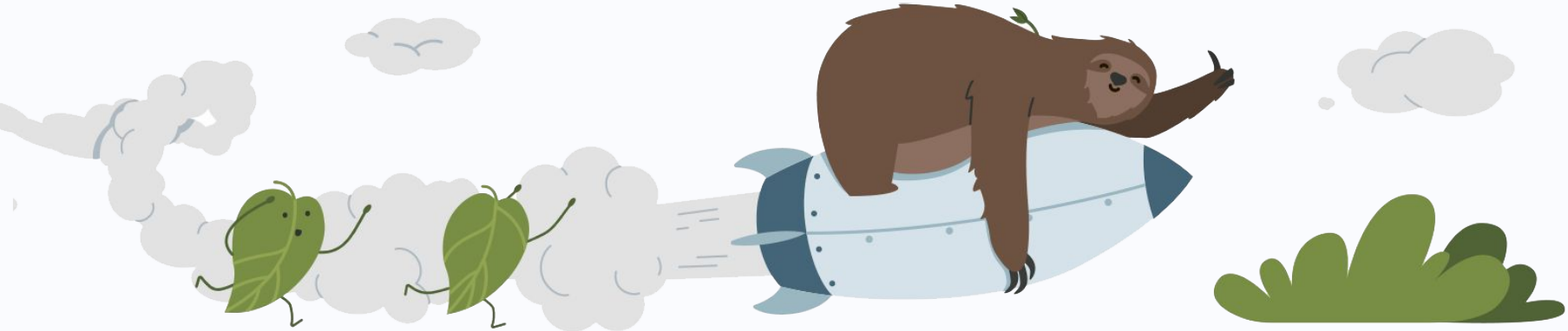
Improving Web Performance

with Todd Gardner



Improving
Web Performance

Part 1: Understanding

Part 2: Improving

Part 3: Planning

Todd Gardner

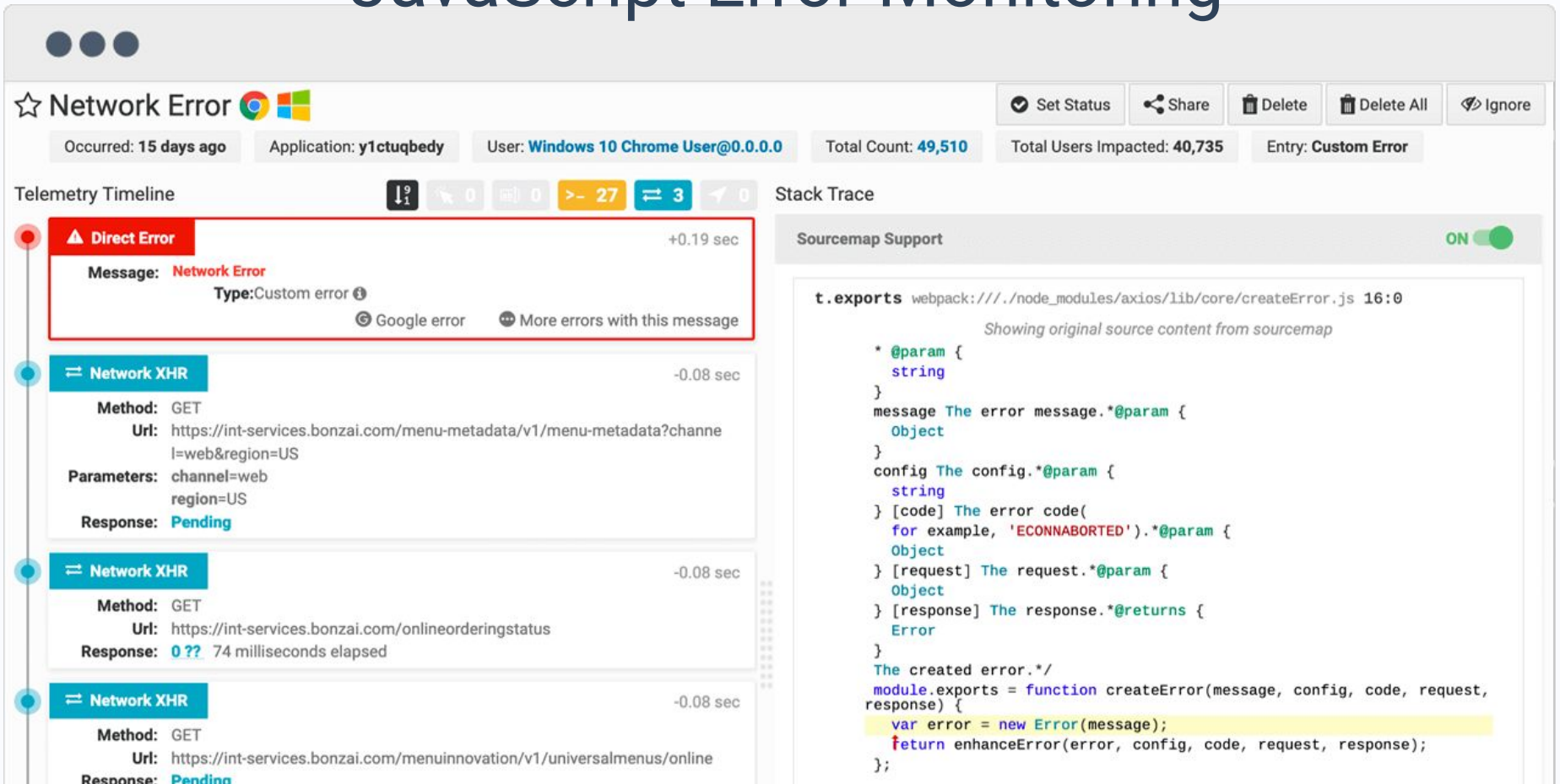
@ToddHGardner

Software Developer and Entrepreneur

Stillwater, MN, USA

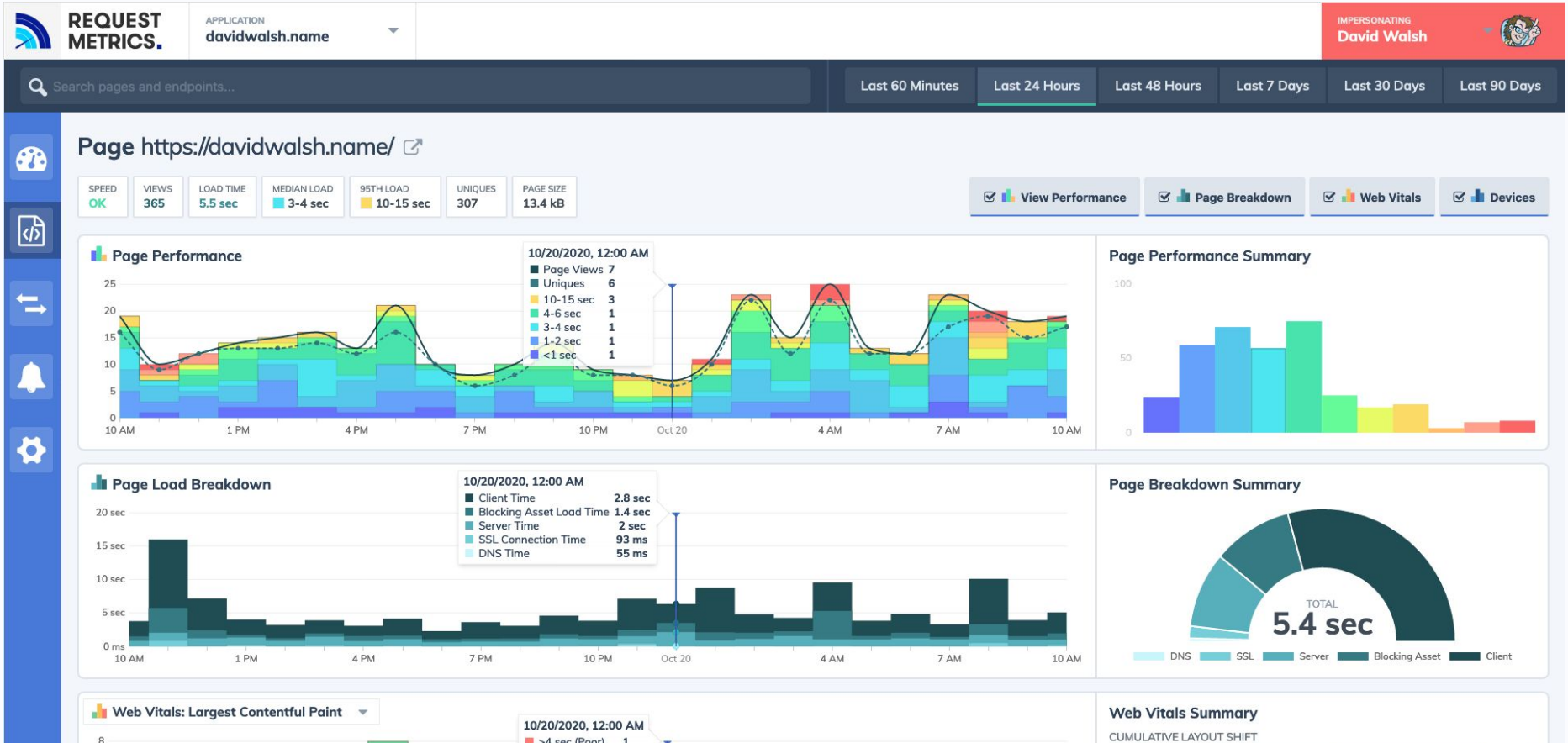
TRACKJS

JavaScript Error Monitoring



REQUEST METRICS.

Real User Performance, Simplified



Debugging and Fixing Common JavaScript Errors

Todd Gardner
TrackJS

3 hours, 39 minutes CC

Stomp out bugs and clean up JavaScript apps! In this course, Todd Gardner (Co-founder of TrackJS), walks through common JavaScript bugs and how to isolate and fix the source of the problems. By coding along, you'll learn the four stages of a debugging cycle needed to fix bugs. Use Chrome Dev Tools, debugger, network profile and more to fix memory leaks, performance problems, network failures and more! This course is for any JavaScript developer that builds, maintains, or tests an application that uses JavaScript. With the knowledge you gain, you'll be armed to find and squash those bugs faster and for good!

This course and others like it are available as part of our Frontend Masters video subscription.

Published: May 22, 2017

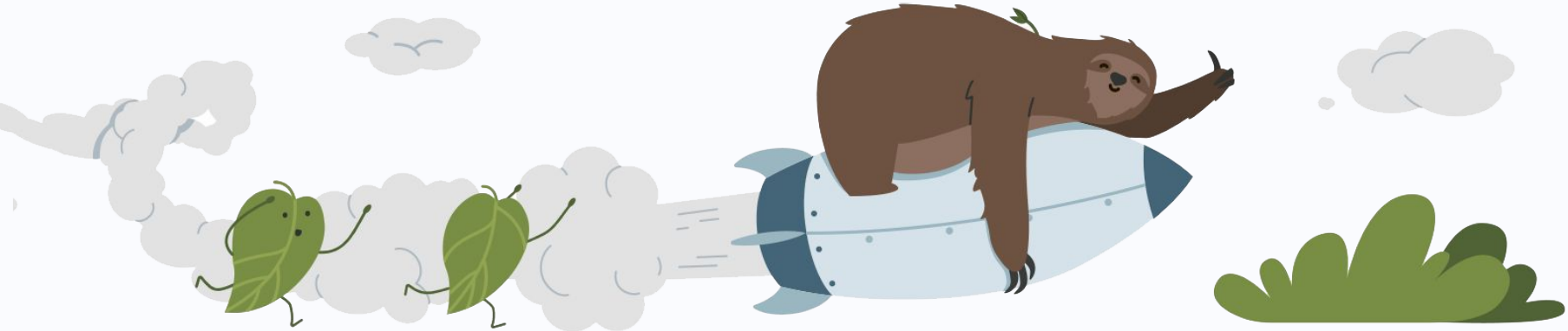
https://frontendmasters.com/courses/chrome-dev-tools-v2/

Improving
Web Performance

Part 1: Understanding

- Psychology of performance
- Measuring performance
- Interpreting performance data

Why is performance important?



Why is this important?

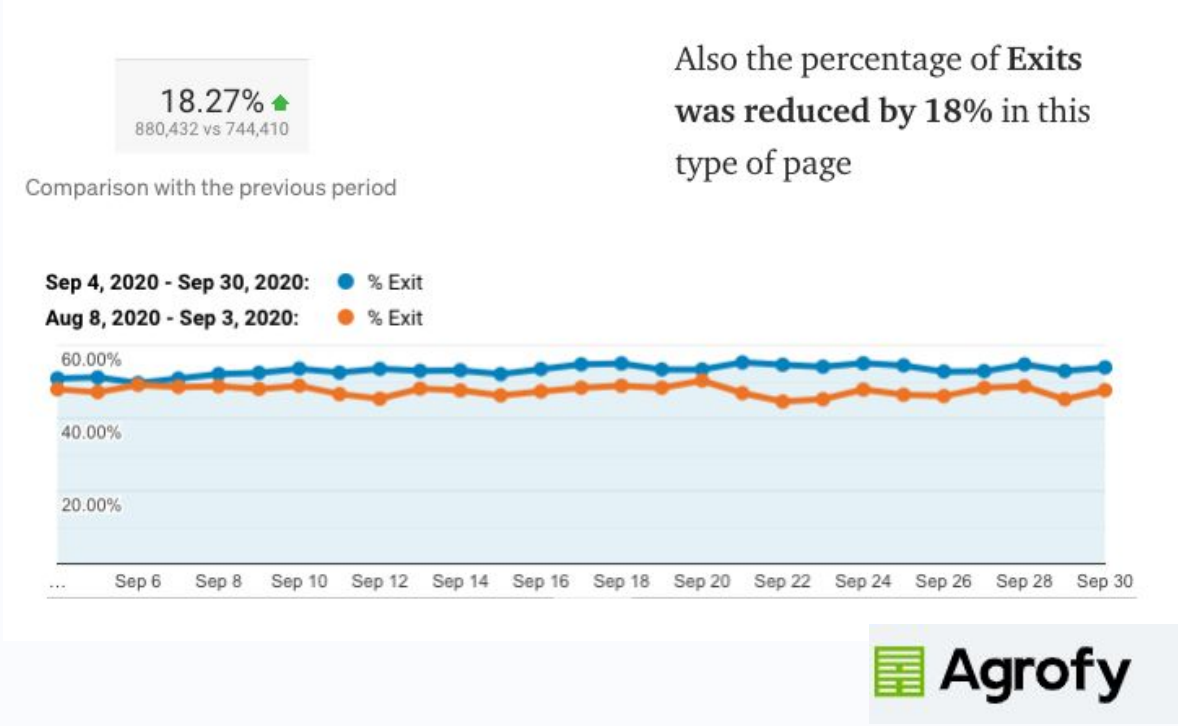
Every 1s improvement = Up to 2% increase in CVR

100ms improvement = Up to 1% incremental revenue

Walmart

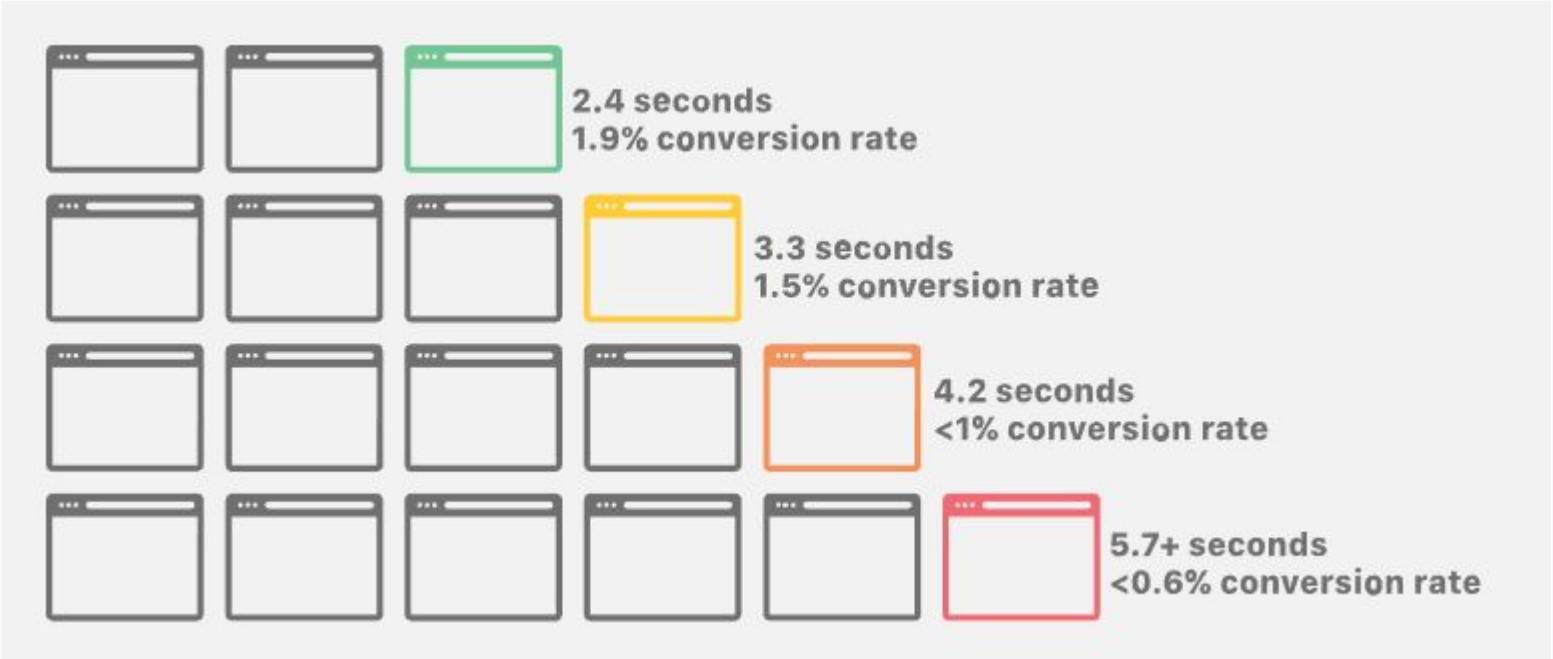
https://www.slideshare.net/devonauerswald/walmart-pagespeedslide/46

Why is this important?



https://mollar-luciano.medium.com/how-agrofy-optimised-core-web-vitals-and-improved-business-metrics-2f73311bca

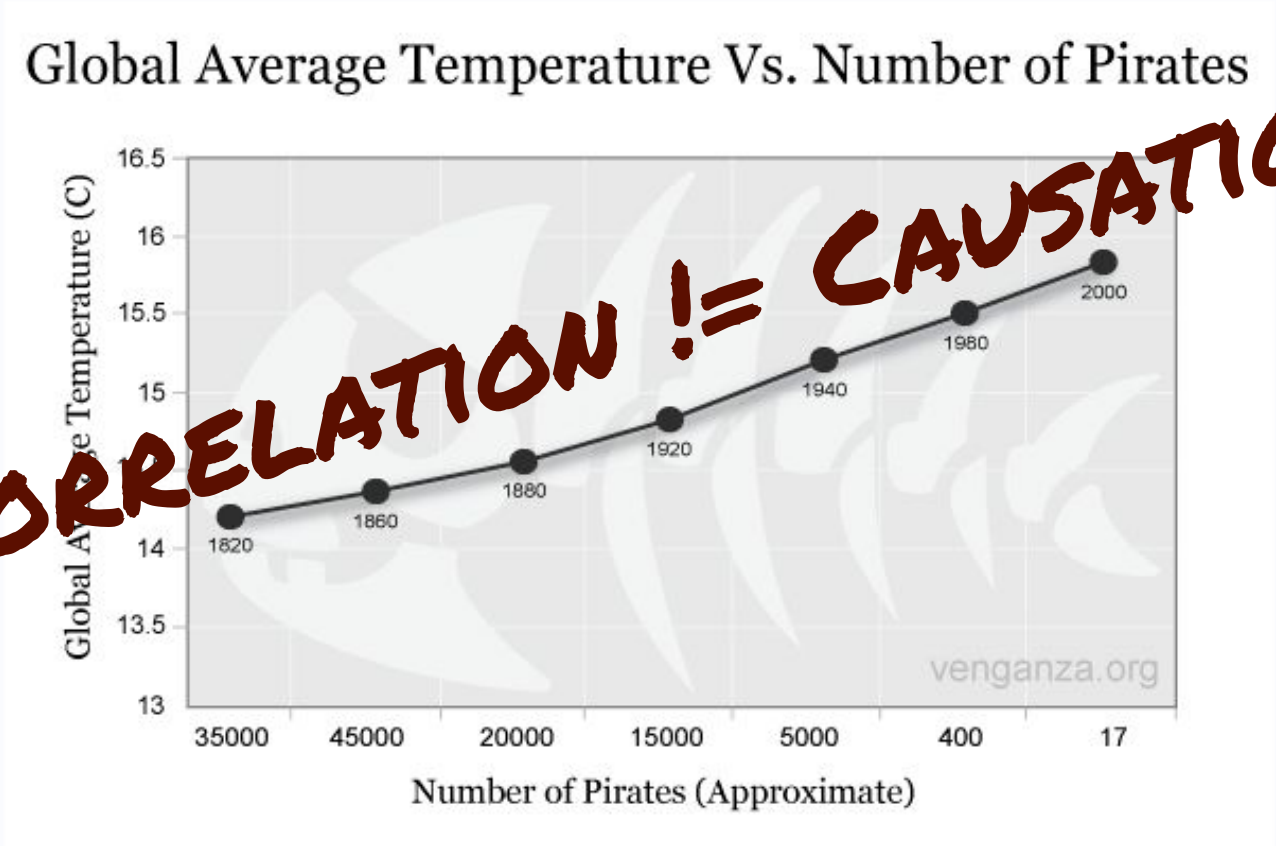
Why is this important?



CLOUDFLARE

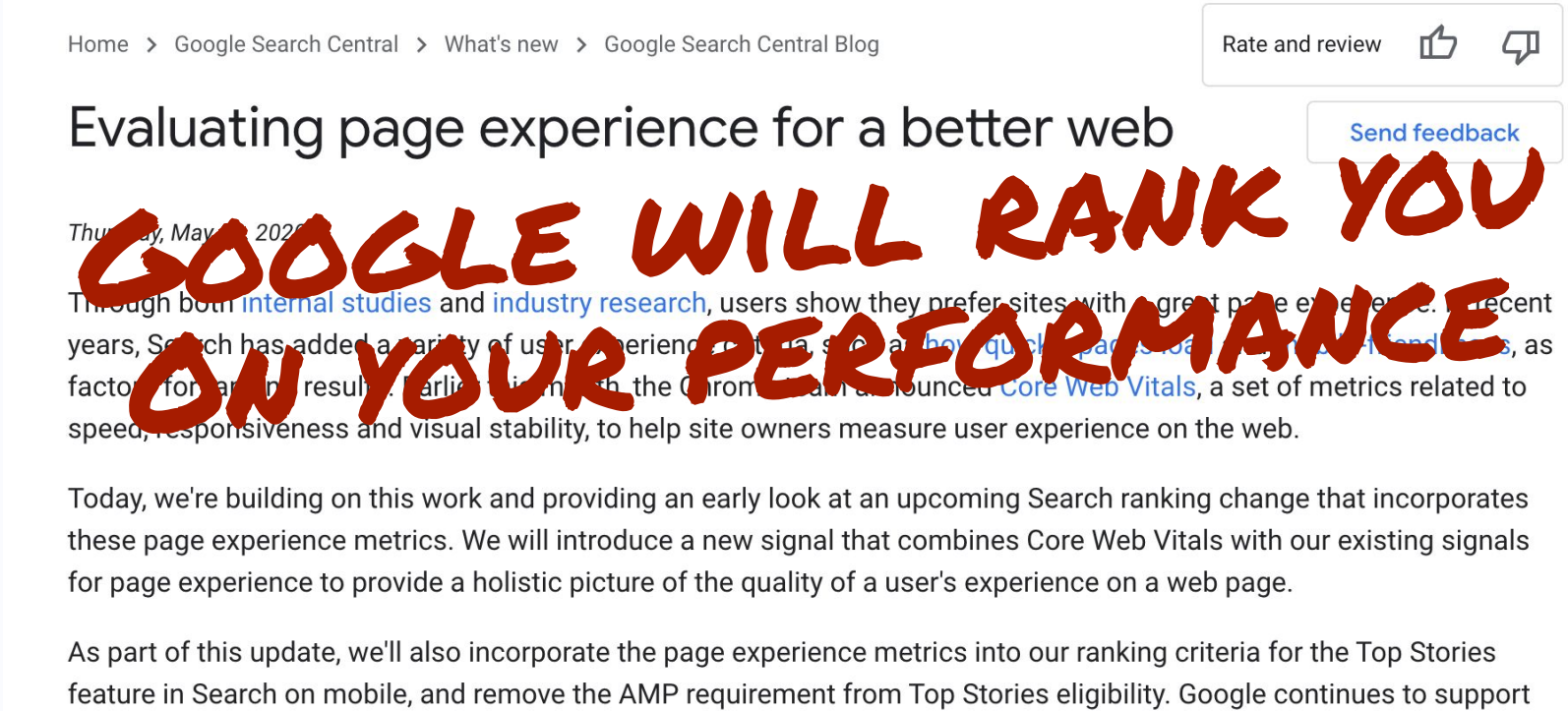
https://www.cloudflare.com/learning/performance/more/website-performance-conversion-rates/

Why is this important?



CORRELATION != CAUSATION

Why is performance important #1



Why is performance important #2

Angry and frustrated users don’t stick around long

Exercise 1:
What feels Fast?

Copy the **Performance Comparison Worksheet** and use the “Exercise 1” sheet to rank your perceived site performance from fastest to slowest.

Exercise 1:
What feels Fast?

Website	Performance Rank
https://www.npr.org/ *Publicly Funded*	1
https://www.cnn.com/ *Advertising Funded*	4
https://www.nytimes.com/ *Subscription Funded*	2
https://www.wsj.com/ *Subscription Funded*	3

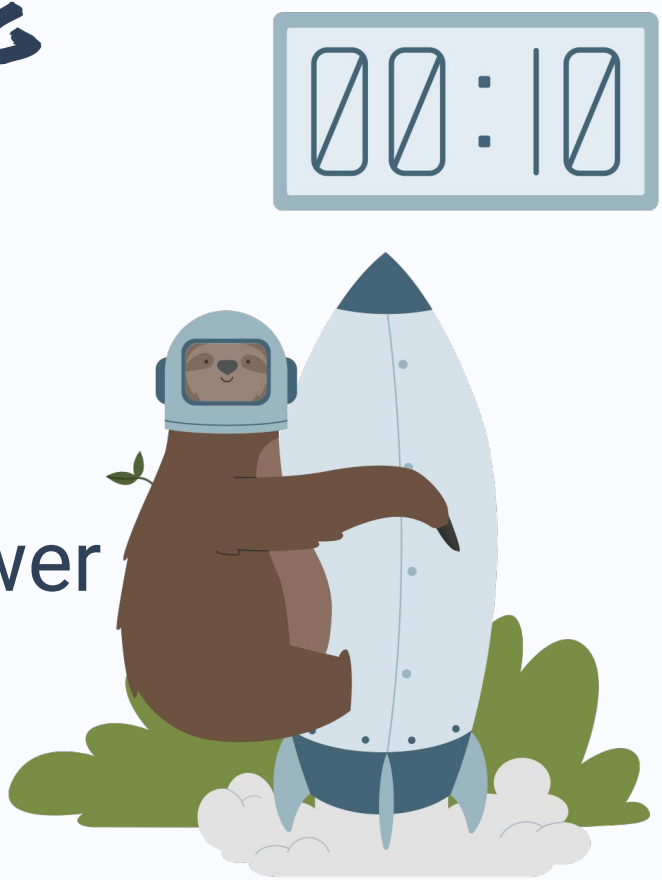
Psychology of Waiting

Wait time feels subjective

Perceived Performance

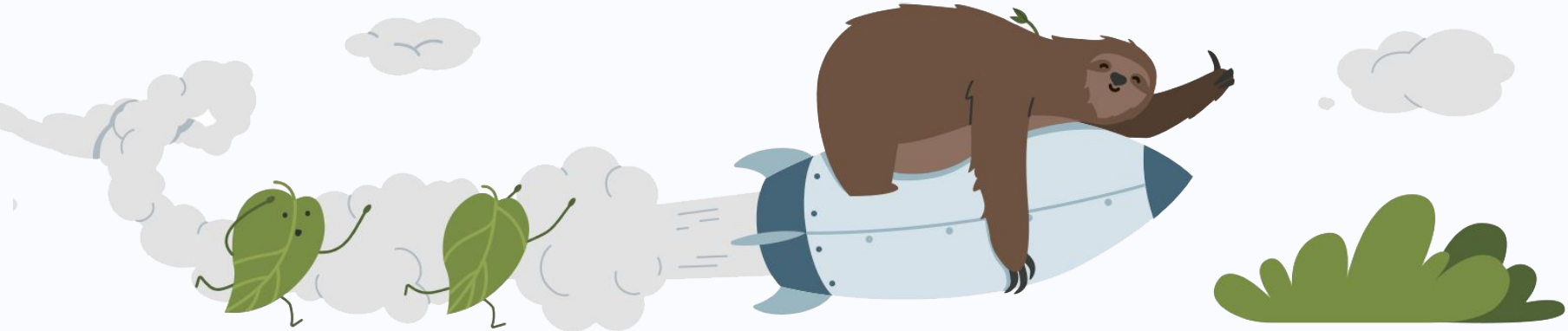
Psychology of Waiting

1. People want to start
2. Bored waits feel slower
3. Anxious waits feel slower
4. Unexplained waits feel slower
5. Uncertain waits feel slower
6. People will wait for value



Adapted from @SimonHearne https://www.youtube.com/watch?v=7i_yQyHdxUo

Measuring Web Performance



The old way: Page Load

Start

Load

Page Load
Gaming the Metrics

Start

Load

Lazy Loading

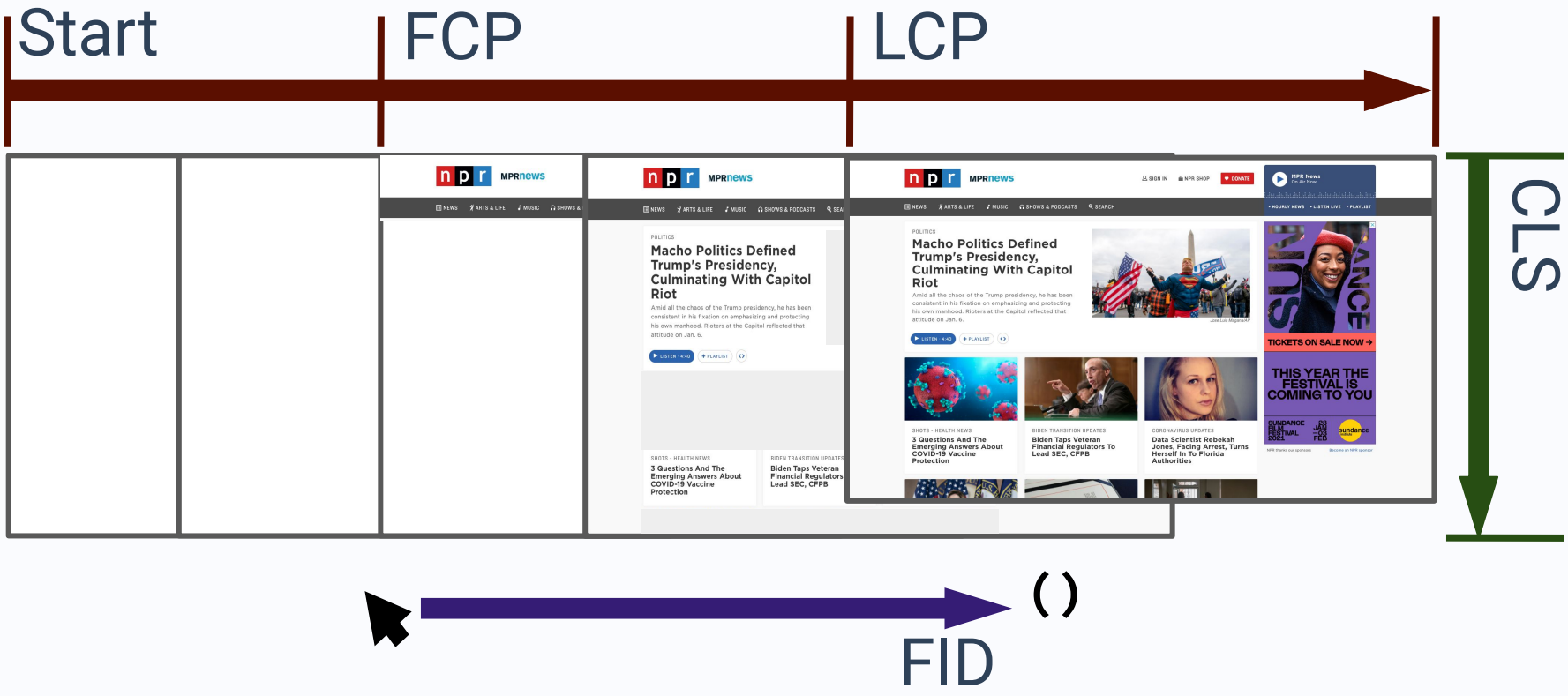
Page Load
Gaming the Metrics

Start

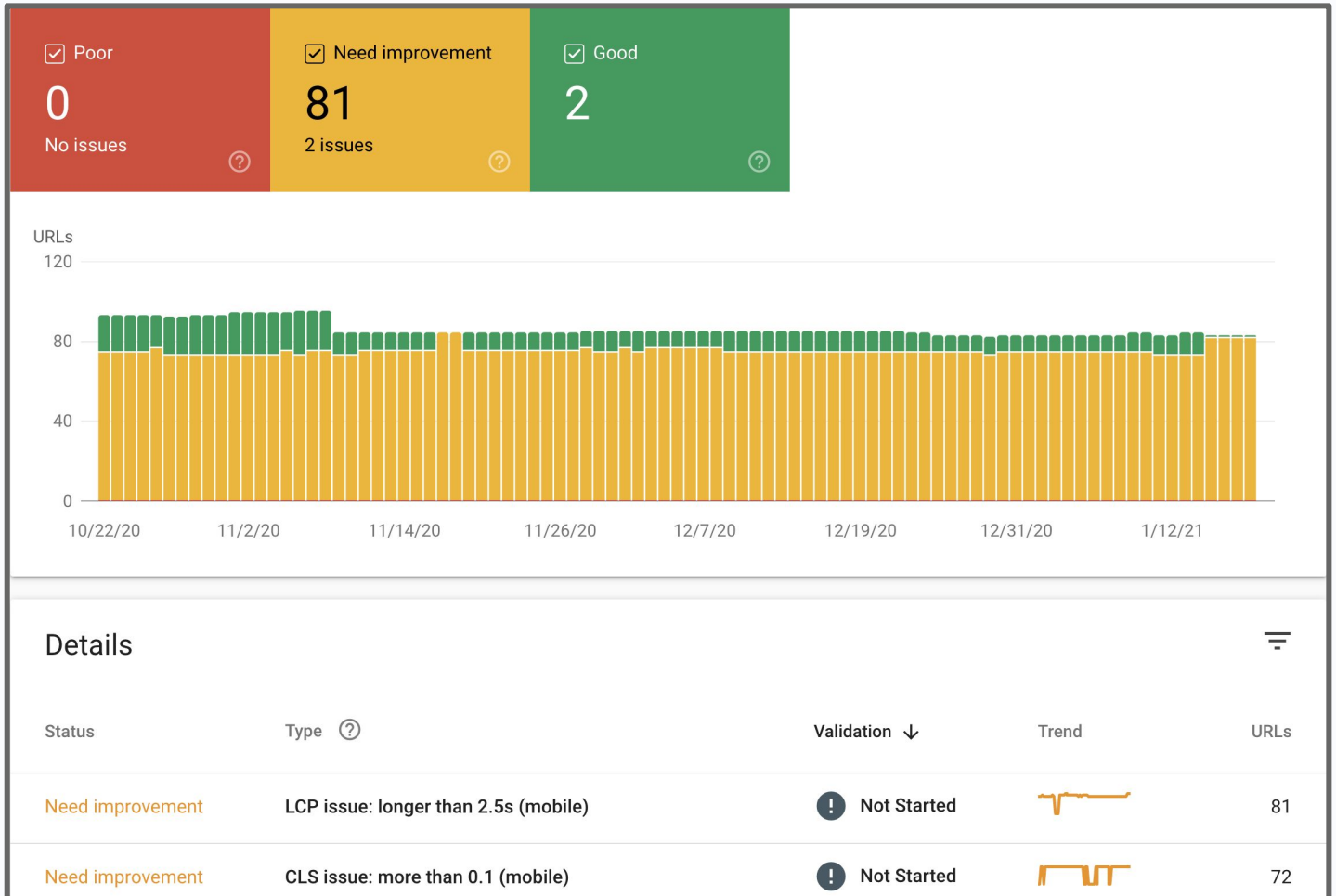
Load

Lazy Loading

The new way: Web Vitals

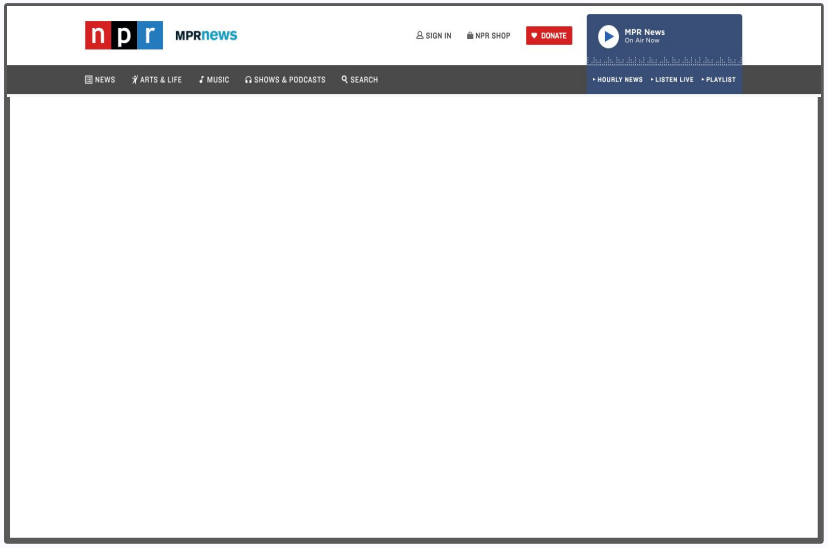


The new way: Web Vitals



Web Vitals

First Contentful Paint (FCP)



Web Vitals

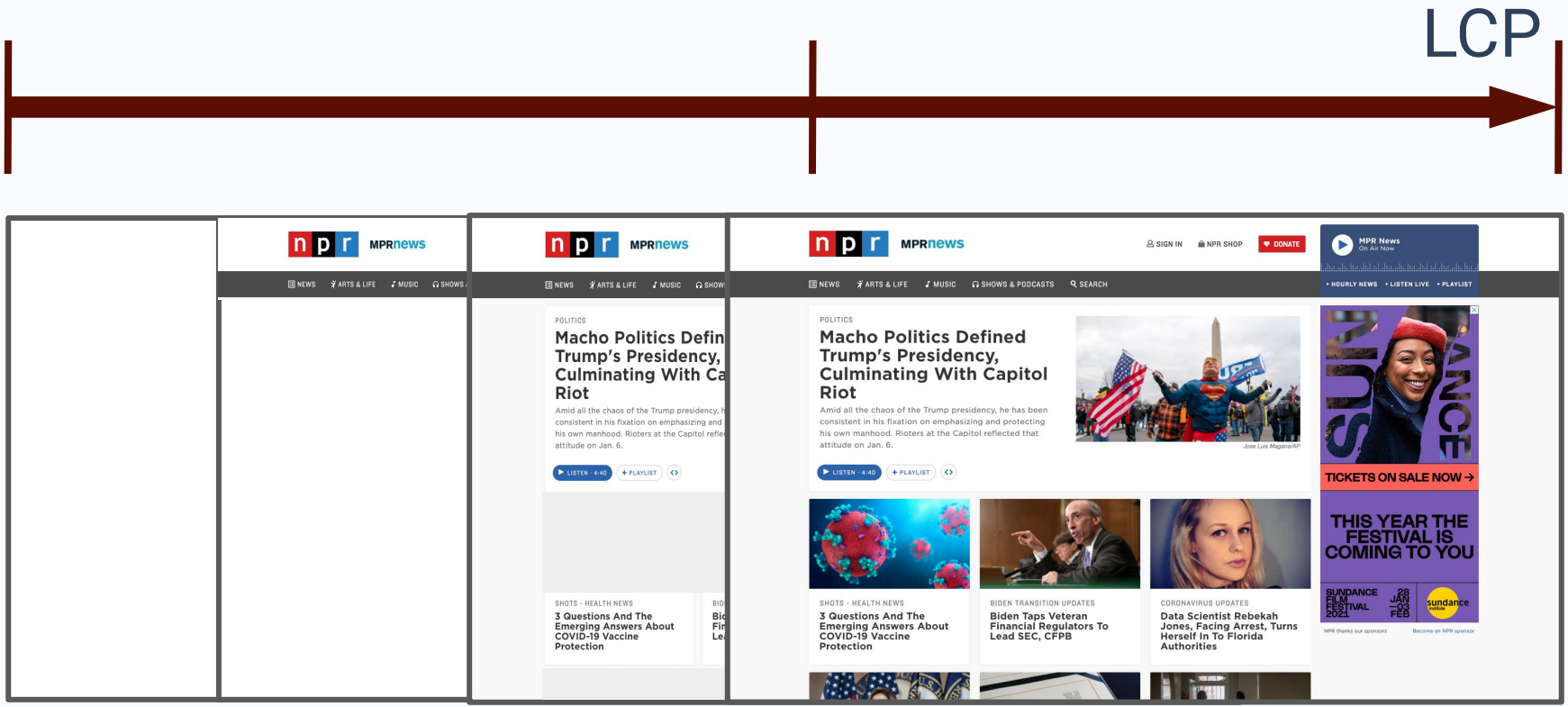
First Contentful Paint (FCP)

The time until the user sees an indication that the page is loading.

*Respond Quick

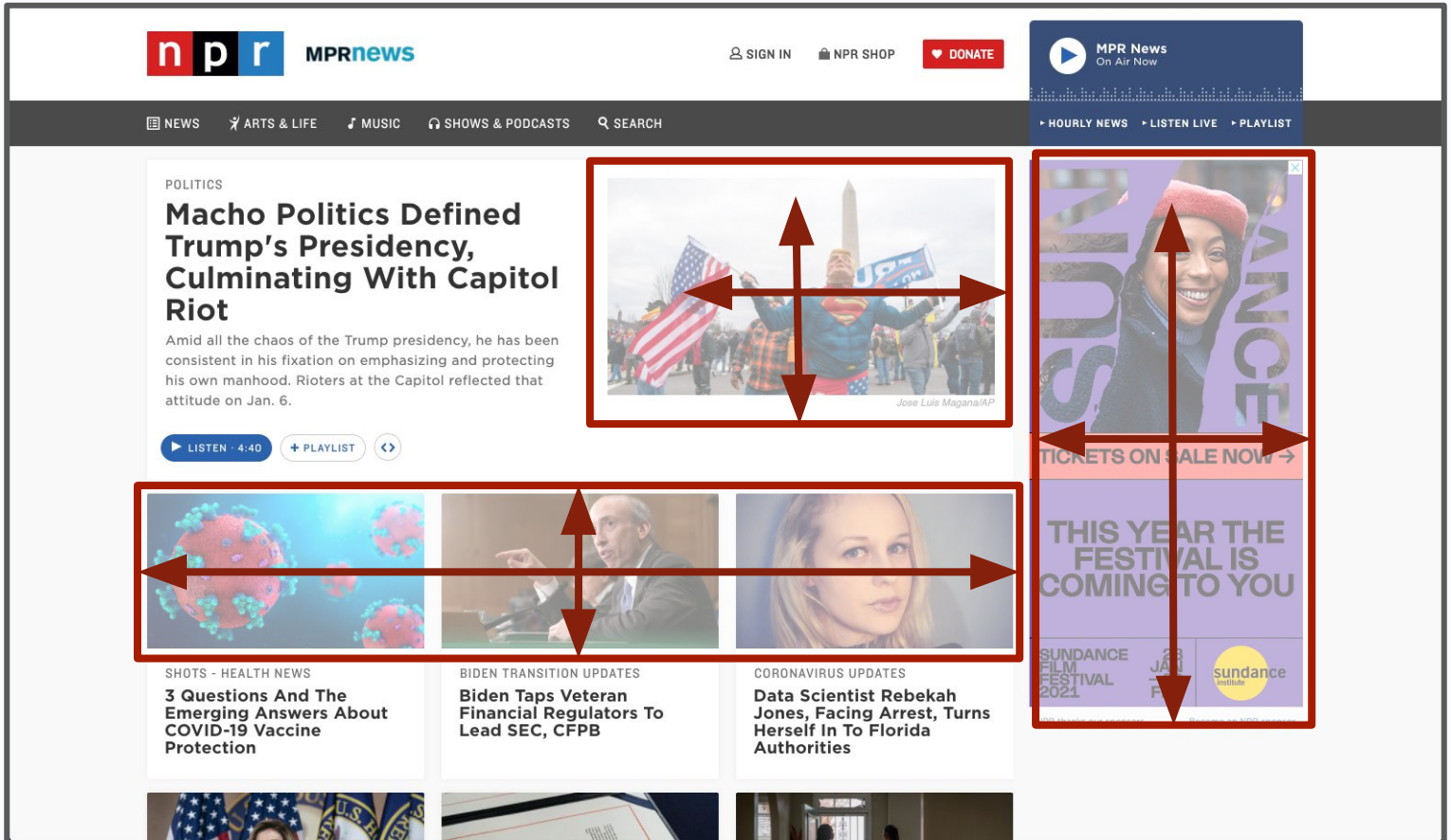
Web Vitals

Largest Contentful Paint (LCP)



Web Vitals

Largest Contentful Paint (LCP)

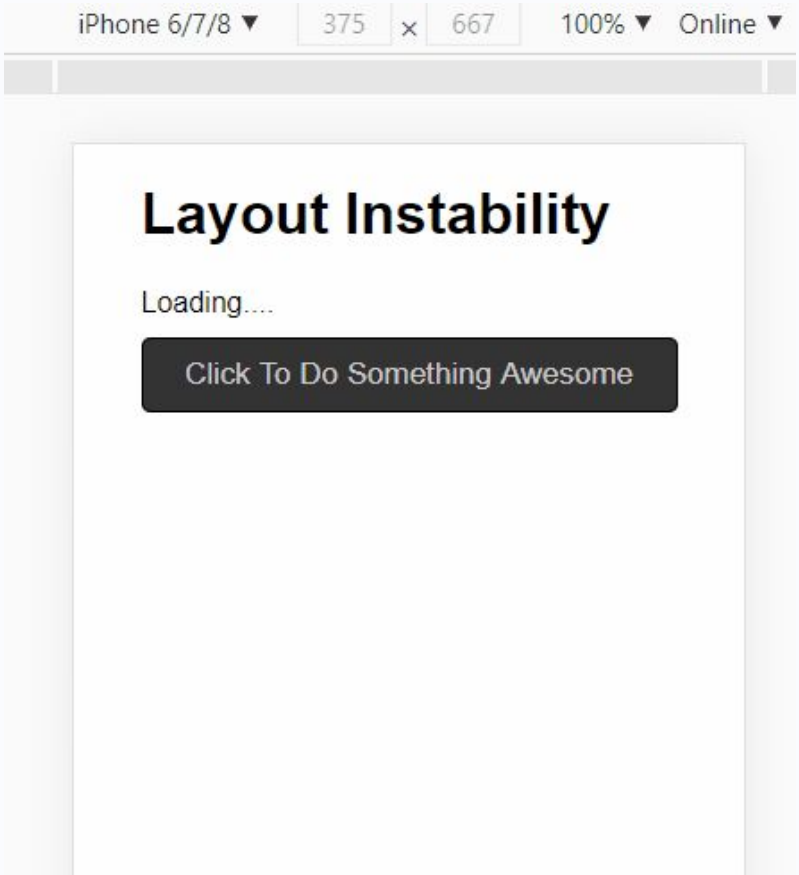


Web Vitals
Largest Contentful Paint (LCP)

The time until the user sees most of the page and believes it is (almost) ready.

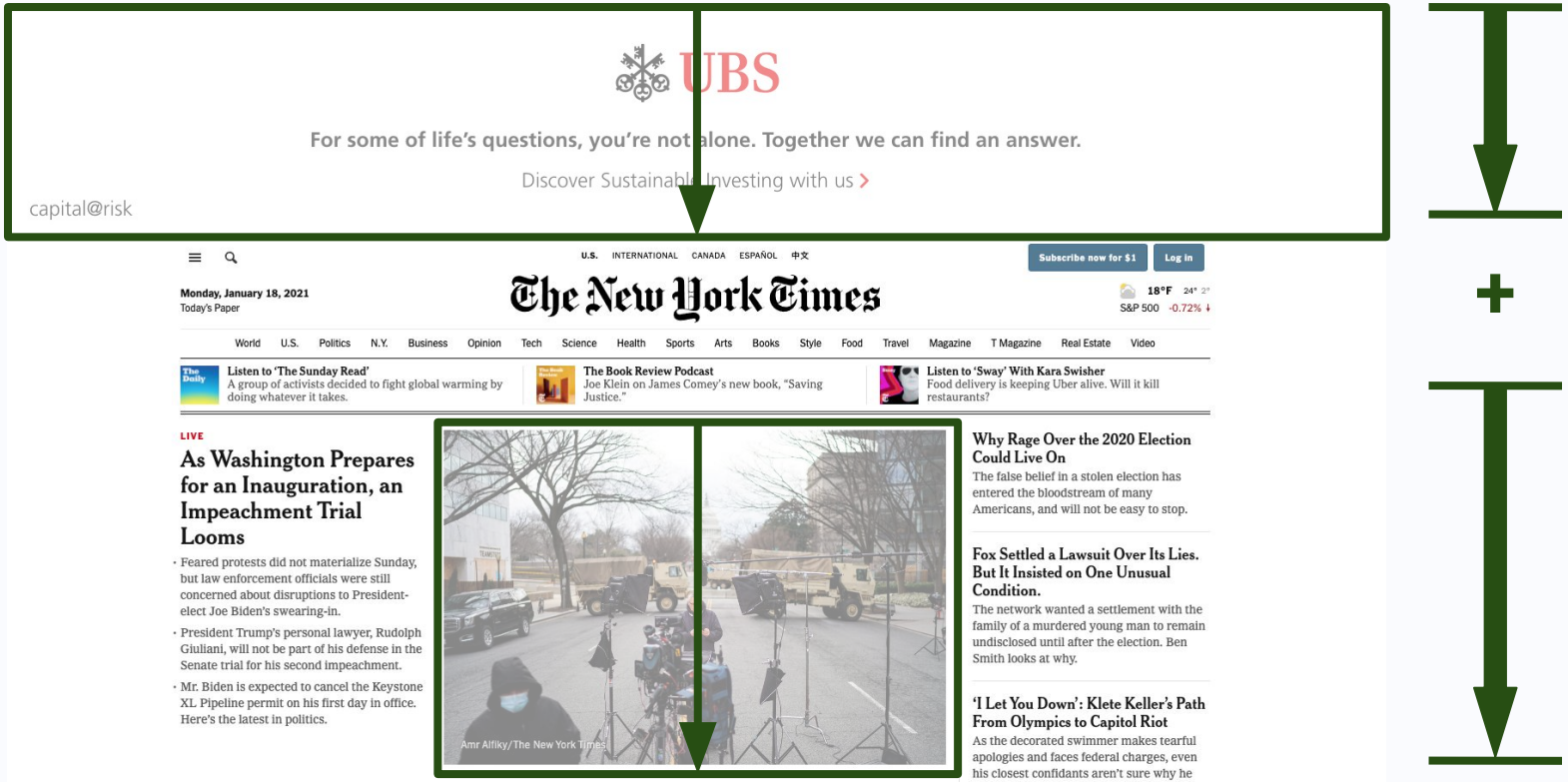
*Get to the point

Web Vitals
Cumulative Layout Shift (CLS)



Web Vitals

Cumulative Layout Shift (CLS)



+

CLS

Web Vitals

Cumulative Layout Shift (CLS)

The movement distance and impact of page elements during the ***entire lifetime*** of the document the user sees.

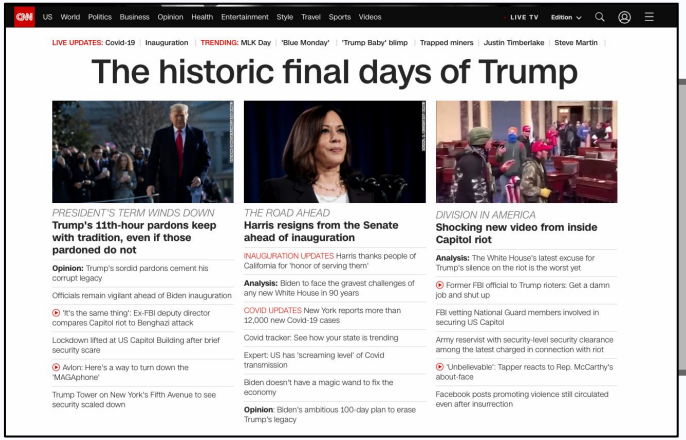
*Don't move stuff

Web Vitals
Cumulative Layout Shift (CLS)

How might this impact
Client-Side Rendering?

Web Vitals

First Input Delay (FID)



Browser Background and async work

Web Vitals
First Input Delay (FID)

The browser time delay between the user's first click and execution of application code.

*Don't Load too Much

Web Vitals

First Contentful Paint (FCP)	Respond Quick
Largest Contentful Paint (LCP)	Get to the point
Cumulative Layout Shift (CLS)	Don't move stuff
First Input Delay (FID)	Don't load too much

Web Vitals

(Loading)

LCP

Largest Contentful Paint

(Interactivity)

FID

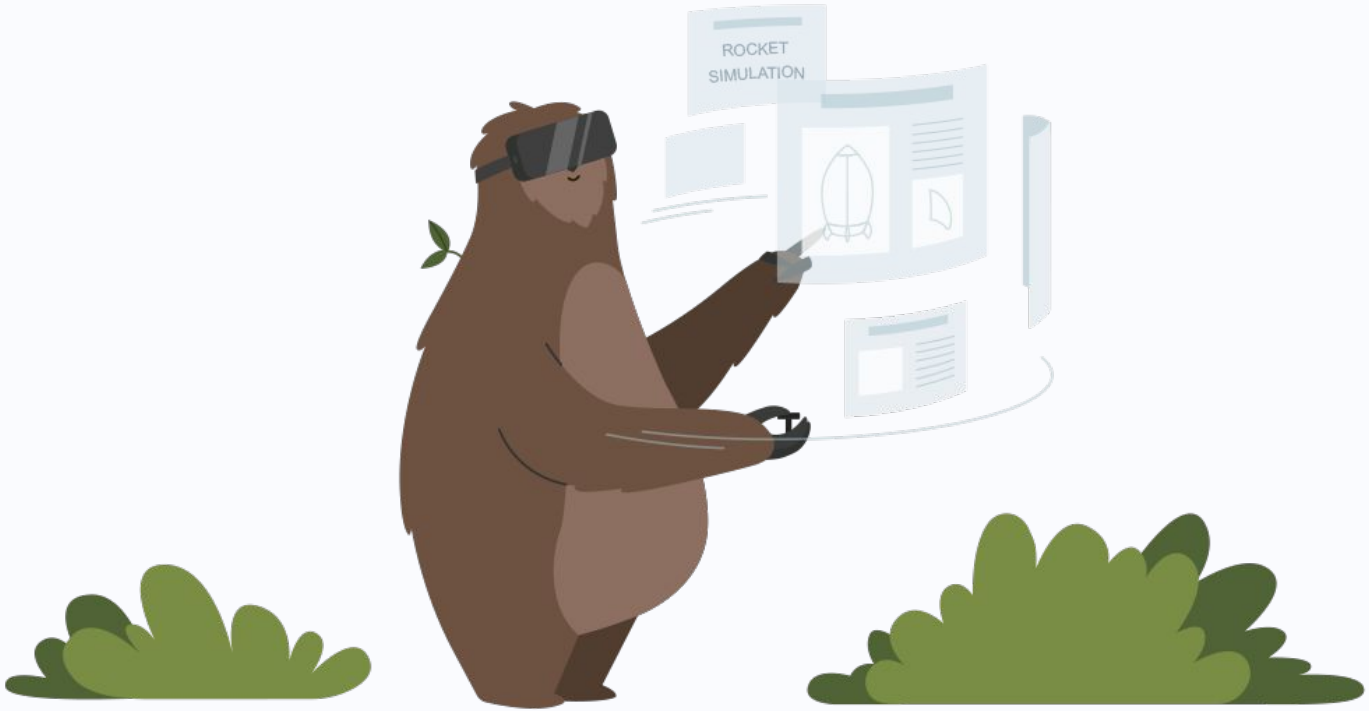
First Input Delay

(Visual Stability)

CLS

Cumulative Layout Shift

Demonstration:
Chrome Lighthouse



Chrome Lighthouse
Quirks and Gotchas

- Relative to ***your*** machine, network
- Chrome window size
- Chrome application priority

Mastering Chrome Developer Tools v2

Jon Kuperman
Adobe

3 hours, 35 minutes CC

Go beyond console.log to master all the built-in tools available in Google's Chrome Developer Tools to edit, debug, and profile your web applications! You'll learn to step through your code with the debugger, audit web page performance, debug Node.js, and remove "page jank" when a site isn't keeping up.

This course and others like it are available as part of our Frontend Masters video subscription.

Published: September 12, 2018

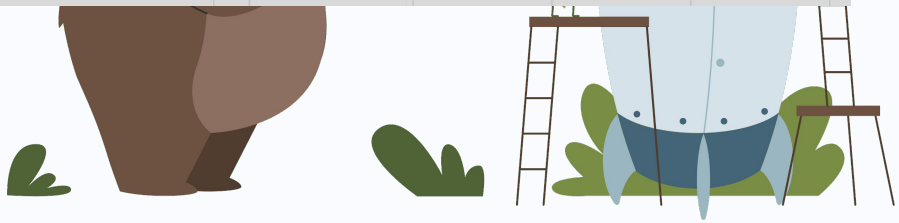
https://frontendmasters.com/courses/chrome-dev-tools-v2/

Exercise 2: Performance In The Lab

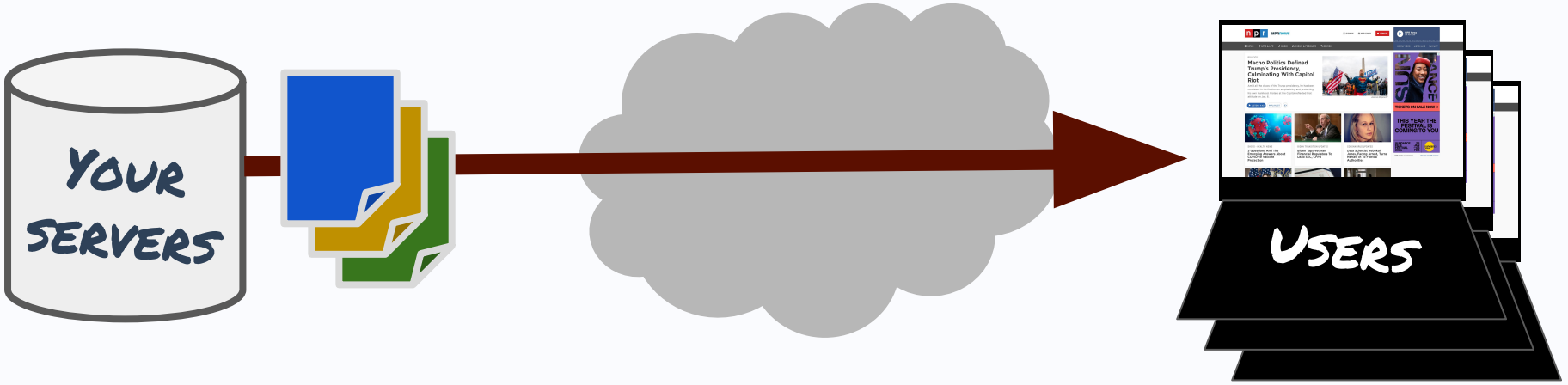
Run Chrome Lighthouse reports for the sites in your **Performance Comparison Worksheet** and record your metrics in the “Exercise 2” sheet.

Exercise 2: Performance In The Lab

Website	First Contentful Paint (FCP)	Largest Contentful Paint (LCP)	Cumulative Layout Shift (CLS)	Perceived Speed Rank	FCP Rank	LCP Rank	CLS Rank
https://www.npr.org/	0.9	2	0.001	1	2	1	1
Publicly Funded							
https://www.cnn.com/	2	5.5	0.159	4	4	3	3
Advertising Funded							
https://www.nytimes.com/	0.9	2.3	0.01	2	2	2	2
Subscription Funded							
https://www.wsj.com/	0.5	14.8	0.631	3	1	4	4
Subscription Funded							

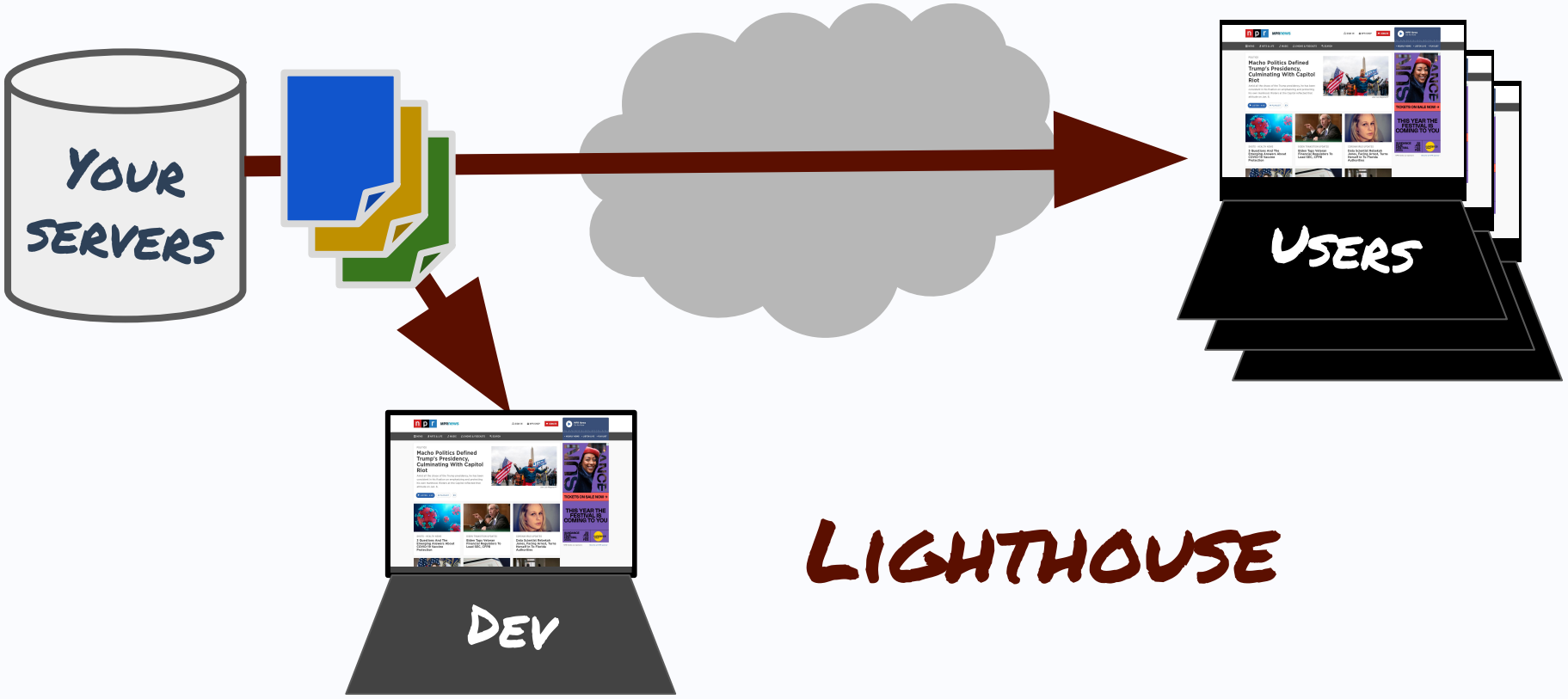


Where do we measure from?



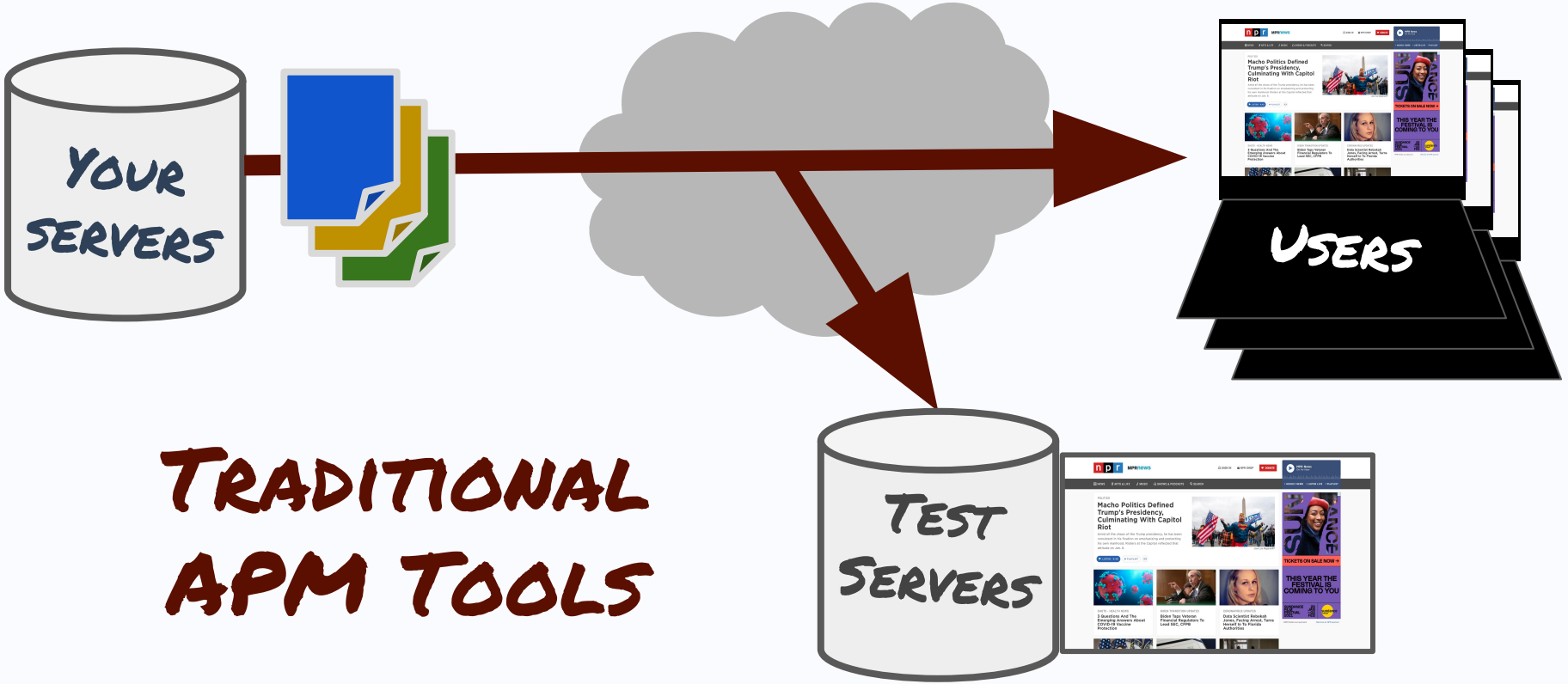
Where do we measure from?

Lab Data



Where do we measure from?

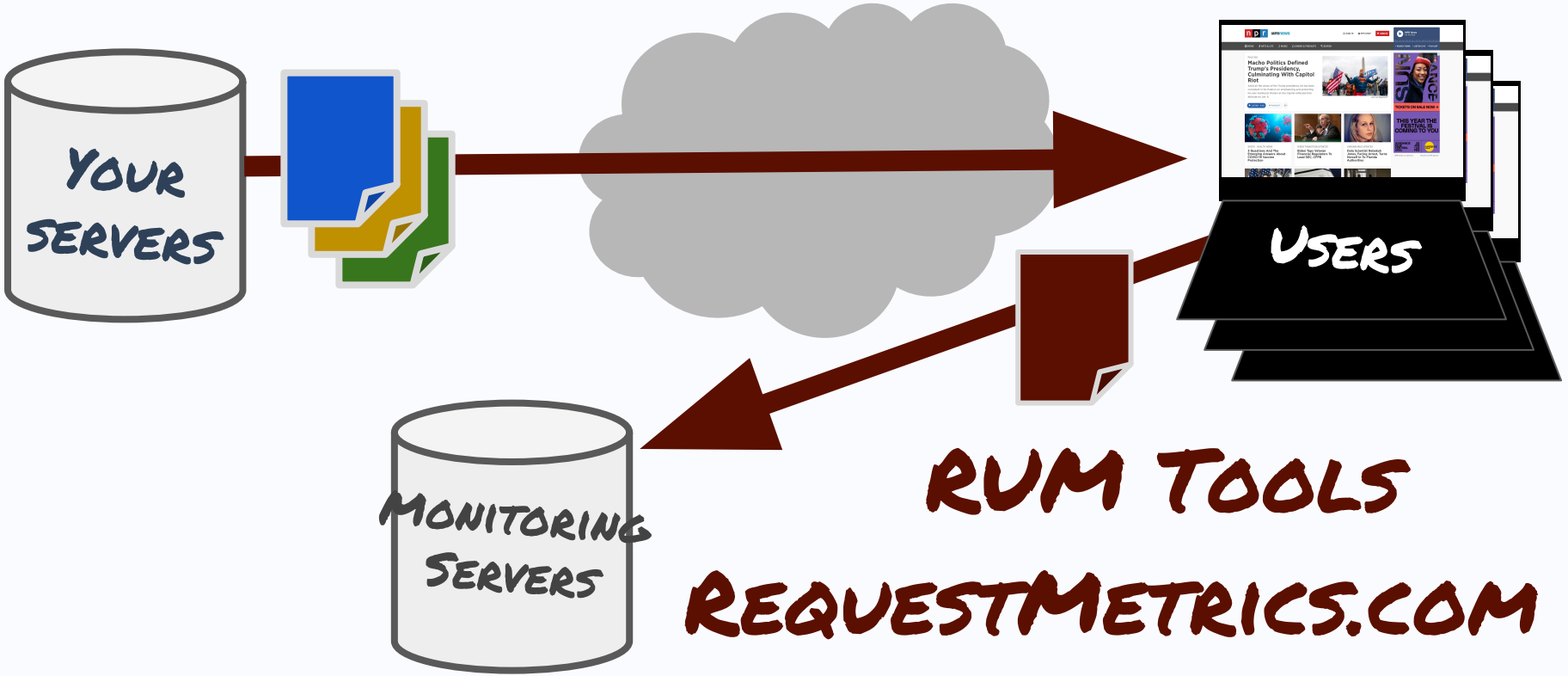
Synthetic Data



Traditional APM Tools

Where do we measure from?

Field Data

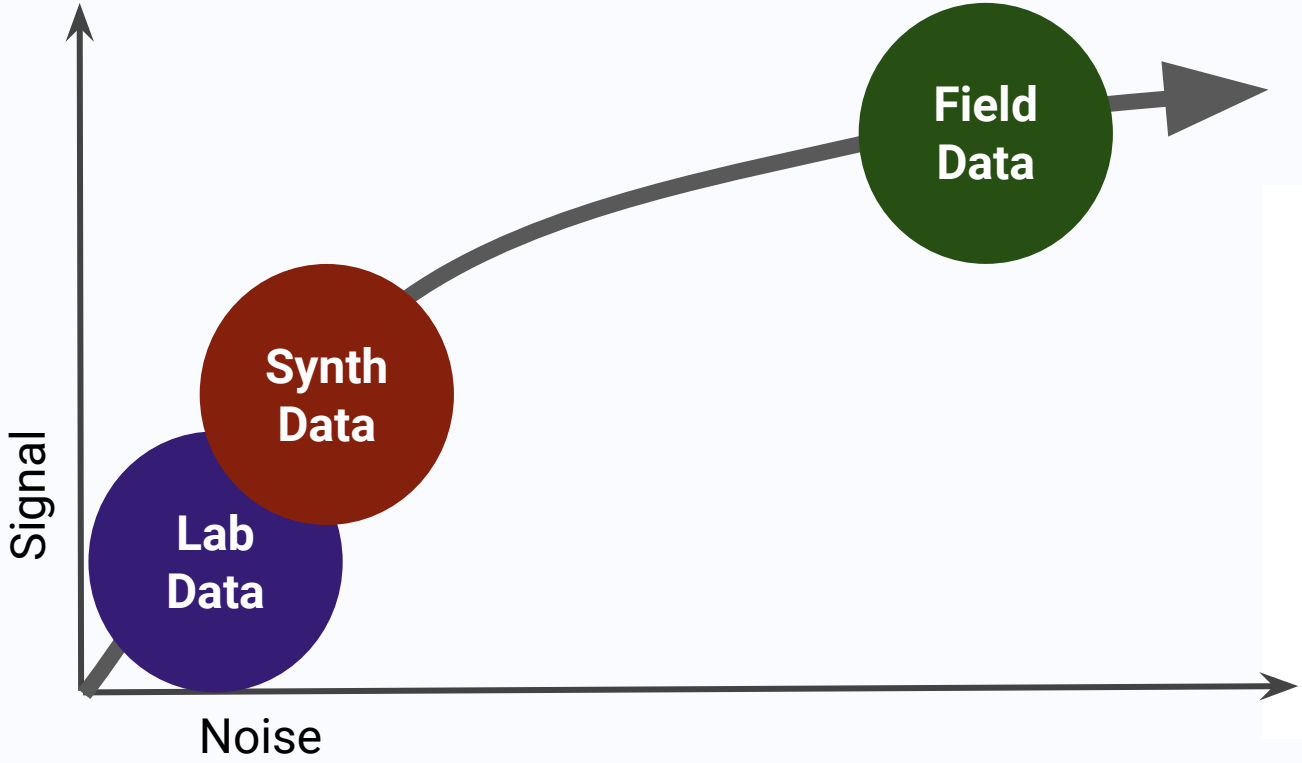


RUM Tools

RequestMetrics.com

Where do we measure from?

Signal to Noise

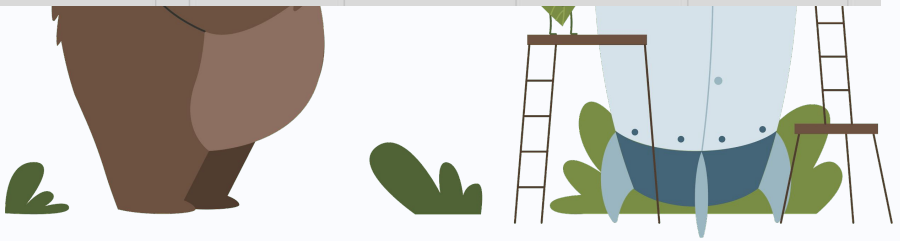


Exercise 3: Performance In The Field

Check the CrUX data for the sites in your **Performance Comparison Worksheet** and record your metrics in the “Exercise 3” sheet.

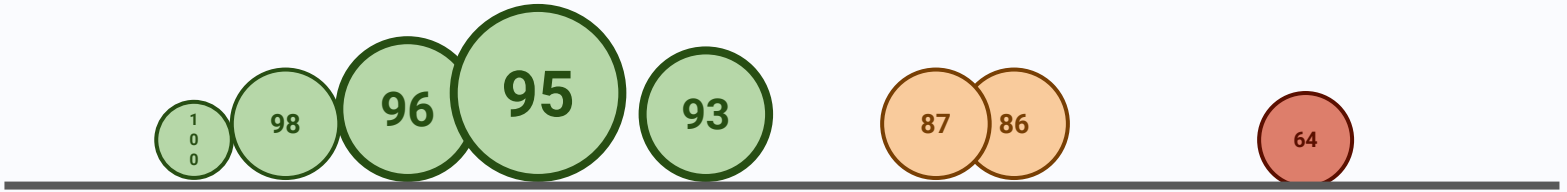
Exercise 3: Performance In The Field

Website	p75 First Contentful Paint	p75 Largest Contentful Paint	p75 Cumulative Layout Shift	Perceived Speed Rank	FCP Rank and Change	LCP Rank and Change	CLS Rank and Change
https://www.npr.org/	1.3	3.5	0.05	1	3	3	1
Publicly Funded					-30.77%	-42.86%	-98.00%
https://www.cnn.com/	2.4	5	0.63	4	4	4	3
Advertising Funded					-16.67%	10.00%	-74.76%
https://www.nytimes.com/	1.1	2.2	0.13	2	1	1	2
Subscription Funded					-18.18%	4.55%	-92.31%
https://www.wsj.com/	1.2	3.4	0.66	3	2	2	4
Subscription Funded					-58.33%	335.29%	-4.39%



Interpreting Field Data

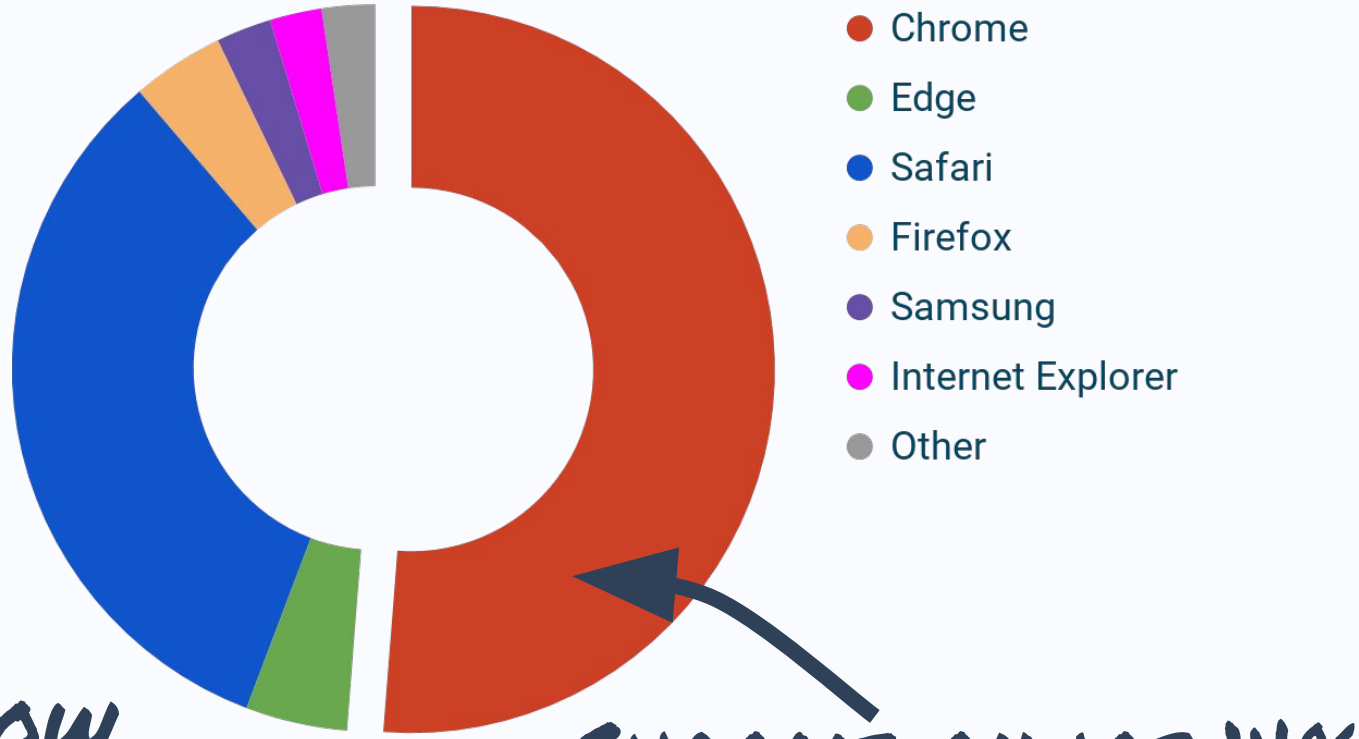
Lab Data



Field Data

Interpreting Field Data

Understanding the sample

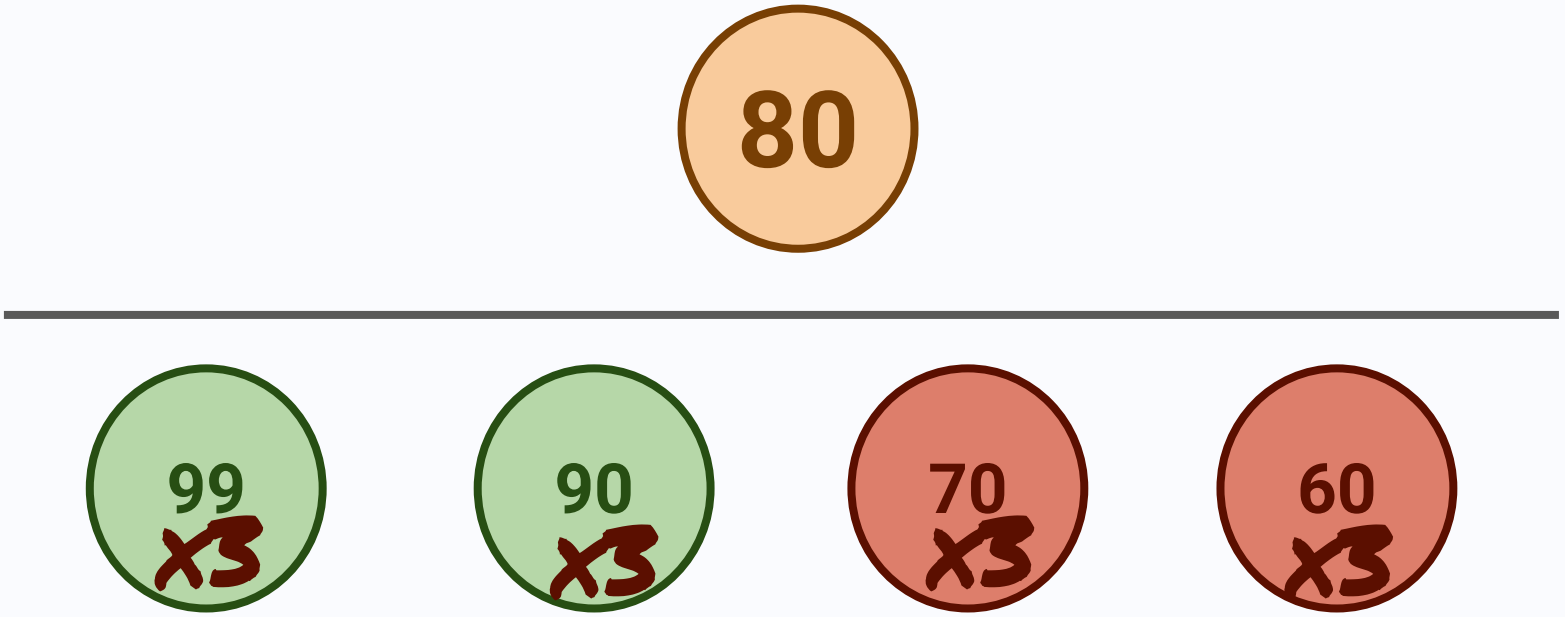


Edge is Blink now

Chrome on iOS 14%

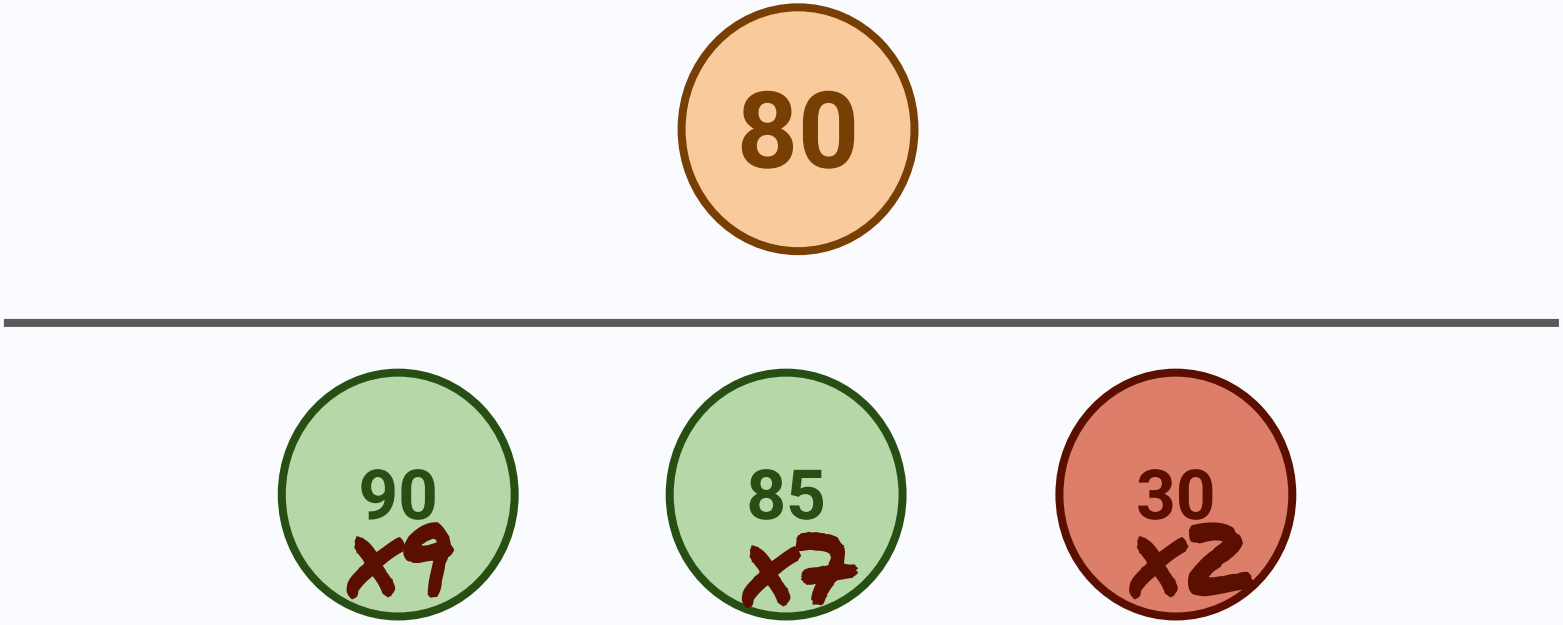
Interpreting Field Data

Averages

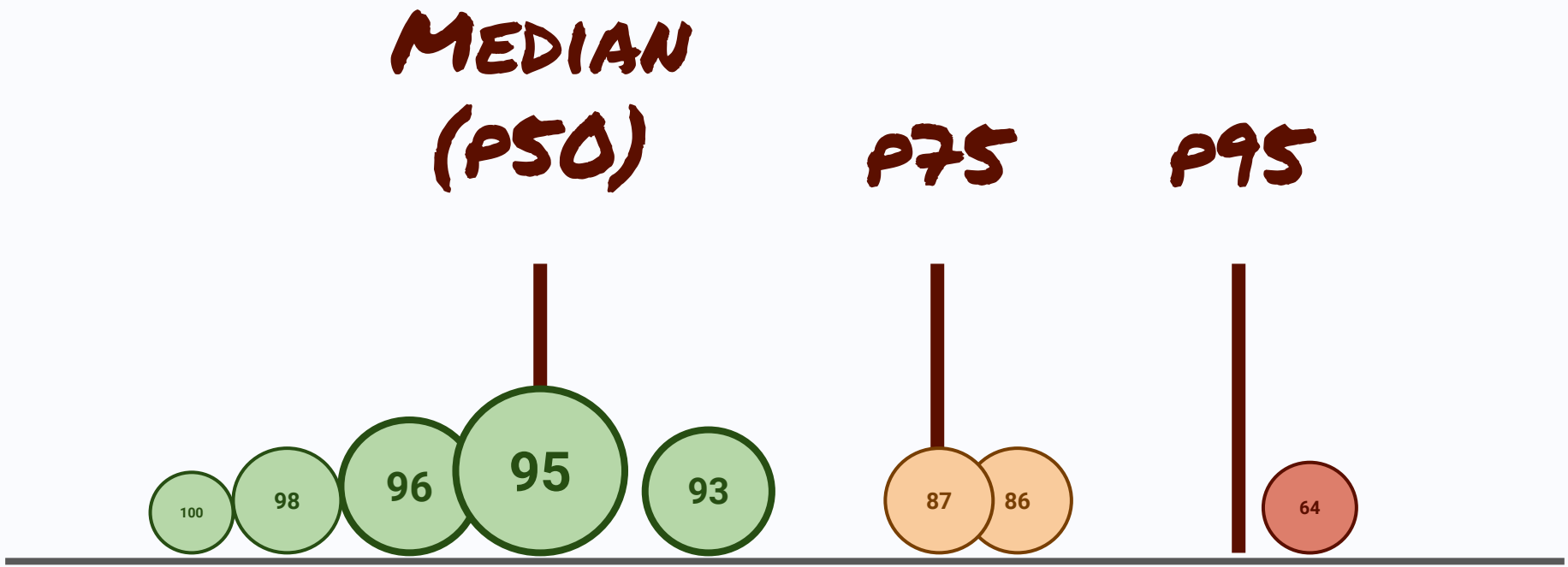


Interpreting Field Data

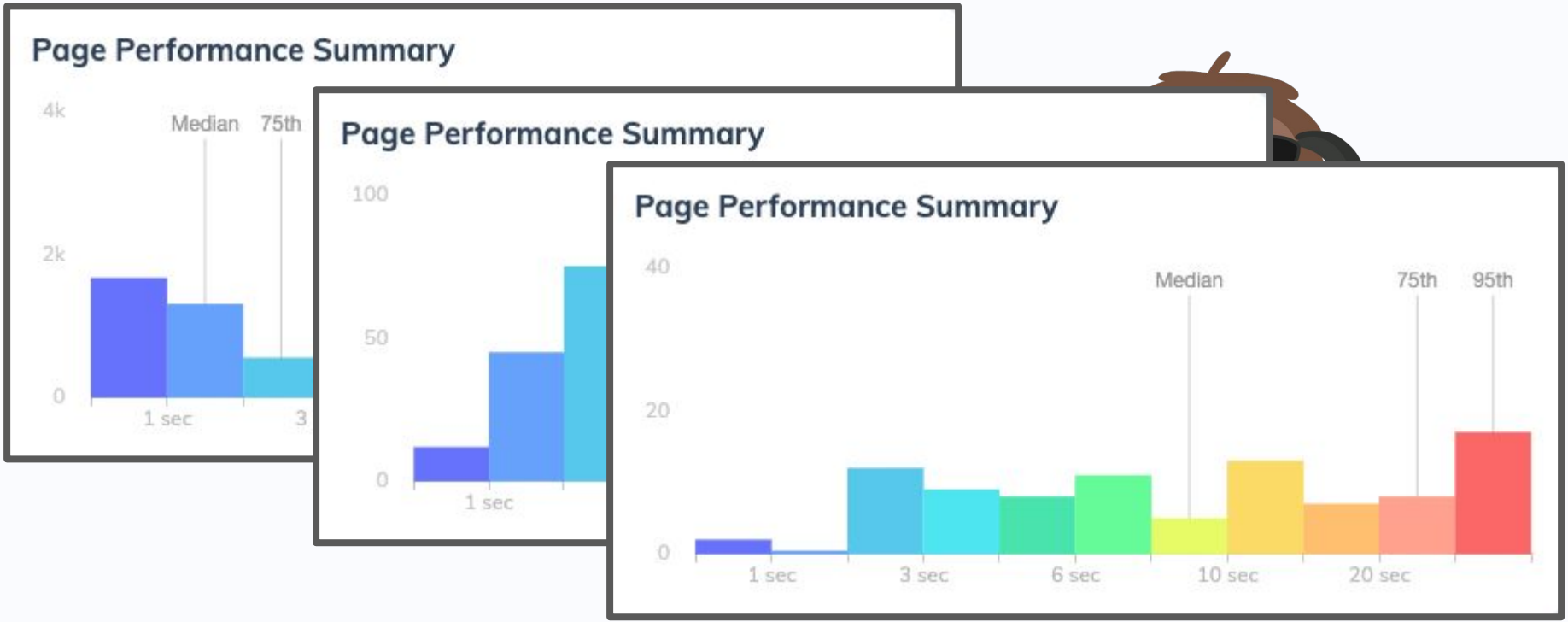
Averages



Interpreting Field Data
Median and Percentiles



Interpreting Field Data
Median and Percentiles



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