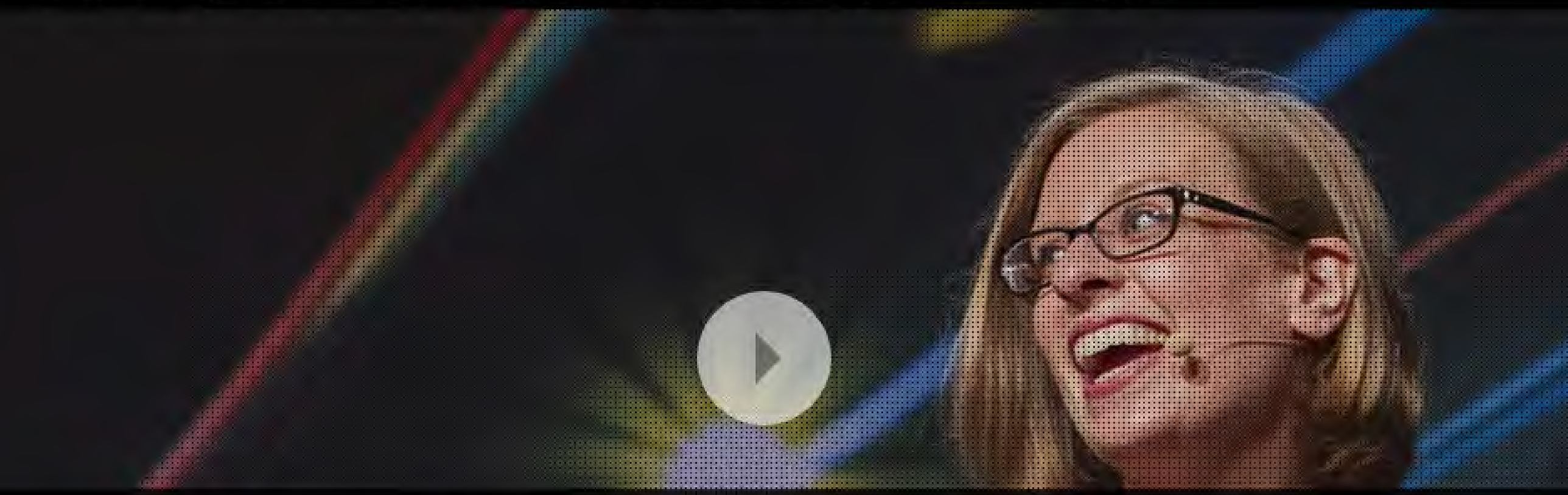
Schedule | Speakers | Exhibit Hall | Venue | About | Blog | Account | Register



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Attend the Velocity web performance and DevOps conference to join the engineers, developers, business technology, and operations pros defining the modern, IT-driven business.

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http://stevesouders.com/talks.php

- https://speakerdeck.com/yeseniaperezcruz/design-decisions-through-the-lens-of-a-performance-budget
- http://larahogan.me/design/
- http://www.amazon.com/Designing-Performance-Weighing-Aesthetics-Speed/dp/1491902515
- https://www.youtube.com/watch?v=DFImM0r4EpE
- http://www.slideshare.net/bluesmoon/beyond-page-level-metrics
- http://bradfrost.com/blog/post/performance-as-design/