

Opportunity Insights

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



PRESENTER

Guilherme THOMPSON
Sr Mgr, Data Science
@ 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



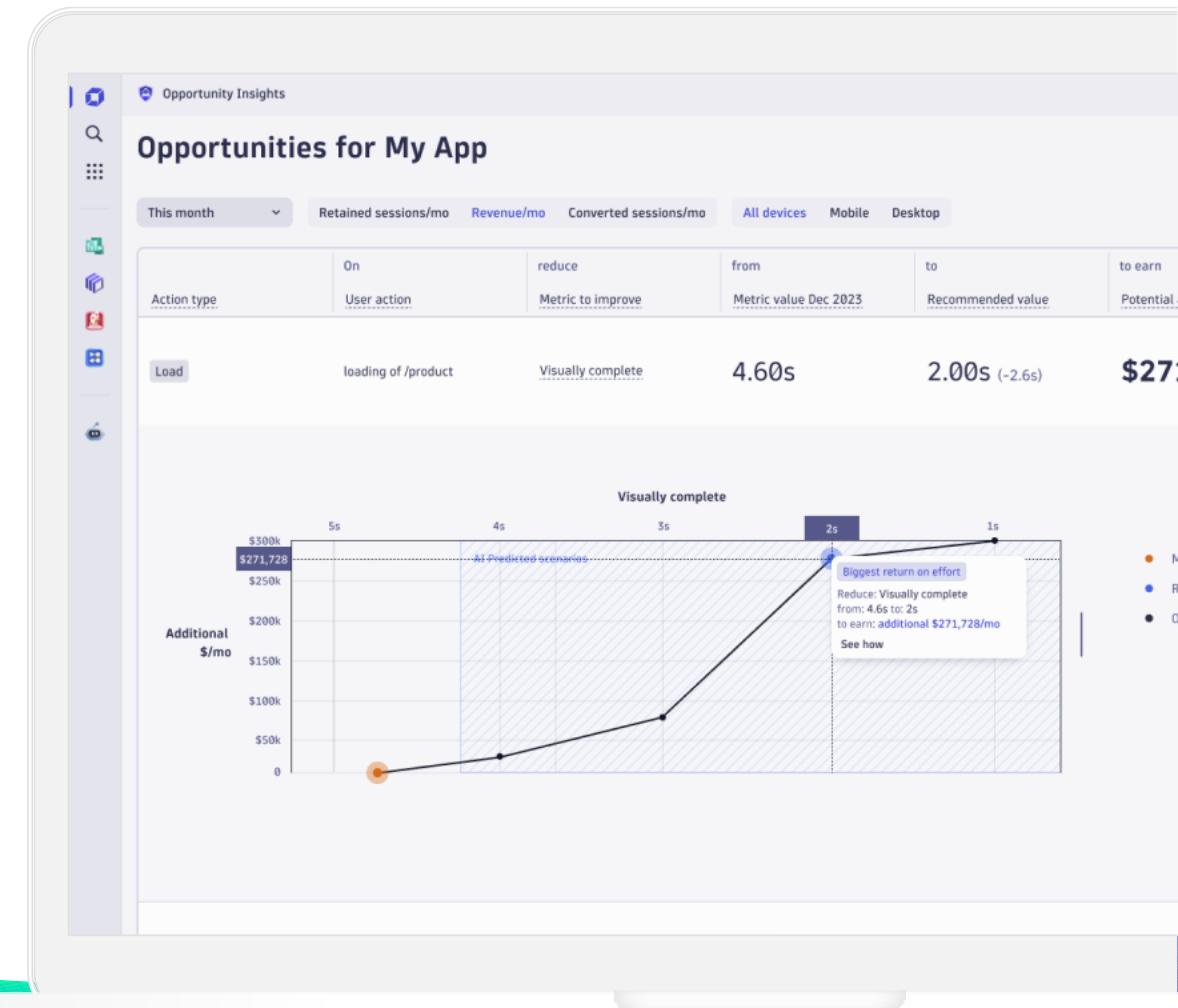
Human Expertise Driving Digital Optimization

Detailed recommendations for optimization driving business outcomes

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

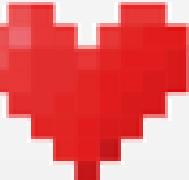
You know performance & errors matter.
Now you'll know how much.

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

Categories Overview AI App & Mobile Data & Measurement Industries Search

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.¹ 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.²

“When load time goes from 3 seconds to 4 seconds, conversion rates decline sharply. If you can shave even one second off of improvement, you’ll experience a 2% increase in conversion.”

Thanks for tuning in to Google I/O! [Watch content on-demand.](#)

web.dev

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

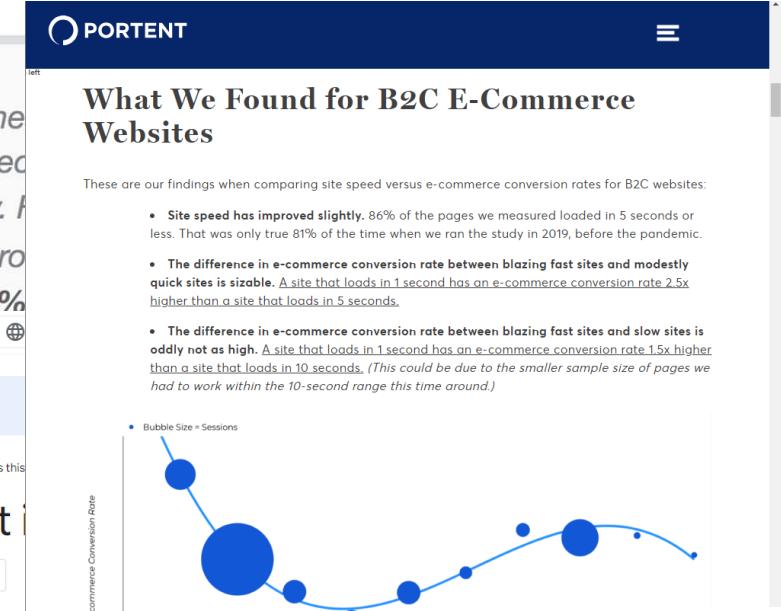
On this page

- 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>



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

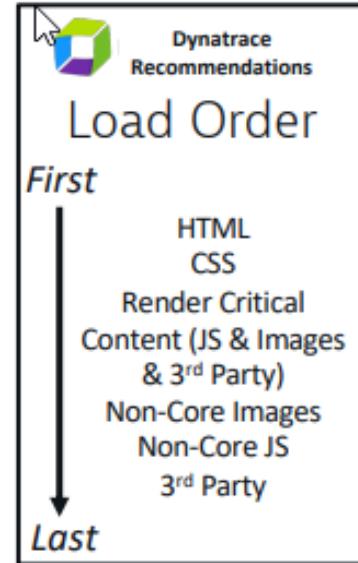
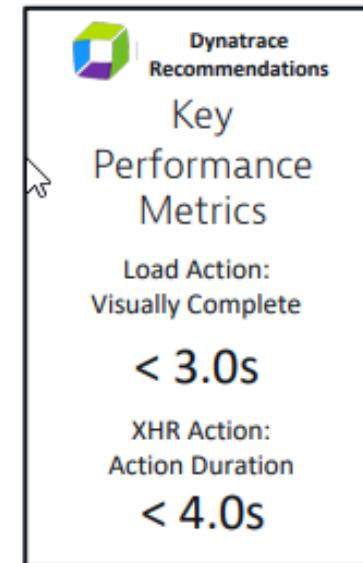
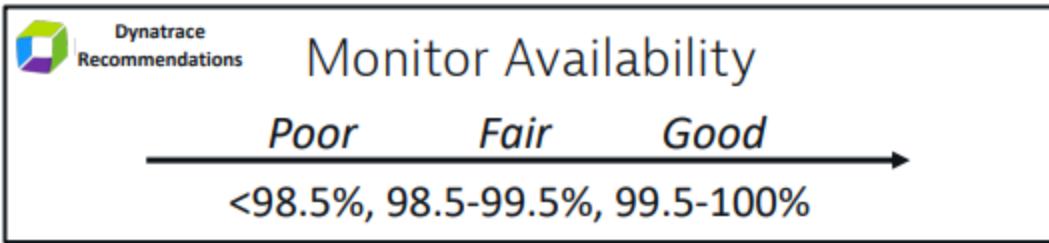
Cumulative Layout Shift

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



Dynatrace Recommendations

Performance

Browser Processing	JS Errors	Resources Request/Response	TTFB	Load Event End	Action Duration
< 1.0s	< 5%	< 200ms	< 500ms	< 4.5s	< 6.0s

Dynatrace Recommendations

Visual Metrics

Speed Index	Visually Complete	Largest Contentful Paint
< 2.0s	< 3.0s	< 2.5s



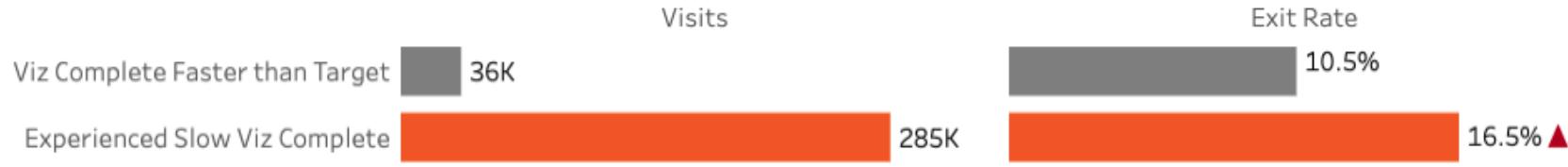
Dynatrace Recommendations

Page Construction

Desktop	Mobile
100	1MB
Request count	Transfer size
50	500kB
Request count	Transfer size

Even Business Insights ...

DESKTOP



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

MOBILE



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)

TABLET



▲ 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



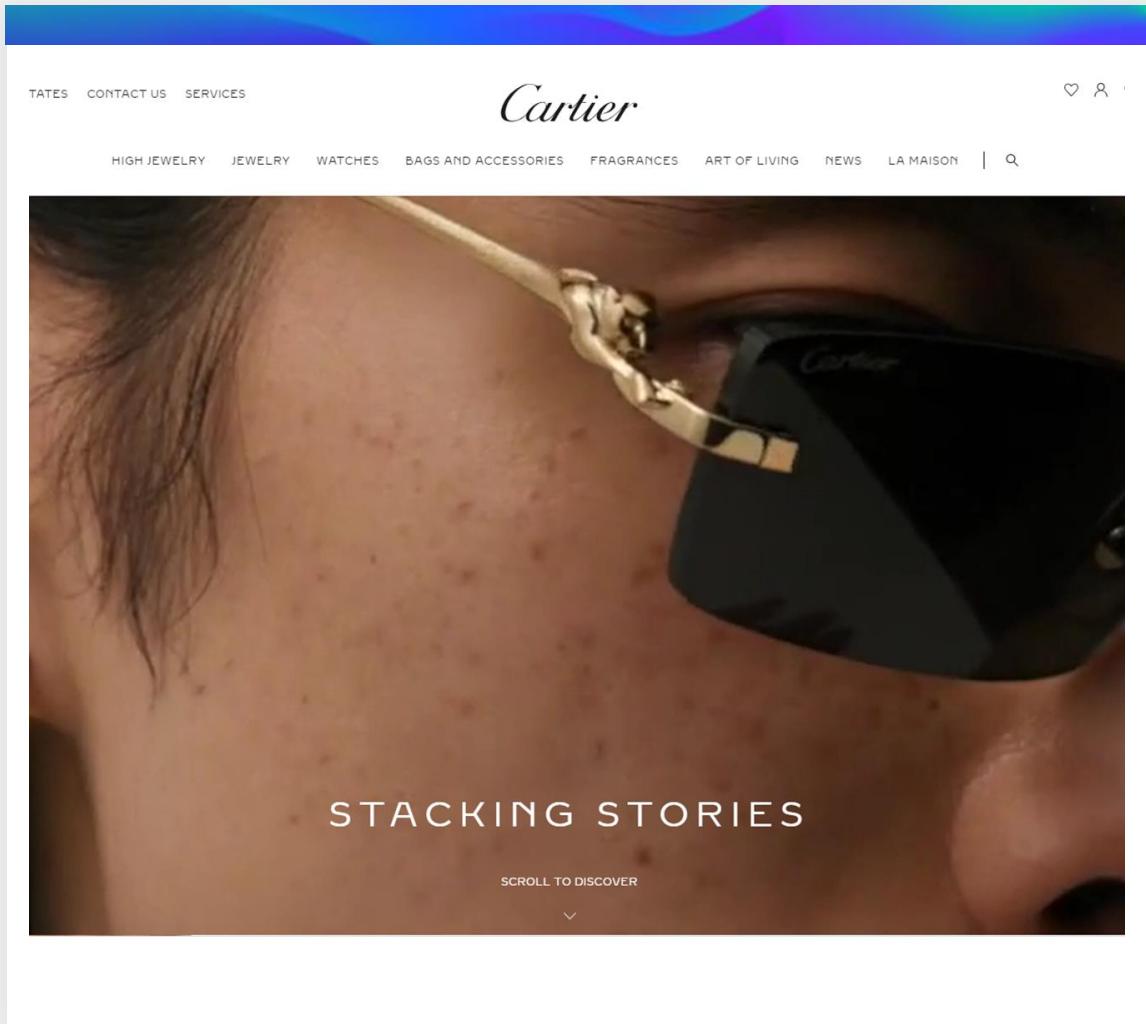
No two websites are the same...

No two websites are the same...

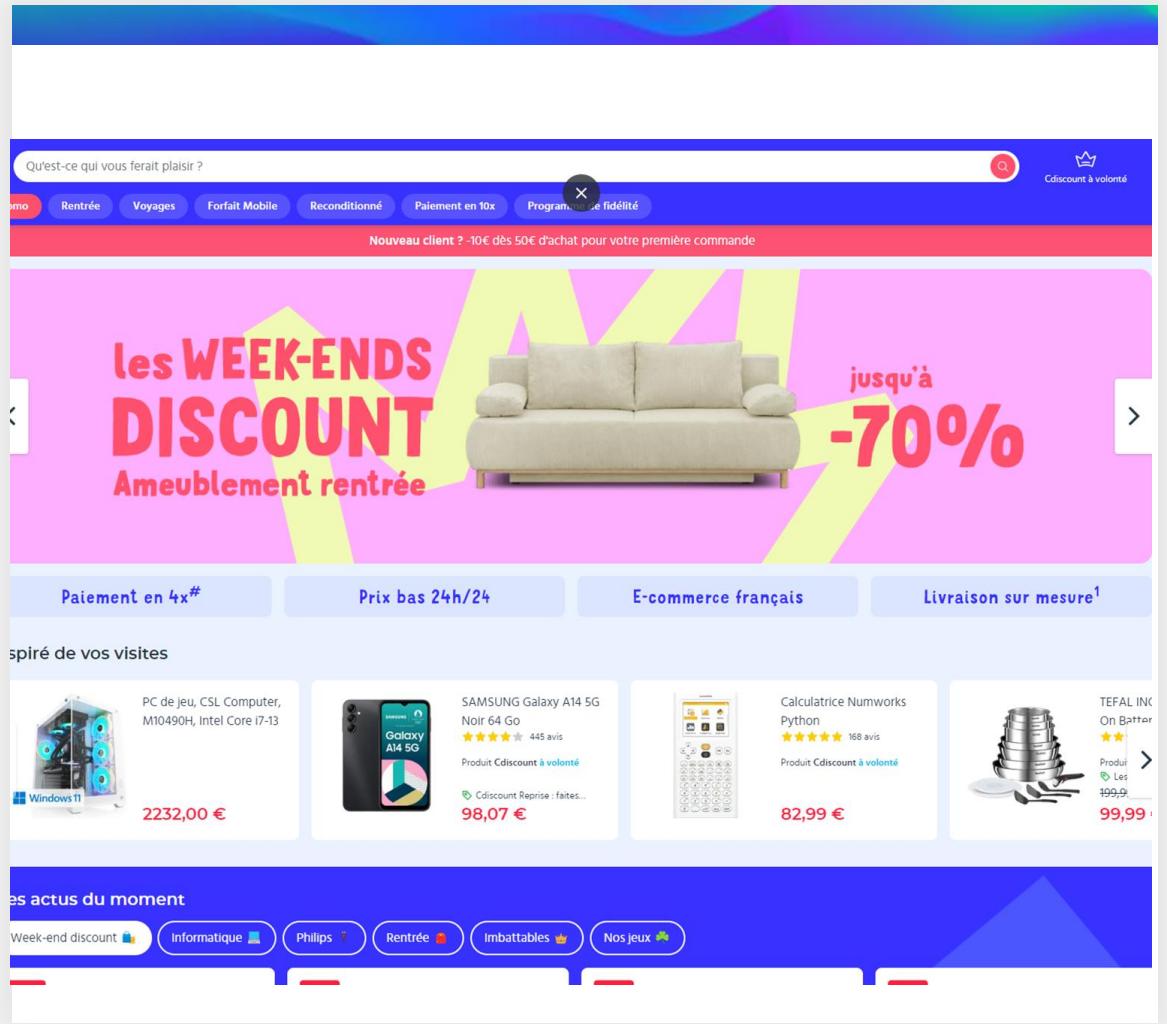
The screenshot shows the Krug website homepage. At the top, there's a navigation bar with links for "KRUG X FLEUR", "KRUG X MUSIQUE", the Krug logo, "STORIES", "AMATEURS DE KRUG", and "MON COMPTE". The main visual features a bottle of Krug Grande Cuvée Champagne next to a large, shiny sheet of gold foil. The background has a blue-to-white gradient header. A small "andé Cuvee" watermark is visible in the bottom left corner.

The screenshot shows the Suntory Beverage & Food France website homepage. The header includes the Suntory logo, "BEVERAGE & FOOD FRANCE", and a "FRANCE" dropdown menu. Below the header, there's a navigation bar with links for "A PROPOS", "CARRIÈRES", "DÉVELOPPEMENT DURABLE", "MARQUES", "A LA UNE", "CONTACT", and a search icon. A "FRANCE" section is highlighted. The main content features a bottle of Orangina inside a stylized blue hexagonal frame. To the right, the text reads "Des boissons rafraîchissantes iconiques" and "Nous proposons des boissons savoureuses pour offrir des moments de plaisir à nos consommateurs.", followed by a "NOS PRODUITS" button. The footer contains the text "Une entreprise leader des boissons", "Suntory Beverage & Food France est une entreprise de boissons unique, guidée par sa vision "Growing for Good".", and "Elle fait partie des acteurs majeurs dans le domaine des boissons.".

No two websites are the same...



The Cartier website features a large, close-up photograph of a woman's neck and shoulder. A Cartier bracelet is visible on her wrist. The background is a warm, golden color. The Cartier logo is prominently displayed at the top left. The navigation bar includes links for TATES, CONTACT US, SERVICES, HIGH JEWELRY, JEWELRY, WATCHES, BAGS AND ACCESSORIES, FRAGRANCES, ART OF LIVING, NEWS, LA MAISON, and a search icon. Below the photo, the text "STACKING STORIES" is displayed.



The Cdiscount website has a vibrant pink and yellow promotional banner at the top. It features the text "les WEEK-ENDS DISCOUNT Ameublement rentrée" and "jusqu'à -70%". Below the banner, there are sections for "Paiement en 4x#", "Prix bas 24h/24", "E-commerce français", and "Livraison sur mesure¹". There are also sections for "spiré de vos visites" and "les actus du moment". The footer includes a navigation bar with links for Week-end discount, Informatique, Philips, Rentrée, Imbattables, and Nos jeux.

w e

yearn care
desire
embrace

honor support
devote defend
glorify like
admirer

treasure
crave
uplift
like
uphold

cherish
dote
uplift
delight
respect

trust
comfort
fond

adore
hold
enjoy

love
hug
revere
savor

speed
protect
fancy

CONFIDENTIAL



Opportunity Insights App

Opportunity Insights

Opportunities for My App

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

Action type	On	reduce	from	to	to earn
	User action	Metric to improve	Metric value Dec 2023	Recommended value	Potential additional \$/mo
Load	loading of /product	Visually complete	4.60s	2.00s (~2.6s)	\$271,728

Show scenarios

Visually complete

Additional \$/mo

\$300k
\$250k
\$200k
\$150k
\$100k
\$50k
0

5s 4s 3s 2s 1s

Median Dec 2023
Recommendation
Other scenarios

Share with your team

The screenshot displays the 'Opportunities for My App' section of the Opportunity Insights App. At the top, there are filters for 'This month', 'Retained sessions/mo', 'Revenue/mo', 'Converted sessions/mo', 'All devices', 'Mobile', and 'Desktop'. Below this is a table with columns for 'Action type', 'On', 'reduce', 'from', 'to', and 'to earn'. A single row is shown for 'Load' on 'loading of /product', reducing 'Visually complete' from 4.60s to 2.00s (~2.6s), resulting in a potential additional earning of '\$271,728'. A 'Show scenarios' button is next to this row. Below the table is a chart titled 'Visually complete' with an x-axis from 5s to 1s and a y-axis from \$0 to \$300k. It shows a curve starting at (5s, ~\$20k) and ending at (1s, ~\$271,728). A blue dot on the curve is labeled 'Recommendation'. Other points on the curve are labeled 'Median Dec 2023' (orange dot at ~\$20k) and 'Other scenarios' (black dots at ~\$50k and ~\$75k). A tooltip for the recommendation point says: 'Biggest return on effort: Reduce: Visually complete from: 4.6s to: 2s to earn: additional \$271,728/mo See how'. At the bottom right of the chart area is a 'Share with your team' button.



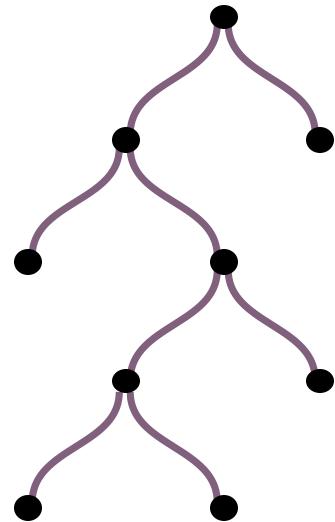
You are losing **8268**
users per month directly due to slow
slow performance.

Action type	User action	Metric to improve	Metric value Jul 2024	Recommended value	Potential additional retained sessions/mo
XHR	click on search	Duration	1,240ms	500ms (-740ms)	8268

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...

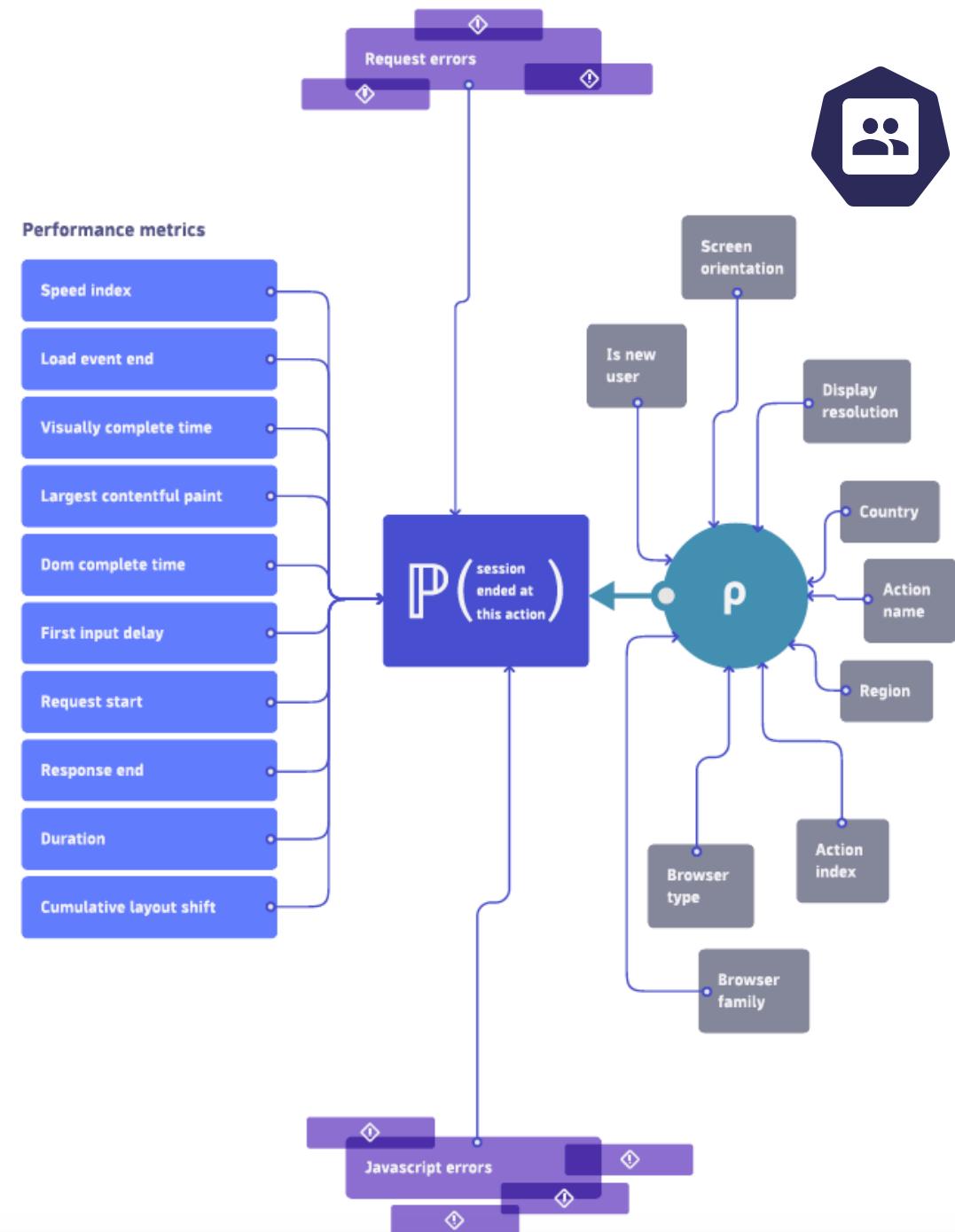
Causal AI model

$$A = \left[\begin{array}{c|c} \text{columns of } X & \text{columns of } \rho \\ \hline \cdots & \cdots \end{array} \right] \quad \text{and} \quad Y = \left[\begin{array}{c} \cdots \\ \vdots \\ \cdots \end{array} \right] \quad \text{N rows}$$

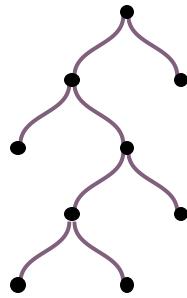
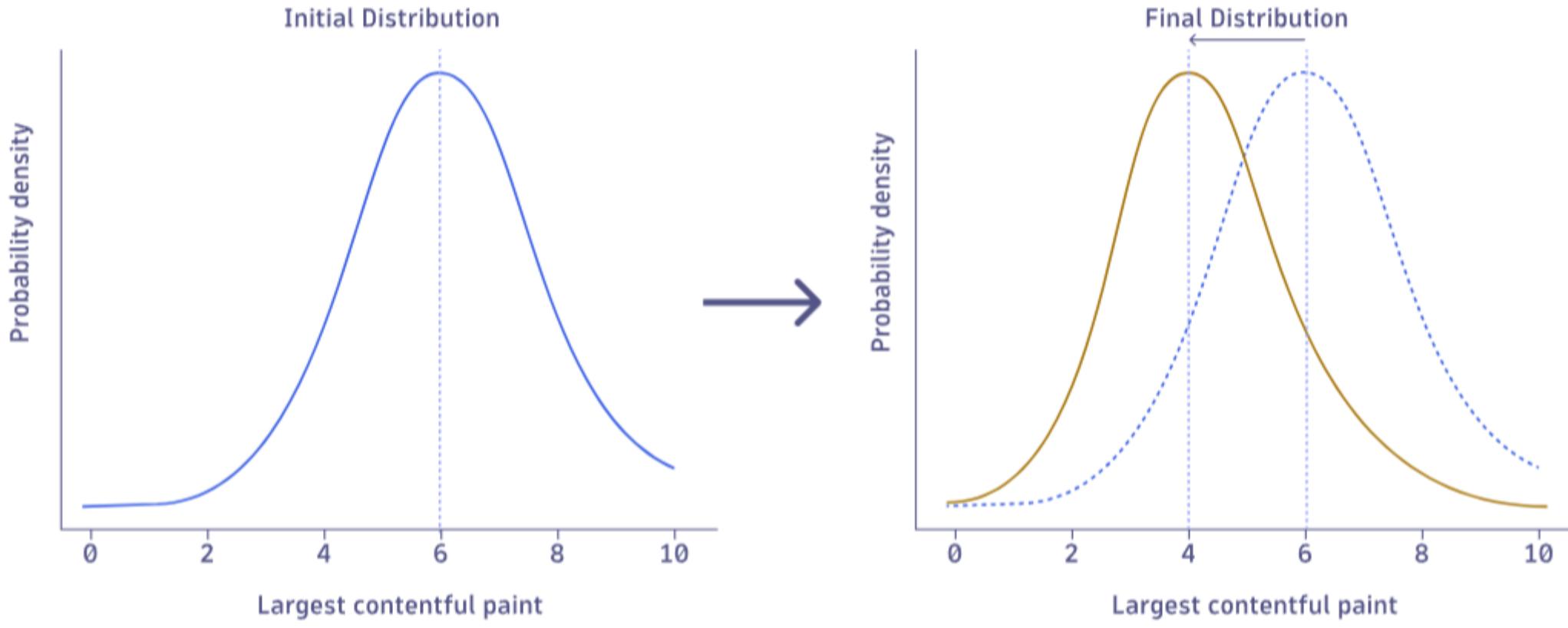
$$\min_{\theta} - \sum_{i=1}^N y_i \log(g(a_i)) + (1 - y_i) \log(1 - g(a_i))$$

s.t.:

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

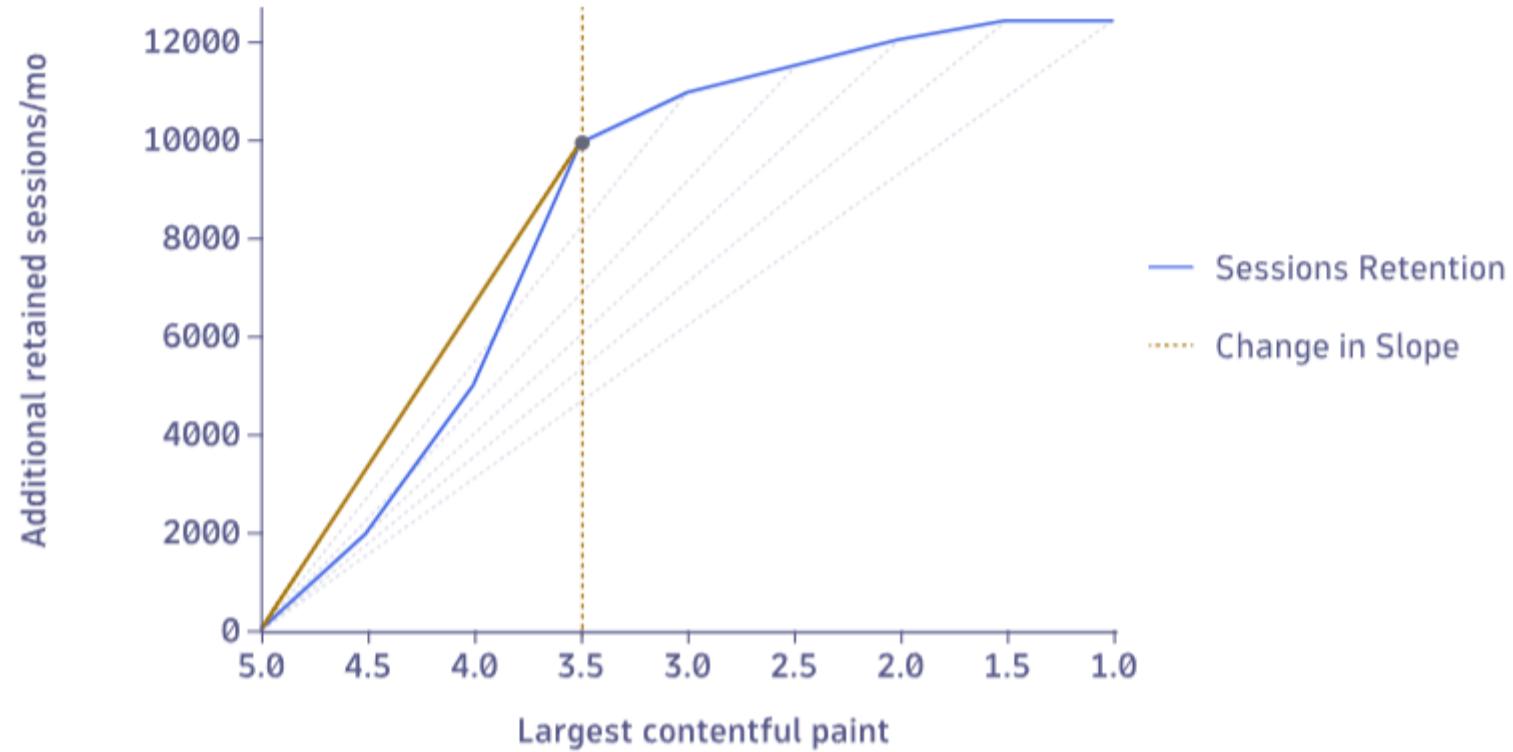
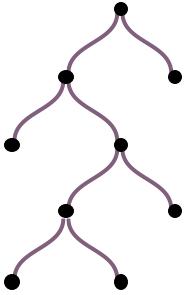


Monte Carlo simulation



Opportunity Ranking

CONFIDENTIAL

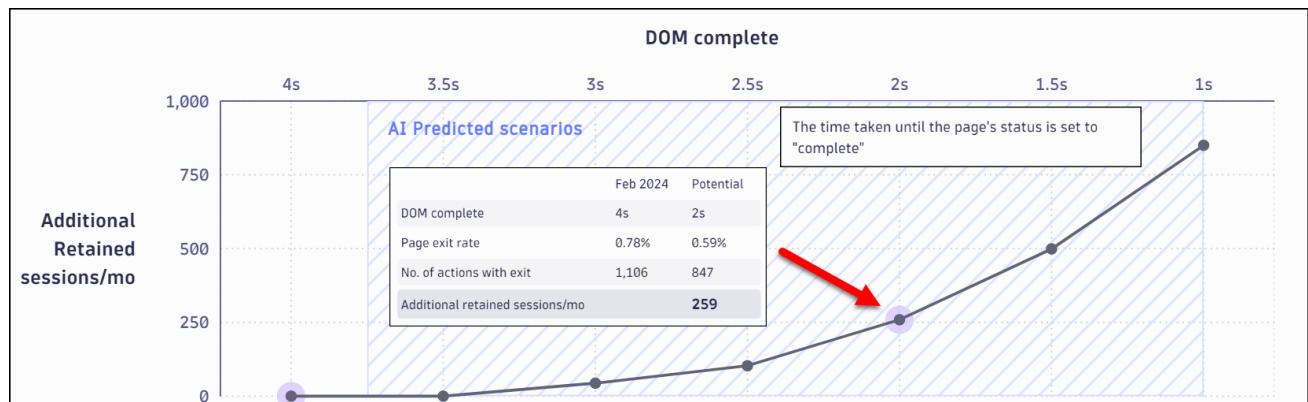
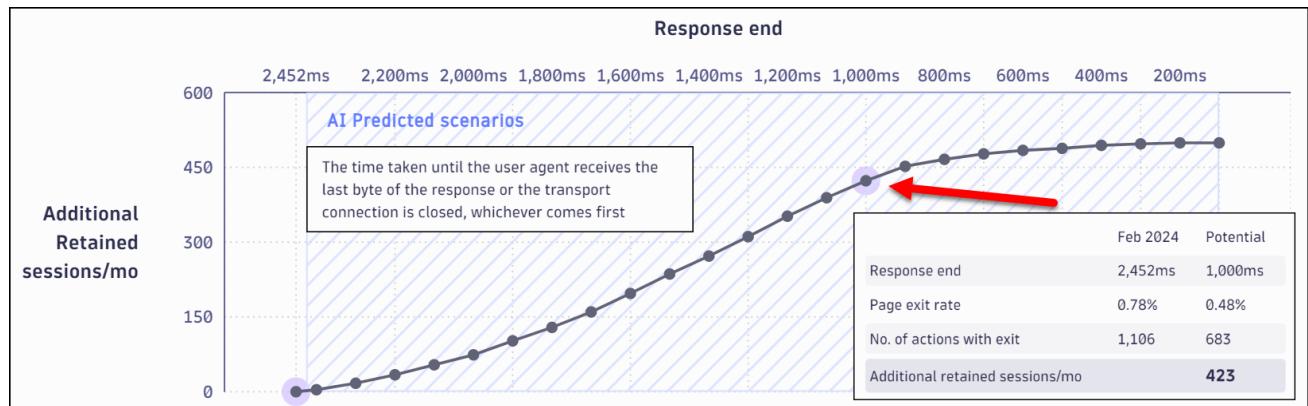
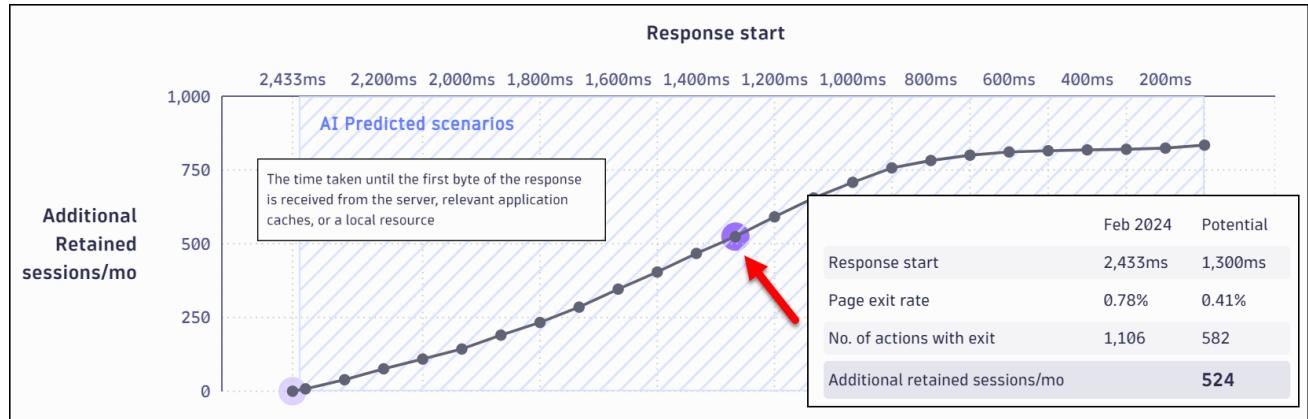


Deep Dive – Choose Transaction

loading of page XXX

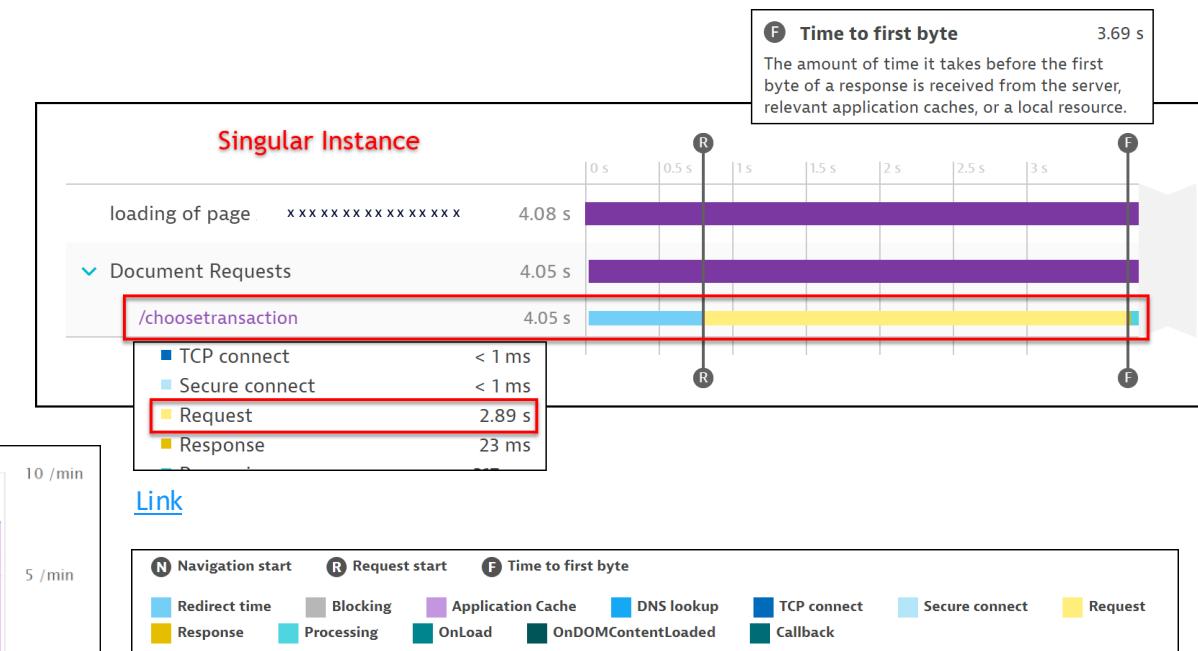
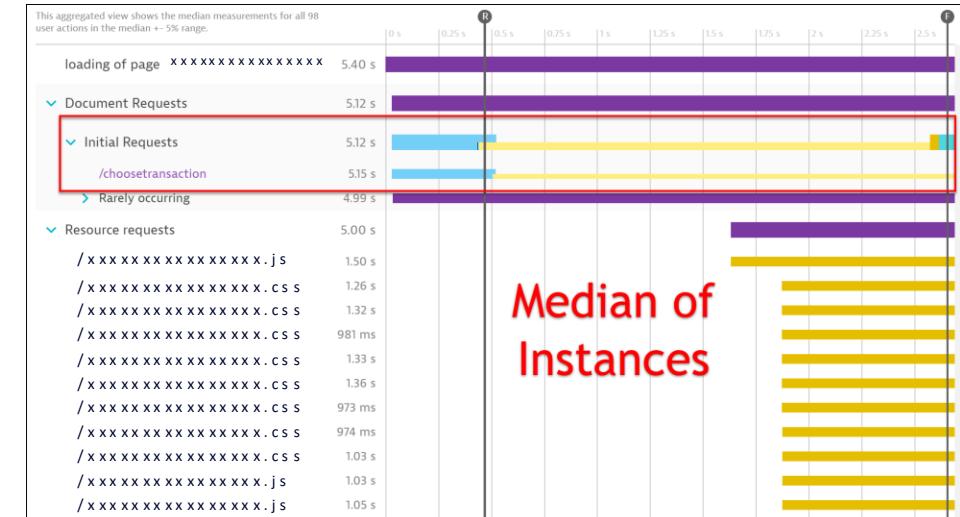
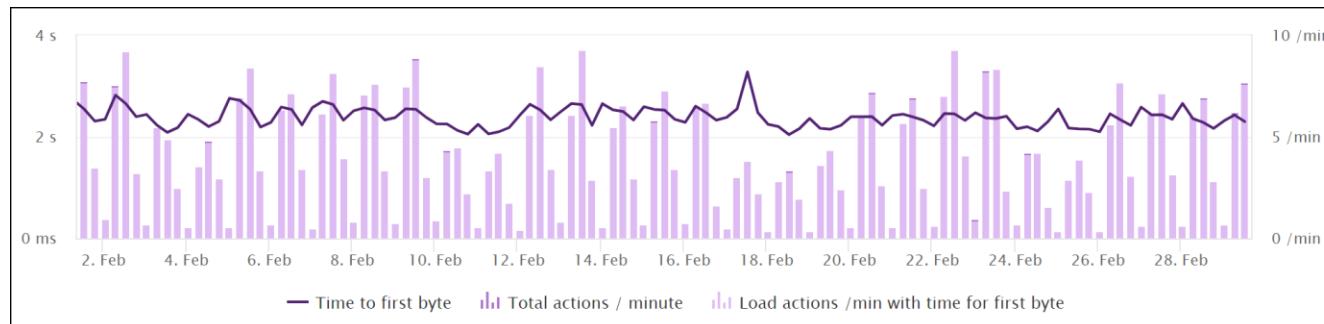
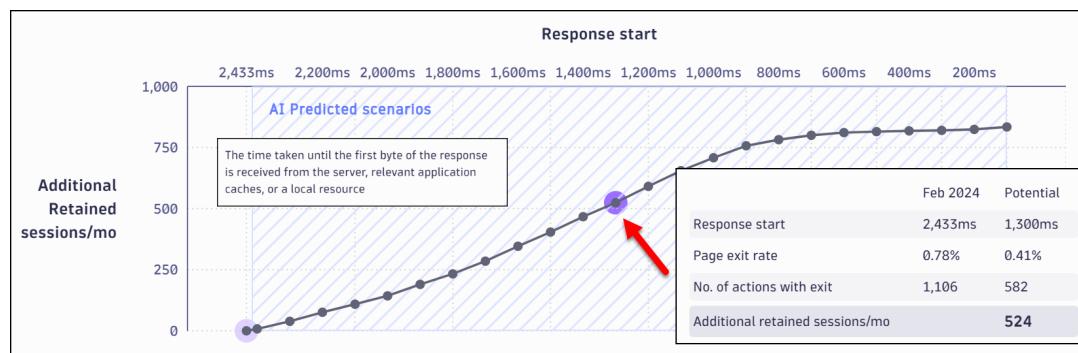
Choose Transaction - Summary

- 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)



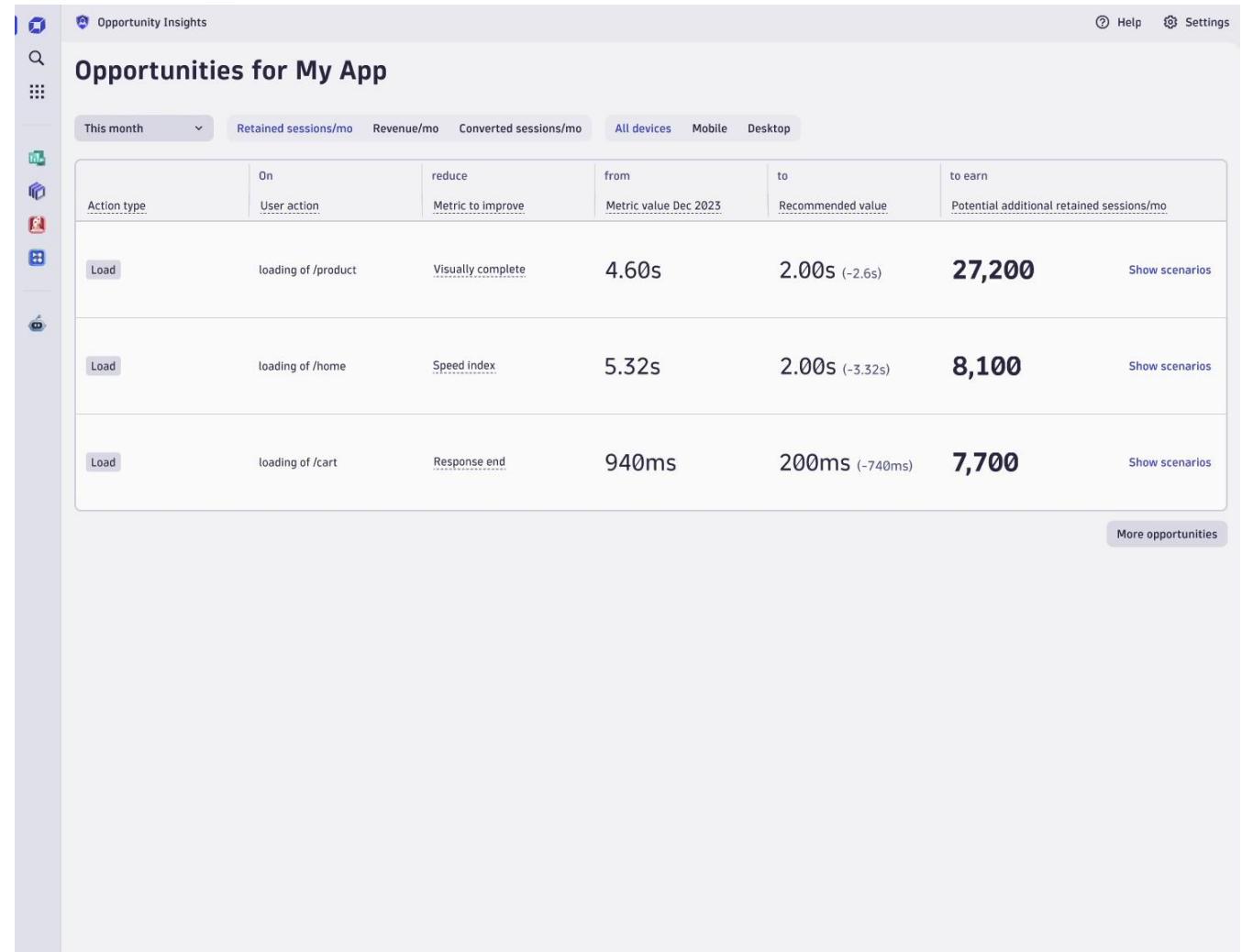
Choose Transaction – Response Start/End Analysis

- 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.”



Performance and errors in context

The screenshot shows the Opentelemetry Opportunity Insights dashboard for eCom - Web. The top navigation bar includes icons for Home, Opportunity Insights, Search, and Settings, along with links for Help and Settings. The main title is "Opportunities for eCom - Web". Below the title, there are filter options: "This month" dropdown, "Retained sessions/mo" (selected), "Revenue/mo", "Converted sessions/mo", and device filters: "All devices", "Mobile", "Desktop". A table displays three opportunities:

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

A "More opportunities" button is located at the bottom right of the table area.

Questions?



Blog Post



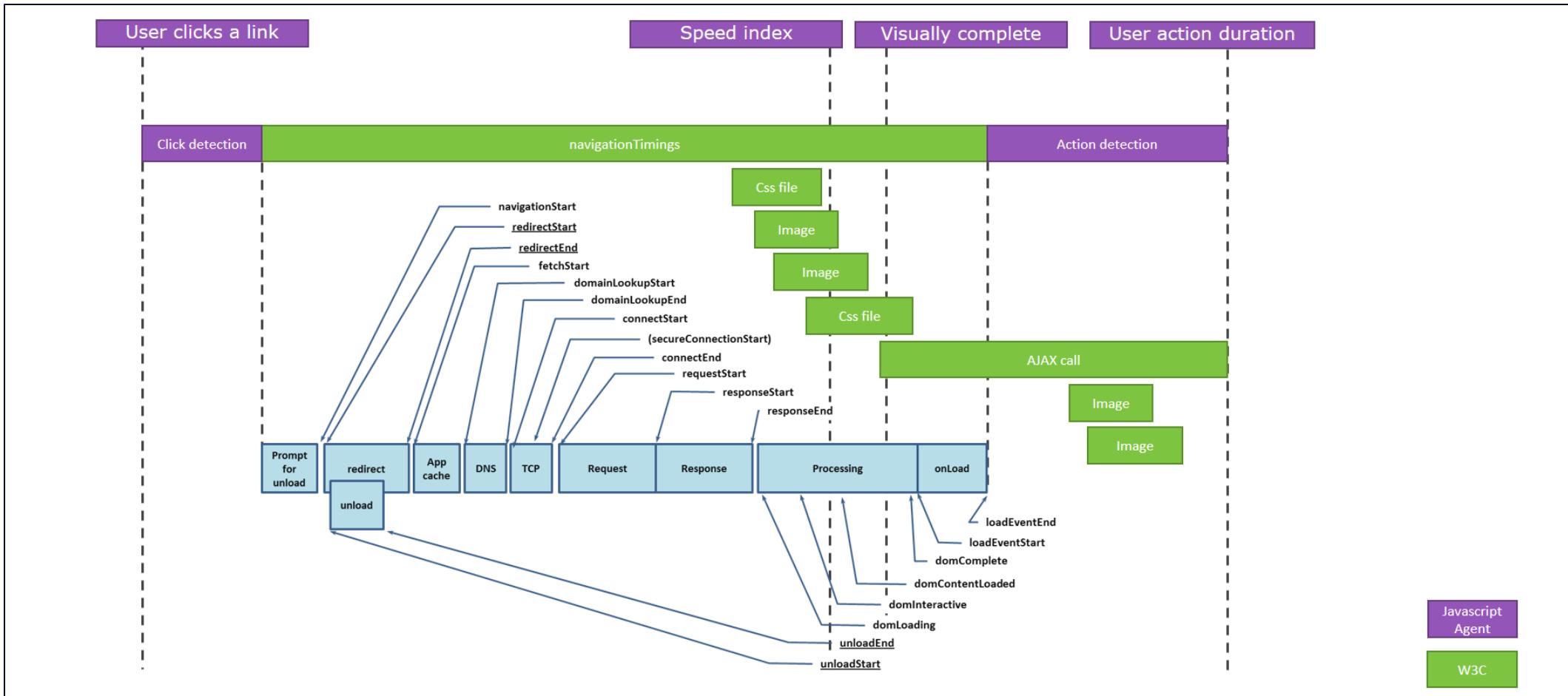
White Paper



CLOUD DONE RIGHT

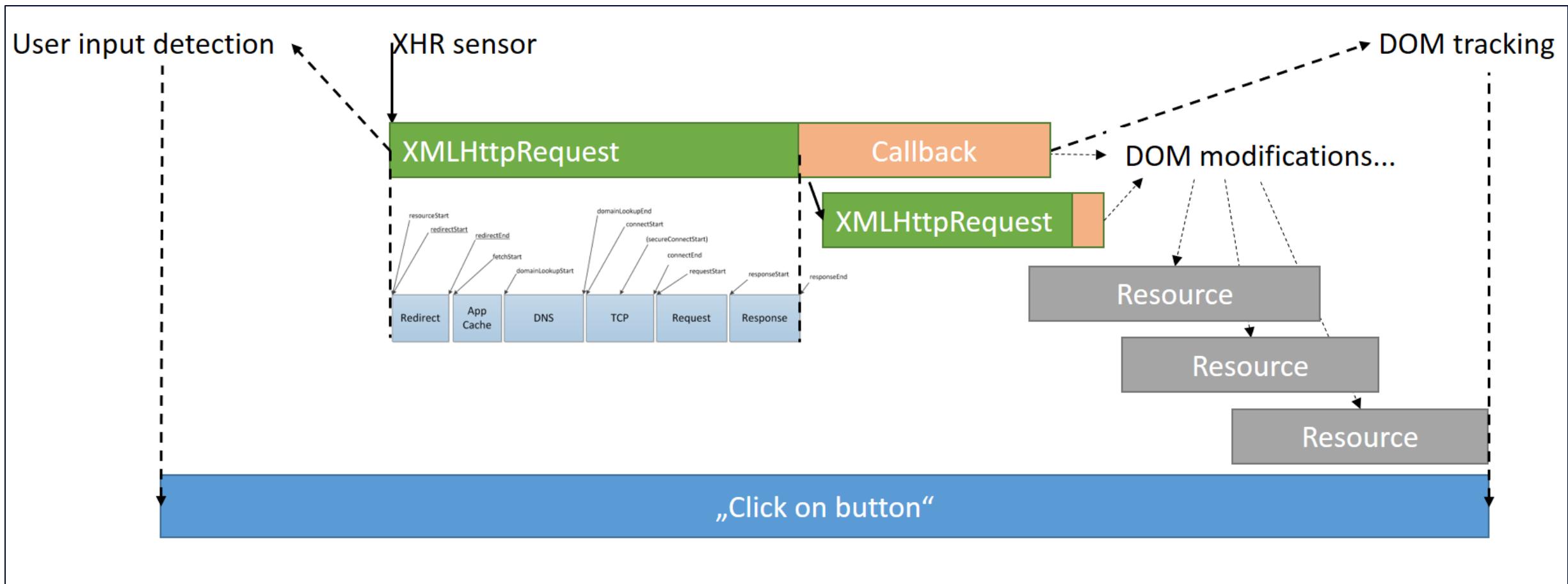
Appendix – Page Load Cycle

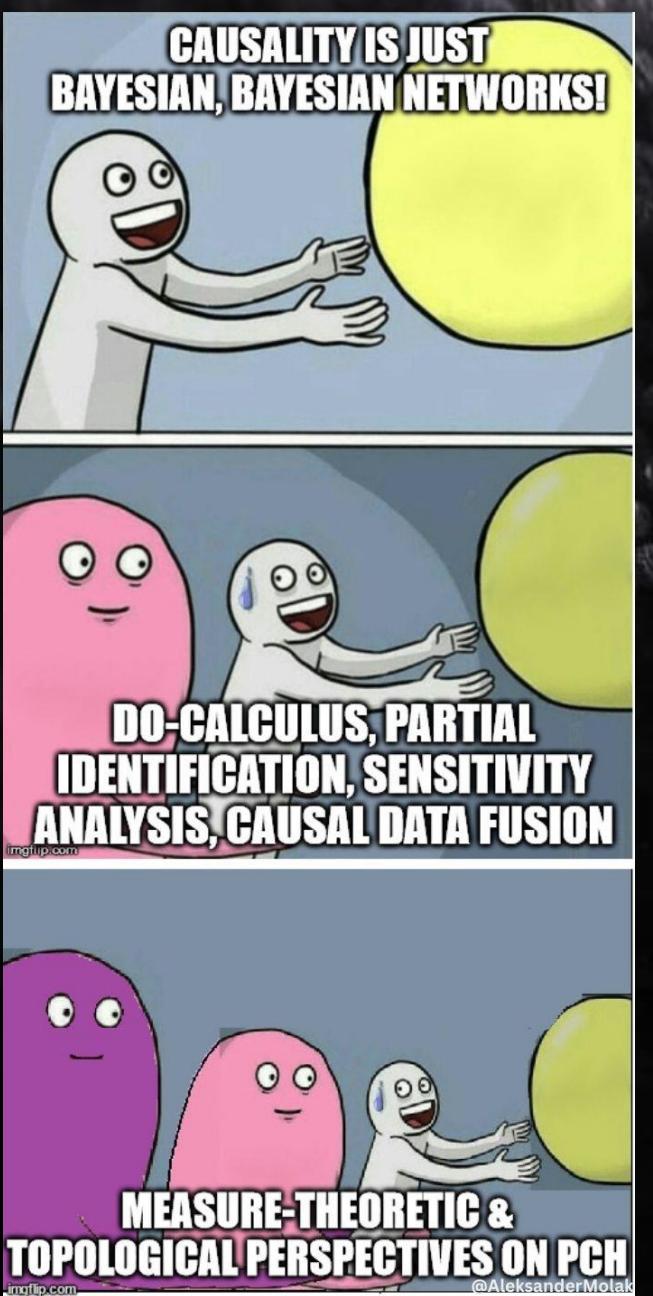
- [Reference Link](#)



Appendix – XHR Action Cycle

- [Reference Link](#)





Source: Aleksander Molak