

# Opportunity Insights

Optimizing the Essentials: A Causal AI Approach to Prioritize Website Improvements Based on Business Impacts



PRESENTER

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@ Business Insights

# Jumpstart. Analyze. Optimize.



Hands-on Management  
and Best Practices

Tailored Digital Experience  
management for your specific  
verticals, teams, and use cases



Advanced Use Cases  
and Analytics

Extending and expanding core Dynatrace  
use cases with advanced analytics and  
business reporting



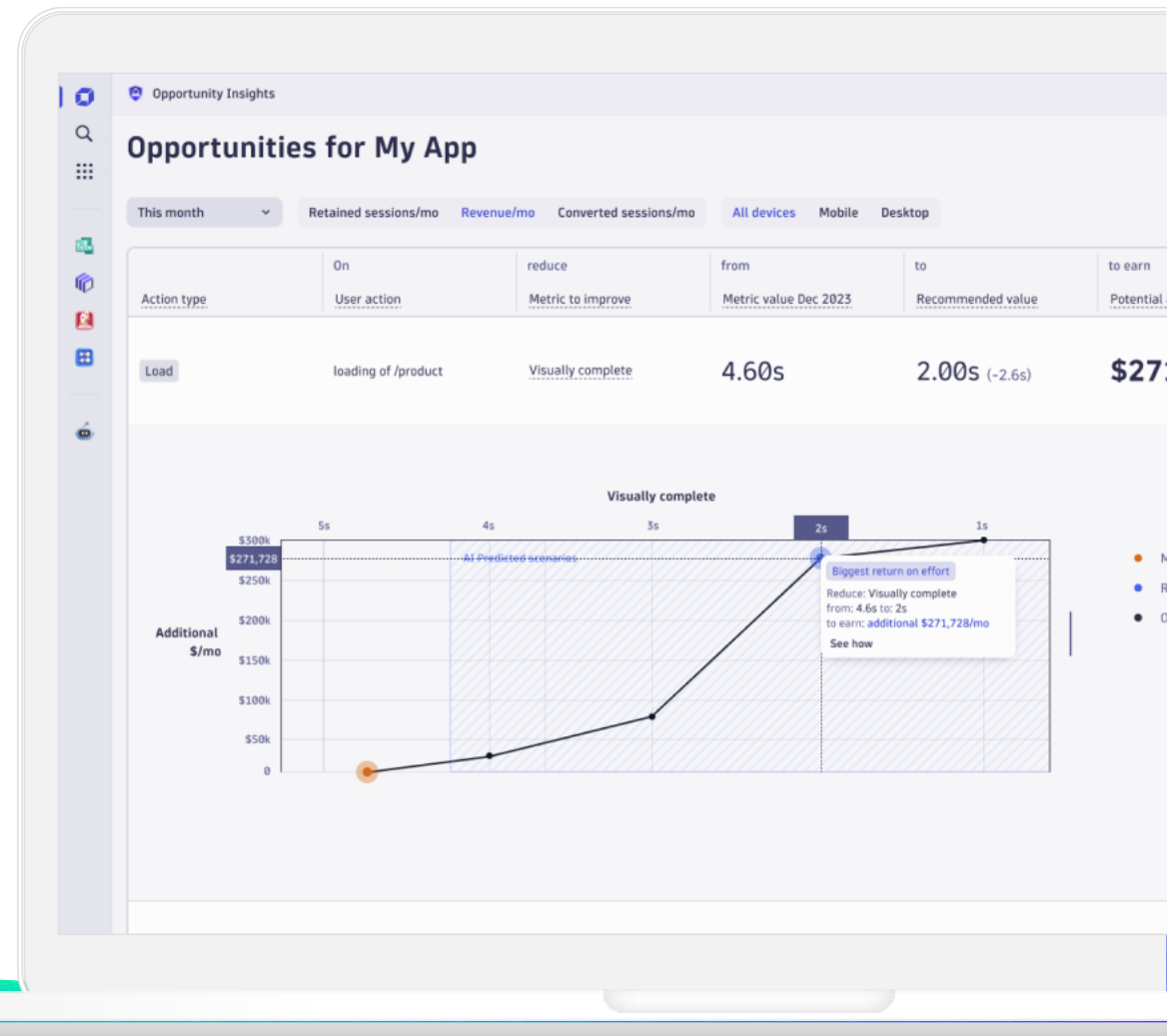
Human Expertise  
Driving Digital  
Optimization

Detailed recommendations for  
optimization driving business  
outcomes

**We help customers to extract +200% of their DEM solution!**

You know performance & errors matter.  
Now you'll know how much.

Opp insights can pinpoint what is having the biggest impact, predict the effect of improvement, and we help you understand how to get there



~~User Behavior is subject to User Experience~~

~~Customers punish poor UX/UI~~

w e  s p e e d

UNITED STATES

# Find out how you stack up to new industry benchmarks for mobile page speed

Daniel An / February 2018

This article has been updated with new data. It was originally published in February 2017.

Today, it's critical that marketers design fast web experiences across all industry sectors. People want to quickly pay bills on finance sites, get rapid results when they're browsing vacation reviews, and view an article immediately when they click through. And if there's too much friction, they'll abandon the site and move on.

Here's the good news. Since we looked at mobile page speeds last year, the average time it takes to fully load a mobile landing page has dropped by seven seconds.<sup>1</sup> The bad news is that it still takes about 15 seconds, according to our new analysis. That's far too slow when you consider faster mobile site speed makes people view more pages on the site, convert more, and buy more on most brand sites.<sup>2</sup>

web.dev

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## Vodafone: A 31% improvement LCP increased sales by 8%

**On this page**

- Highlighting the opportunity
- The approach they used
- A/B test
- Optimizations
- Overall business results

By running an A/B test specifically focused on optimizing Web Vitals, Vodafone found that a 31% improvement in LCP led to 8% more sales, a 15% improvement in their lead to visit rate, and a 11% improvement in their cart to visit rate.

Vodafone is a leading telecommunications company in Europe and Africa operating fixed and mobile networks in 21 countries and partnering with mobile networks in 48 more. By running an A/B test on a landing page (where version A was optimized for Web Vitals and had a 31% better LCP score in the field than version B), Vodafone determined that optimizing for Web Vitals generated 8% more sales.

<https://web.dev/case-studies/vodafone#approach>

...g time  
\$1.6  
...ear” 1

“When load time  
seconds to 4 sec  
decline sharply. I  
second of impro  
experience a 2%

PORTENT

## What We Found for B2C E-Commerce Websites

These are our findings when comparing site speed versus e-commerce conversion rates for B2C websites:

- Site speed has improved slightly. 86% of the pages we measured loaded in 5 seconds or less. That was only true 81% of the time when we ran the study in 2019, before the pandemic.
- The difference in e-commerce conversion rate between blazing fast sites and modestly quick sites is sizable. A site that loads in 1 second has an e-commerce conversion rate 2.5x higher than a site that loads in 5 seconds.
- The difference in e-commerce conversion rate between blazing fast sites and slow sites is oddly not as high. A site that loads in 1 second has an e-commerce conversion rate 1.5x higher than a site that loads in 10 seconds. (This could be due to the smaller sample size of pages we had to work within the 10-second range this time around.)

Share

Page Load Time (seconds)	Bounce Rate (%)
1	7
2	6
3	11
4	24
5	38
6	46
7	53
8	59
9	61
10	65
11	62
12	67
13	69
14	66
15	69
16	73

# Core Web Vitals

## LCP

### Largest Contentful Paint

The Largest Contentful Paint (LCP) metric reports the render time of the largest image or text block visible within the viewport, relative to when the page first started loading.

To provide a good user experience, sites should strive to have Largest Contentful Paint of 2.5 seconds or less. To ensure you're hitting this target for most of your users, a good threshold to measure is the 75th percentile of page loads, segmented across mobile and desktop devices.

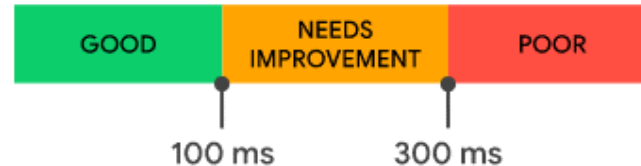


## FID

### First Input Delay

FID measures the time from when a user first interacts with a page (i.e. when they click a link, tap on a button, or use a custom, JavaScript-powered control) to the time when the browser is actually able to begin processing event handlers in response to that interaction.

To provide a good user experience, sites should strive to have a First Input Delay of 100 milliseconds or less. To ensure you're hitting this target for most of your users, a good threshold to measure is the 75th percentile of page loads, segmented across mobile and desktop devices.



## CLS

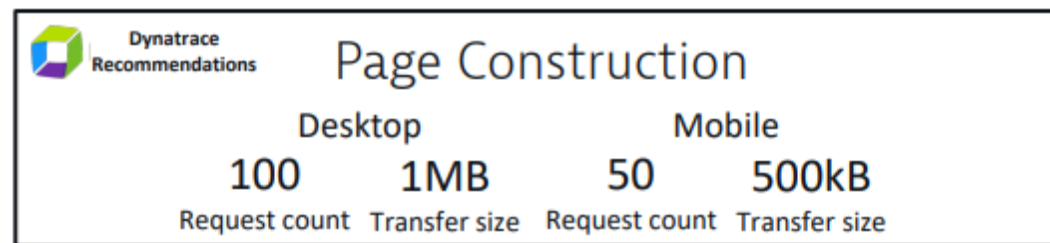
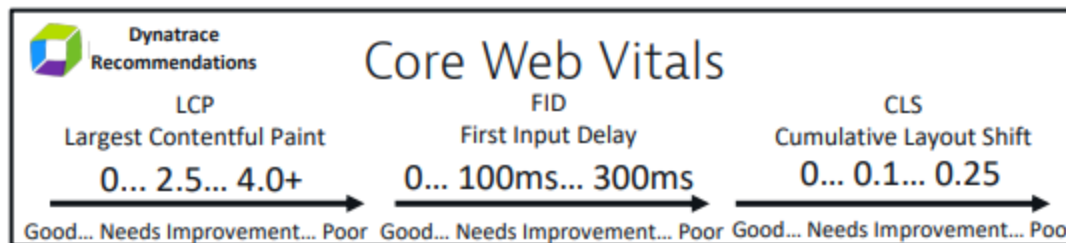
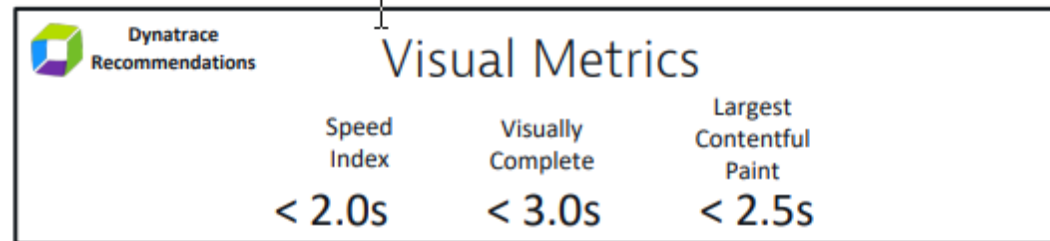
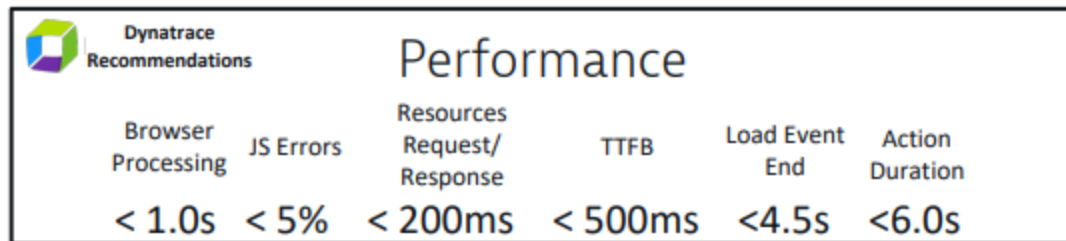
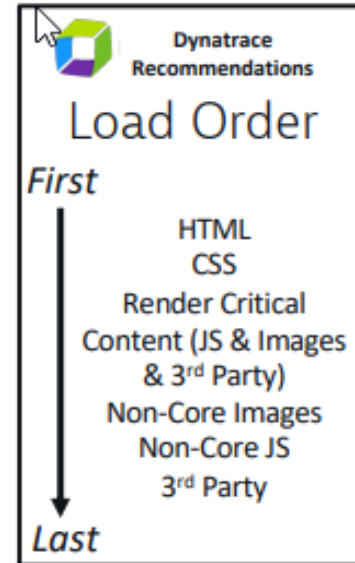
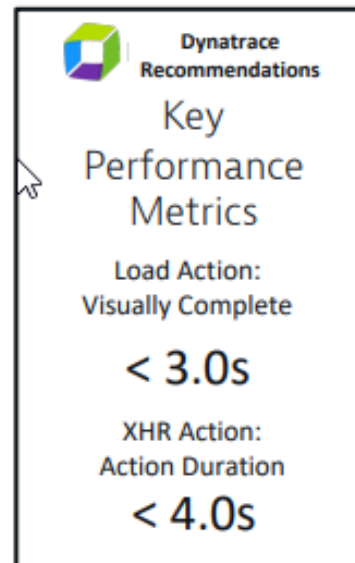
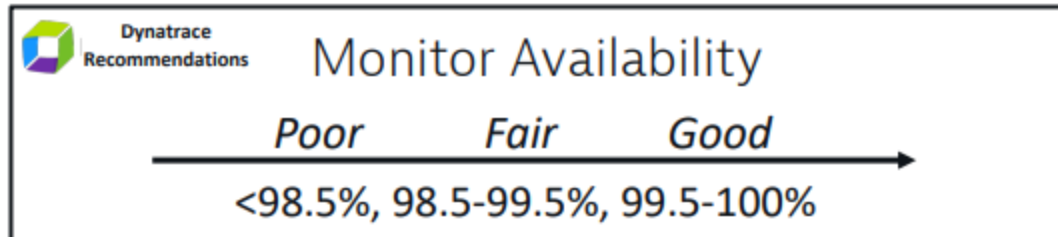
### Cumulative Layout Shift

CLS is a measure of the largest burst of layout shift scores for every unexpected layout shift that occurs during the entire lifespan of a page.

To provide a good user experience, sites should strive to have a CLS score of 0.1 or less. To ensure you're hitting this target for most of your users, a good threshold to measure is the 75th percentile of page loads, segmented across mobile and desktop devices.



# Dynatrace Recommendations



# Even Business Insights ...

## DESKTOP



## MOBILE



## TABLET



Performance is a key factor to visitor engagement across all device types

Visitors who have to wait over 3 seconds for their page to be visually complete are 5-7% more likely to exit (**~3600 visitors per day**)

▲ Visitors experiencing poor Performance (High Viz Complete or JS Errors) have significantly higher exit rates. Difference is statistically significant (unlikely to be caused randomly and by chance). Confidence level is 95%. Only includes visits that did not bounce.

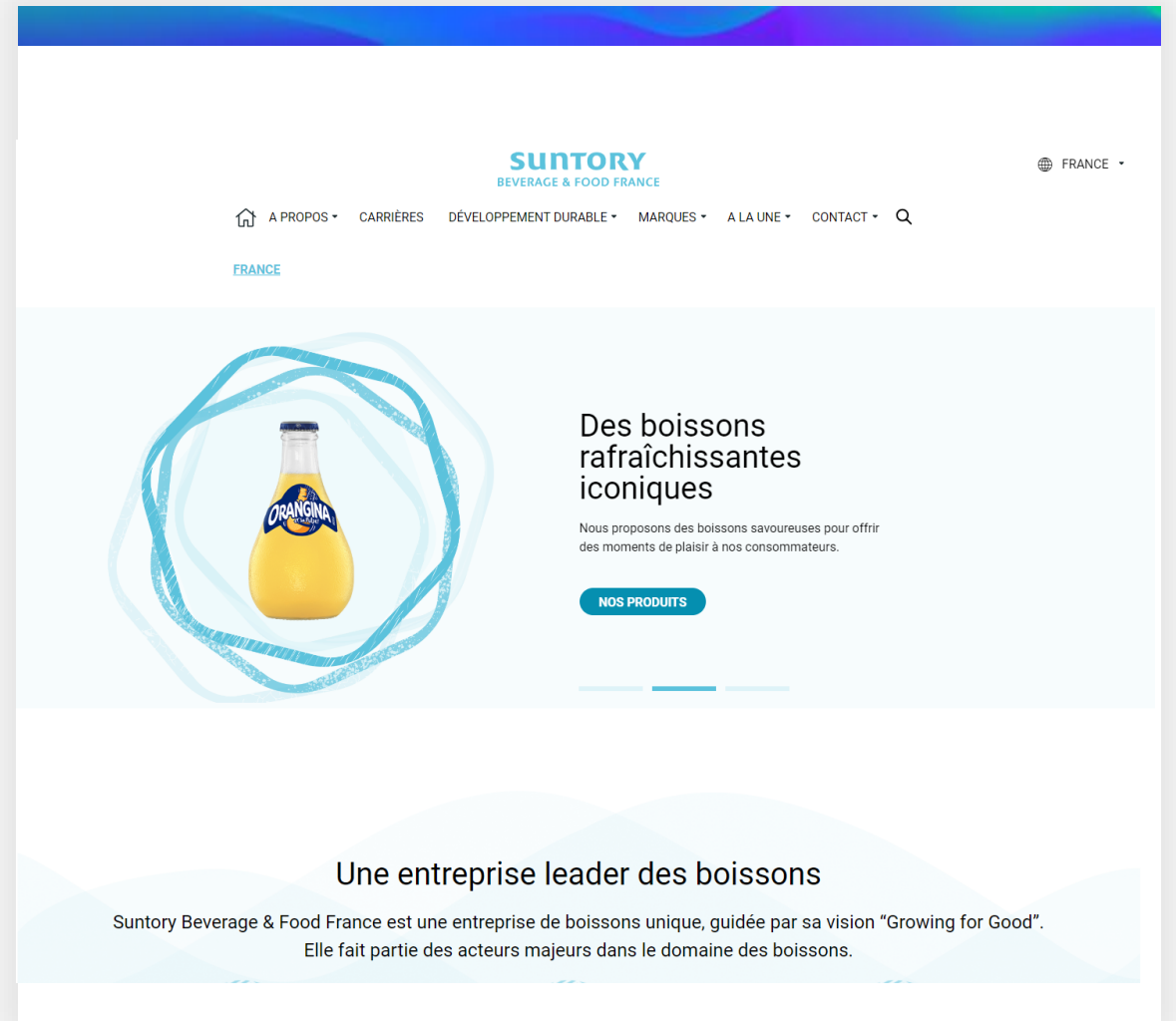
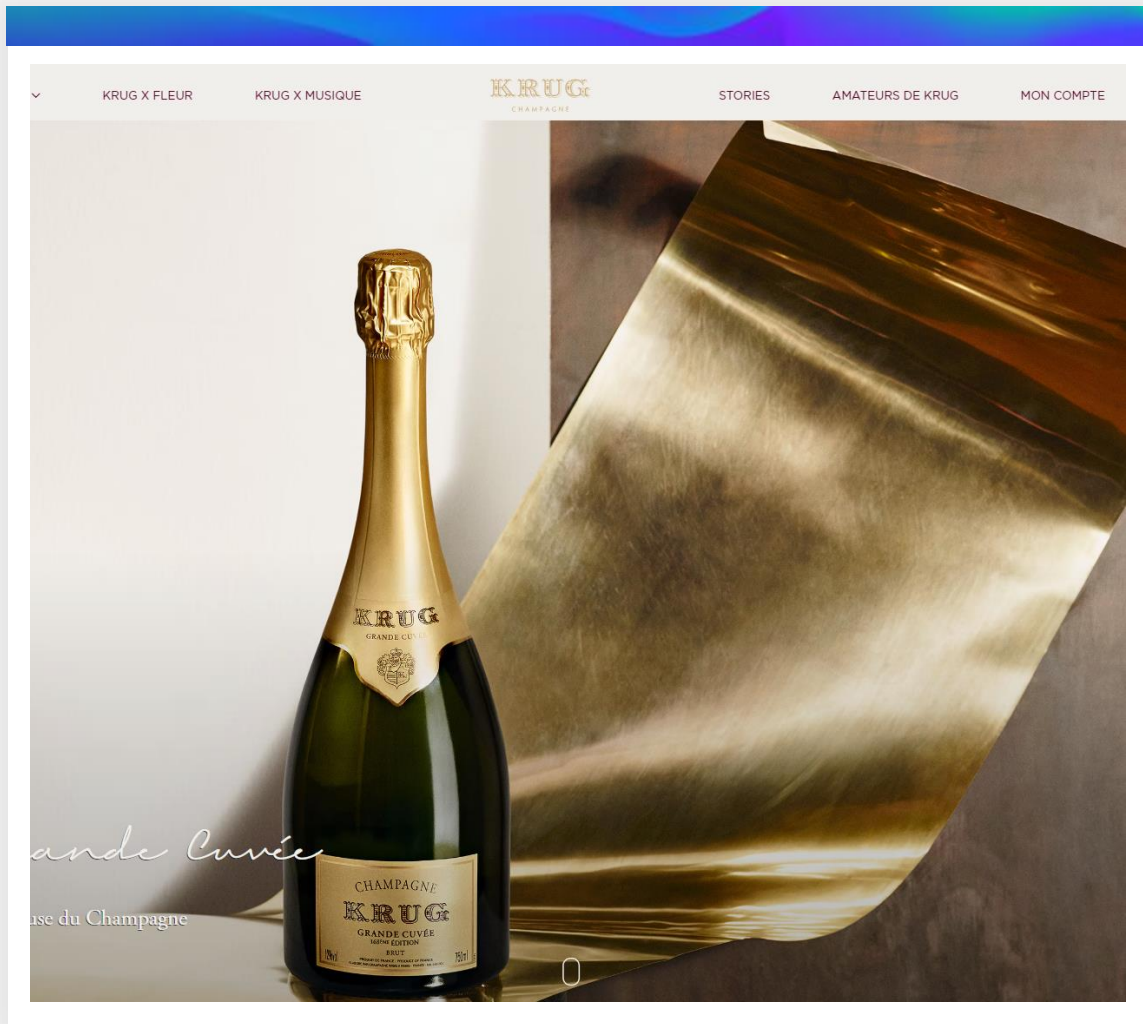
Viz Complete Faster than Target: Viz Complete is faster than 2s  
Experienced Slow Viz Complete: Viz Complete is slower than 3s



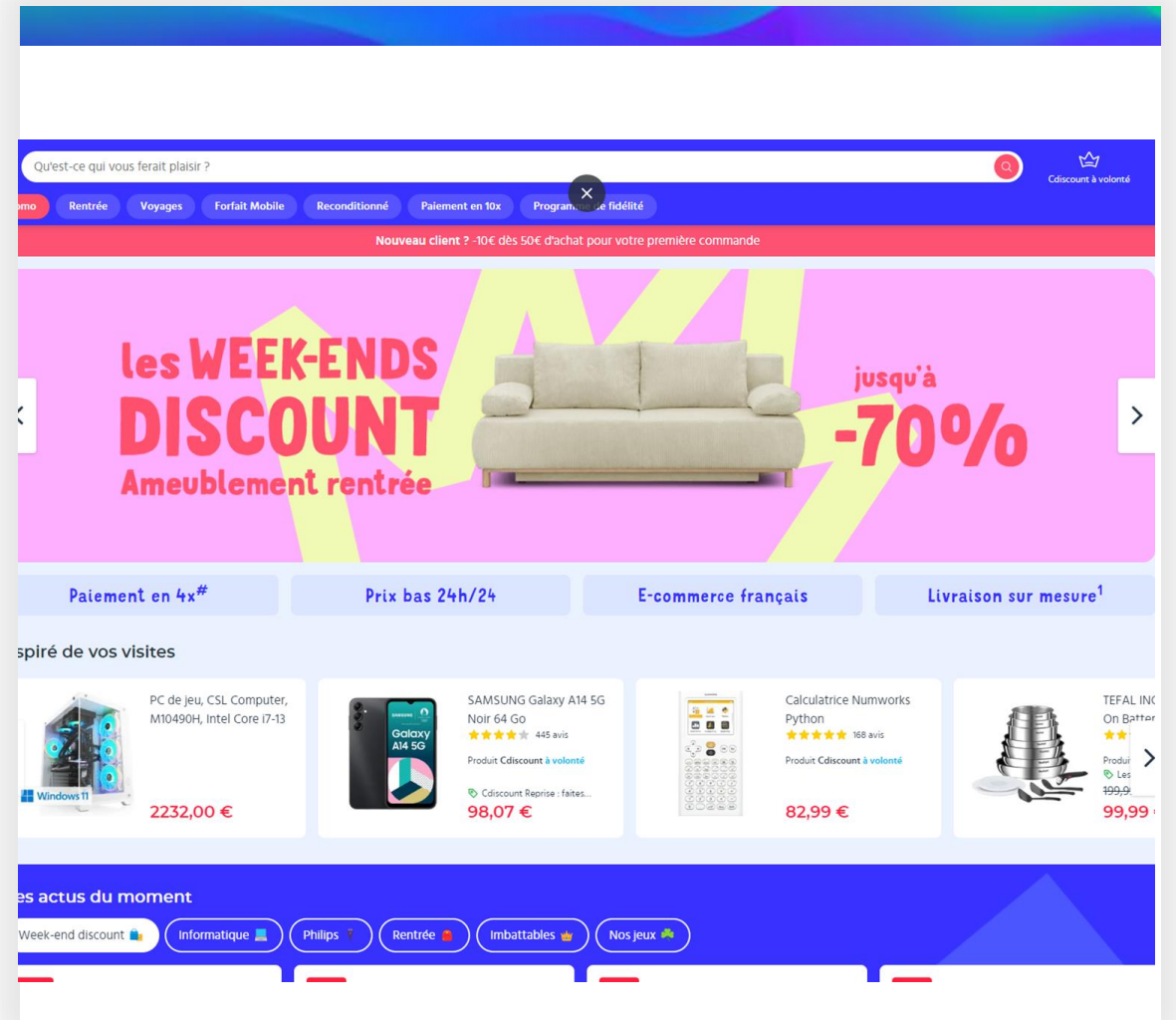
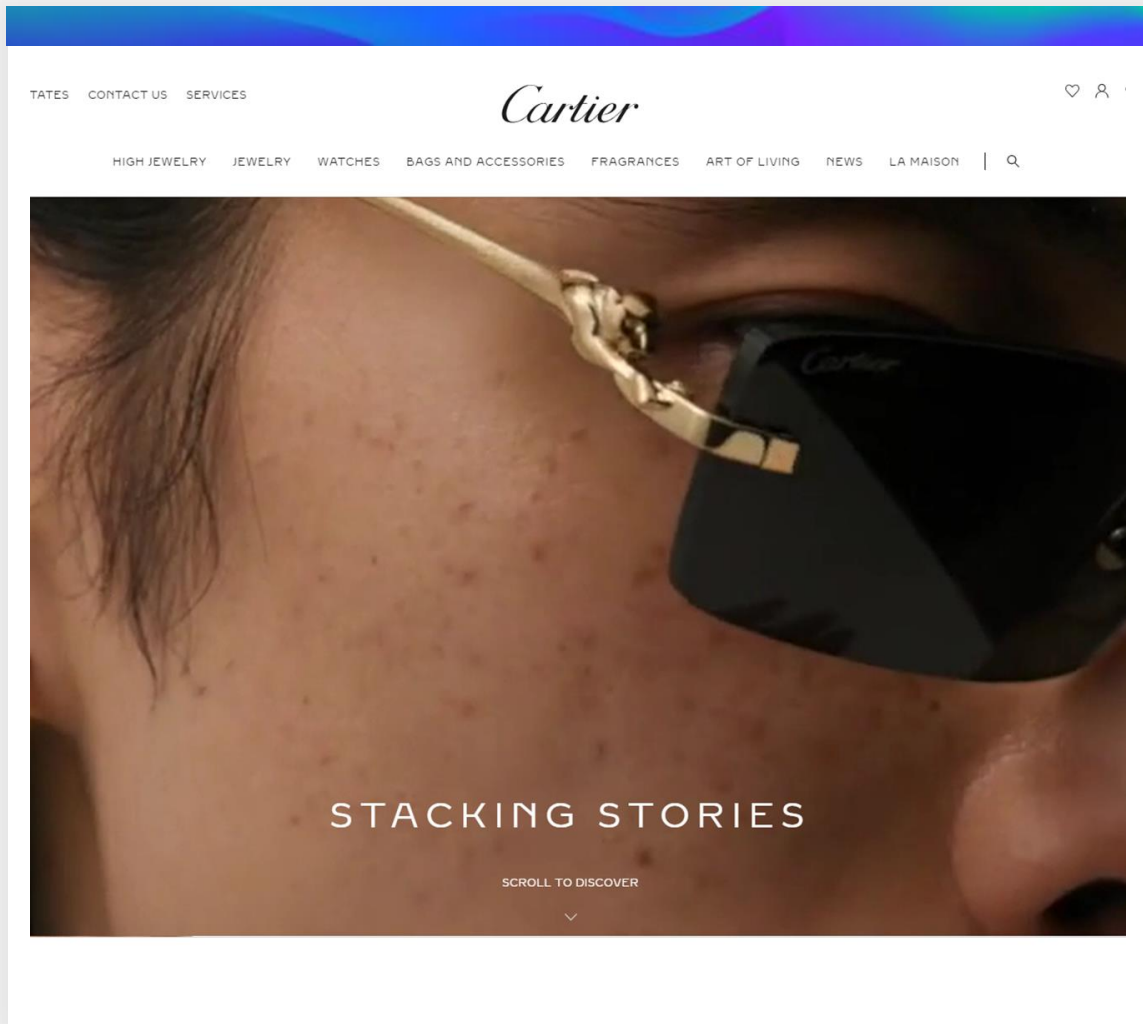


No two websites are the same...

# No two websites are the same...



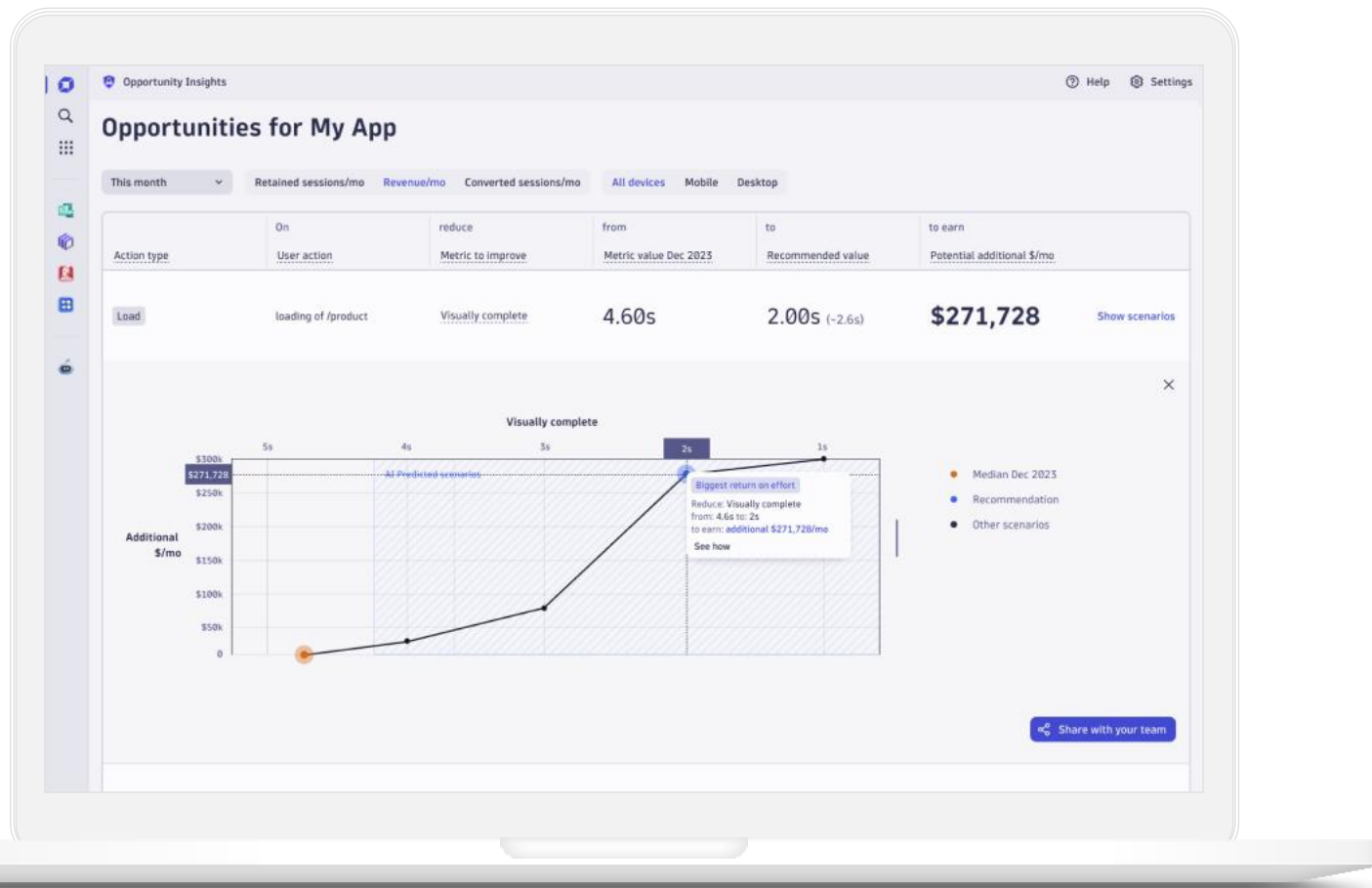
# No two websites are the same...







# Opportunity Insights App



You are losing **8268**  
users per month directly due to slow  
slow performance.

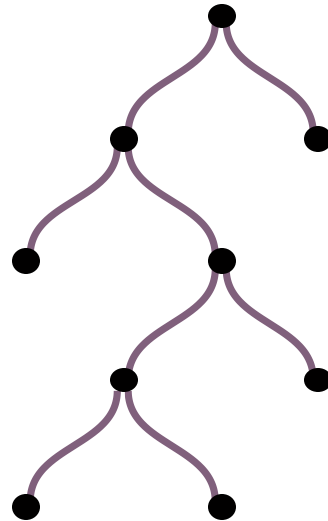
<u>Action type</u>	<u>User action</u>	<u>Metric to improve</u>	<u>Metric value Jul 2024</u>	<u>Recommended value</u>	<u>Potential additional retained sessions/mo</u>
XHR	click on search	<u>Duration</u>	1,240ms	500ms (-740ms)	<b>8268</b> <a href="#">Show scenarios</a>



# How do we do it?



Predictive AI driven by your real user  
user data in context



Hundreds of Millions of Simulations  
Simulations to surface the biggest  
biggest opportunities

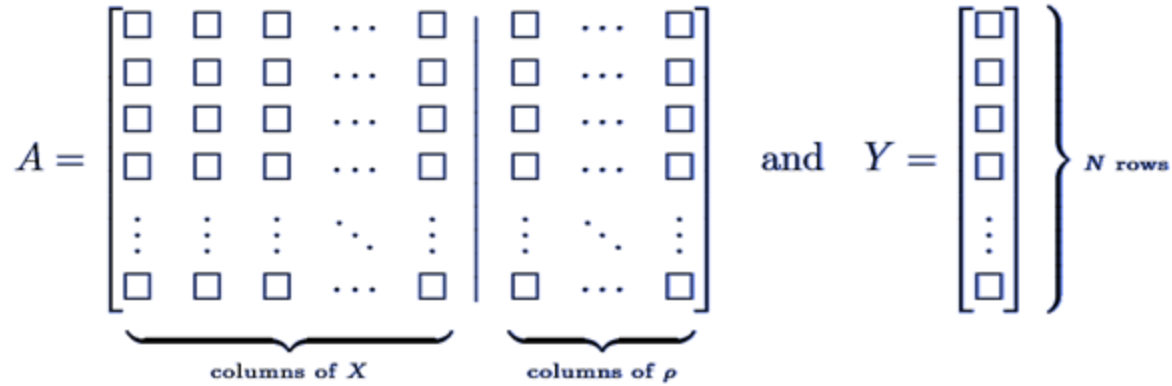


Accurate Behavior Prediction

# Insights AI

How we do it...

# Causal AI model

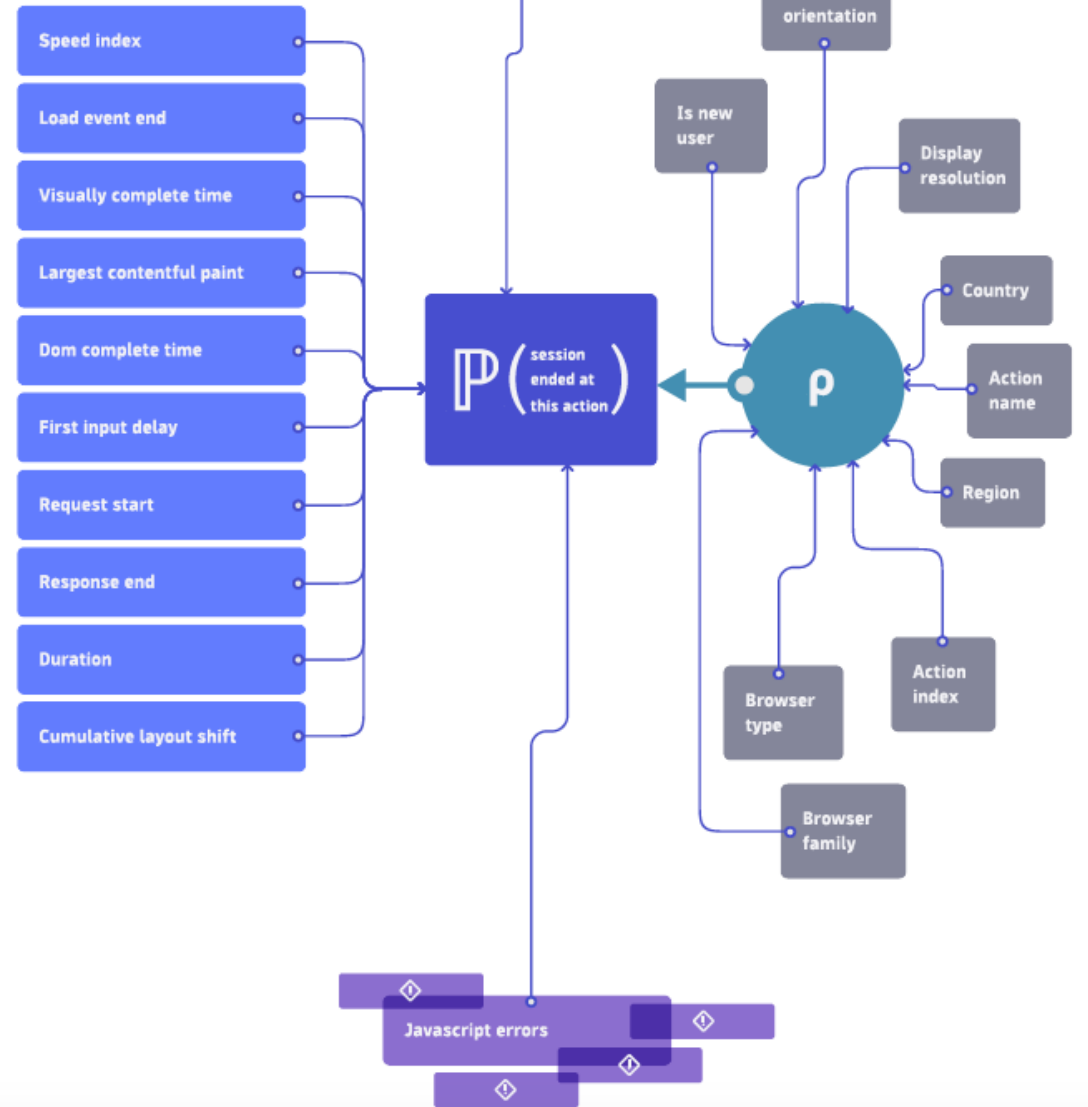


$$\min_{\theta} - \sum_{i=1}^N y_i \log(g(a_i)) + (1 - y_i) \log(1 - g(a_i))$$

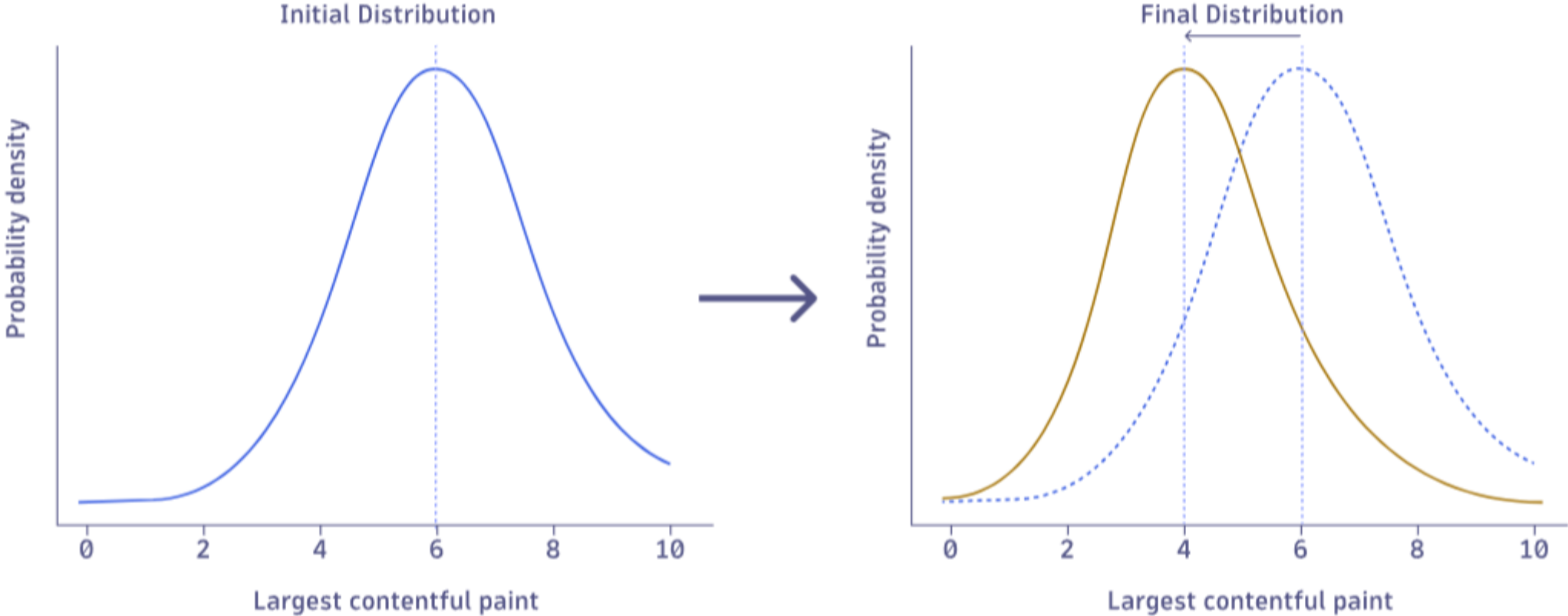
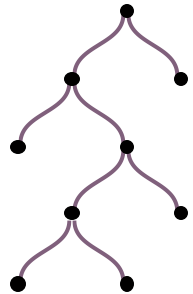
s.t.:

$$g_{\theta} = \sigma \circ f_{\theta}, \quad g_{\theta}(A) = \hat{Y} \text{ and } \frac{\partial g_{\theta}}{\partial x} > 0 \quad \forall x \in X,$$

Performance metrics

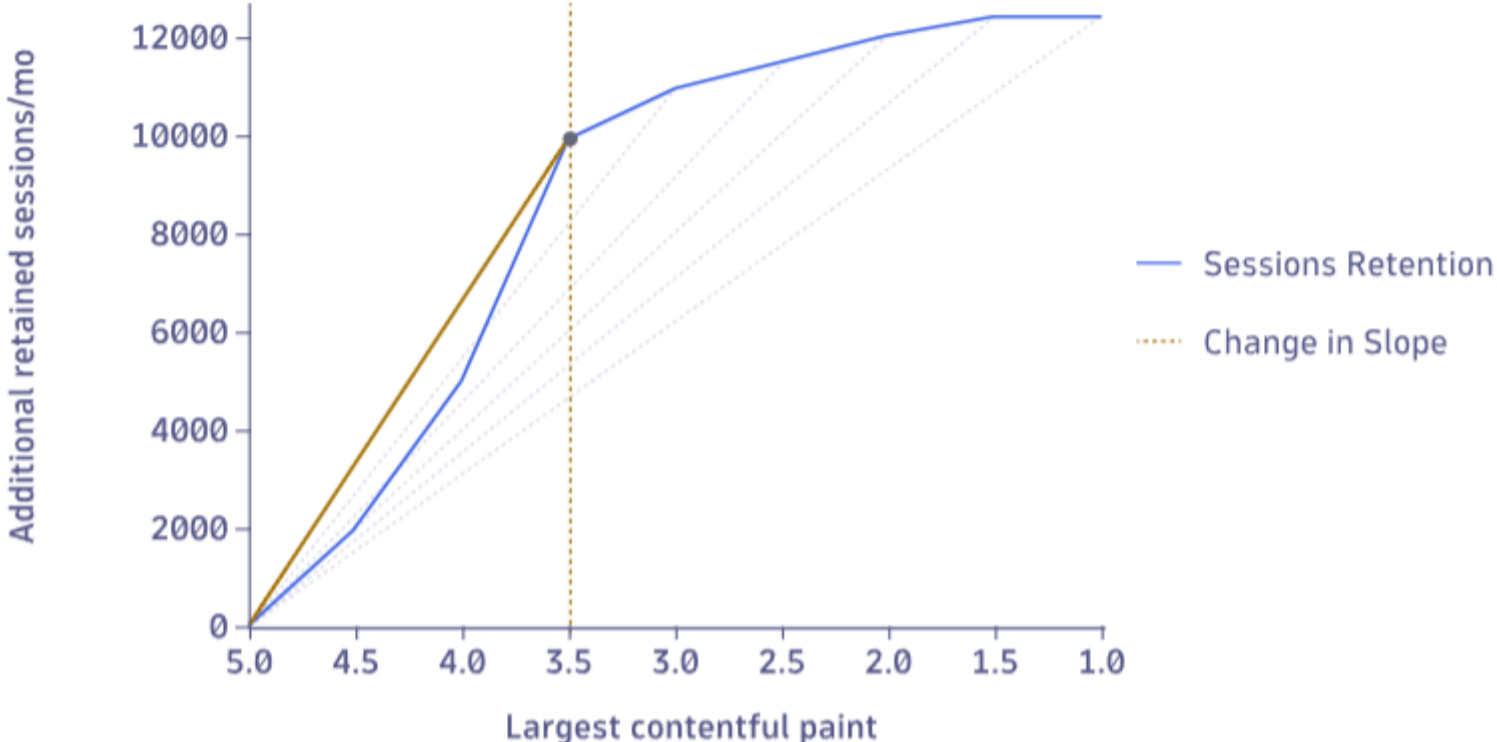
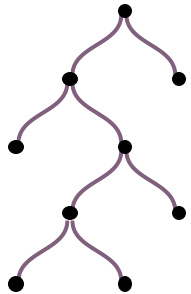


# Monte Carlo simulation



Example of the transformed shape

# Opportunity Ranking

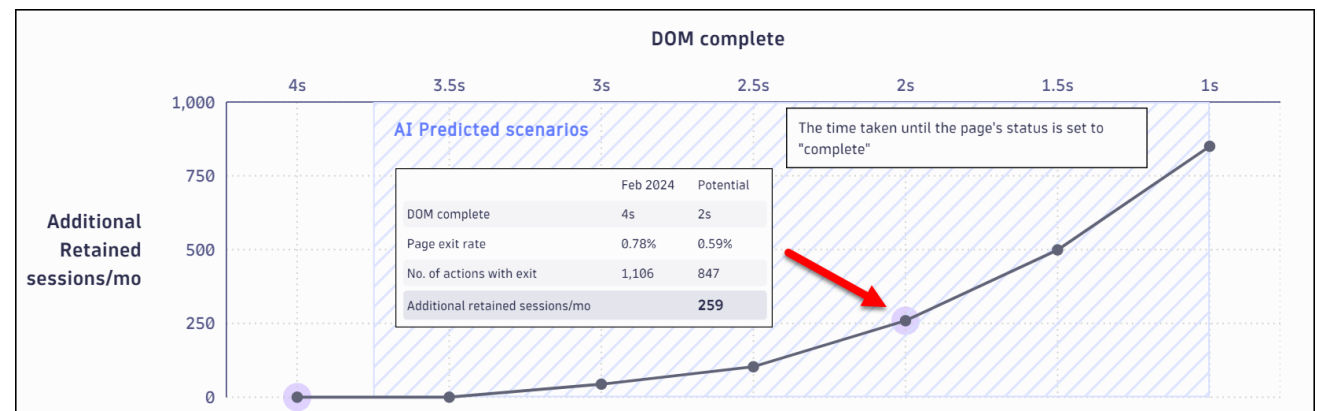
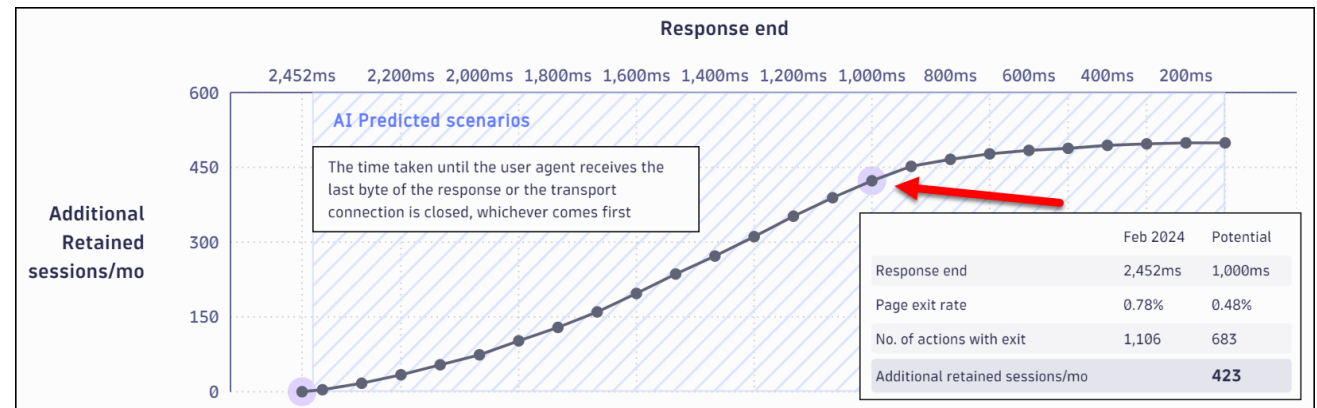
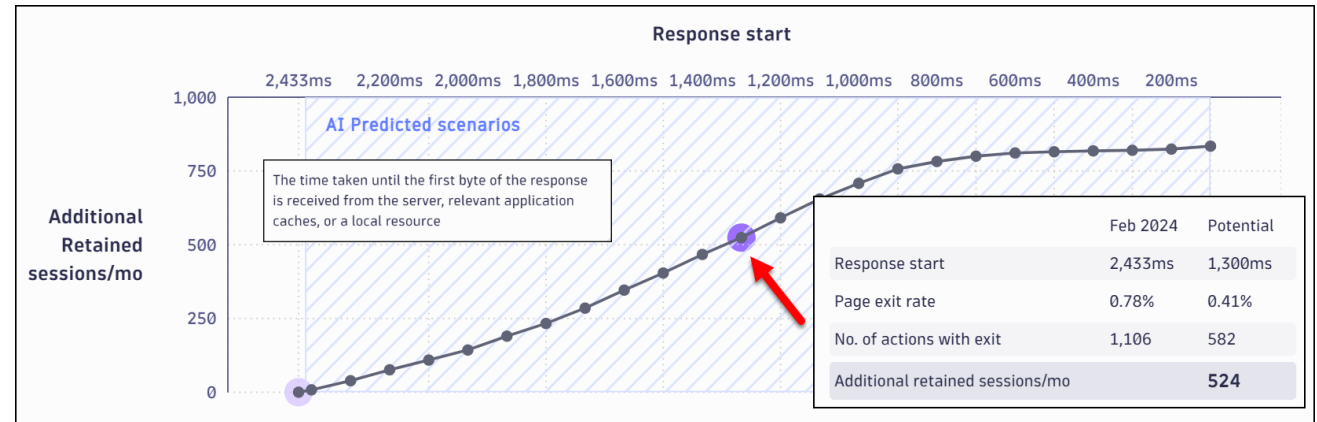


# Deep Dive – Choose Transaction

loading of page XXX

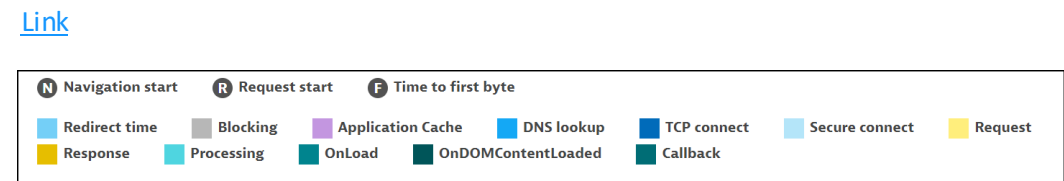
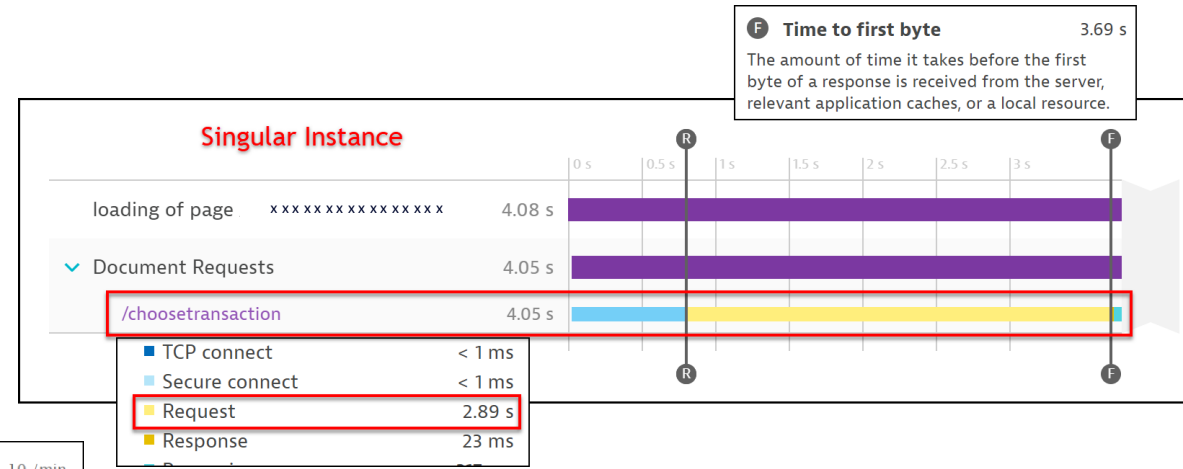
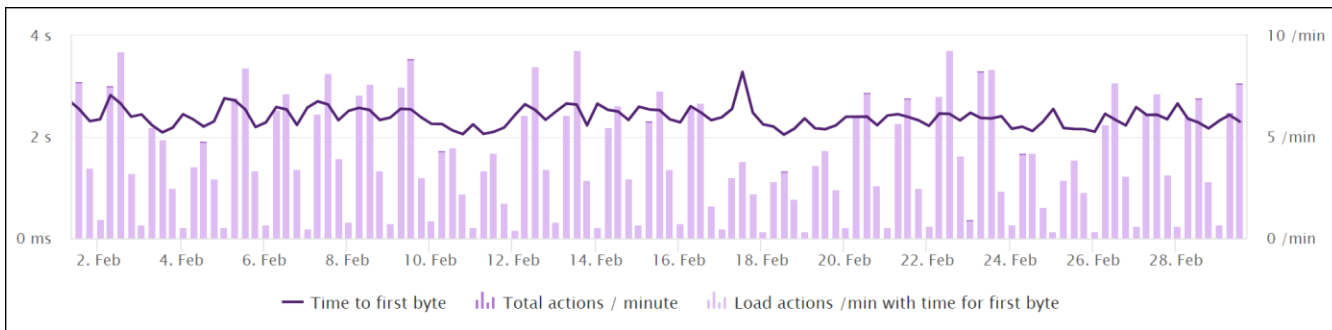
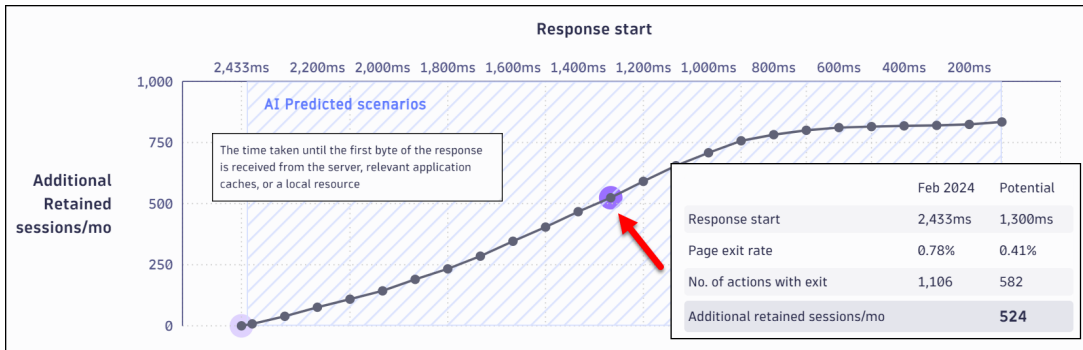
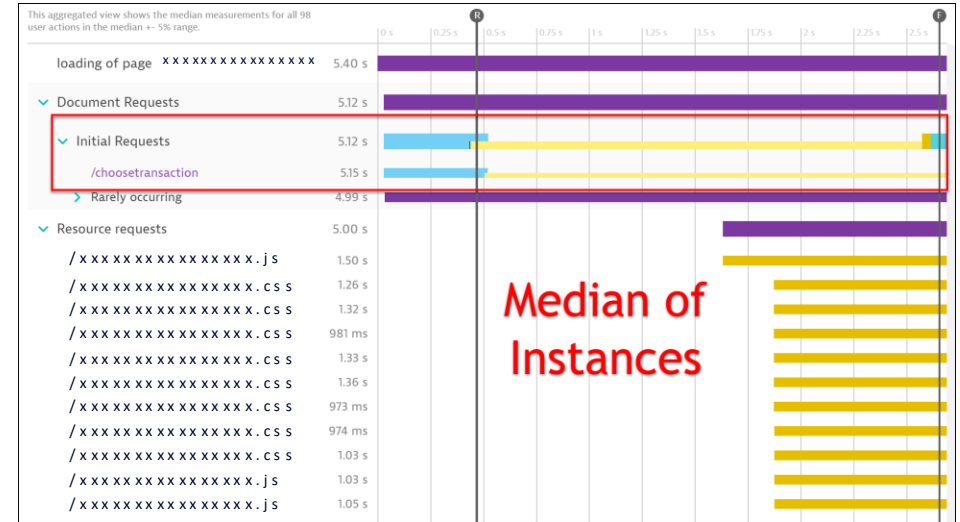
# Choose Transaction - Summary

- The top three areas of focus for Choose Transaction include...
  - Response Start (AKA Time to First Byte)
  - Response End
  - DOM Complete
- The Machine Learning recommended timings for each include...
  - Response Start → 1.3s (from 2.4s)
  - Response End → 1.0s (from 2.4s)
  - DOM Complete → 2.0s (from 4.0s)



# Choose Transaction – Response Start/End Analysis

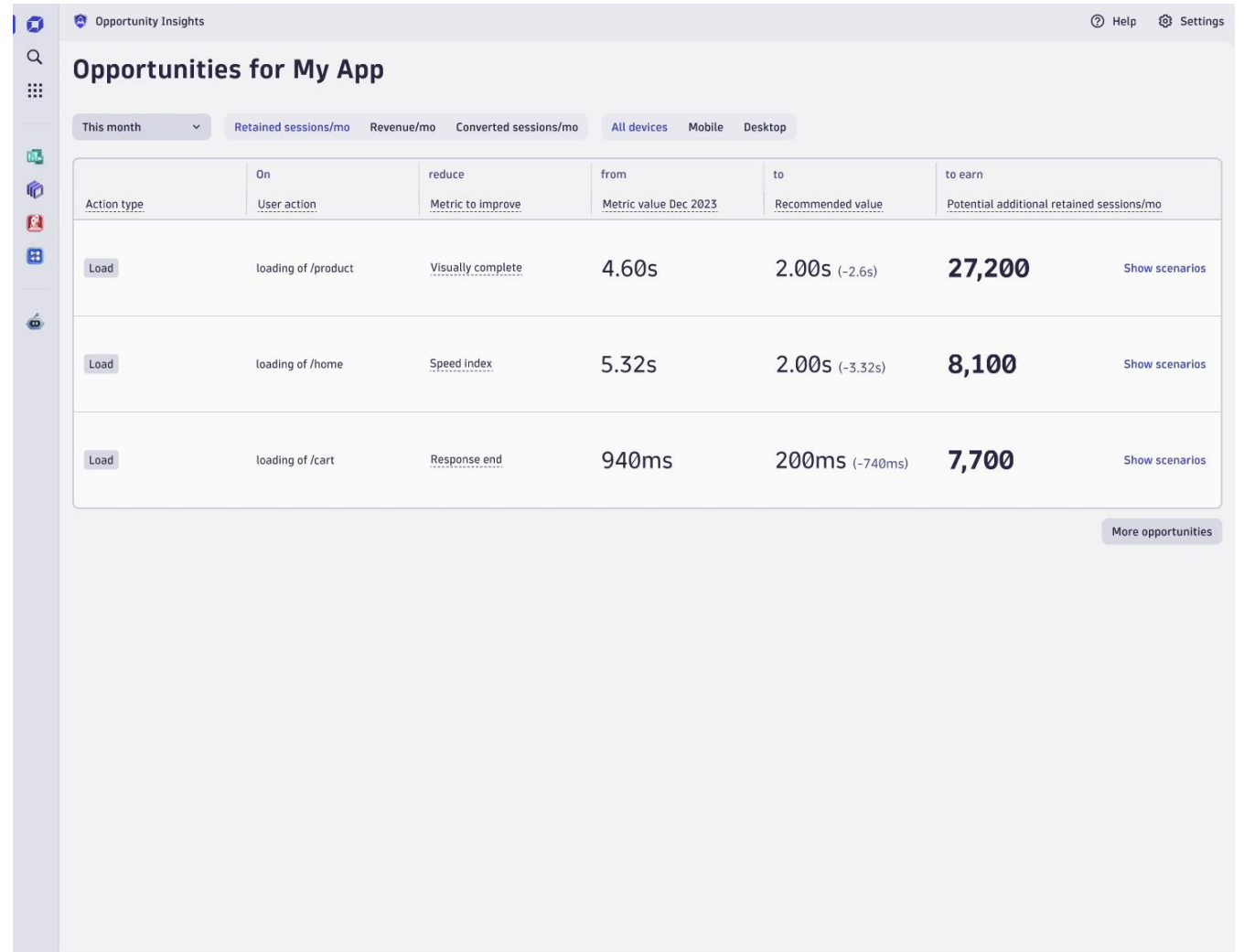
- Response Start/End directly impacted by slower “Request” phase of initial document request
  - Improving backend server response (alongside redirect time) will improve these timings





# Opportunity Insights – Early Praise

- Airline - “This is **exactly what we need** [in our decision-making], connecting application performance and business outcomes”.
- Insurance - “This aligns with the direction we are taking the company, which is to **make decisions based on business impact**”.
- Payment - “Honestly, **this should be driving** where they (the teams) are doing **bug fixes and performance improvements**.”
- Retail – “We have a 3 year plan to make Dynatrace our single observability tool and this data is what we need to **connect our initiatives to our business stakeholders**.”



The screenshot displays the 'Opportunity Insights' dashboard for 'My App'. It features a table with columns for Action type, User action, Metric to improve, Metric value Dec 2023, Recommended value, and Potential additional retained sessions/mo. The table lists three opportunities for load actions: loading of /product, loading of /home, and loading of /cart. Each row includes a 'Show scenarios' link and a 'More opportunities' button at the bottom right.

Action type	On User action	reduce Metric to improve	from Metric value Dec 2023	to Recommended value	to earn Potential additional retained sessions/mo	
Load	loading of /product	Visually complete	4.60s	2.00s (-2.6s)	<b>27,200</b>	Show scenarios
Load	loading of /home	Speed index	5.32s	2.00s (-3.32s)	<b>8,100</b>	Show scenarios
Load	loading of /cart	Response end	940ms	200ms (-740ms)	<b>7,700</b>	Show scenarios

# Performance and errors in context

Opportunity Insights Help Settings

## Opportunities for eCom - Web

This month Retained sessions/mo Revenue/mo Converted sessions/mo All devices Mobile Desktop

Action type	On User action	reduce Metric to improve	from Metric value Dec 2023	to Recommended value	to earn Potential additional retained sessions/mo	
Load	loading of /product	Visually complete	4.60s	2.00s (-2.6s)	<b>27,200</b>	<a href="#">Show scenarios</a>
Load	loading of /home	Speed index	5.32s	2.00s (-3.32s)	<b>8,100</b>	<a href="#">Show scenarios</a>
Load	loading of /cart	Response end	940ms	200ms (-740ms)	<b>7,700</b>	<a href="#">Show scenarios</a>

[More opportunities](#)

## Questions?

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Blog Post



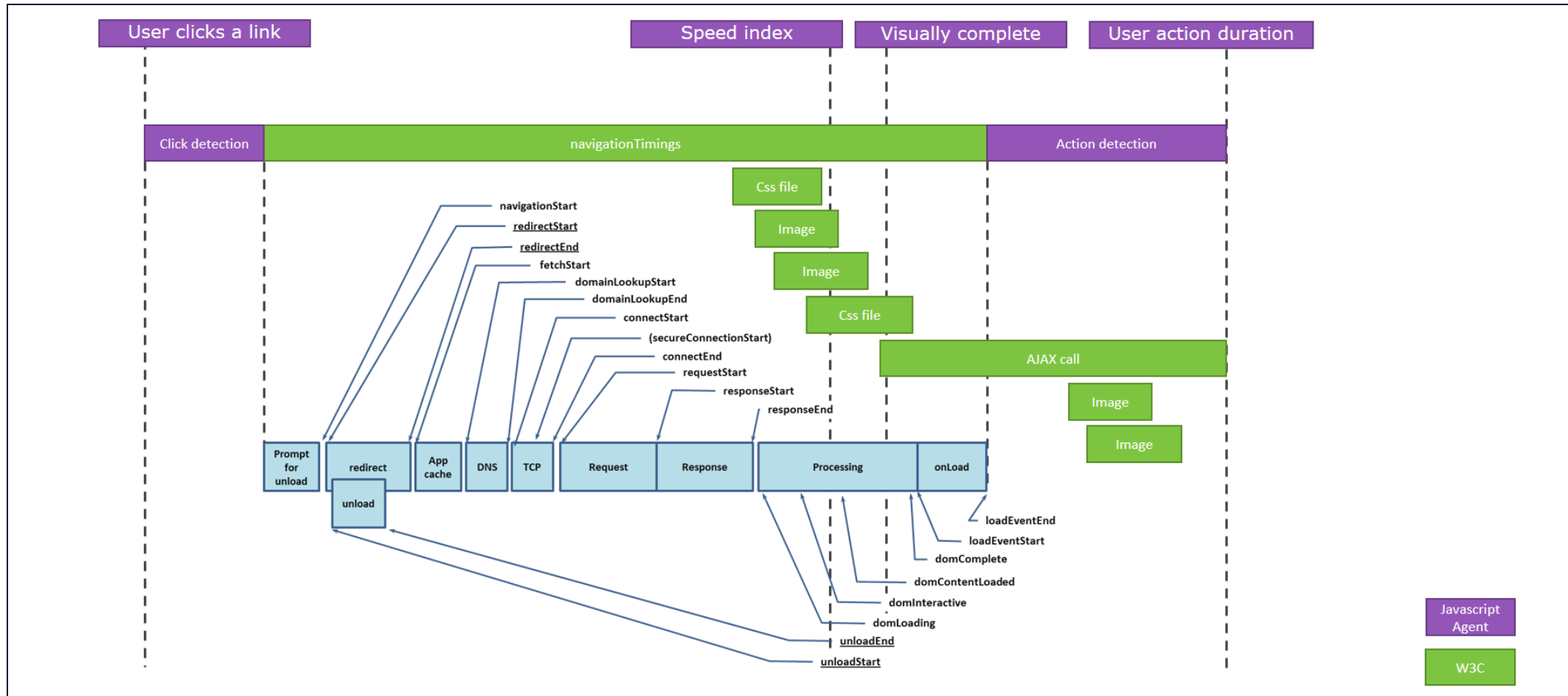
White Paper



CLOUD DONE RIGHT

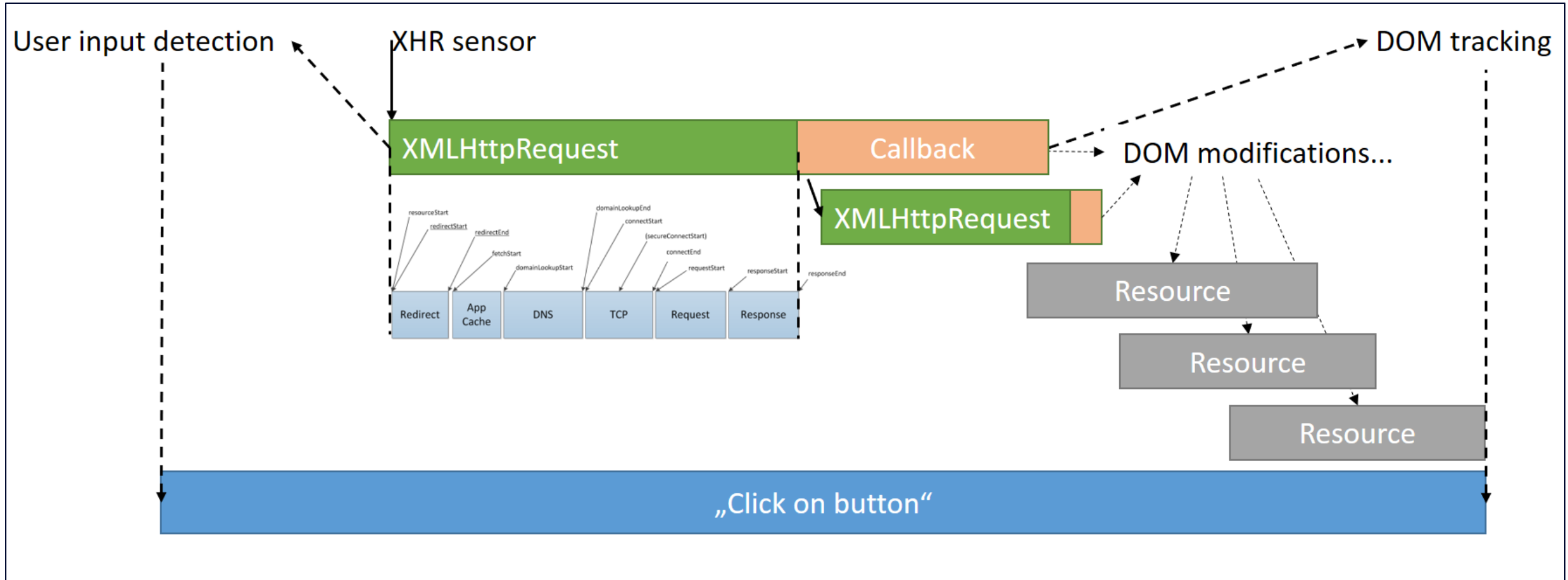
# Appendix – Page Load Cycle

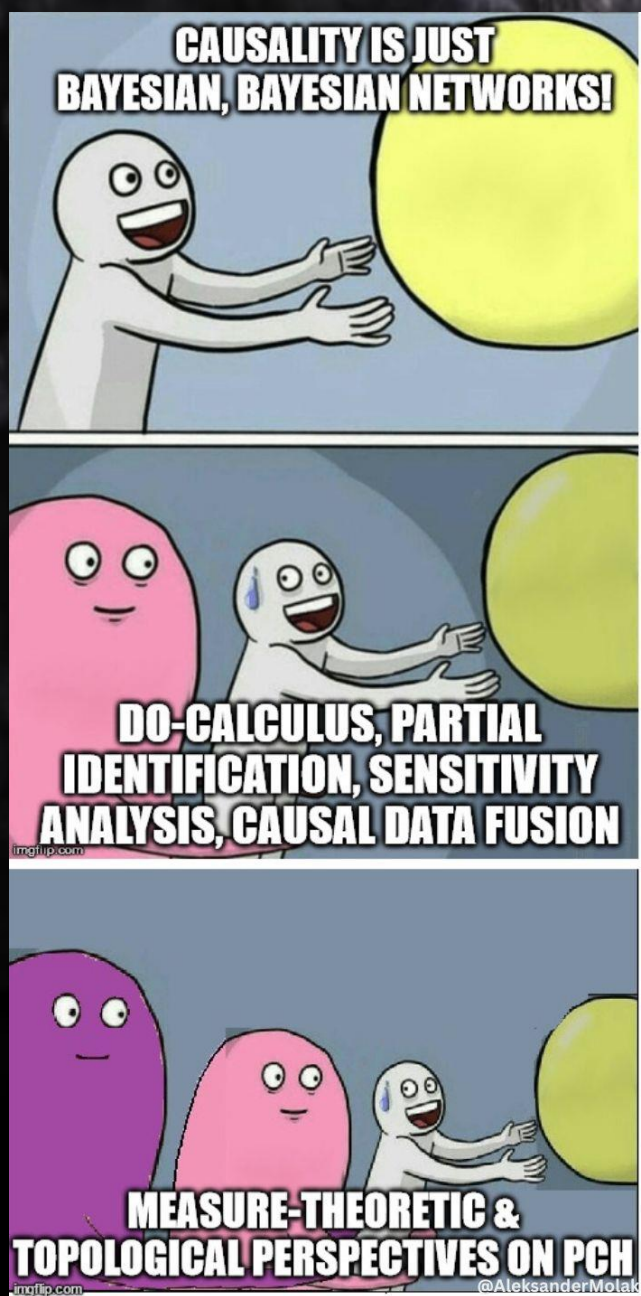
- [Reference Link](#)



# Appendix – XHR Action Cycle

- [Reference Link](#)





Source: Aleksander Molak

