

expo QA 24

MADRID
May 28th,
29th, 30th
2024



expoqa.com

Front-end Performance Testing & Microservices:

How to achieve
fast and fluid User Experience
with the Google Core Web Vitals

Isabelle Cosar - Product Engineer/Quality Engineer



MADRID 28th, 29th & 30th May 2024

Agenda

1

Introductions
to myself, my
company & its
operating model

2

The Google Core
Web Vitals (CWV),
key Front-End
Performance
metrics

3

Engaging and
mobilising service
teams with the
CWV

4

Example of
monitoring,
measuring and
testing the CWV



Who am I

French

Product Engineer / Quality Engineer (QE) at John Lewis Partnership - partner since 2019

25 years' experience in QE, mostly in London, UK. Focus on NFT

Led Non-Functional Testing in Financial Services

Moved into delivery 4 years ago, into a service team

Profile



Isabelle Cosar

Ed

Product Engineer - QE in Team Content (JL) - Lead #comm-testing and Champion #comm-browserstack & Percy
Izabel

<https://www.linkedin.com/in/isabelle-cosar/>

2

Google Core Web Vitals (CWV)



They are set of 3 specific page speed and user interaction measurements that have become THE REFERENCE to assess the loading speed, interactivity, and visual stability of a web page. The measurements evolve over time.

We use them as a standard to measure and improve our Front-end / Client-side Performance for our e-commerce website.

Core Web Vitals



(Loading)



(Interactivity)



(Visual Stability)

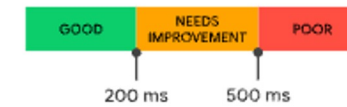
LCP

Largest Contentful Paint



INP

Interaction to Next Paint



CLS

Cumulative Layout Shift



<https://web.dev/vitals/>

<https://web.dev/learn-core-web-vitals/>

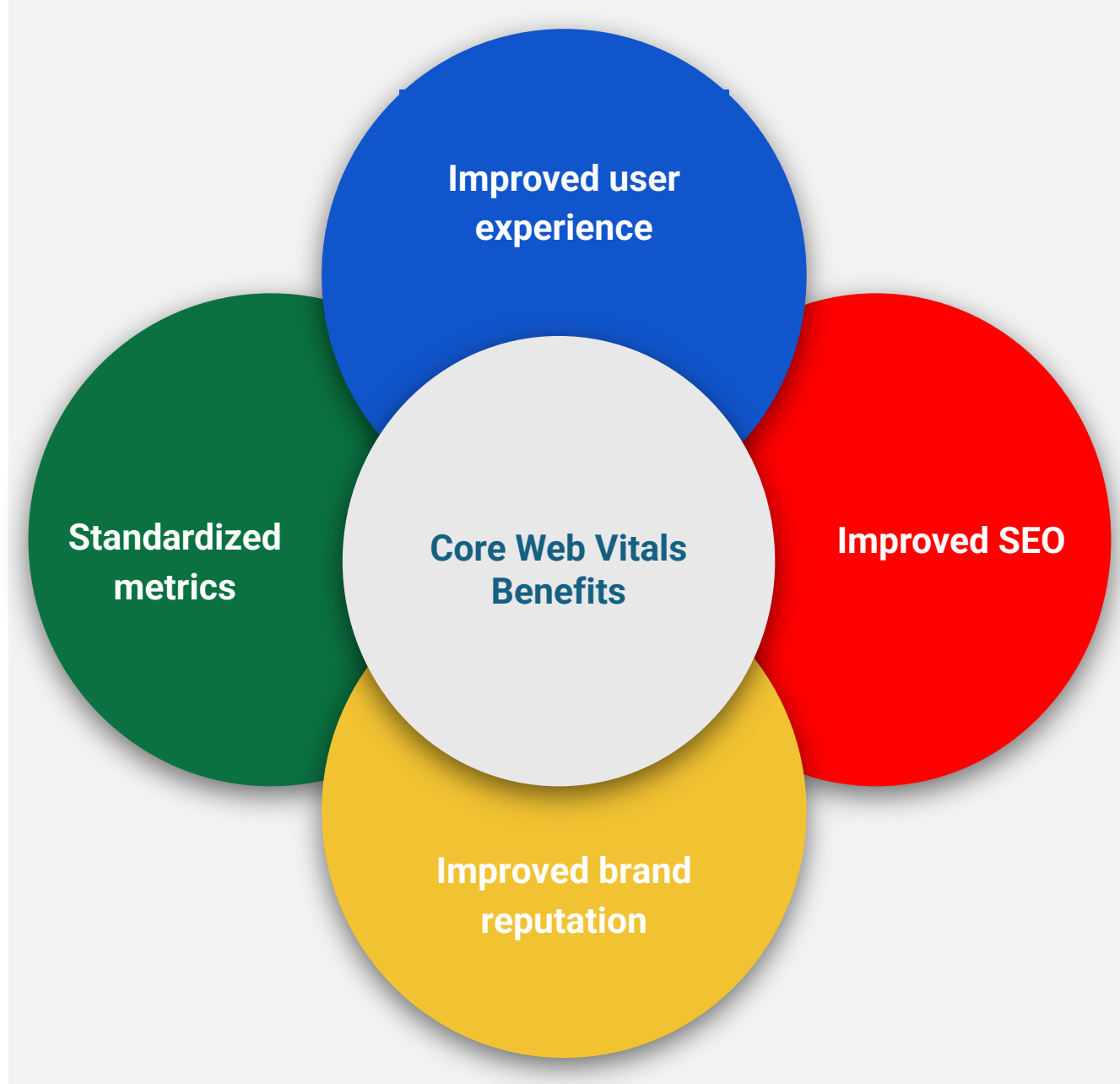
2

The importance of CWV

Overall, optimising for Core Web Vitals helps website owners improve the user experience, increase traffic and revenue, and stay ahead of the competition in search rankings.

We use them as a standard to measure and improve our Front-end / Client-side Performance for our e-commerce website.

I will explain in part 3 and 4 how we measure the CWV.



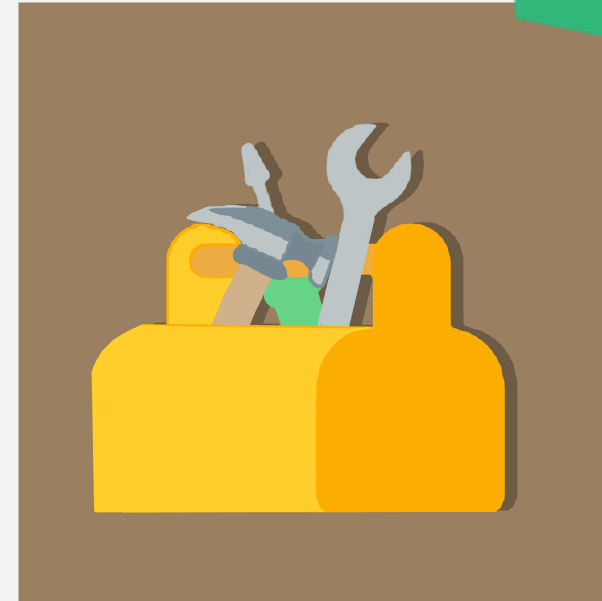
3

How our teams were engaged with CWV by the platform team

1. Communicating

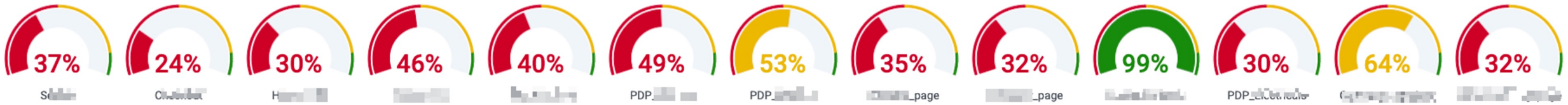
2. Challenging

3. Supporting with custom tools to test and monitor

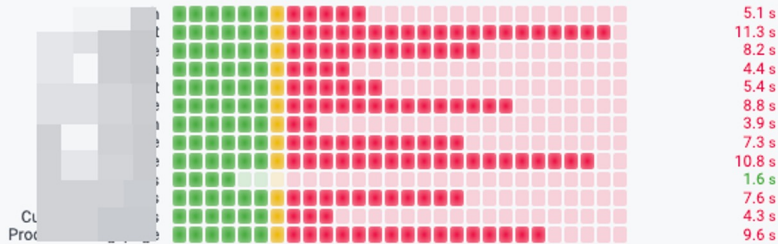


Challenging: FE Performance Leaderboard

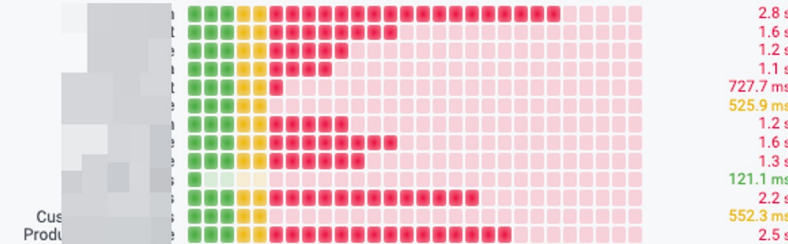
Lighthouse Performance Score



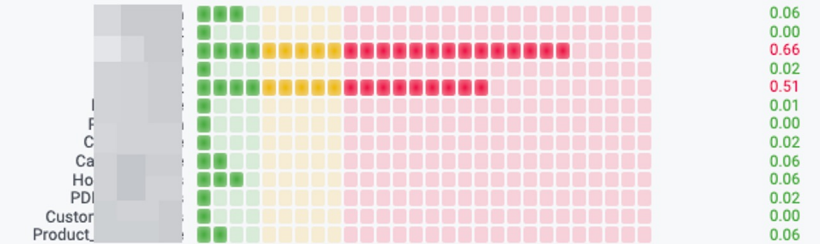
Largest Contentful Paint



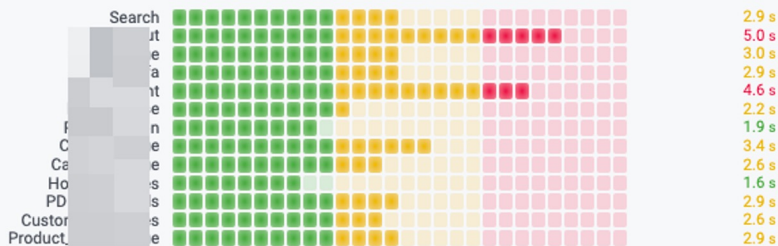
Total Blocking Time



Cumulative Layout Shift



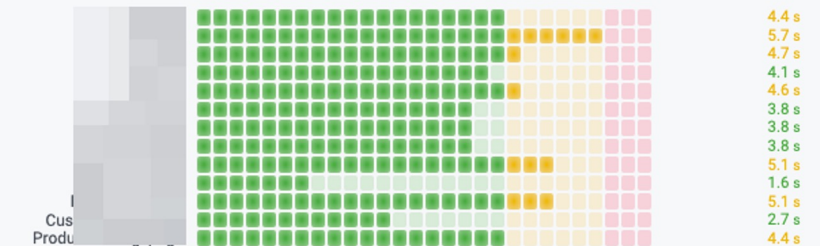
First Contentful Paint



Time To Interactive



Speed Index



3

Tooling

1. Sitespeed for testing (Initially)
2. WebPageTest for Testing & Monitoring
3. CWV Production Monitoring
4. Notifications of negative changes in each Microservice Slack channel

Sonic Performance Monitor APP 11:01

Hi team-👋, according to the [Chrome User Experience Report](#), 1 (100%) out of the 1 most popular urls for the **Homepage [content-app (production)]** pages is currently passing the Core Web Vitals assessment for mobile and 1 (100%) is passing for desktop.

For mobile, out of the 1 pages tested using [Page Speed Insights](#)...

- 1 page (100%) is passing the [LCP](#) audit (last week, 1 page was tested with 1 page / 100% passing).
- 1 page (100%) is passing the [FID](#) audit (last week, 1 page was tested with 1 page / 100% passing).
- 1 page (100%) is passing the [CLS](#) audit (last week, 1 page was tested with 1 page / 100% passing).

For desktop, out of the 1 pages tested using [Page Speed Insights](#)...

- 1 page (100%) is passing the [LCP](#) audit (last week, 1 page was tested with 1 page / 100% passing).
- 1 page (100%) is passing the [FID](#) audit (last week, 1 page was tested with 1 page / 100% passing).
- 1 page (100%) is passing the [CLS](#) audit (last week, 1 page was tested with 1 page / 100% passing).

More information about what pages were tested and the direction in which your Core Web Vitals metrics are trending can be found using this [Grafana dashboard](#) 📄.

Sonic Performance Monitor APP 07:06

Hi #team-👋! Here's a summary of the [latest webpagetest results](#) from `prod` for `content - Homepage`. There are 13 metrics that might have a problem, but these may critically influence CWV:

`cumulative_layout_shift`: 0.3 (28 day avg: 0.018, z-score: 4.2, change: 1561%).

`content - Homepage` (17 kB) 📄



5 replies Last reply 5 days ago



3

Key challenges faced & actions taken

1. Getting traction

2. Teams to get involved in a **continuous** way

3. The tooling had to evolve over time to be more adequate to the teams' WoW (Ways of Working) and to provide more accurate data.



4 Real life Example

Starting point: Production issue with CWV

1. Detection: Alerting
2. RCA: Observability & temporary workaround
3. Fixing, Testing & Redeploying

The Homepage



Cumulative Layout Shift

0.302

(Visual Stability)

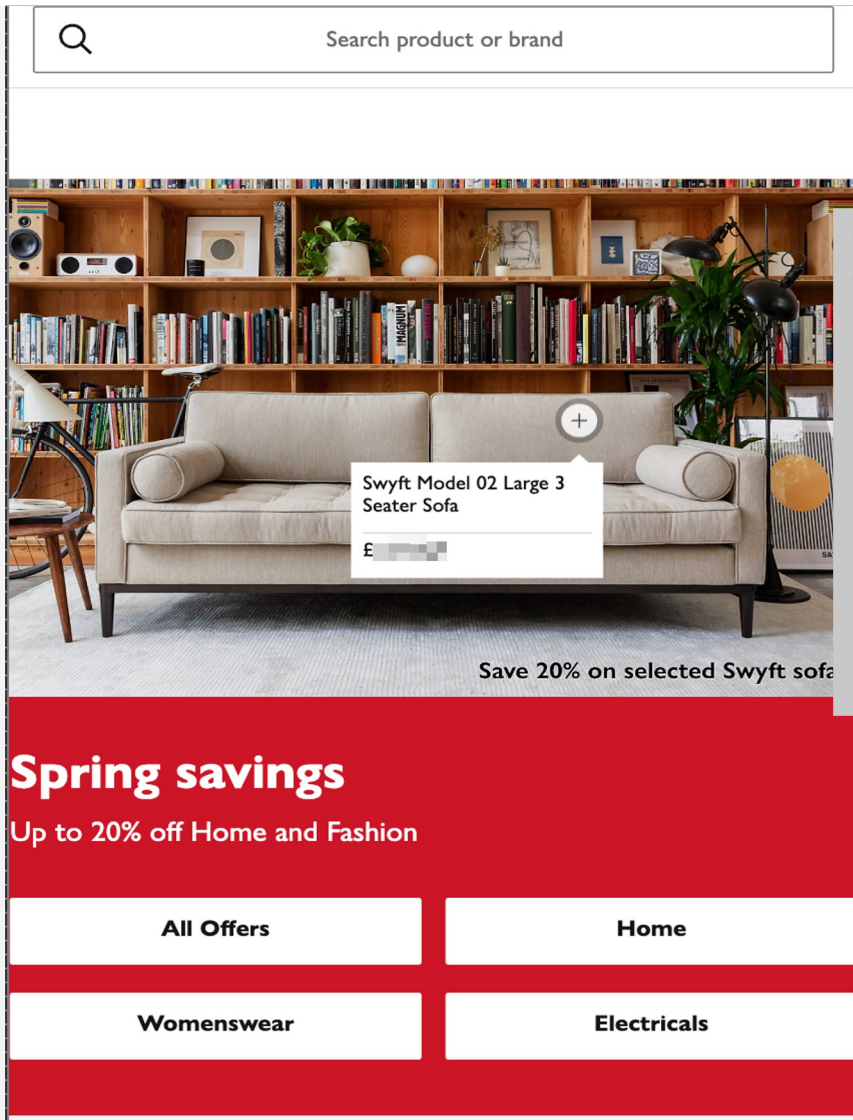
CLS

Cumulative Layout Shift



0.1

0.25



Alert generated in Slack by the WebPageTest tool from the platform team

A screenshot of a Slack message from the 'Sonic Performance Monitor' app. The message is addressed to '#team-crayon!' and provides a summary of the latest webpagetest results for 'prod' for 'content - Homepage'. It states that there are 13 metrics that might critically influence CWV. A specific metric, 'cumulative_layout_shift: 0.3', is highlighted with a red box, along with its 28-day average (0.018), z-score (4.2), and a significant change of 1561%. Below the text is a line graph titled 'Page load timings' showing various metrics (tftb, fcp, lcp, dcl, fully_loaded) over time from 26/03 to 01/04. The 'fully_loaded' metric shows a sharp increase starting around 28/03. The message also indicates 'content - Homepage (17 kB)' and has 5 replies.

Alert generated in Slack by the WebPageTest tool from the platform team

svc-content

4 replies Last reply [redacted]

April

Sonic Performance Monitor APP 07:06

Hi #team-[redacted]! Here's a summary of the [latest webpagetest results](#) from **prod** for **content - Homepage**. There are 13 metrics that might have a problem, but these may critically influence CWV:

cumulative_layout_shift: 0.3 (28 day avg: 0.018, z-score: 4.2, change: 1561%).

content - Homepage (17 kB)

Page load timings

6 s
4 s
2 s
0 ms

26/03 28/03 30/03 01/04

— ttfb — fcp — lcp — dcl — fully_loaded

5 replies Last reply [redacted]

Thread # svc-content

score: 4.2, change: 1561%.

content - Homepage (17 kB)

Page load timings

6 s
4 s
2 s
0 ms

26/03 28/03 30/03 01/04

— ttfb — fcp — lcp — dcl — fully_loaded

5 replies

Sonic Performance Monitor APP 5 months ago

Something seems to be wrong with these metrics. There may be a problem, please take a look?

cumulative_layout_shift: 0.3 (28 day avg: 0.018, z-score: 4.2, change: 1561%).



+1561% increase in the CLS !!
Score: 0.3

4

I double checked on the WebPageTest tool dashboard provided by Platform team



4

I checked for more details in the WebPageTest tool provided by the platform team

URL: <https://www.johnlewis.com/> DATE: 02/04/2023, 06:12:58

Webpage Performance Test Result

content - Homepage SETTINGS: PIXEL2 v107 Test Location More Share

View: Details Tools: Export Re-Run Test

Requests Details

Use this page to explore the metric timings and request waterfall for any run of your test.

Observed Metrics (Run number 4)

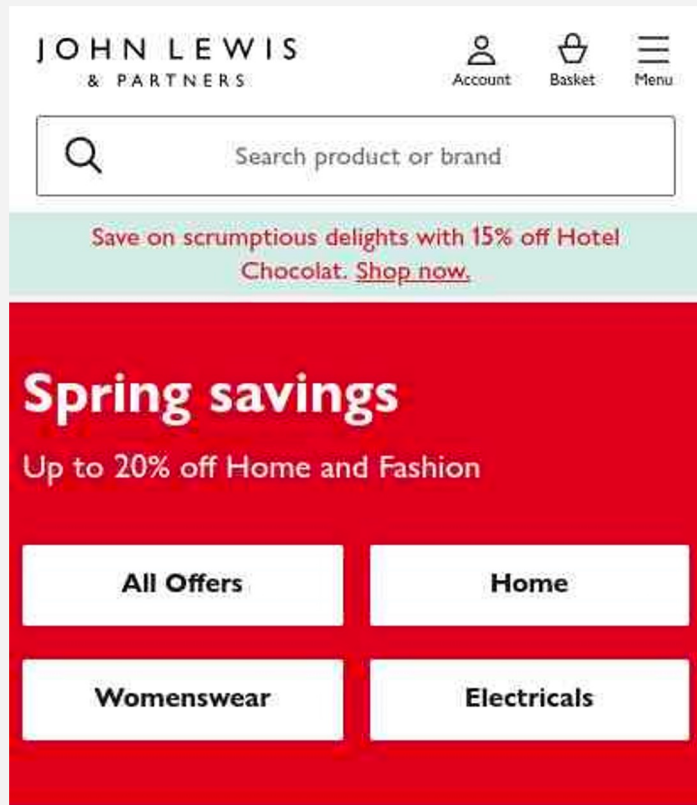
View run details: [Run 1 \(Repeat View\)](#), [Run 2 \(Repeat View\)](#), [Run 3 \(Repeat View\)](#), [Run 4 \(Repeat View\)](#), [Run 5 \(Repeat View\)](#)

FIRST VIEW ([RUN 4](#))

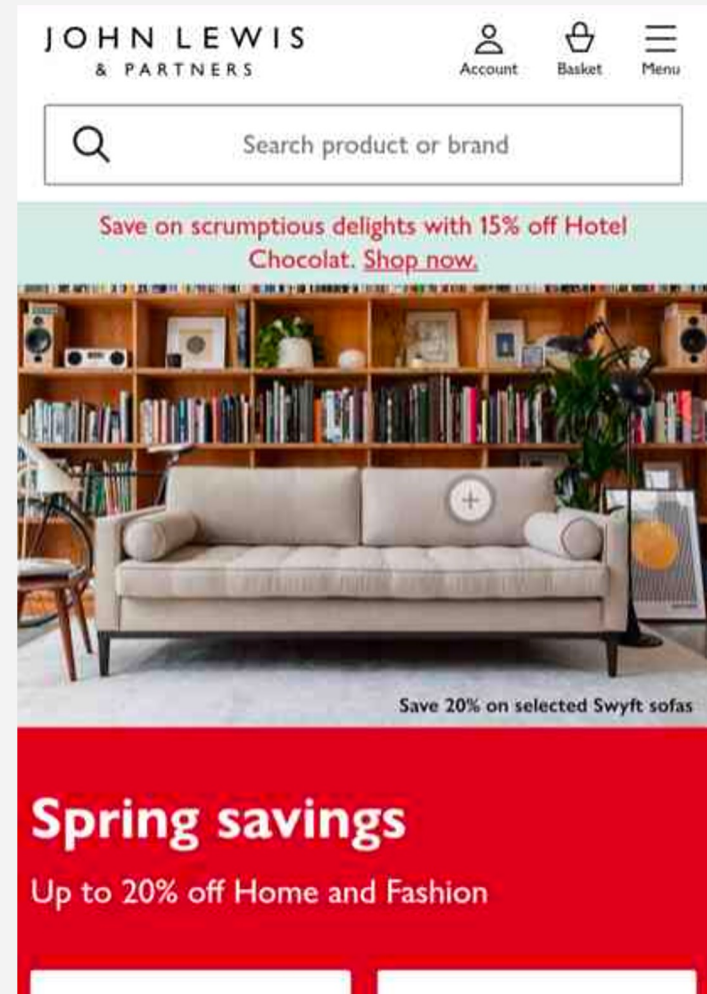
First Byte	Start Render	FCP	Speed Index	LCP	CLS	TBT	DC Time	DC Requests	DC Bytes	Time	Requests	Total Bytes
.192s	.500s	.510s	.898s	1.171s	.302	≥ .550s	4.387s	256	4,327 KB	5.346s	279	4,428 KB

4

I ran some manual visual checks in the Home Page



47% loaded



100% loaded

.....

4

I got confirmation with Lighthouse from the Dev tools (Chrome/Edge)

Dimensions: Responsive 540 x 851 100% No throttling

16:36:24 - www.preview.johni

Performance Score: 21

Performance

Values are estimated and may vary. The [performance score is calculated](#) directly from these metrics. [See calculator.](#)

▲ 0-49 ■ 50-89 ● 90-100

METRICS

● First Contentful Paint 1.5 s	▲ Largest Contentful Paint 11.6 s
▲ Total Blocking Time 3,100 ms	▲ Cumulative Layout Shift 0.312

Expand view

Save 20% on selected Swyft sofas

Spring savings
Up to 20% off Home and Fashion

All Offers Home

4 I got more details on the RCA from Lighthouse

The image shows a Lighthouse audit for CLS (Cumulative Layout Shifts). On the left, a visual representation of a webpage layout is shown with a ruler. A callout box points to a specific element: `div.cms-grid-col--d40e4.aem-kit-col.cms-grid-col-md-7--d2994.undefined.cms-grid-md-...` with dimensions `540 x 300`. Below this, a purple banner contains the text "Spring savings" and "Up to 20% off Home and Fashion". Underneath are four buttons: "All Offers", "Home", "Womenswear", and "Electricals". A callout box labeled "The shifting blocks" points to these buttons. Another callout box labeled "The block responsible for the shift" points to a red "Spring savings" banner above the buttons.

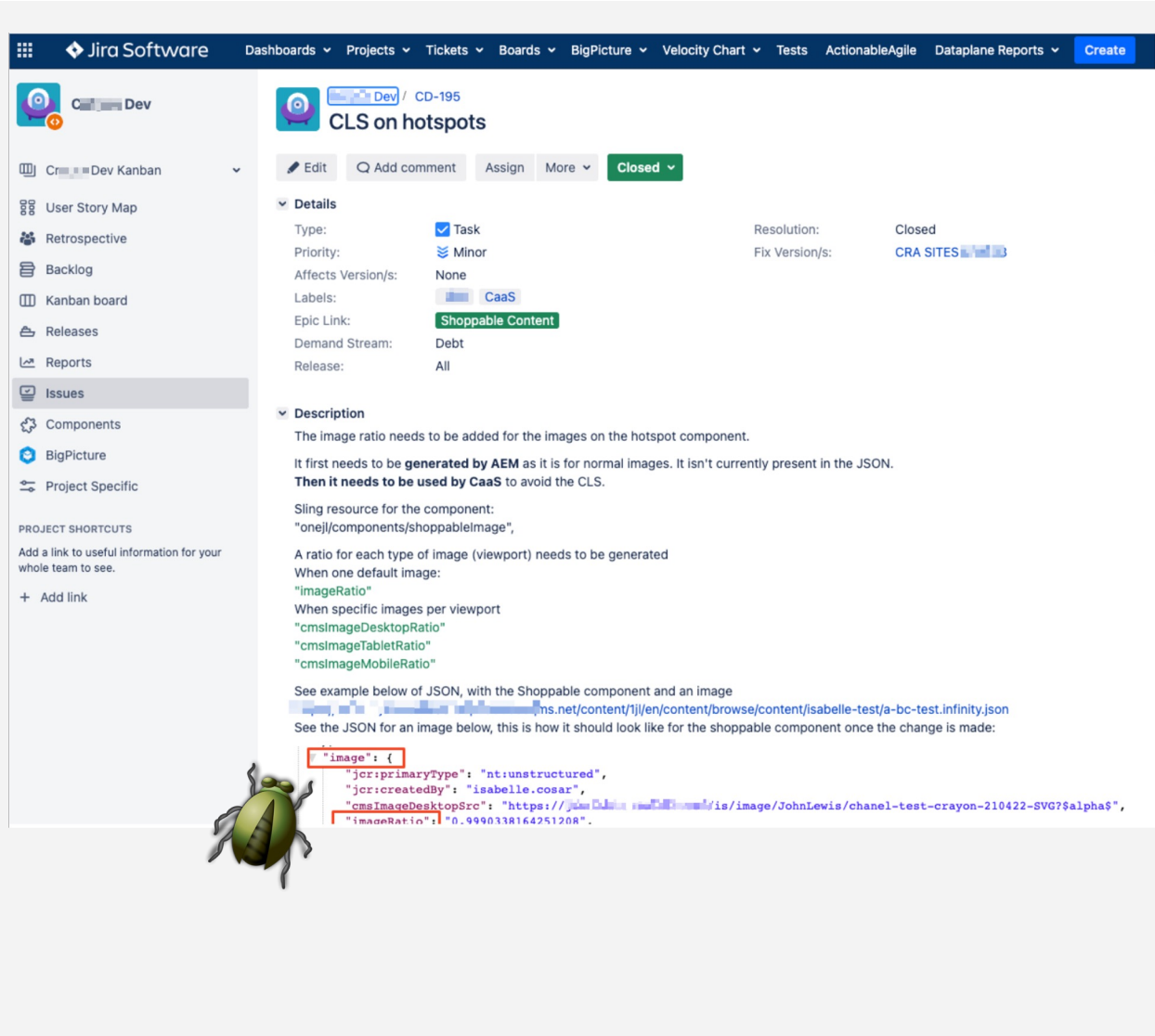
On the right, the Lighthouse audit results are displayed. The "Show audits relevant to:" filter is set to "CLS". Under "DIAGNOSTICS", the audit "Avoid large layout shifts" is expanded, showing 5 elements found. A table lists the elements contributing most to the CLS of the page:

Element	CLS Contribution
<code>div.cms-grid-col--d40e4.aem-kit-col.cms-grid-col-md-7--d2994.undefined.cms-grid-md-hide--9ca17.cms-grid-col-lg-6-64a64.cms-grid-lg-hide--fa93a.container-containerComponent-69aa2.container-makeClassStronger-e9539.cms-grid-disable-gutters--280f6</code>	0.161
<code>div.cms-grid-col--d40e4.aem-kit-col-...-9ca17.cms-grid-lg-hide--fa93a.container-containerComponent-69aa2.container-makeClassStronger-e9539.cms-grid-disable-gutters--280f6</code>	0.149

I discussed with my team then raised a bug ticket

Problem & fix: the image wasn't passing its ratio to the browser

- Passing the image ratio/size to the browser helps improve CLS by providing the browser with advance knowledge of the image's aspect ratio before it finishes loading
- Allocation of Space: When the browser knows the size of the image in advance & it can allocate the necessary space for the image while the page is loading. By reserving the appropriate space, the browser ensures that other elements on the page are not displaced when the image finally loads.



The screenshot shows a Jira Software interface for a bug ticket titled "CLS on hotspots" (CD-195) in the "Dev" project. The ticket is marked as "Closed".

Details:

- Type: Task
- Priority: Minor
- Affects Version/s: None
- Labels: CaaS
- Epic Link: Shoppable Content
- Demand Stream: Debt
- Release: All

Description:

The image ratio needs to be added for the images on the hotspot component. It first needs to be **generated by AEM** as it is for normal images. It isn't currently present in the JSON. **Then it needs to be used by CaaS** to avoid the CLS.

Sling resource for the component:
"onej/components/shoppableImage",

A ratio for each type of image (viewport) needs to be generated

When one default image:
"imageRatio"

When specific images per viewport
"cmsImageDesktopRatio"
"cmsImageTabletRatio"
"cmsImageMobileRatio"

See example below of JSON, with the Shoppable component and an image
[https://www.woolworths.com.au/content/dam/woolworths/woolworths-net/content/1j/en/content/browse/content/isabelle-test/a-bc-test.infinity.json](#)

See the JSON for an image below, this is how it should look like for the shoppable component once the change is made:

```

"image": {
  "jcr:primaryType": "nt:unstructured",
  "jcr:createdBy": "isabelle.cosar",
  "cmsImageDesktopSrc": "https://www.woolworths.com.au/content/dam/woolworths-net/content/1j/en/content/browse/content/isabelle-test/a-bc-test-crayon-210422-SVG?Salphas",
  "imageRatio": "0.9990338164251208"
}

```

A small cartoon beetle icon is positioned at the bottom of the JSON code block.

4

The Hero got immediately replaced by a standard image component passing its ratio to the browser

- Thread
- Lottie Beattie** 3 days ago
@A... @Amy... @Isabelle... - please can you remove the hotspot from the hero banner (I think it's only on mobile at the moment), we believe it's causing huge CLS issues. @Isabelle Cosar FYI
- 11 replies
- Amy...** 3 days ago
Hey @Lottie Beattie Ah I see. Sure. I wanted to check with Isabelle about the current CLS issue. Removing the Hotspot now
- Isabelle Cosar** 3 days ago
From Desktop & tablet too please @A... (edited)
- Isabelle Cosar** 3 days ago
And the hotspot wasn't working on desktop as the URL also needed to be repeated on the desktop tab btw @A...
- Amy...** 3 days ago
Sure I will. Oh I see! I wasn't aware. Thanks for letting me know
- Isabelle Cosar** 3 days ago
No worries and you are right @A... the shoppable component was causing the high CLS as we have not implemented the image ratio for it as we have for most of the other images component. This means the browser doesn't know the size of that component before loading it and can't reserve the space for it before loading...

URL: <https://www.johnlewis.com/> DATE: 04/04/2023, 06:14:25

Webpage Performance Test Result

content - Homepage SETTINGS: PIXEL2 v107 Test Location More Share

View: Details Tools: Export Re-Run Test

Requests Details

Use this page to explore the metric timings and request waterfall for any run of your test.

Observed Metrics (Run number 2)

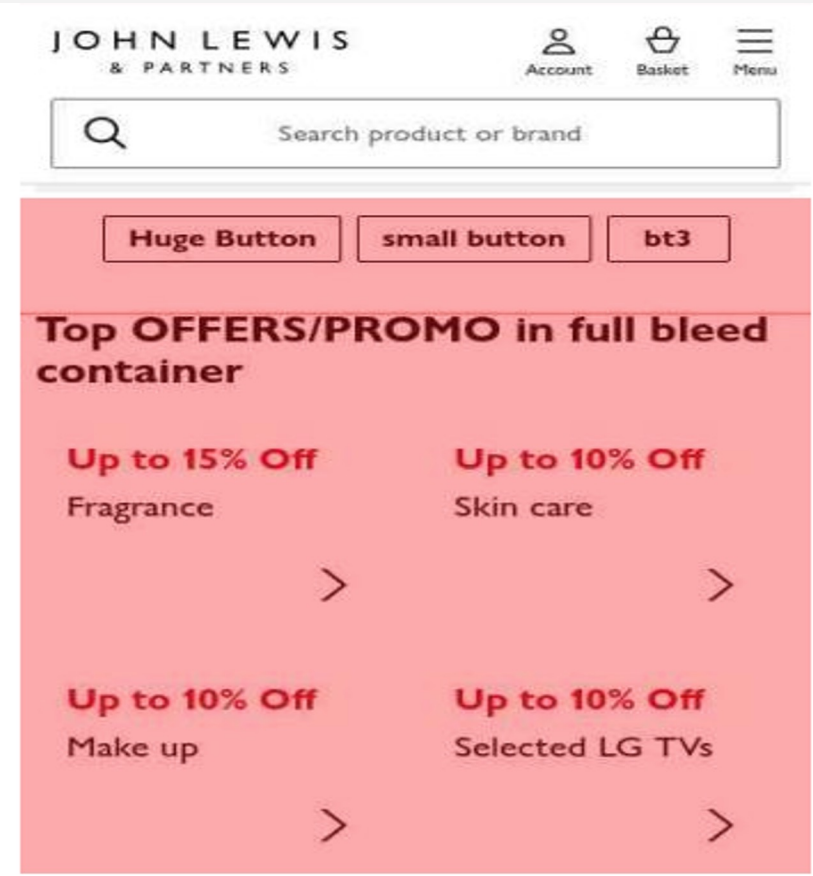
View run details: [Run 1 \(Repeat View\)](#), [Run 2 \(Repeat View\)](#), [Run 3 \(Repeat View\)](#), [Run 4 \(Repeat View\)](#), [Run 5 \(Repeat View\)](#)

FIRST VIEW (RUN 2)

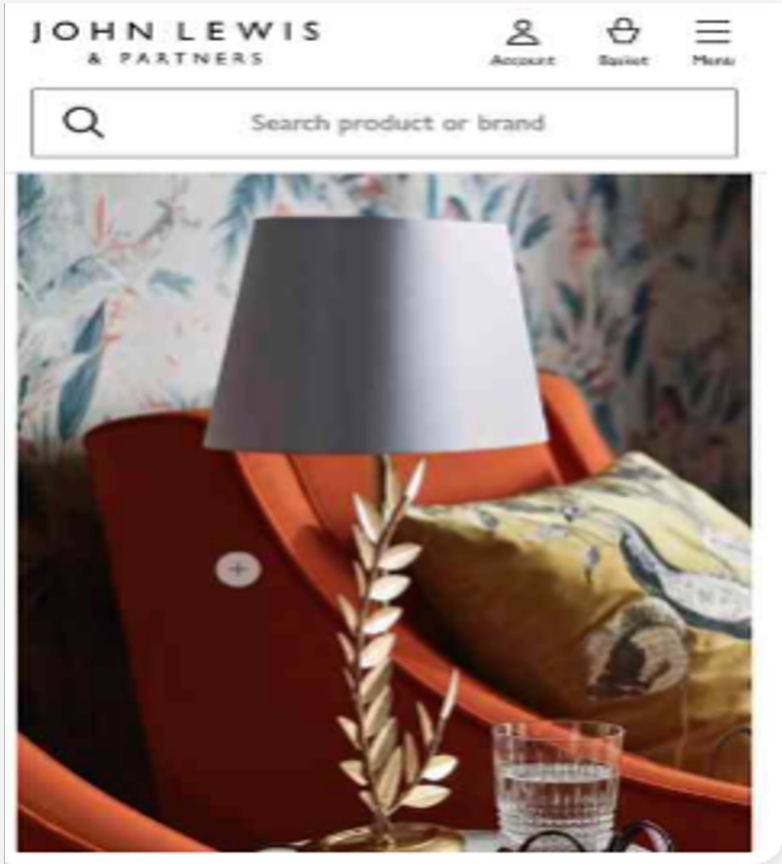
First Byte	Start Render	FCP	Speed Index	LCP	CLS	TBT	DC Time	DC Requests	DC Bytes	Time	Requests	Total Bytes
.208s	.500s	.494s	.765s	.811s	.001	≥ .480s	3.822s	257	4,311 KB	4.479s	279	4,413 KB

4

I created a baseline test page in our test environment, monitored by WebPageTest



47% loaded



100% loaded

.....

4

A fix was deployed in the test environment and the CLS disappeared.
CLS score = 0!!



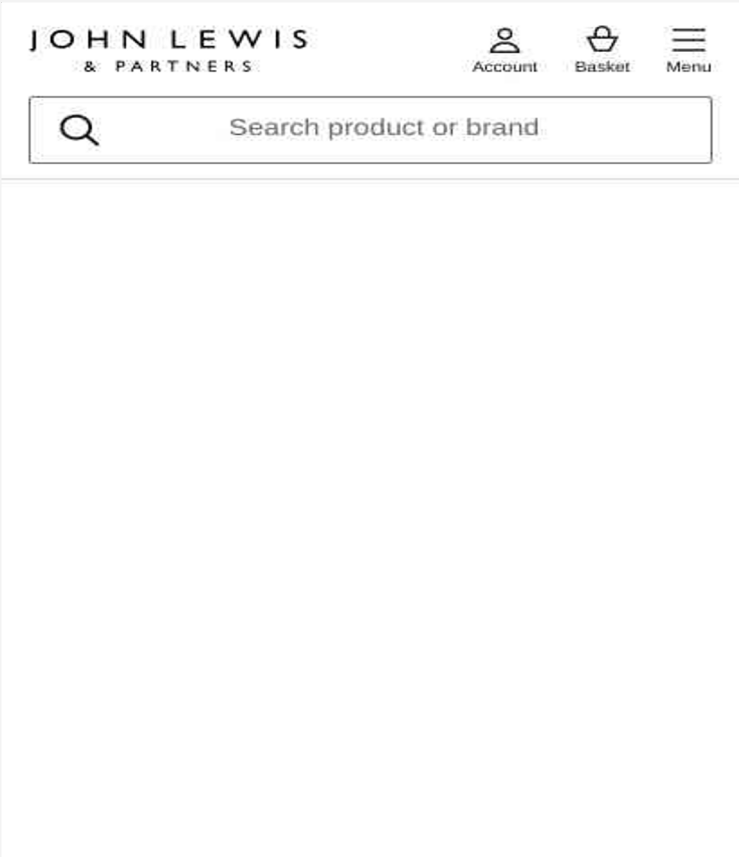
Baseline test page deployed in test on 10/5

Fix deployed in test on 16/5

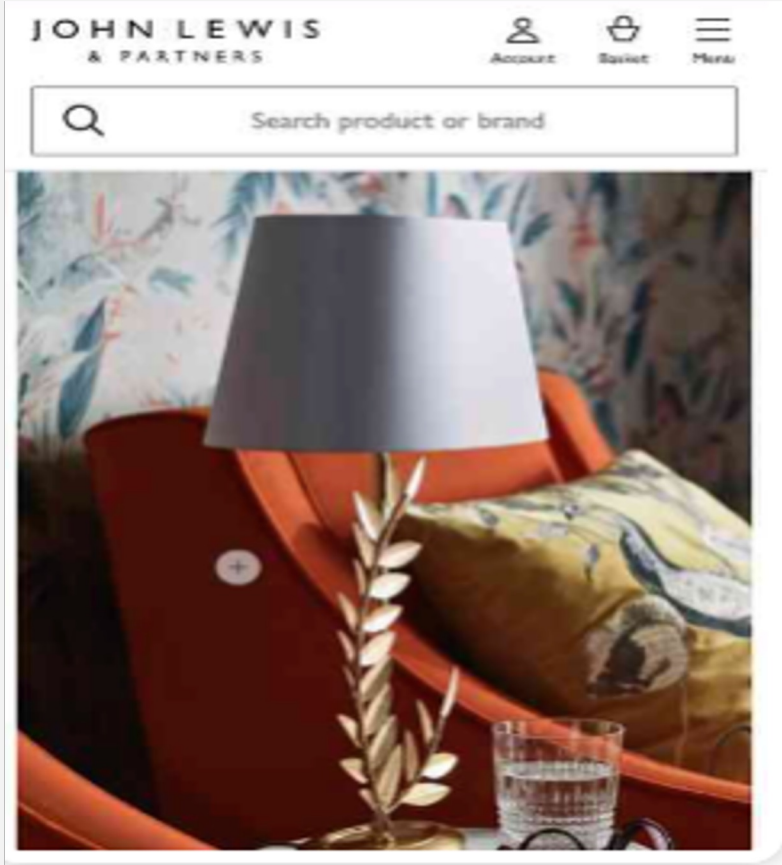


4

Now the page first loads a blank space quickly replaced by the hotspot component and not causing any shift in the page



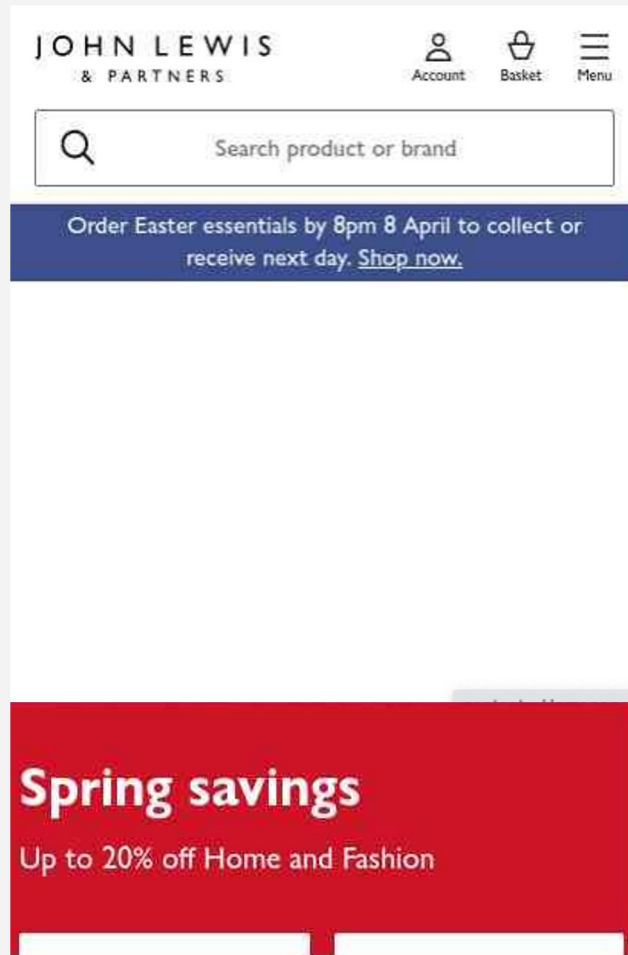
47% loaded



100% loaded

.....

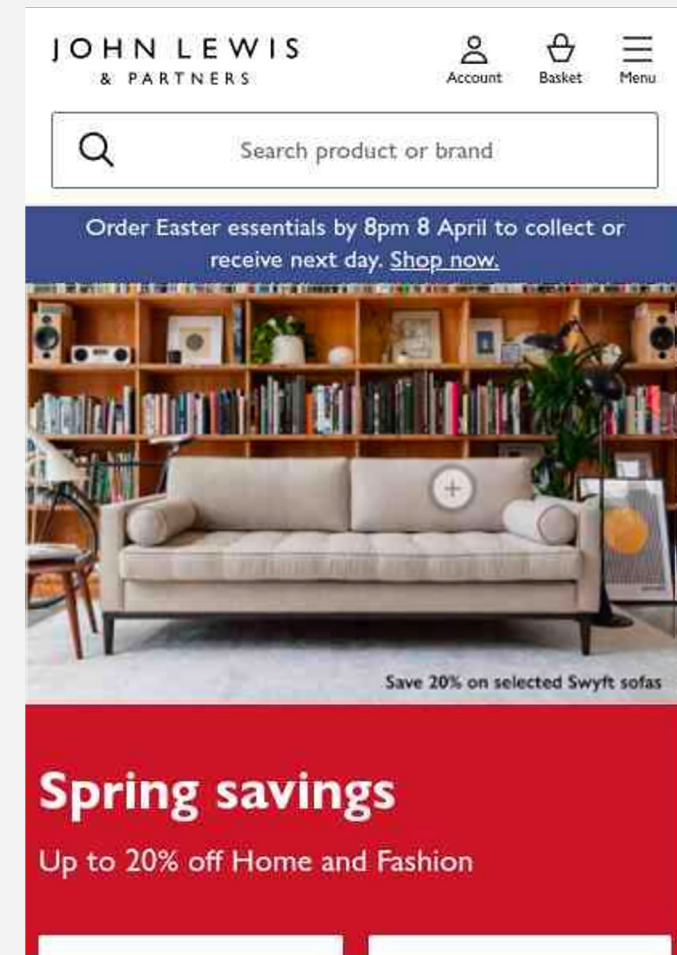
And this is what it did on the Home Page in Production



47% loaded



.....



100% loaded

4

Confirmed by testing in production with a Web Vitals Chrome extension/plugin



The screenshot shows a browser window displaying a website with a Web Vitals Chrome extension overlay. The extension displays performance metrics for the page, including Largest Contentful Paint (2.391s), Cumulative Layout Shift (0.000), First Input Delay (Waiting for input...), Interaction to Next Paint (Waiting for input...), First Contentful Paint (2.359s), and Time to First Byte (2.093s). The console also shows logs for the extension, including LCP, FCP, TTFB, and CLS values.

Metric	Value	Category
Largest Contentful Paint	2.391s	Core Web Vital metric
Cumulative Layout Shift	0.000	Core Web Vital metric
First Input Delay	Waiting for input...	Pending Core Web Vital metric
Interaction to Next Paint	Waiting for input...	Pending Core Web Vital metric
First Contentful Paint	2.359s	Core Web Vital metric
Time to First Byte	2.093s	Experimental metric

Console logs for the Web Vitals Extension:

- [Web Vitals Extension] LCP 2391 ms (good)
- [Web Vitals Extension] FCP 2359 ms (needs-improvement)
- [Web Vitals Extension] TTFB 2093 ms (poor)
- [Web Vitals Extension] CLS 0.00 (good)

Confirmed by the WebPageTest tool



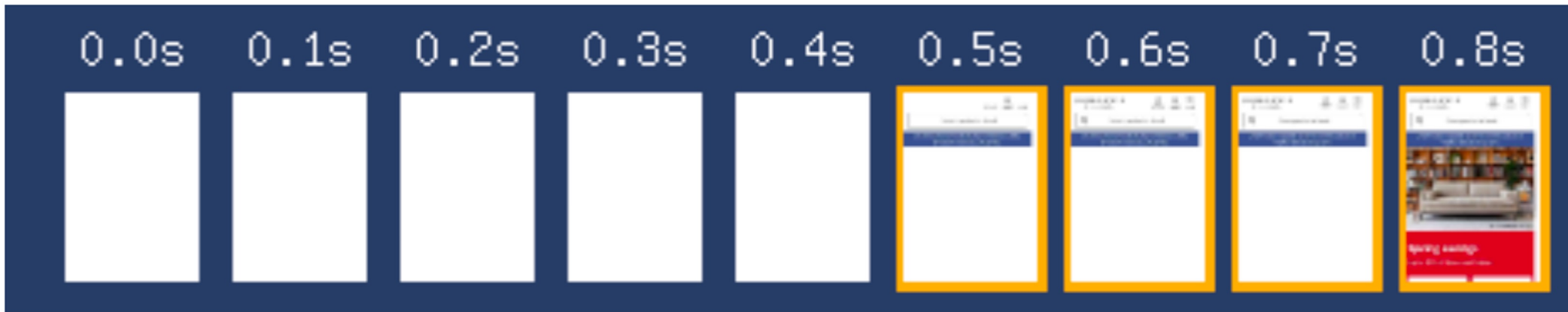
Observed Metrics (Run number 2)

View run details: [Run 1 \(Repeat View\)](#), [Run 2 \(Repeat View\)](#), [Run 3 \(Repeat View\)](#), [Run 4 \(Repeat View\)](#), [Run 5 \(Repeat View\)](#)

FIRST VIEW ([RUN 2](#))

First Byte	Start Render	FCP	Speed Index	LCP	CLS	TBT	DC Time	DC Requests	DC Bytes	Time	Requests	Total Bytes
.208 _s	.500 _s	.494 _s	.765 _s	.811 _s	.001	≥ .480 _s	3.822 _s	257	4,311 KB	4.479 _s	279	4,413 KB

Visual Page Loading Process ([Explore](#))



Bootstrap_start	snaptr	generated-content-percent	generated-content-size	domInteractive	domContentLoaded	loadEvent
0.312s	2.575s	1.080	8.510	1.097s	1.589s - 1.594s (0.005s)	3.811s - 3.881s (0.070s)

Any
Questions

expo IQA 24

MADRID
May 28th,
29th, 30th
2024

Thank you for attending

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