INPcrease user happiness

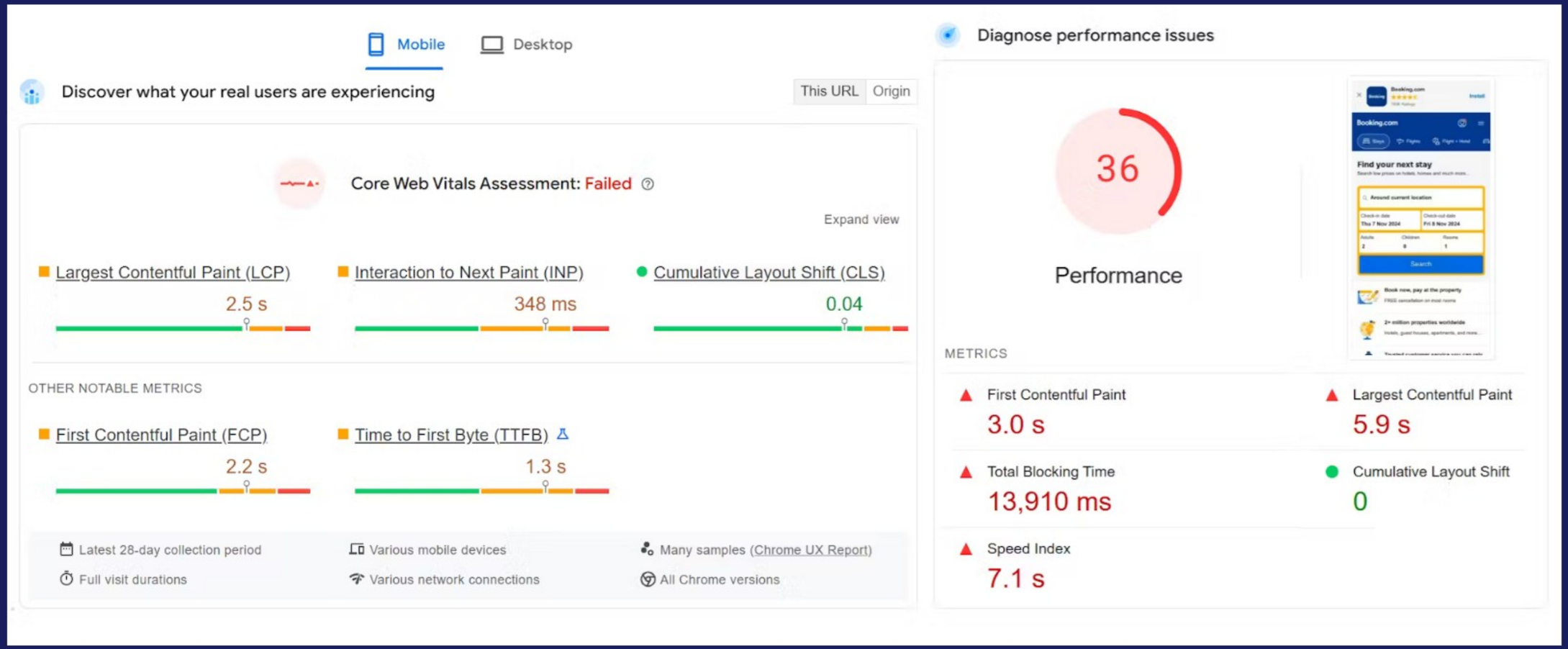
with actionable use cases from the field!



Join us (WiFi pass: akamai2024)



134 2 25



Core Web Vitals (left) versus Lighthouse (right)

Welcome to field versus lab data

Rank these experiences by annoyance



21 1 4 183

Who are we?

- Erwin Hofman
- co-founder and CTO RUMvision
- Web performance consultant
- Google Developer Expert
- Trainer & public speaker



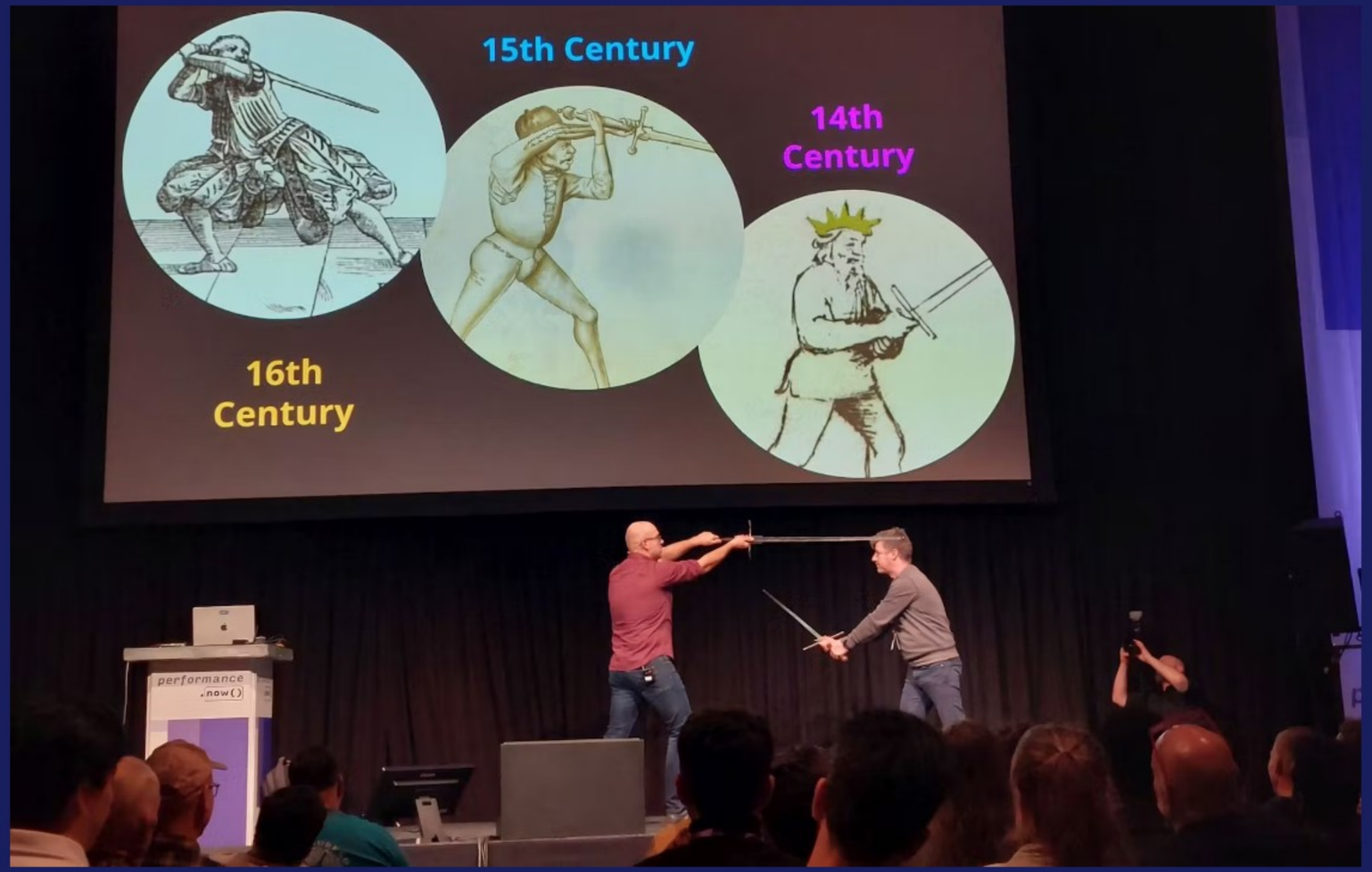
19 1 1

Who are we?

- Karlijn Löwik
- CEO & co-founder RUMvision
- Mage-OS NL + Lady Magento board member
- W3C RUM community group co-chair
- CWV + RUM advocate



20


15th Century
14th Century
16th Century
performance
.now()

Who is RUMvision?

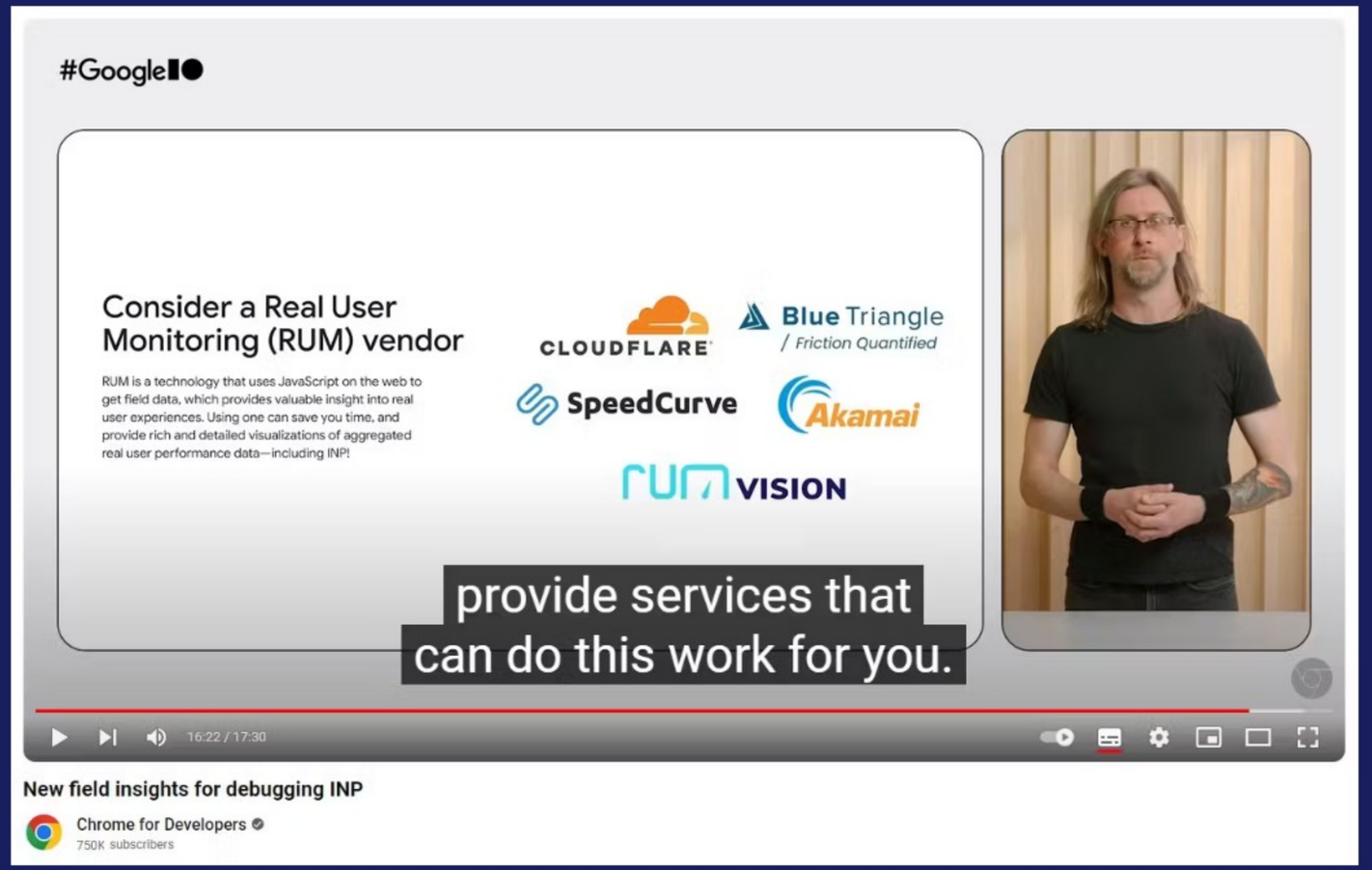
- Real User Monitoring (RUM)
- Built on top of web-vitals.js
- Based here in The Netherlands
- INP breakdown + LoAF since 2023
- Goal: getting real user insights to all stakeholders





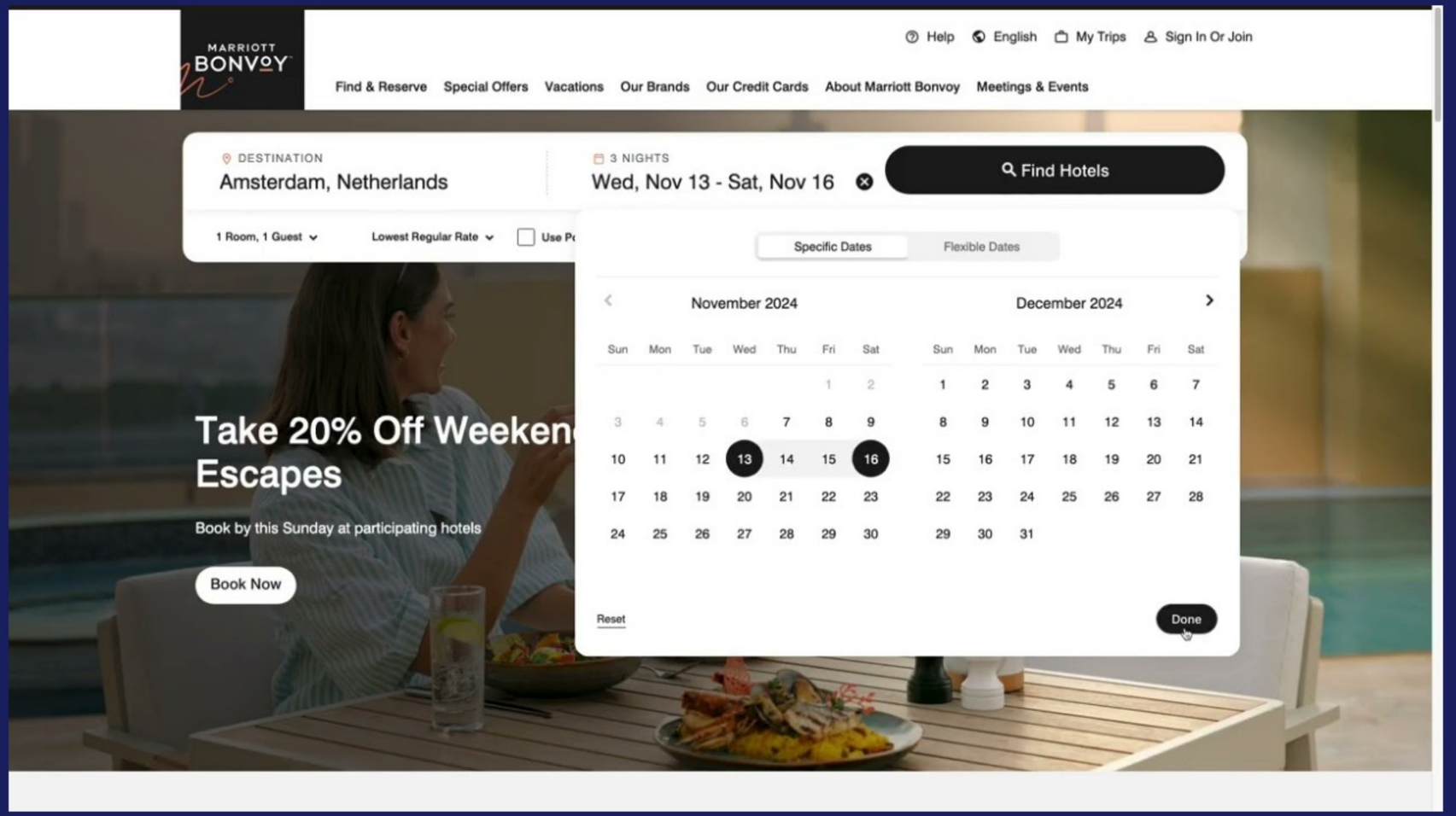


47 25 11



io.google/2024/explore/ba446093-0036-410b-ba1e-f9016ec21899/

You can't improve what you can't measure


MARRIOTT BONVOY
Help
English
My Trips
Sign In Or Join
Find & Reserve
Special Offers
Vacations
Our Brands
Our Credit Cards
About Marriott Bonvoy
Meetings & Events
DESTINATION
Amsterdam, Netherlands
3 NIGHTS
Wed, Nov 13 - Sat, Nov 16
Find Hotels
1 Room, 1 Guest
Lowest Regular Rate
Specific Dates
Flexible Dates
November 2024
December 2024
Take 20% Off Weeken
Escapes
Book by this Sunday at participating hotels
Book Now
Reset
Done

INP demo

web.dev/blog/inp-cwv-march-12

FID & INP

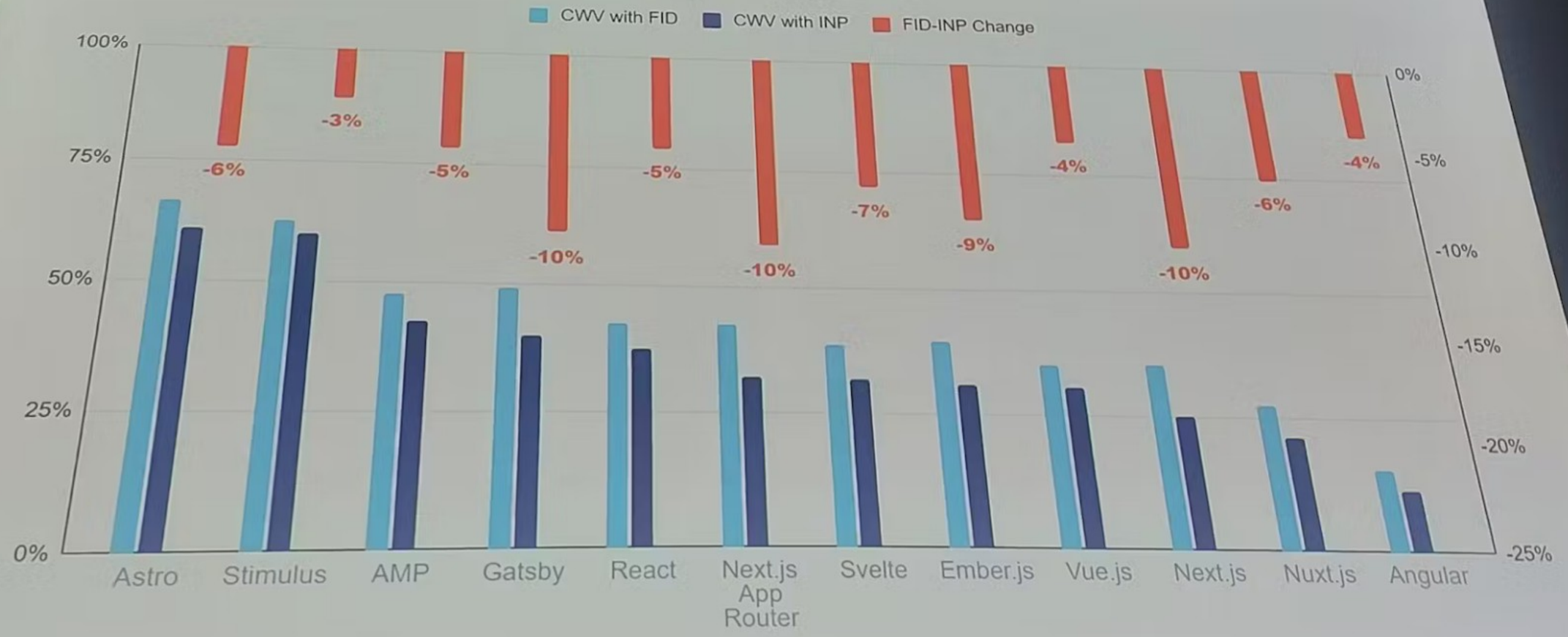
🗓️ March 12th 2024
INP replaced FID

🗓️ September 9th 2024
FID fully deprecated

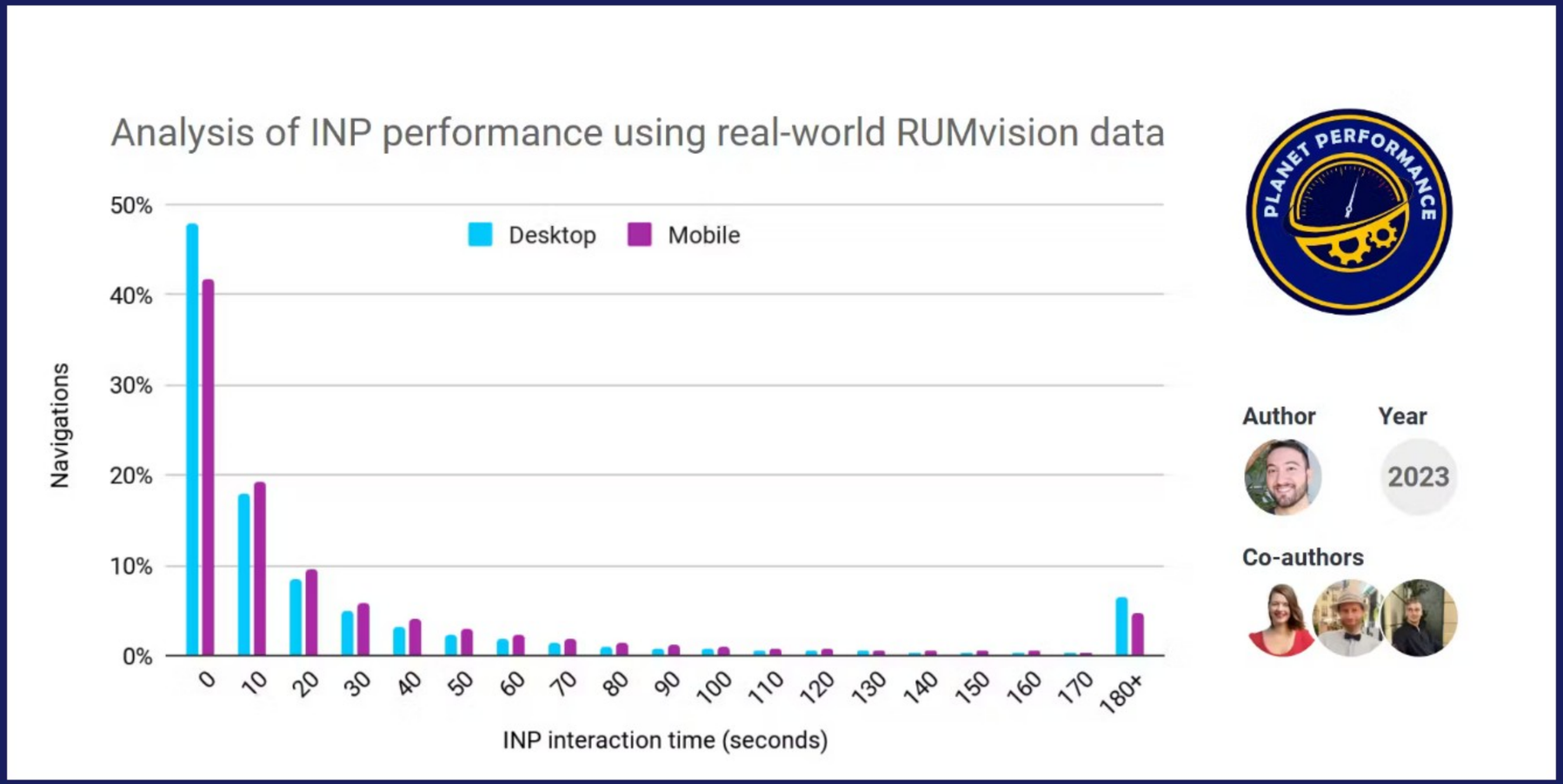


The Frontend Sadness Index

Web Almanac 2024: Performance (HTTP Archive and CrUX)







calendar.perfplanet.com/2023/inp-performance-analysis-rumvision-data/

More than 25% of INPs happens after 20 seconds

LOAD STATE	P75	TREND	EVENTS	DISTRIBUTION
all	⚠ 207 ms	→ baseline	29M	
complete	✓ 189 ms	↗ 8.7%	89% of all	
dom-content-loaded	⚠ 343 ms	↘ 65.7%	10% of all	
loading	● 718 ms	↘ 246.9%	1% of all	
dom-interactive	● 702 ms	↘ 239.1%	1% of all	

rumvision.com/help-center/filters/metric/load-state/

89% of INPs happens when JS + CSS + images are present

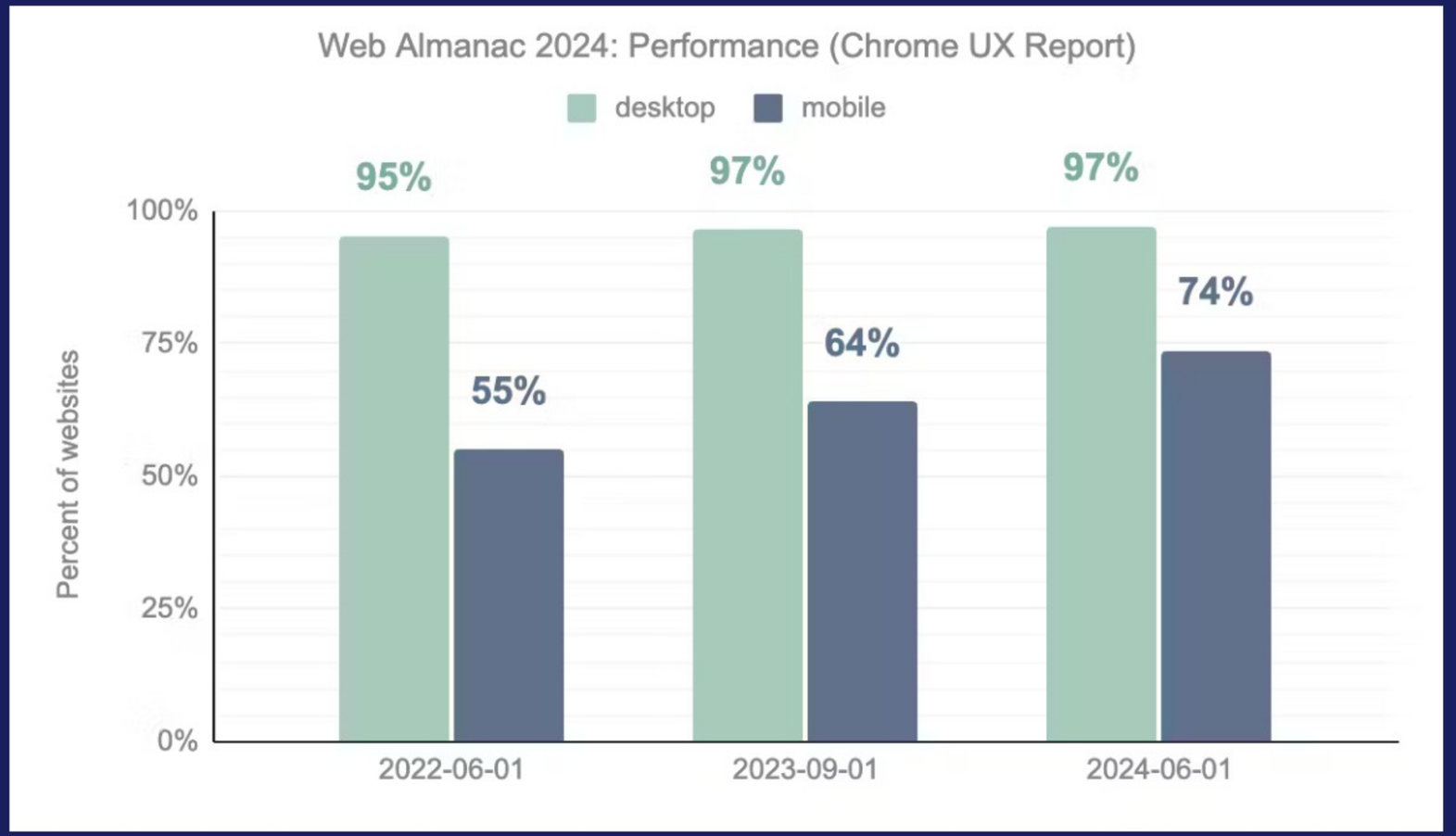
INP

Interaction to Next Paint



web.dev/articles/defining-core-web-vitals-thresholds#inp

6
1



almanac.httparchive.org/en/2024/performance#interaction-to-next-paint-inp

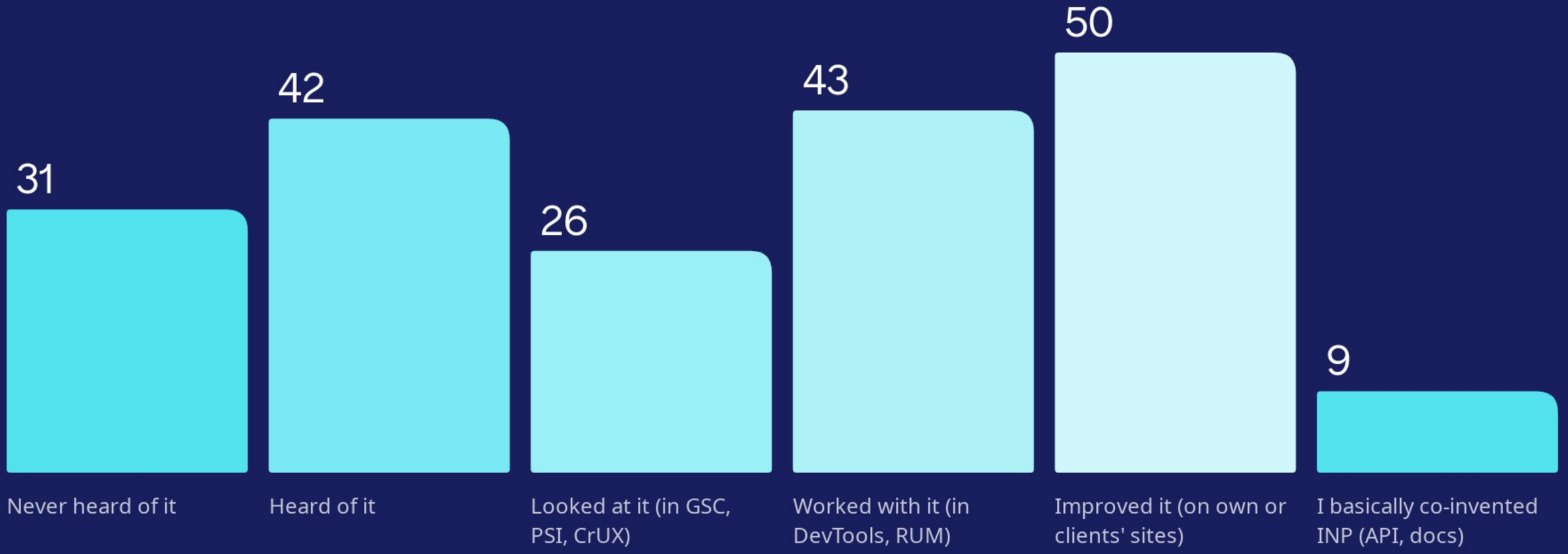
Device gap and trend over time

Who are you?



28 2 4 203

Your knowledge on INP before perf.now()

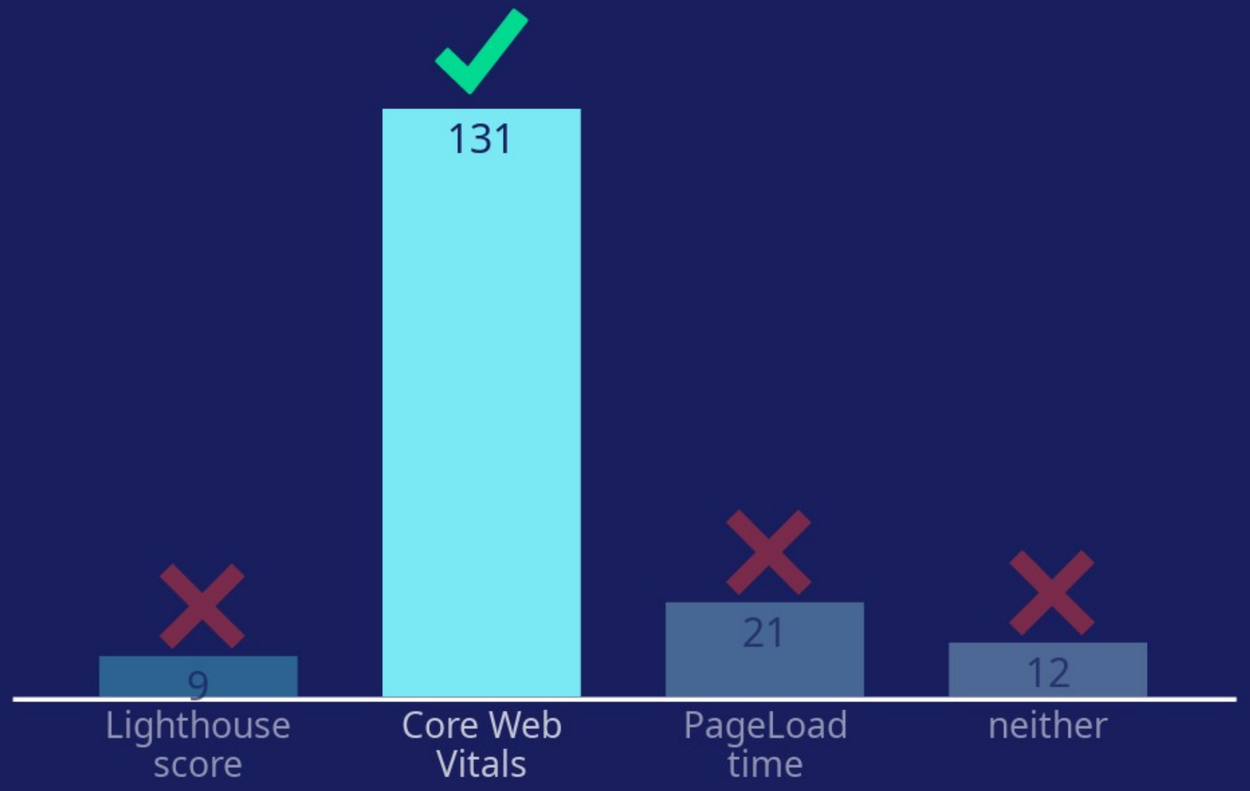


12 201

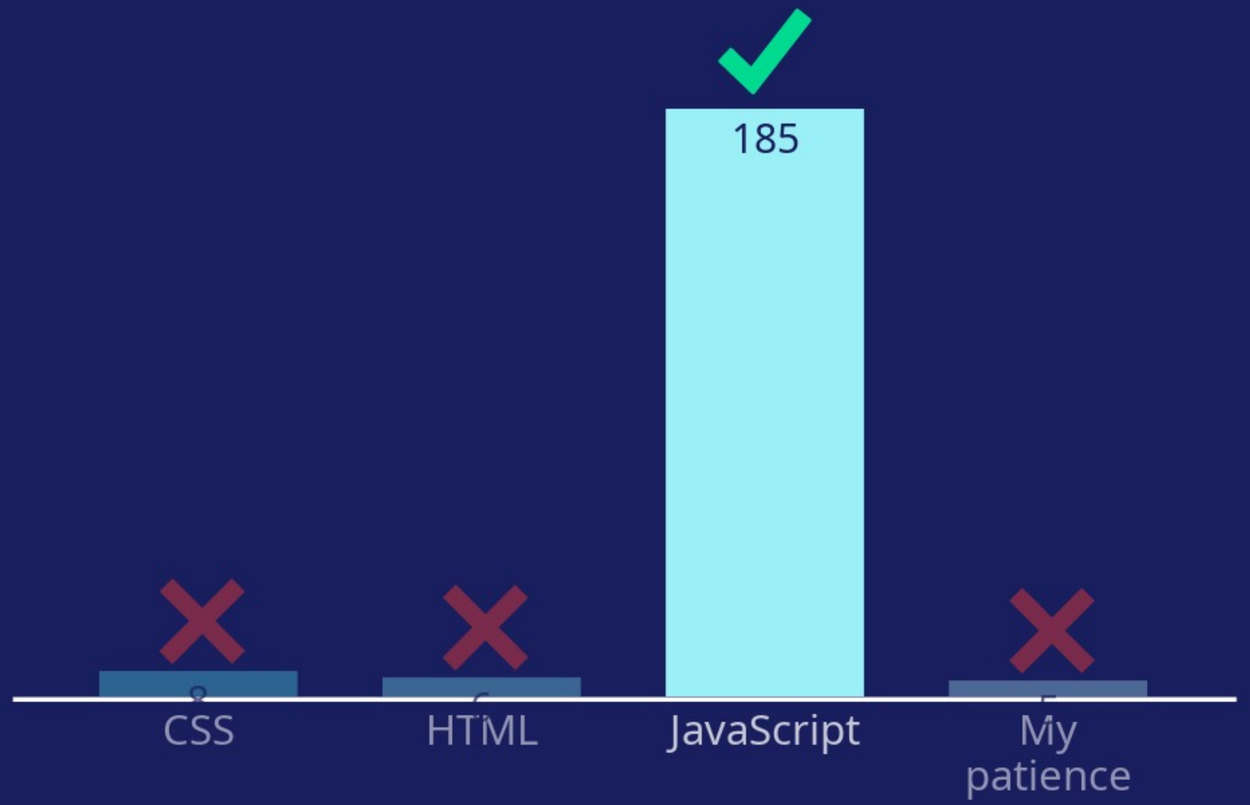
Let's gear up

- With a entry-level quiz
- Speed will give you more points
- To win a limited edition merch

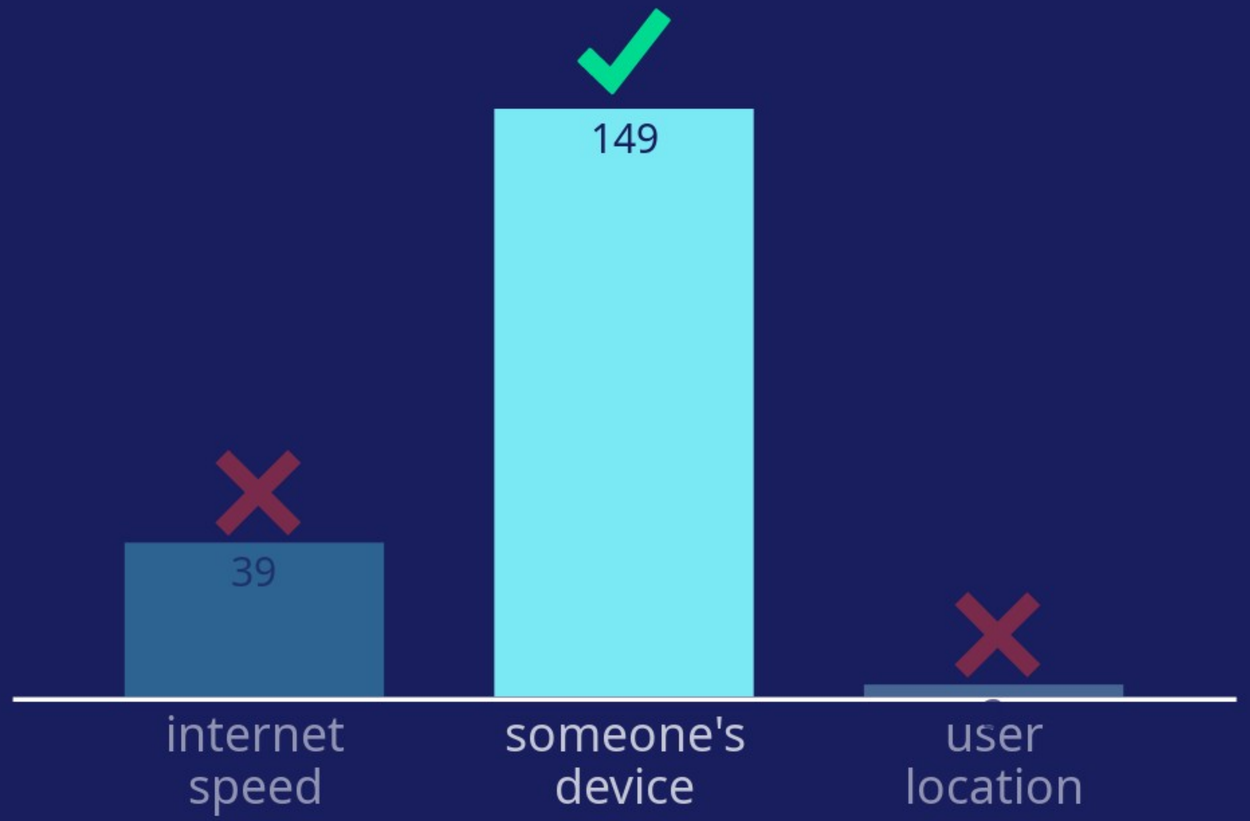
What matters for SEO?



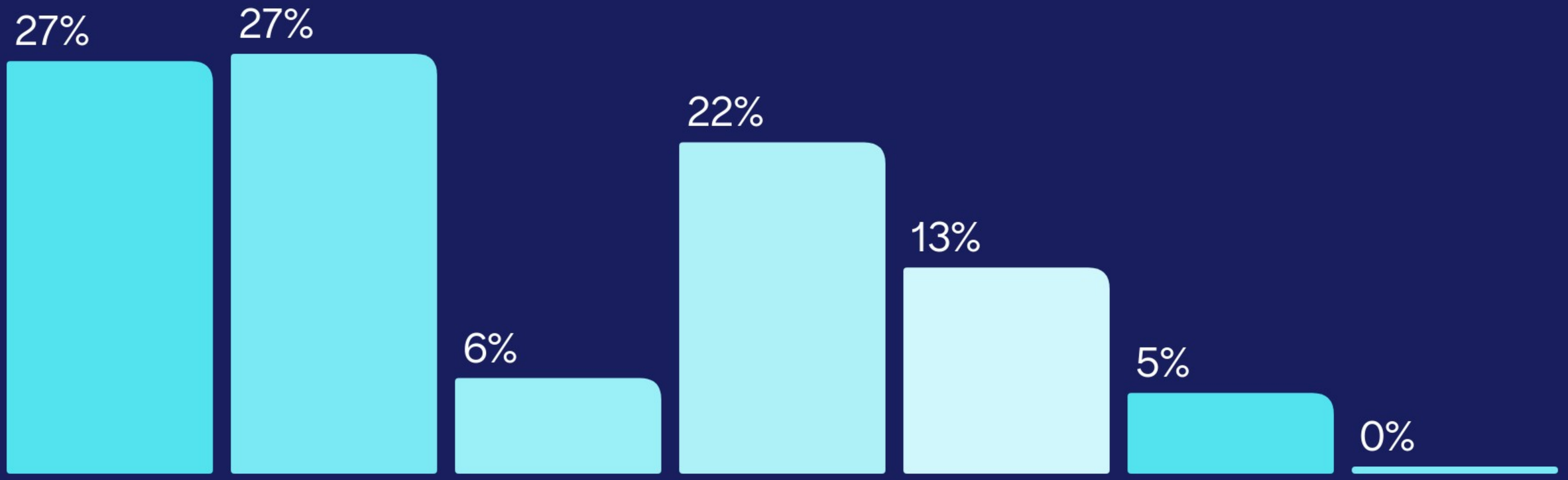
What has the biggest impact on INP?



What has the highest correlation with INP?



What kind of phone do you have?



30 1 1 204

DEVICE MEMORY	P75	TREND	EVENTS	DISTRIBUTION
all	▲ 206 ms	→ baseline	29M	
1 GB	● 712 ms	↘ 245.6%	0% of all	
2 GB	● 504 ms	↘ 144.7%	6% of all	
4 GB	▲ 243 ms	↘ 18%	43% of all	
8 GB	✓ 149 ms	↗ 27.7%	50% of all	

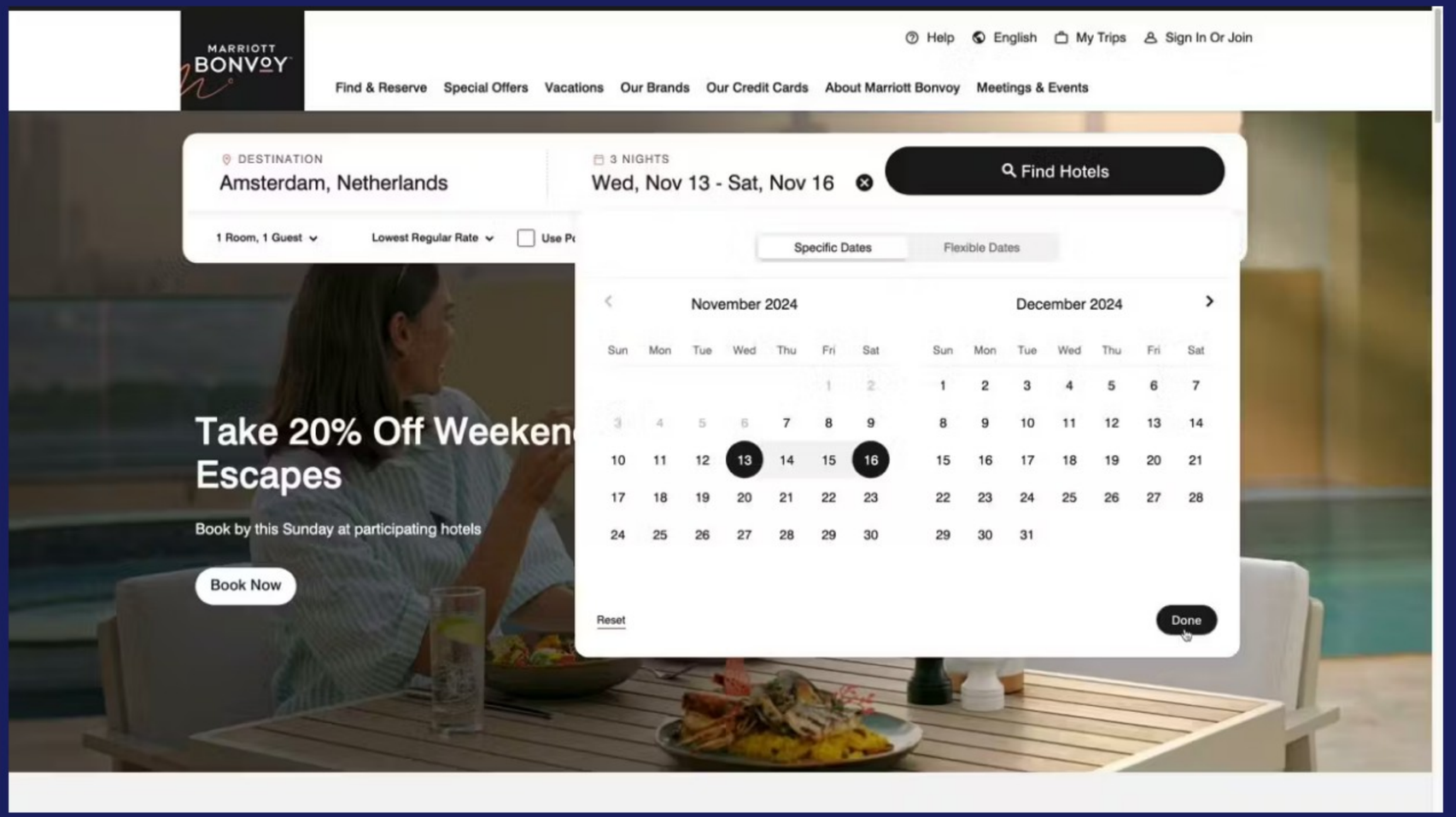
developer.mozilla.org/en-US/docs/Web/API/Device_Memory_API

mobile RUMvision INP by deviceMemory

10 1 2

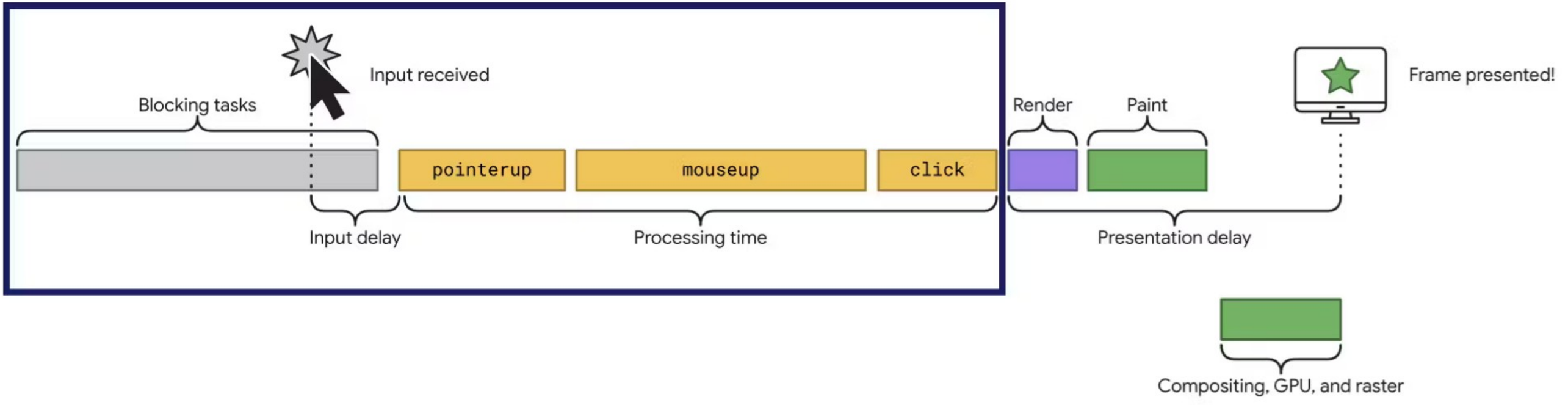
Let's get technical!

9 2



INP sub-parts

mostly JavaScript

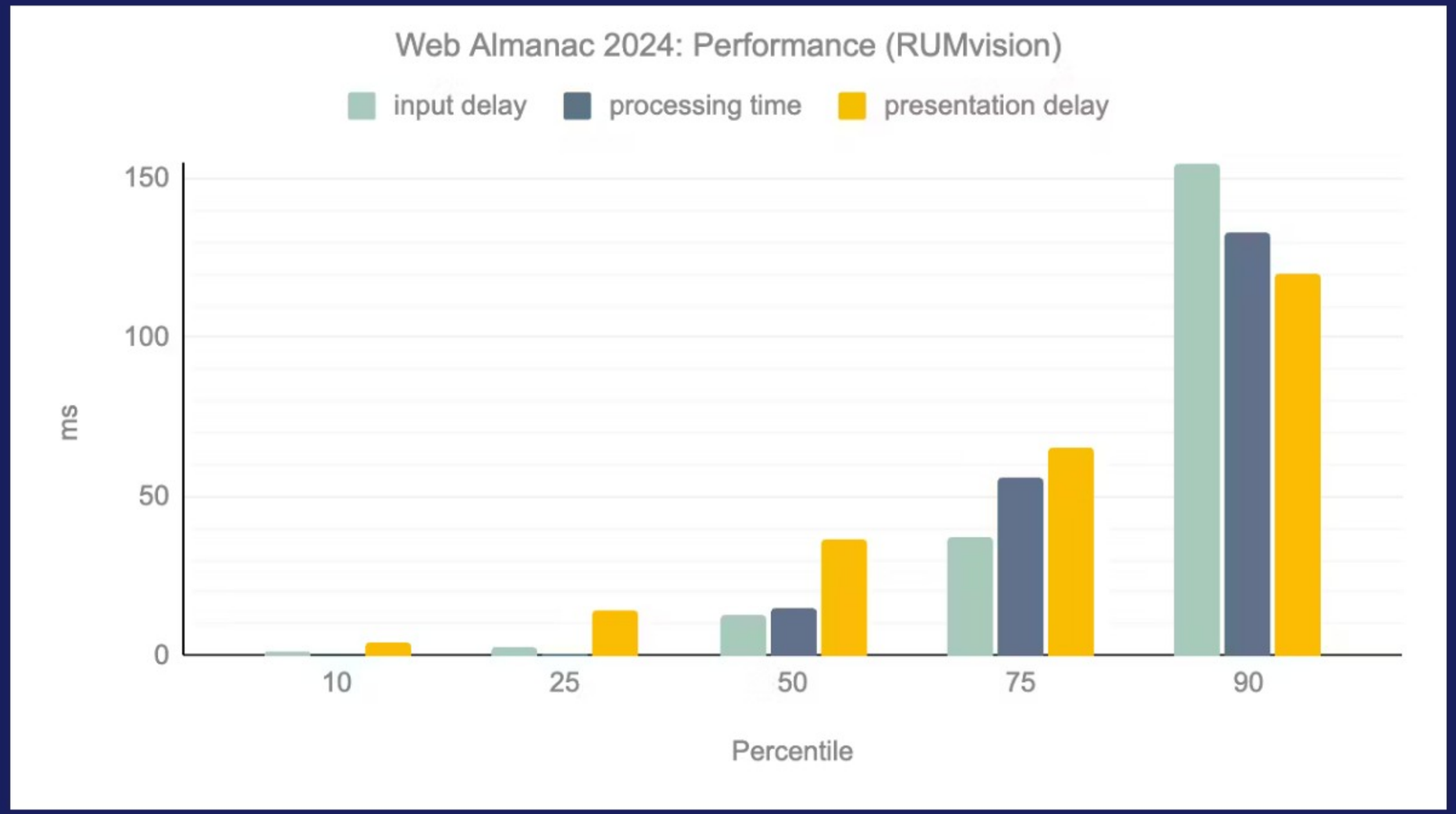


web.dev/articles/inp#whats_in_an_interaction

9 1 ?

Lazyloads all JavaScript:

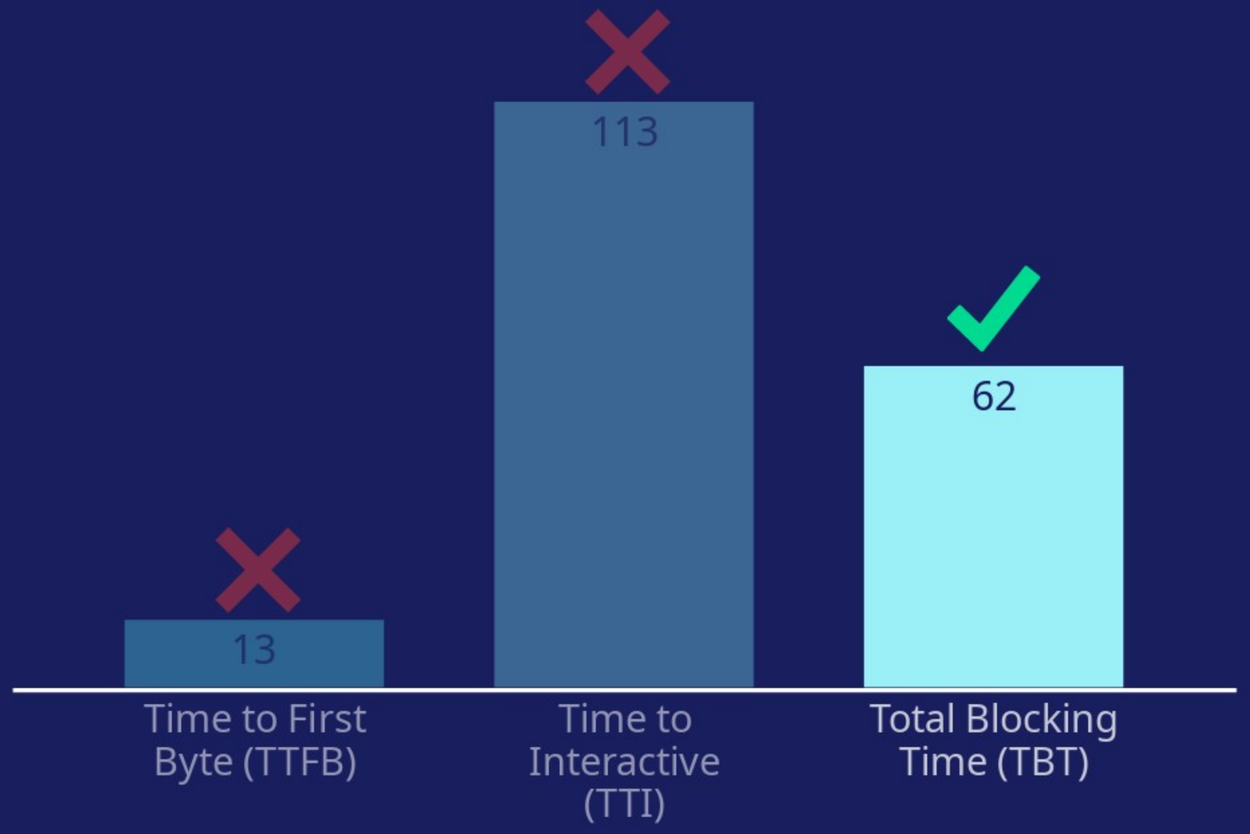




almanac.httparchive.org/en/2024/performance#inp-subparts

NP sub-parts by percentile (all devices)

Which Lighthouse metric is closest to INP?



38 2 2

web.dev

How to improve TBT

In general we recommend optimizing for INP over TBT as we recommend using TBT is a proxy metric for INP in the lab (where INP cannot usually be accurately measured). Therefore, to improve TBT look at our guidance for Optimizing INP.

web.dev/articles/tbt#how_to_improve_tbt

developer.chrome.com/blog/new-in-devtools-121#interactions

INP debugging became easier in 2024

📅 Chrome 121

→ Whiskers

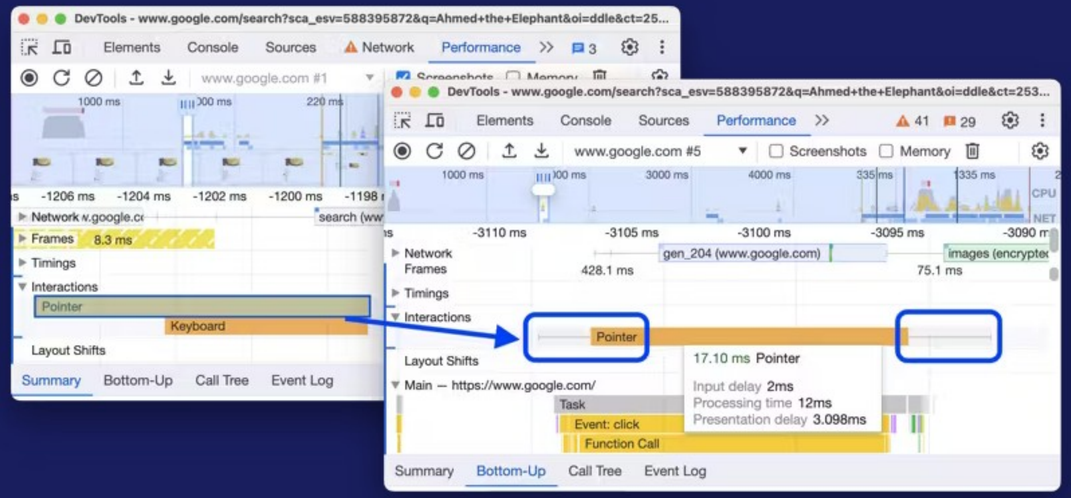
📅 Chrome 123

→ LoAF

📅 Chrome 129

→ new Performance panel

→ Scheduler.yield



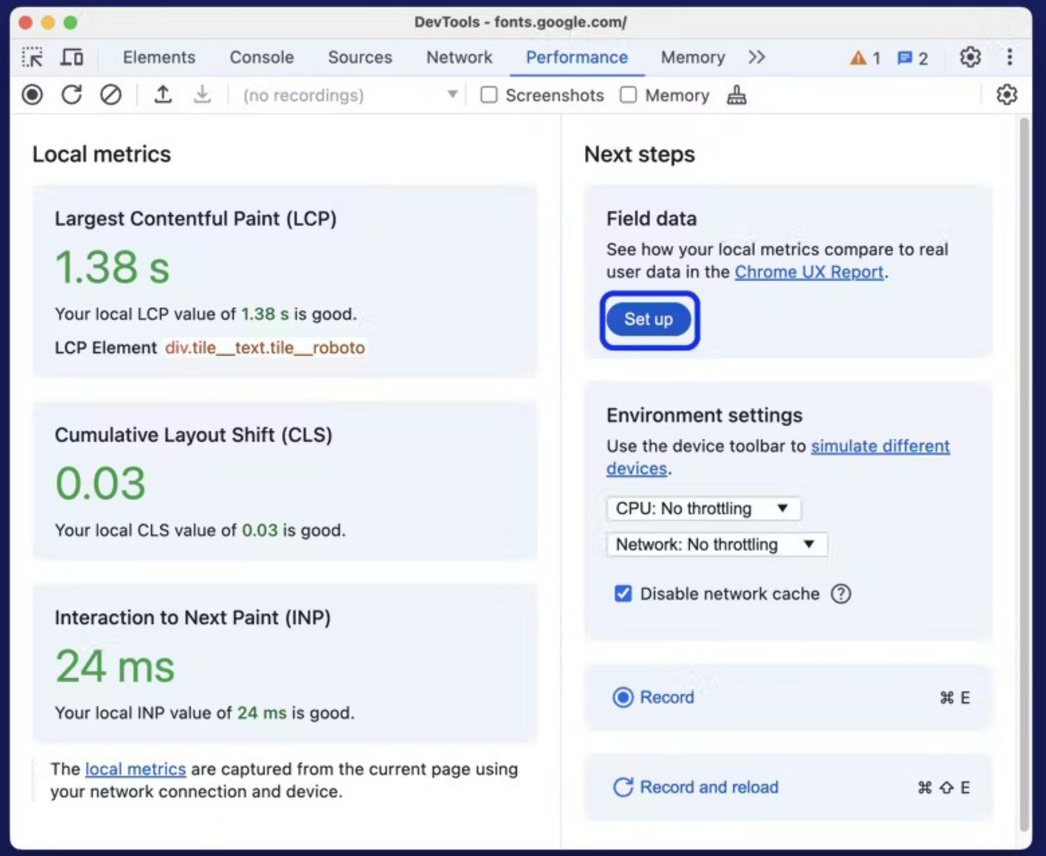
developer.chrome.com/docs/devtools/performance/overview

INP debugging became easier in 2024

🗓️ Chrome 121
→ Whiskers

🗓️ Chrome 123
→ LoAF

🗓️ Chrome 129
→ new Performance panel
→ Scheduler.yield



developer.chrome.com/docs/web-platform/long-animation-frames#loaf-entry

INP debugging became easier in 2024

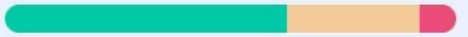
🗓️ Chrome 121
→ Whiskers

🗓️ Chrome 123
→ LoAF

🗓️ Chrome 129
→ new Performance panel
→ Scheduler.yield


```
{
  "blockingDuration": 0,
  "duration": 60,
  "entryType": "long-animation-frame",
  "firstUIEventTimestamp": 11801.099999999627,
  "name": "long-animation-frame",
  "renderStart": 11858.800000000745,
  "scripts": [
    {
      "duration": 45,
      "entryType": "script",
      "executionStart": 11803.199999999255,
      "forcedStyleAndLayoutDuration": 0,
      "invoker": "DOMWindow.onclick",
      "invokerType": "event-listener",
      "name": "script",
      "pauseDuration": 0,
      "sourceURL": "https://web.dev/js/index-ffde4443.js",
      "sourceFunctionName": "myClickHandler",
      "sourceCharPosition": 17796,
      "startTime": 11803.199999999255,
      "window": [Window object],
      "windowAttribution": "self"
    }
  ],
  "startTime": 11802.400000000373,
  "styleAndLayoutStart": 11858.800000000745
}
```


9 5

LOAF INVOKER TYPE	P75	TREND	EVENTS	DISTRIBUTION
all	▲ 261 ms	→ baseline	12M	
event-listener	▲ 248 ms	↗ 5%	88% of all	
user-callback	▲ 373 ms	↘ 42.9%	6% of all	
classic-script	▲ 379 ms	↘ 45.2%	5% of all	
resolve-promise	▲ 297 ms	↘ 13.8%	1% of all	
module-script	● 778 ms	↘ 198.1%	0% of all	
reject-promise	▲ 448 ms	↘ 71.6%	0% of all	

rumvision.com/help-center/filters/metric/loaf/#loaf-invoker

mobile RUMvision INP by invokerType

7 1

```
// event-listener
button.addEventListener('click', () => { });

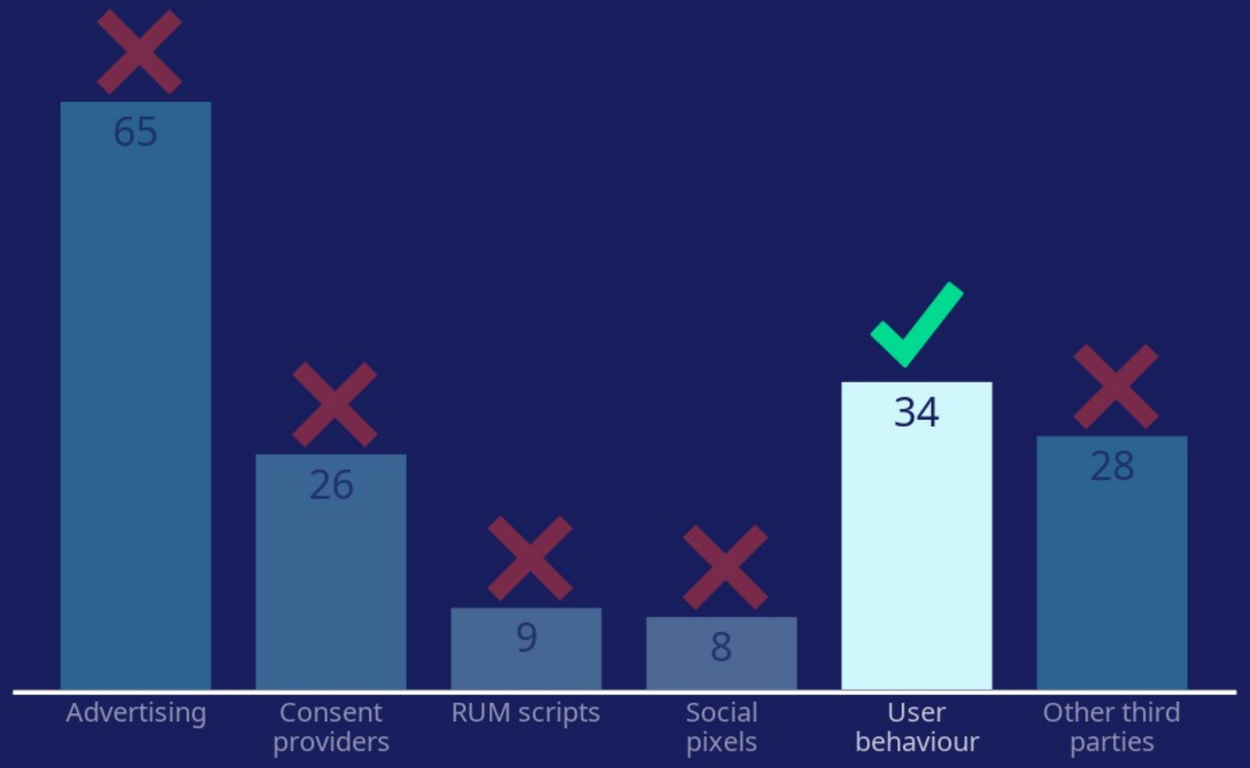
// user-callback
setTimeout(() => { /* JS work */ }, 1000););

// classic-script
<script src=""></script>
```

developer.mozilla.org/en-US/docs/Web/API/PerformanceScriptTiming/invokerType

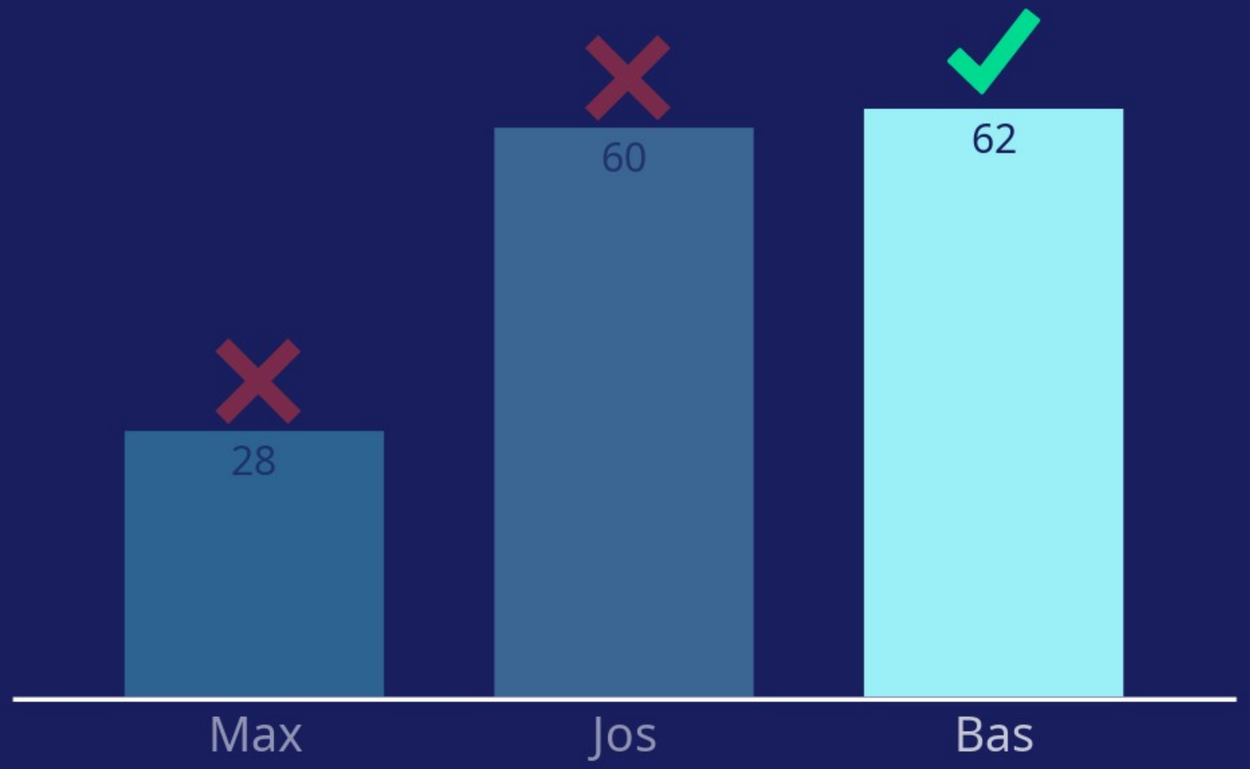
invokerType code examples

Which category of scripts has the greatest impact on INP?

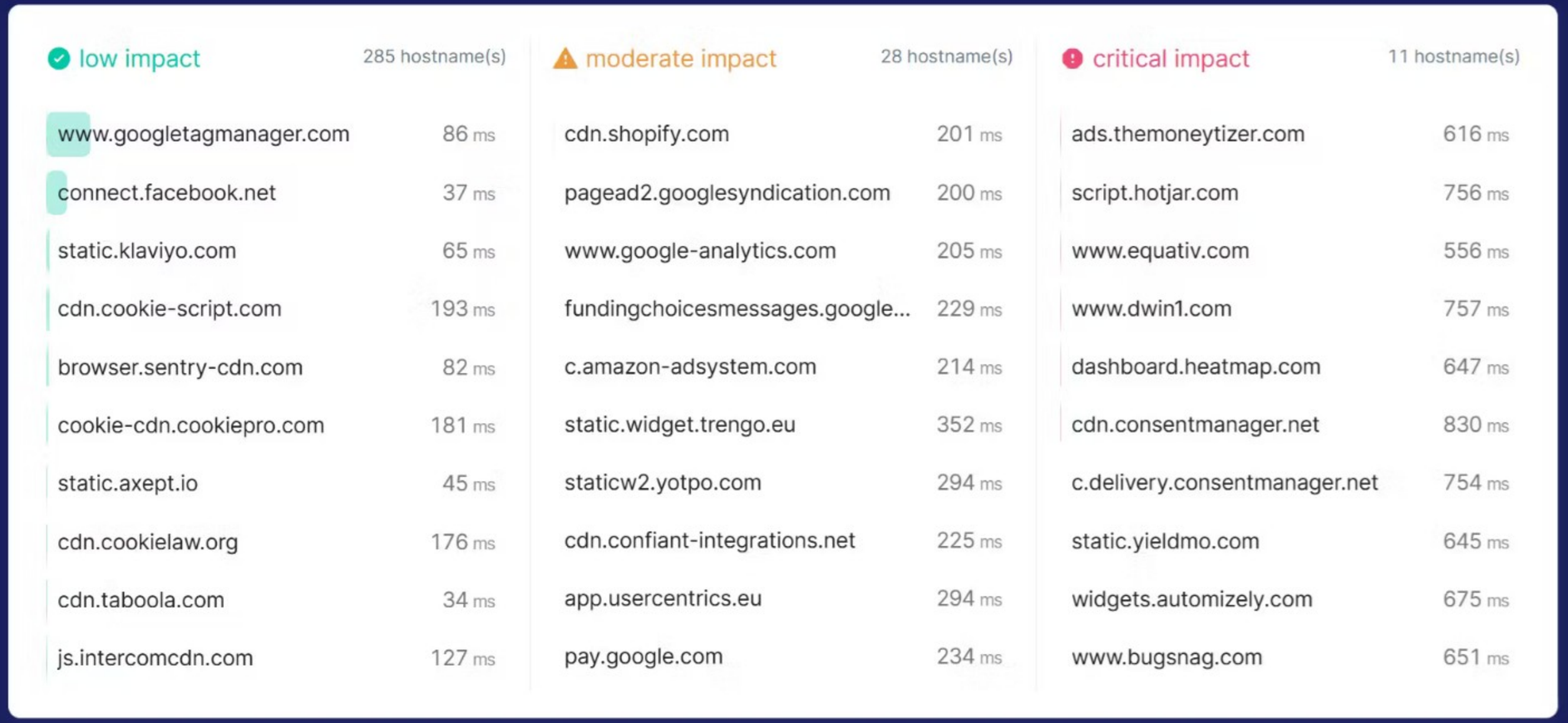


20 3 2

Who was the first (and last) Dutch speaker at perf.now()?



28 9 6



low impact	285 hostname(s)	moderate impact	28 hostname(s)	critical impact	11 hostname(s)
www.googletagmanager.com	86 ms	cdn.shopify.com	201 ms	ads.themoneytizer.com	616 ms
connect.facebook.net	37 ms	pagead2.googlesyndication.com	200 ms	script.hotjar.com	756 ms
static.klaviyo.com	65 ms	www.google-analytics.com	205 ms	www.equativ.com	556 ms
cdn.cookie-script.com	193 ms	fundingchoicesmessages.google...	229 ms	www.dwin1.com	757 ms
browser.sentry-cdn.com	82 ms	c.amazon-adsystem.com	214 ms	dashboard.heatmap.com	647 ms
cookie-cdn.cookiepro.com	181 ms	static.widget.trengo.eu	352 ms	cdn.consentmanager.net	830 ms
static.axept.io	45 ms	staticw2.yotpo.com	294 ms	c.delivery.consentmanager.net	754 ms
cdn.cookielaw.org	176 ms	cdn.confiant-integrations.net	225 ms	static.yieldmo.com	645 ms
cdn.taboola.com	34 ms	app.usercentrics.eu	294 ms	widgets.automizely.com	675 ms
js.intercomcdn.com	127 ms	pay.google.com	234 ms	www.bugsnag.com	651 ms

pure JS time per sourceURL hostname

INP + LoAF = better third-party insights 🤓

11

JS time of alternative Consent Provider solutions P75

www.consentmanager.net
based on a total of 10K events

cdn.consentmanager.net	830 ms
c.delivery.consentmanager.net	754 ms

usercentrics.com
based on a total of 3.1K events

app.usercentrics.eu	292 ms

www.google.com
based on a total of 9.6K events

fundingchoicesmessages.go...	229 ms

sourcepoint.com
based on a total of 2.5K events

cdn.privacy-mgmt.com	198 ms

www.cookiebot.com
based on a total of 18K events

consent.cookiebot.com	195 ms

cookie-script.com
based on a total of 92K events

cdn.cookie-script.com	193 ms

www.cookiepro.com
based on a total of 38K events

cookie-cdn.cookiepro.com	181 ms

www.cookielaw.org
based on a total of 33K events

cdn.cookielaw.org	176 ms

sirdata.com
based on a total of 1.4K events

js.cookieless-data.com	0 ms
choices.consentframework.com	82 ms
js.sddan.com	51 ms

liveramp.com
based on a total of 138 events

ats-wrapper.privacymanager.io	94 ms

www.axept.io
based on a total of 33K events

static.axept.io	45 ms

www.cookieyes.com
based on a total of 6.6K events

cdn-cookieyes.com	44 ms

Comparing third-parties with real INP data

INP case studies

You can now put away your mobile devices



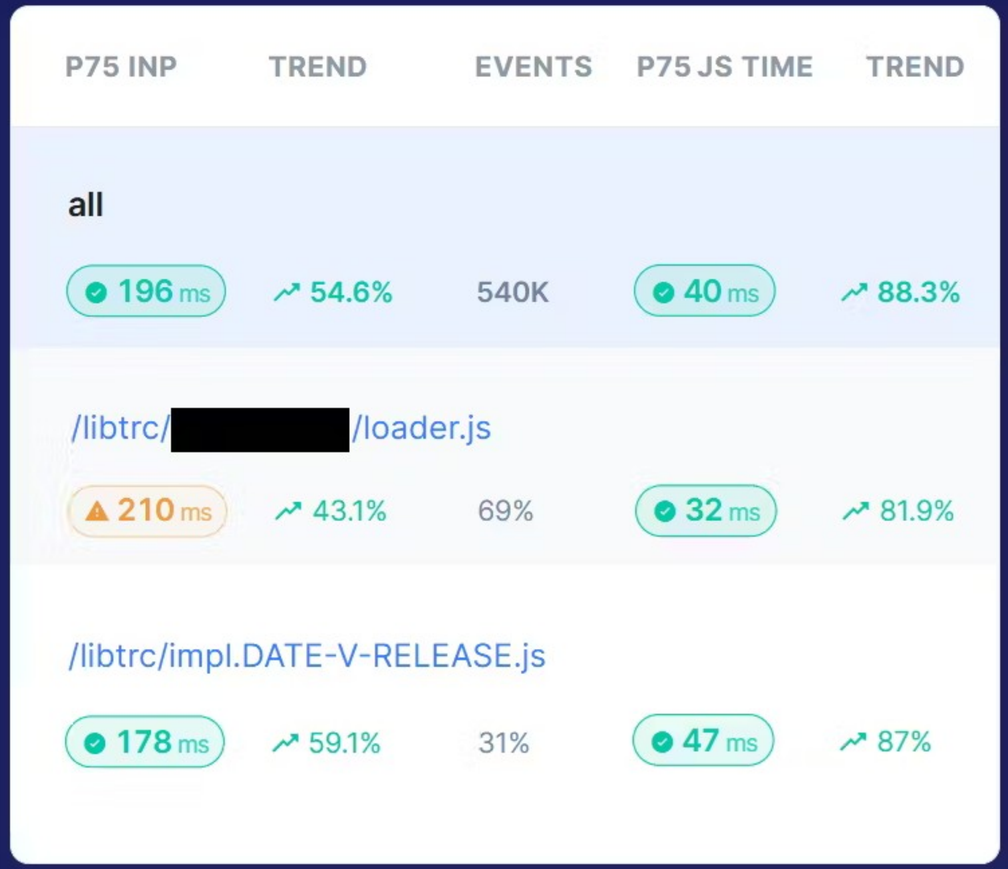
content recommendation provider

4

web.dev/case-studies/taboola-inp

36% INP improvement by Taboola

- analyzing TBT synthetically had some limitations
- Taboola then joined the LoAF origin trial
- 💡 find code examples in the web.dev case study
- our data shows 54.6% for 2023 Dec vs 2024 Oct
- libtrc/impl.js went from 361ms to 47ms (87%)



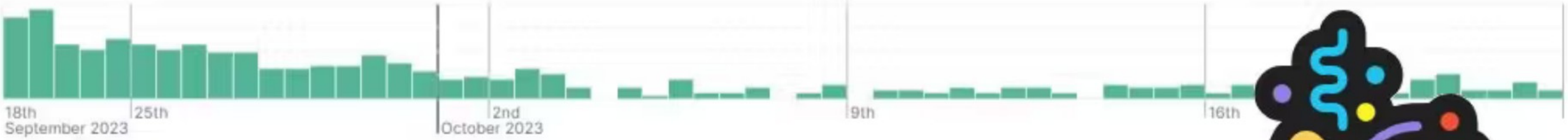


Shopify merchant

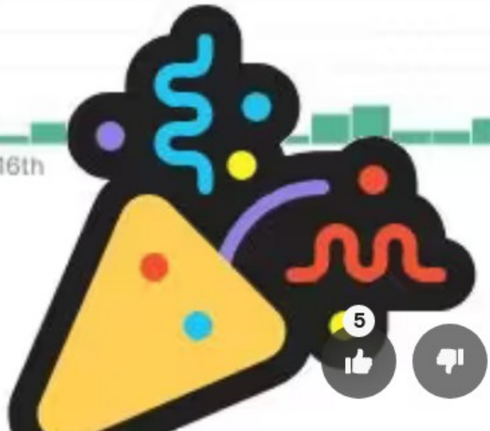
github.com/w3c/long-animation-frames#value-to-end-users--publishers

Third party ditching moment.js

- moment.js = date formatting library
- we reached out to BigSur AI
- turned out that moment.js wasn´t even used
- ✅ 112ms inividual win, 2ms overall win
- 💡 regularly check dependencies



third party INP improved with RUM & LoAF




IMPROVED
SLOWEST INP
THINKS
ALL INP PROBLEMS
ARE SOLVED
NEW
SLOWEST INP
imgflip.com

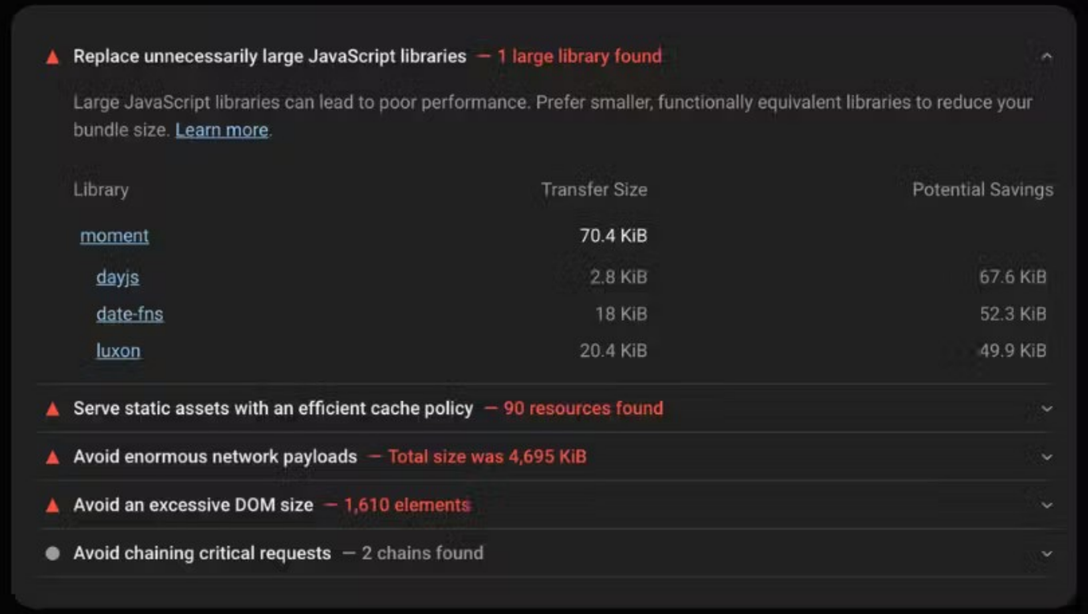
rum VISION



Addy Osmani
@addyosmani

If JavaScript libraries are proving costly, replace them with smaller alternatives.

Lighthouse in @ChromeDevTools now recommends smaller libraries that improve bundle size.



▲ **Replace unnecessarily large JavaScript libraries** — 1 large library found

Large JavaScript libraries can lead to poor performance. Prefer smaller, functionally equivalent libraries to reduce your bundle size. Learn more.

Library	Transfer Size	Potential Savings
moment	70.4 KiB	
dayjs	2.8 KiB	67.6 KiB
date-fns	18 KiB	52.3 KiB
luxon	20.4 KiB	49.9 KiB

▲ **Serve static assets with an efficient cache policy** — 90 resources found

▲ **Avoid enormous network payloads** — Total size was 4,695 KiB

▲ **Avoid an excessive DOM size** — 1,610 elements

● **Avoid chaining critical requests** — 2 chains found

12:00 AM - 12 Sep 2020



osCommerce merchant

biggest online pharmacy of the The Netherlands

DeOnlineDrogist.nl

- → CPU vs GPU animation
- → GTM event yielding

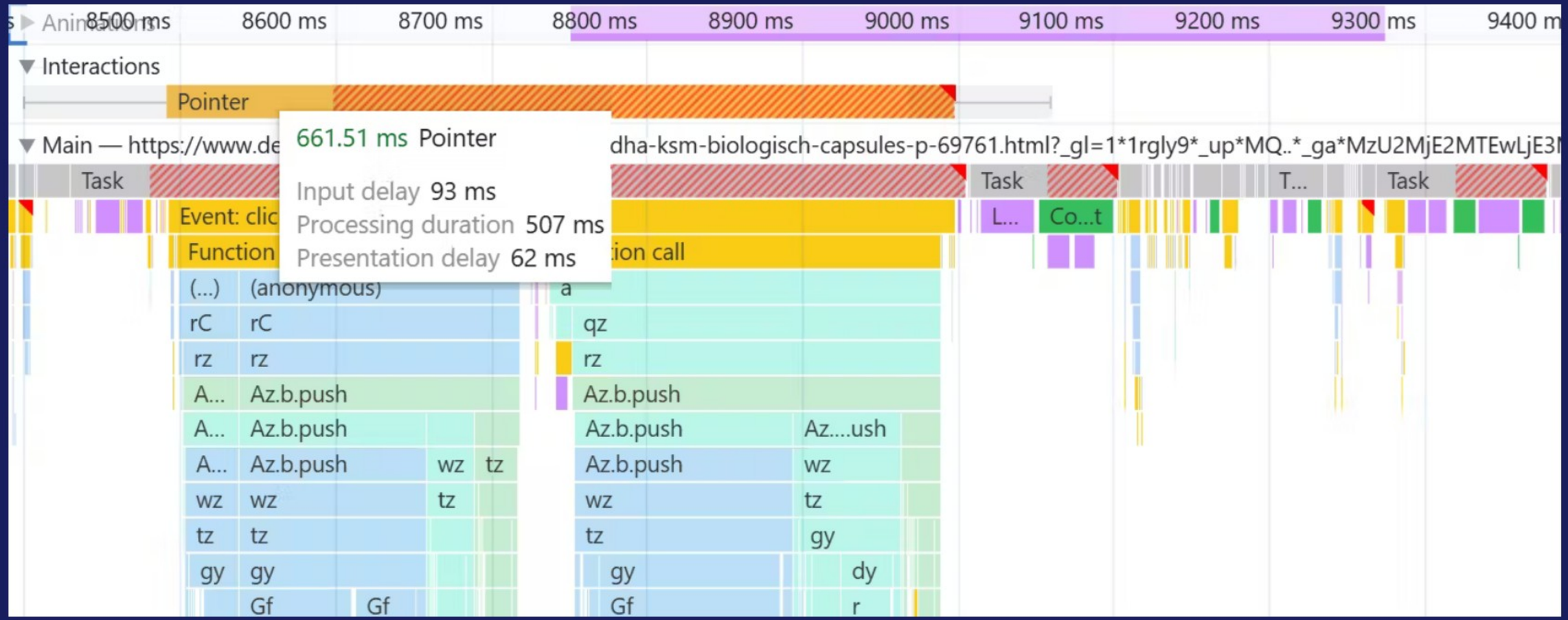
```
.slides.shifting {
    transition: left.2s ease-out;
    // force GPU animation
    transition-property: transform;
}
```

```
// from CPU animation:
this._items.style.left = -i + "px"

// to GPU animation:
this._items.style.transform = "translateX(" + -i + "px)"
```

web.dev/articles/animations-guide

CPU vs GPU animation



web.dev/articles/optimize-long-tasks#scheduler-dot-yield

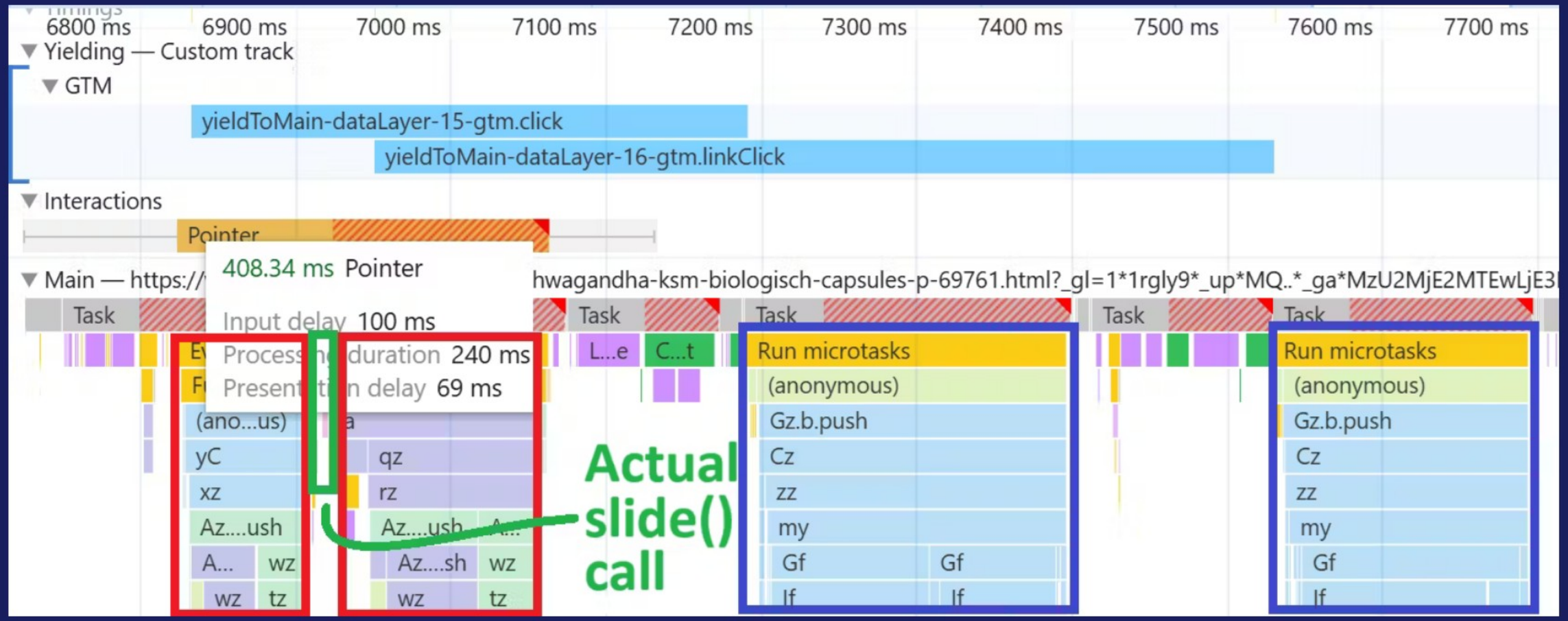
GTM event **without** yielding

```
function yieldToMain(options = {}) {
    // performance.mark + measure
    // fallback to setTimeout
    // promise work based on priority
}

// hijack dataLayer.push
const gtmPriorityEvents = [/^add_to_cart$/];
function yieldDataLayerPush() {
  window.dataLayer.originalPush = window.dataLayer.push;
  window.dataLayer.push = function () {
    const e = [].slice.call(arguments, 0);
    yieldToMain({
      mark: 'dataLayer',
      // postTask-like priority
      priority: gtmPriorityEvents.some(regex => regex.test(e)) ? 'user-blocking' : 'background',
      event: e
    }).then(() => {
      window.dataLayer.originalPush.apply(window.dataLayer, e);
    });
  };
}
```

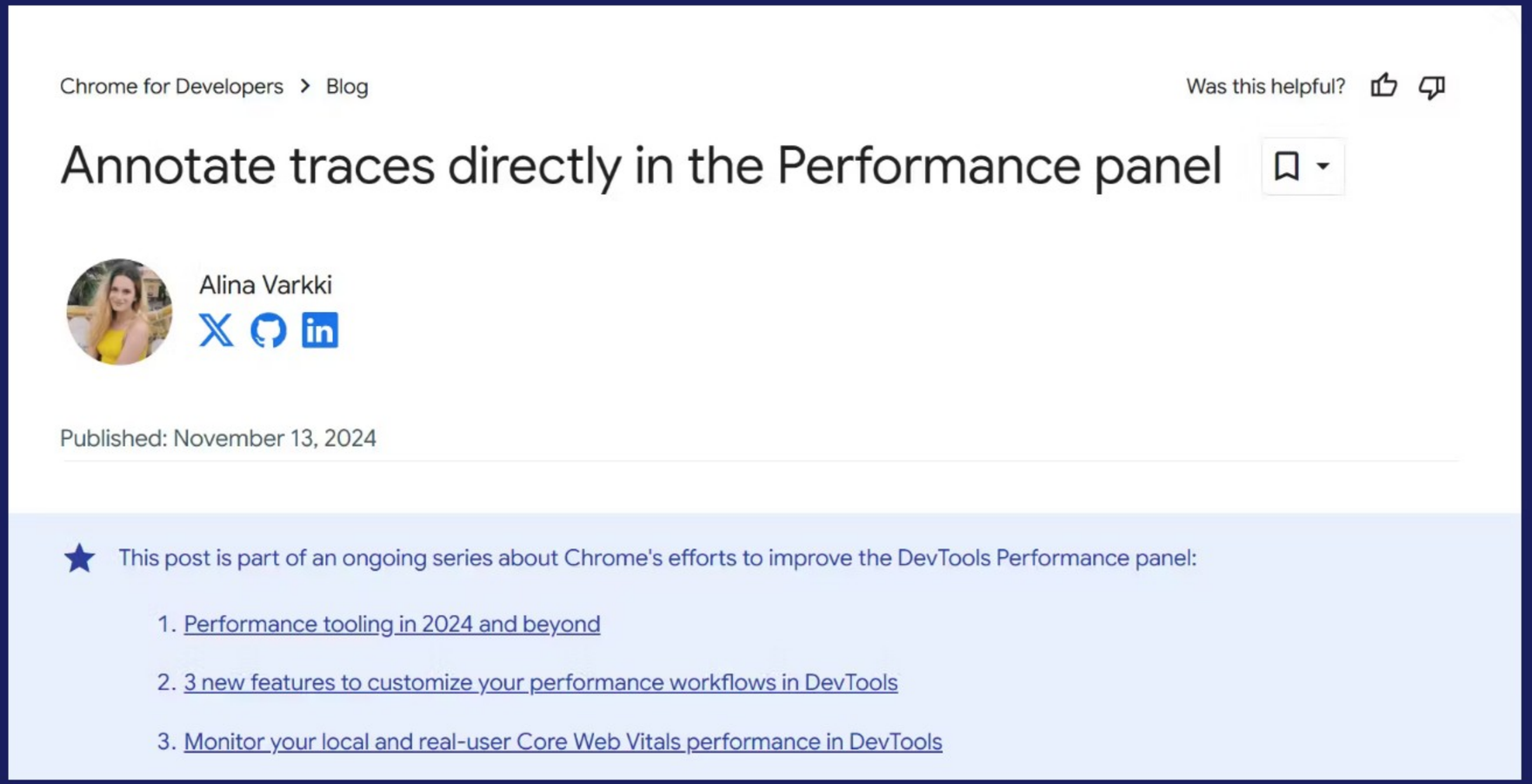
kurtextrem.de/posts/improve-inp#exit-event-handlers-yieldunlessurgent

yieldToMain for GTM events



Processing duration drops from 507ms to 240ms

53% win when yielding GTM events



Chrome for Developers > Blog

Was this helpful?

Annotate traces directly in the Performance panel

Alina Varkki

Published: November 13, 2024

This post is part of an ongoing series about Chrome's efforts to improve the DevTools Performance panel:

1. Performance tooling in 2024 and beyond
2. 3 new features to customize your performance workflows in DevTools
3. Monitor your local and real-user Core Web Vitals performance in DevTools

developer.chrome.com/blog/devtools-annotations

If only I knew before you can annotate directly in DevTools 😅

INP gains

- ✅ 12% win at mobile P75 (20ms)
- ✅ 8% win from mobile P46 (7ms) to P97 (39ms win)
- from CMP clicks and site search to add-to-cart

2

THIRD-PARTY JavaScript

Ben Vinegar
Anton Kovalyov

FOREWORD BY Paul Irish



21% involvement from event listeners sitting in obfuscated code

Removing JS event tracking

- 3950ms from a single script on PDPs
- 76.8% gain as INP dropped to 260ms
- After removing the obfuscated script
- Learning: Remove what you don't need



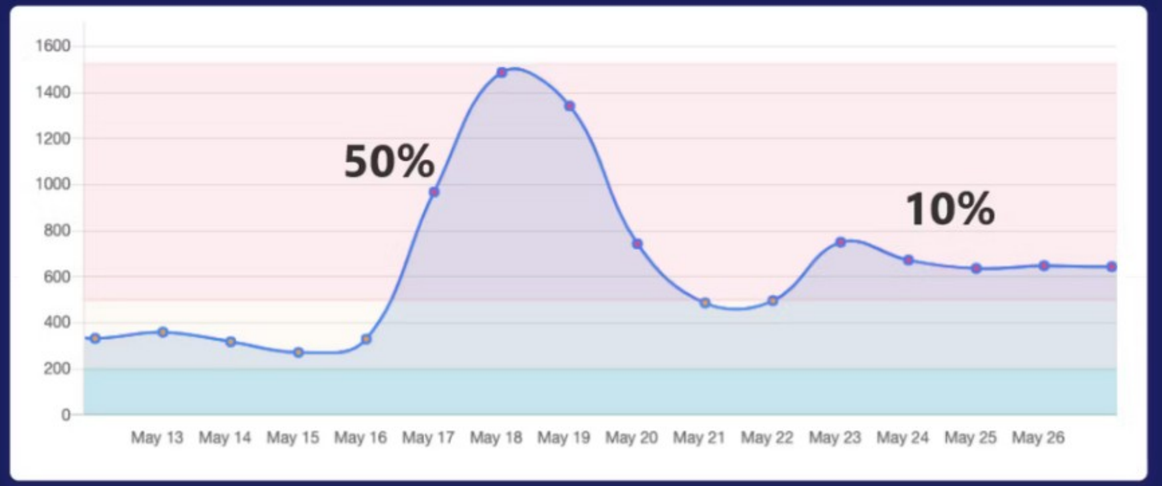
> no idea, some absolute crap though -
> we just removed it,
> wasn't even working properly

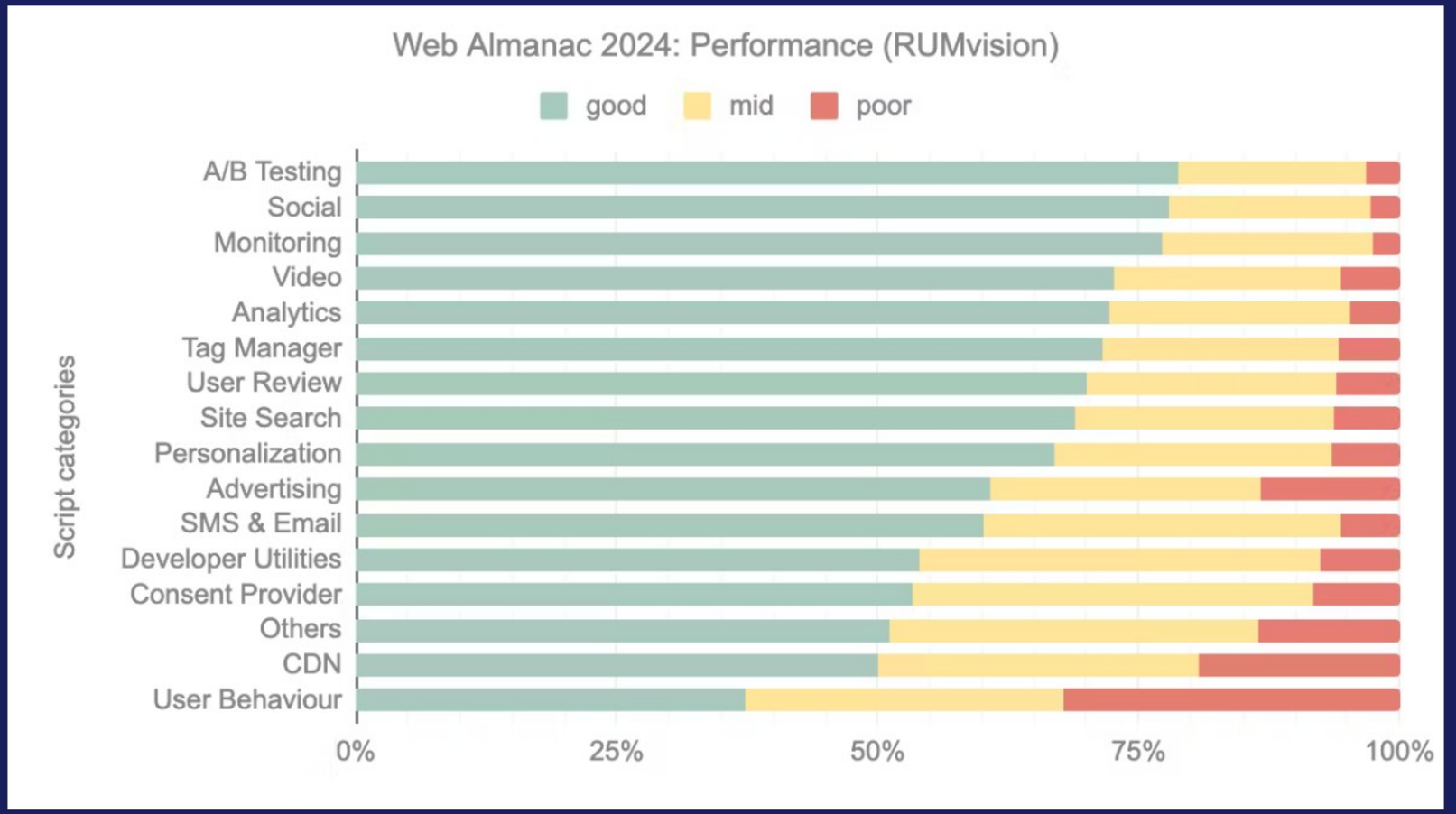
– The client (when asking what this script was actually doing)

No-one (visitor nor merchant) will become any happier

Hotjar sampling-rate vs INP

- From 1500ms back to 620ms
- don't blindly use a high sampling rate
- consider a deviceMemory condition





almanac.httparchive.org/en/2024/performance#long-animations-frames

Mobile INP by script category



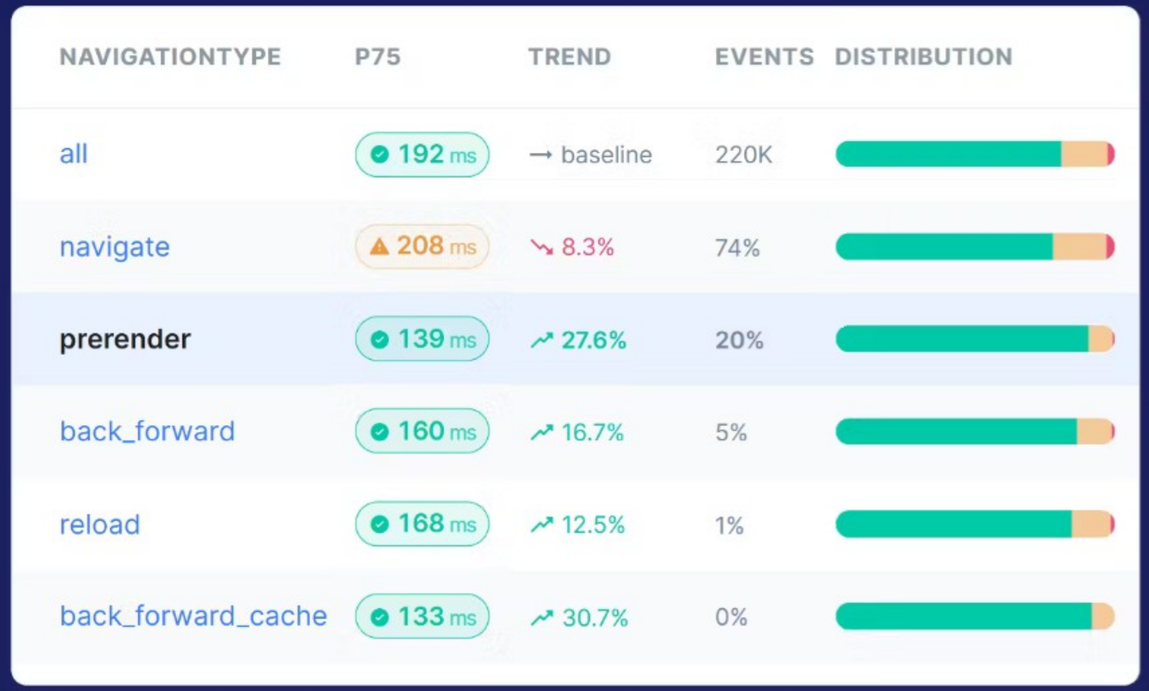
Magento (Adobe Commerce) frontend

1

hyva.io/blog/product/using-speculation-rules-for-instant-page-loads.html

Better INP with Speculation Rules in Hyvä 1.3.7

- When prerendering, subresources will be fetched too
- Meaning, most JS will be executed already
- Resulting in 27.6% better INP on PDPs compared to baseline
- See obelink.be source code for implementation details



NAVIGATIONTYPE	P75	TREND	EVENTS	DISTRIBUTION
all	192 ms	→ baseline	220K	
navigate	▲ 208 ms	↘ 8.3%	74%	
prerender	139 ms	↗ 27.6%	20%	
back_forward	160 ms	↗ 16.7%	5%	
reload	168 ms	↗ 12.5%	1%	
back_forward_cache	133 ms	↗ 30.7%	0%	

loop earplugs

Shopify merchant



Mateusz Krzeszowiak
@krzksz

Huge kudos to @pandectes for applying my Interaction To Next Paint optimisation suggestion in their GDPR Compliance app! As a result, closing the consent popup is now almost 40% snappier on average across all Shopify stores that use it:



Event listeners improved

- from 451ms to 348ms (22.8%)
- Big win overall (for Shopify sites)

LOAF INVOKER TYPE	P75	TREND	EVENTS
all	387 ms	16.6%	243K
event-listener	348 ms	22.8%	81%
user-callback	653 ms	13.4%	12%
classic-script	496 ms	4.6%	5%
resolve-promise	416 ms	2%	2%
module-script	658 ms	171.9%	0%

Before

RUM VISION

INP phases breakdown

docs

9% input delay	76% processing time	15% presentation delay
43 ms moderate	**350** ms poor	**68** ms good

After

INP phases breakdown

docs

34% input delay	32% processing time	34% presentation delay
84 ms moderate	**78** ms good	**85** ms moderate

2

Before

RUM VISION

INP phases breakdown: event-listener

15% input delay	63% processing time	22% presentation delay
61 ms moderate	**260** ms poor	**89** ms moderate

After

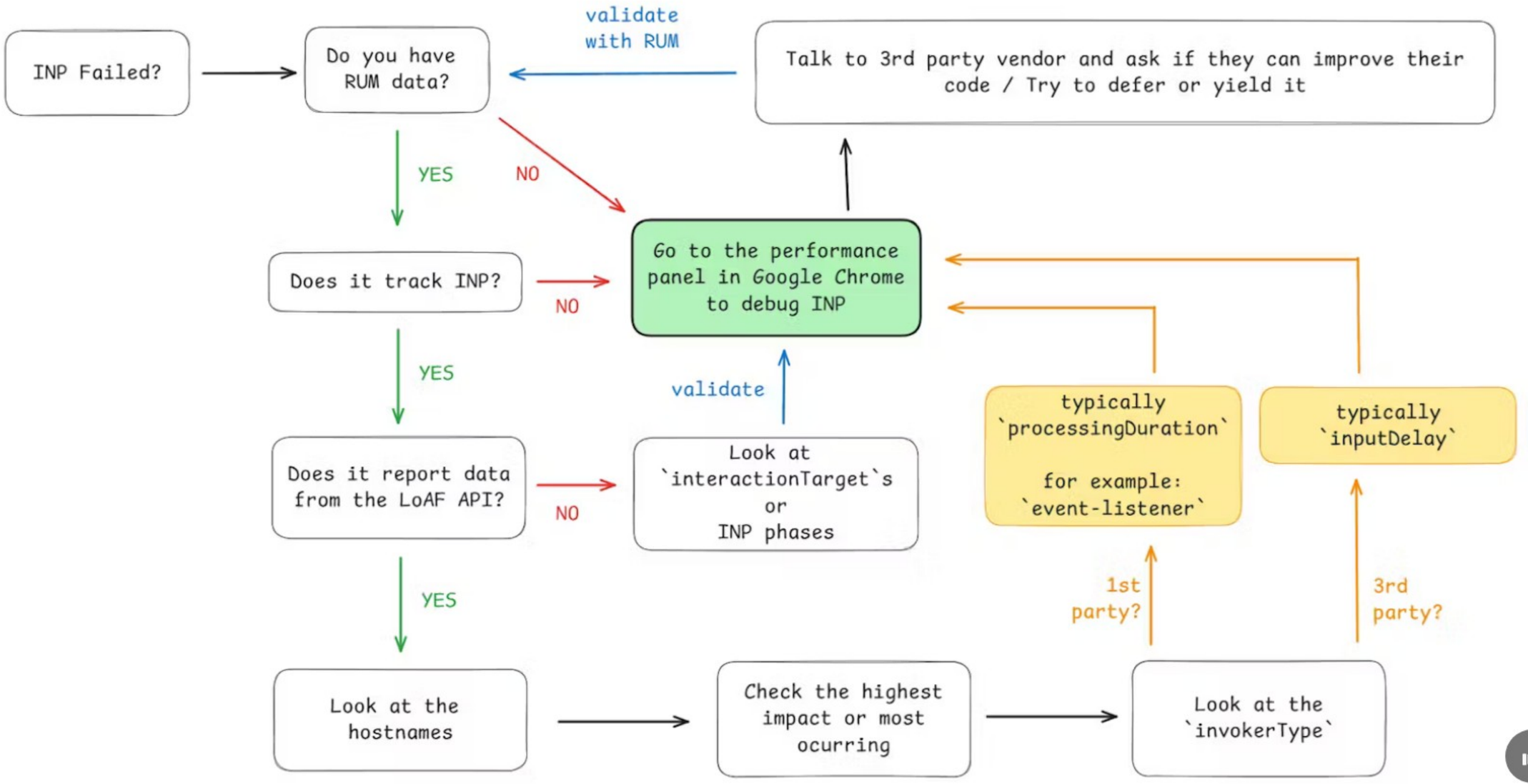
INP phases breakdown: event-listener

docs

19% input delay	54% processing time	26% presentation delay
63 ms moderate	**177** ms moderate	**86** ms moderate

1

Process to debug INP (Interaction to Next Paint)



Going forward

Better insights = better INP

- Third parties (CMPs) have been improving
- Browsers have been improving
- INP + web-vitals.js got finetuned over time
- googletag.setConfig({threadYield:"ENABLED_ALL_SLOTS"});

whatwg/dom

#1308 Proposal: asynchronous event listeners



16 comments



domfarolino opened on August 27, 2024

```
button.addEventListener('click', e => {
   // Do real stuff async
}, {priority: "user-visible"});
```

github.com/whatwg/dom/issues/1308

Proposal for async event listeners



INP has value

Platforms, merchants, RUM providers and your visitors will all benefit

web-platform-tests/interop

#894 Core Web Vitals: LCP, INP, CLS



1 comment

 **ryantownsend** opened on October 10, 2024

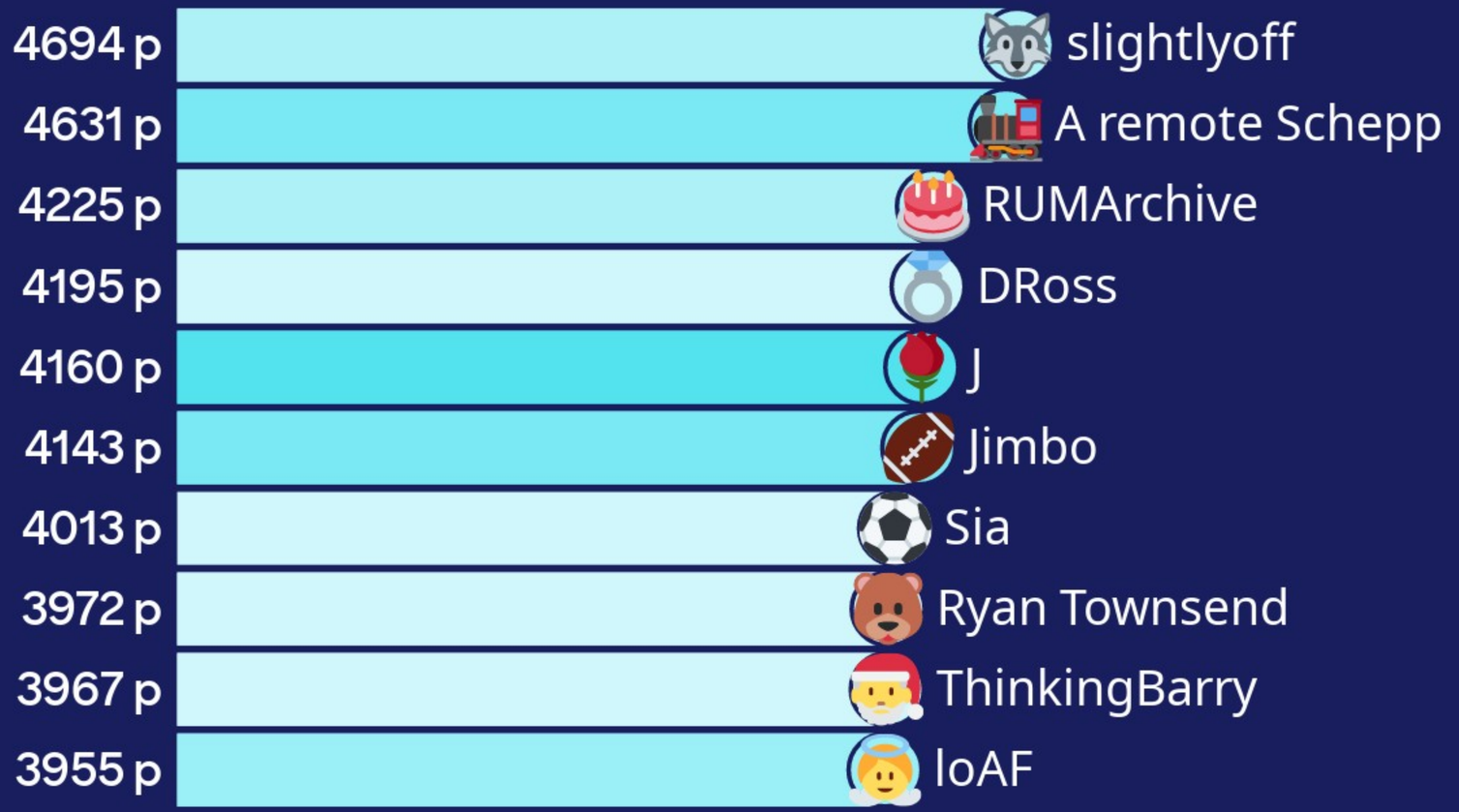
github.com/web-platform-tests/interop/issues/894

Proposal for getting CWV into Interop 2025

Key insights

- Use a RUM tool
- Know your audience and their restraints
- keep challenging marketing + user behaviour tags
- INP is already valuable when combining attribution
- Third-party benchmarking data is available
- When combining INP with LoAF
- INPcrease user happiness

Leaderboard





Thanks for attending!

- linkedin.com/in/**karlijn-lowik**
- linkedin.com/in/**erwinhofman**
- linkedin.com/company/**rumvision**
- rumvision.com/**perf-slides**
- rumvision.com/**demo**
- find us at **Help Desk** @ 13:15 - 13:35