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Digital

Milliseconds make Millions

A study on how improvements in mobile site speed positively affect a brand's bottom line

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THE NEED FOR SPEED

Executive Summary

Even a small improvement to mobile speed can have a positive effect on business results for brands.

Over a 4 week period, we analysed mobile site data from 37 retail, travel, luxury and lead generation brands across Europe and the US. Results showed that a mere 0.1s change in load time can influence every step of the user journey, ultimately increasing conversion rates. Conversions grew by 8% for retail sites and by 10% for Travel sites on average.

With a 0.1s improvement in site speed, we observed that retail consumers spent almost 10% more, while lead generation and luxury consumers engaged more, with page views increasing by 7% and 8% respectively.

The rise of customer expectations and increasing use of smartphones are amplifying the need for mobile speed. The competitive gap will widen between brands who provide great mobile experience and those who don't.

To stay ahead, brands need to make site speed a priority across the organisation. They should adopt a mobile-first mind-set; introducing the right processes and allocating resources to constantly monitor and optimise their site speed.

The study findings are intended to provide new evidence that speed does matter and help brands to prioritise it as a key performance metric.

Key Findings

We observed the following key improvements to engagement and conversion funnel progress based on a 0.1s site speed improvement.

Mobile site speed improvements had a direct correlation to improved funnel progression.

An 8.4% increase in conversions with retail consumers was observed, and an increase in average order value of 9.2%.

When mobile site speed improved we also observed a positive change in number of page views, conversion rates, and average order value.

A 10.1% increase in conversions with travel consumers was observed, and a slight increase in average order value of 1.9%.

Retail consumers were most sensitive to speed in the pre-checkout stages of their conversion journey.

An 8% increase in page views per session was measured for luxury sites.

The highest homepage bounce rate improvement of 6.5% was in the travel vertical.

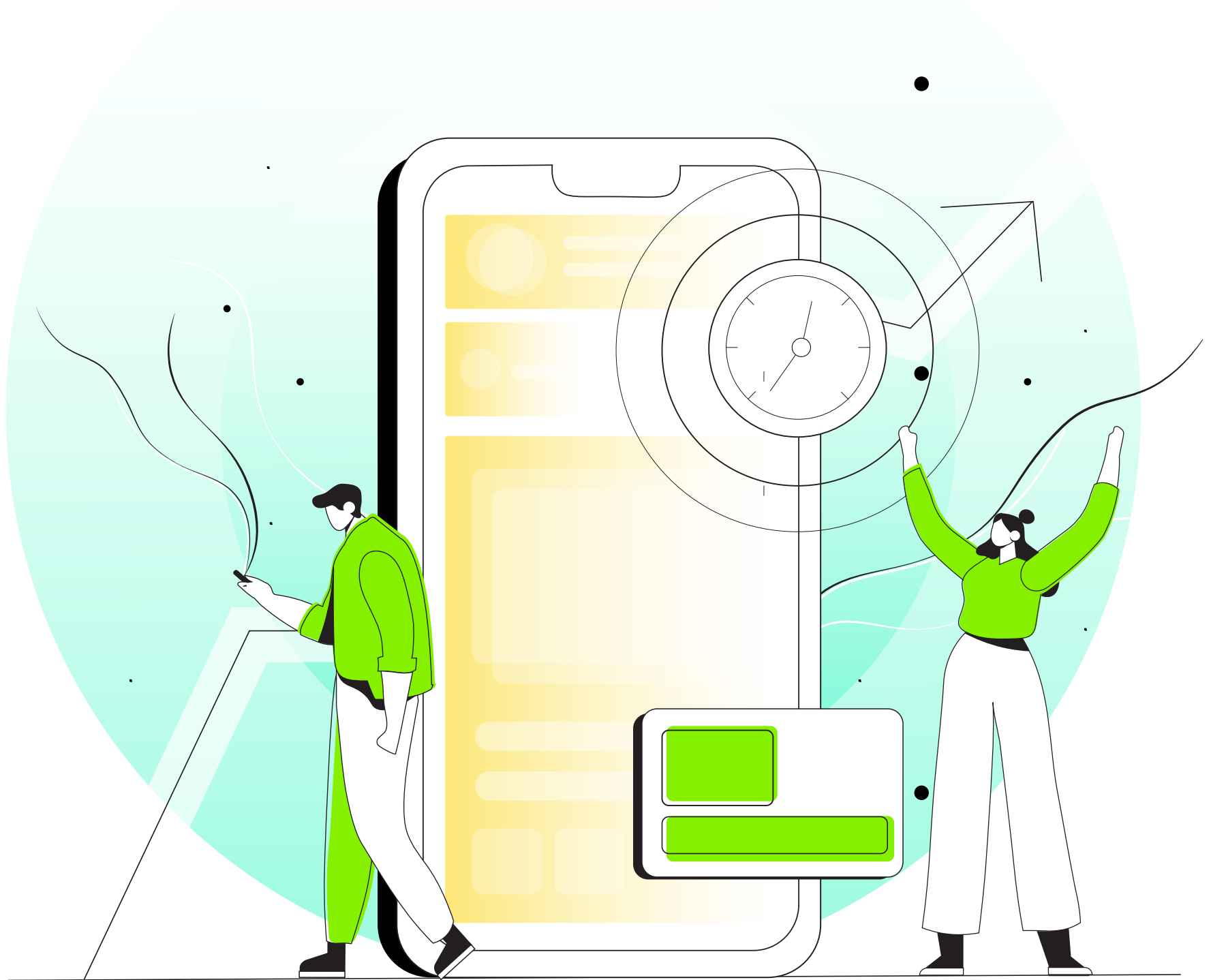Lead generation informational pages bounce rate improved by 8.3%.

Bounce rates on product listing pages in retail and travel improved by 5.7% and 5.4% respectively.

Retail customer engagement increased by 5.2%.

State
of the
Nation

Rising Expectations in the Mobile-First World

Today's consumer is always on the go, has limited patience and expects a more tailored, in–context experience.

People rely on mobile constantly in their daily lives, with almost a third of the UK working population – 10.4 million people – using smartphones to be more productive at work [1]. A study by Boston Consulting Group emphasised this reliance and revealed that people would not be willing to surrender their mobile devices, even at the expense of satisfying some traditional needs.[2]

More than 3 in 10 consumers would stop seeing their friends in person	A third of people would rather give up sex for a year	45% say they would put off going on holiday	46% would be willing to give up a day off per week	More than 55% would rather give up dining out for 12 months

Boston Consulting Group

Even though these findings don't directly apply to mobile-based engagement or sales, it is interesting to see how mobile-centric psychology is changing.

The need for mobile speed

Speed has a direct impact on user experience. Speed plays a vital role in the success of any digital initiative, and is pronounced on e-commerce and other transactional sites. 70% of consumers admit that page speed impacts their willingness to buy from an online retailer [3] and in the US, latency is the number one reason why consumers decide to abandon mobile sites [4], with 10% blaming slow downloads as a reason for not purchasing [5].

Google's user performance data shows that even the smallest fraction of a second in page load can change customer focus and interaction.
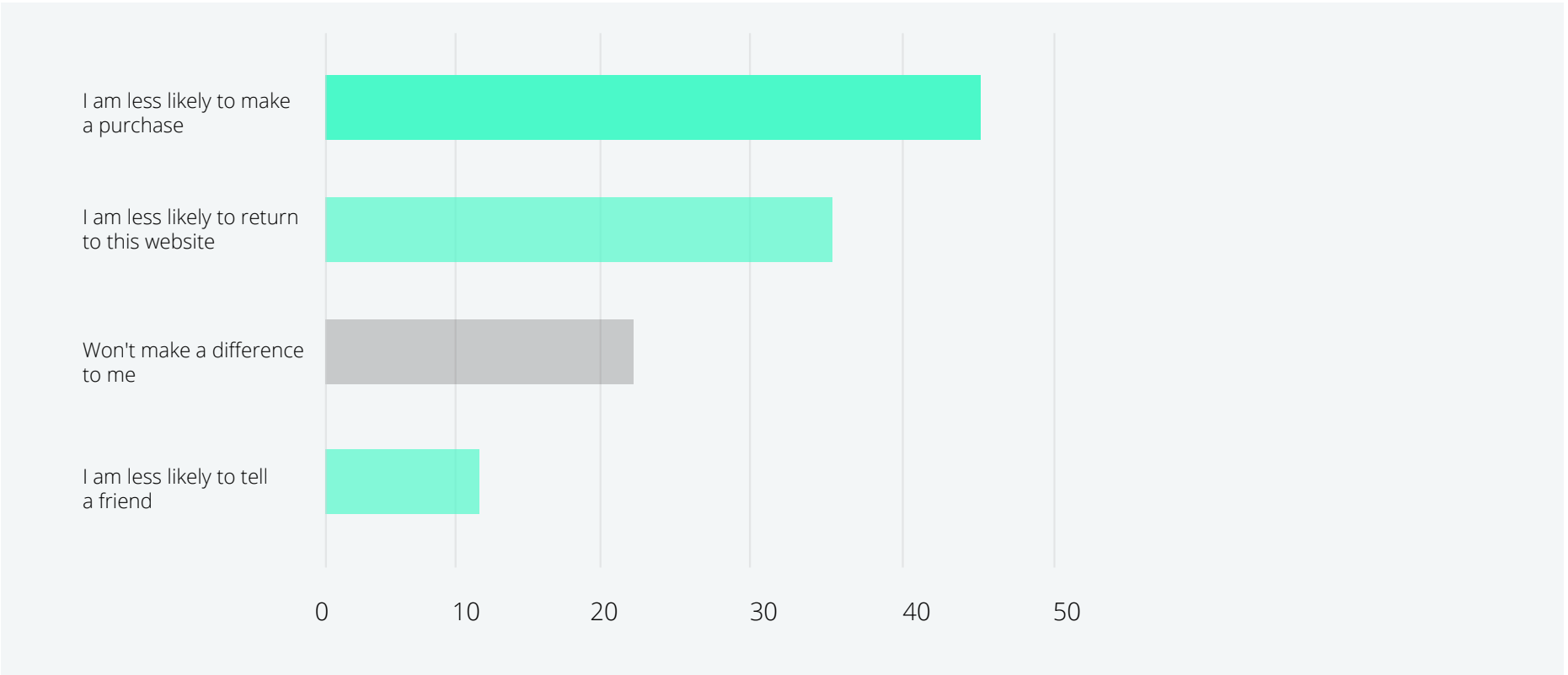
Time to Load	User Impact
0 to 16ms	Users are exceptionally good at tracking motion, and they dislike it when animations aren't smooth. They perceive animations as smooth so long as 60 new frames are rendered every second. That's 16ms per frame, including the time it takes for the browser to paint the new frame to the screen, leaving an app about 10ms to produce a frame.
0 to 100ms	Respond to user actions within this time window and users feel like the result is immediate. Any longer, and the connection between action and reaction is broken.
100 to 300ms	Users experience a slight perceptible delay.
300 to 1000ms	Within this window, things feel part of a natural and continuous progression of tasks. For most users on the web, loading pages or changing views represents a task.
1000ms or more	Beyond 1000 milliseconds (1 second), users lose focus on the task they are performing.
10000ms or more	Beyond 10000 milliseconds (10 seconds), users are frustrated and are likely to abandon tasks. They may or may not come back later.

Customer reactions to slow e-commerce sites

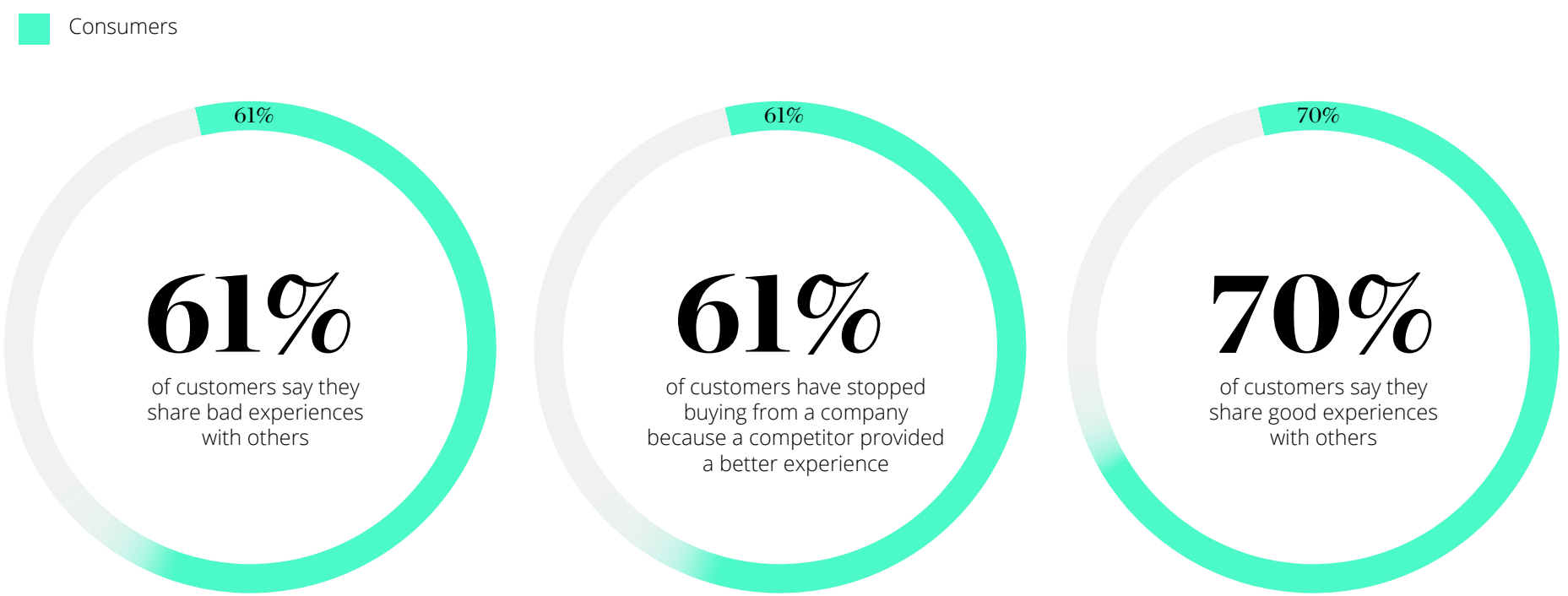Which actions do you take when an e-commerce site loads slower than expected?

There is evidence that site speed improvements can have an impact on customer engagement, conversions and ultimately a brand's bottom line. If we include positive shifts in loyalty, brand perception and advocacy in the mix, we can see that investing in speed is one of the key ingredients that leads to a brand's online success.

Unbounce Speed Impact Report

(1) https://www2.deloitte.com/uk/en/pages/press-releases/articles/more-than-10-million-uk-workers-could-be-using-smartphones-to-boost-productivity.html
(2) The Mobile Revolution: How Mobile Technologies Drive a Trillion-Dollar Impact https://www.bcg.com/en-gb/publications/2015/telecommunications-technology-industries-the-mobile-revolution.aspx January 2015
(3) The Five Fixes To Increase Mobile Checkout Conversion: Optimize Your Mobile Checkout To Capture More Mobile Web Sales. May 9, 2017 | Forrester
(4) https://unbounce.com/page-speed-report/
(5) Must-Have eCommerce Features Road Map: The Retail eCommerce Playbook April 18, 2019| Forrester

Experiences impact the bottom line, for better or worse

■ Consumers

61%
61%
of customers say they
share bad experiences
with others

61%
61%
of customers have stopped
buying from a company
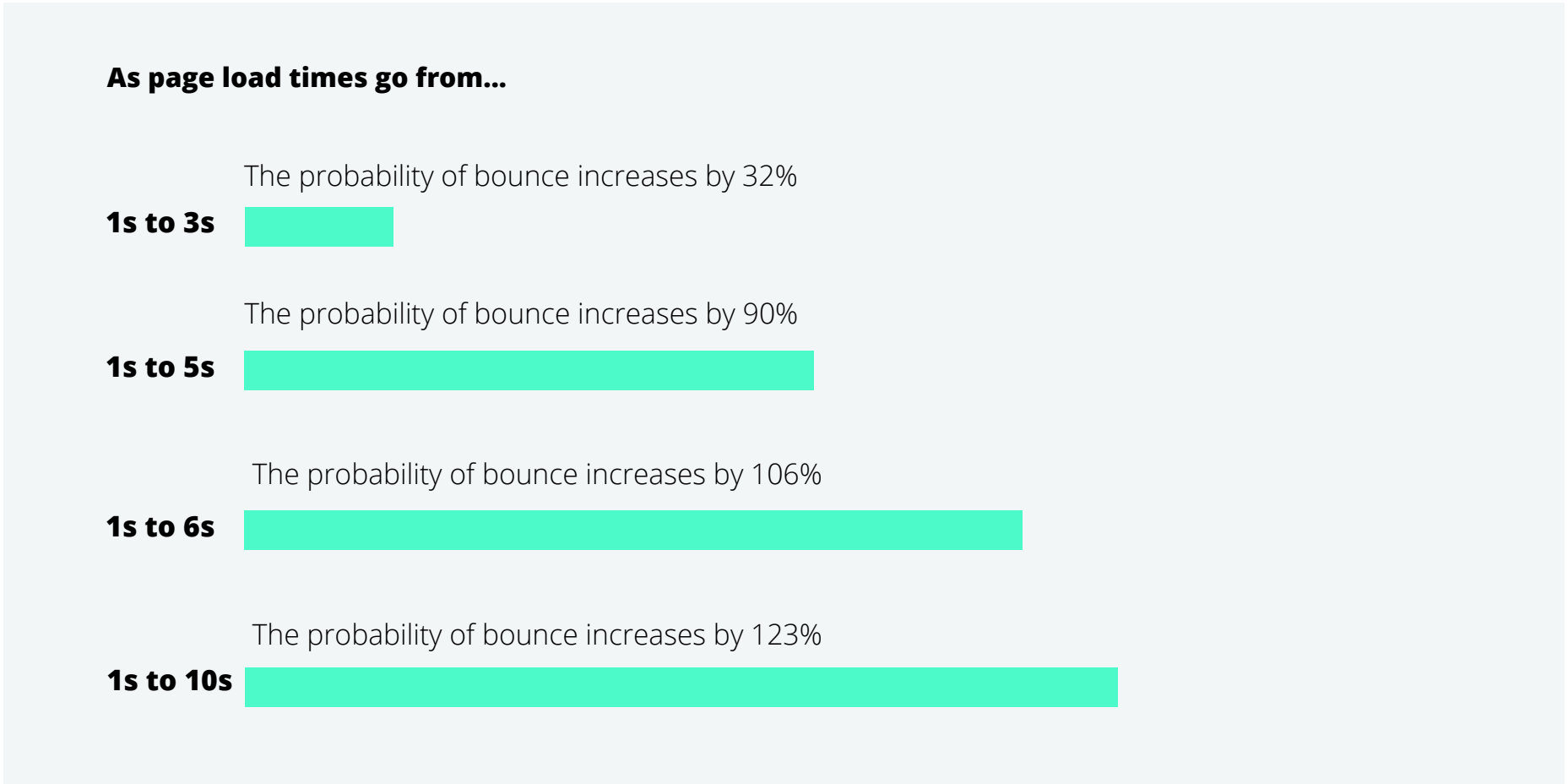because a competitor provided
a better experience

70%
70%
of customers say they
share good experiences
with others

Salesforce Resarch – State of the Connected Customer 2rd Edition

A 2019 study ran by Google in Denmark, demonstrated that on average consumers were 10% more willing to recommend a web shop if load-time was reduced from 13 seconds to 10 seconds. A further reduction from 10 seconds to 3 seconds gave an estimated 26% increase in advocacy. [6]

The study concluded significant potential for increasing consumer loyalty and therefore revenue by optimising mobile website speed. And the slower the website, the bigger the potential. It gets more interesting when we see the direct impact mobile site speed has on likelihood to bounce.

As page load times go from...

The probability of bounce increases by 32%
1s to 3s

The probability of bounce increases by 90%
1s to 5s

The probability of bounce increases by 106%
1s to 6s

The probability of bounce increases by 123%
1s to 10s

Google/SOASTA research 2017

Consumers are now mobile-first

Mobile is asserting itself as the dominant digital touchpoint, influencing both online sales and purchase decisions in-store. This influence will continue to deepen and it is estimated that mCommerce will double from 2019–2023, ultimately accounting for ¾ of total e-commerce sales [7]. There is still a way to go though as retailers see 45% lower conversion rates on mobile devices than on desktop[8]

Smartphones are important to every phase of the purchase journey, from discovery to price checking, however comfort when browsing on mobile is still much higher than the likelihood to purchase. When it comes to mobile transactions, the UK leads the pack; 25% of UK adults who purchase physical goods prefer using a smartphone. [9]

> "
> The poor performance of marketers' mobile websites, including slow page load times, continues to be an issue and is conditioning people to navigate away before they even see the content or products they want.
>
> Forrester: The New Mobile Mind Shift Index, December 21, 2018

In response to an increasingly savvy mobile-first consumer, brands need to prioritise their mobile channels. They need to embrace mobile strategically, tactically and culturally if they want to acquire and retain consumers over the long term.

Rising consumer expectations

Consumer expectations have risen dramatically in the last decade, and will continue to do so. In response, consumer-centricity continues to evolve as one of the most critical and influential business principles. Competition, technology and the evolution of digital channels are amongst the key drivers, however, arguably the main catalyst has been the increase in consumer expectations, or rather the decrease in tolerance of a mediocre experience.

(6) Jonas Christensen, Google Denmark/June 2019/Mobile, https://www.thinkwithgoogle.com/intl/en-154/search/#?query=Mobile
(7) Eamarketer – Retail Mcommerce Sales Penetration, by Country
https://www.emarketer.com/forecasts/5a53f4f2d8690c0d70ffaa06/5b2ac4d13808a50ff8046500
(8)) Mobile Shopping Is Stalling, But Don't Panic – Forrester, May 2018

The consumer experience stakes have never been higher

Consumers

83%
of customers say the experience a company provides is as important as its products and services

69%
of customers say one extraordinary experience raises their expectations of other companies

59%
of customers are willing to pay more for a great experience

Salesforce Resarch – State of the Connected Customer 3rd Edition

Most brands are aware that consumer loyalty can be fragile. It has never been easier for a consumer to abandon in favour of a more personalised customer service, an app with higher self-service utility value, and crucially, a better mobile experience.

Products alone no longer guarantees consumer loyalty. Consumers often consider the experience a brand offers to be its main differentiator.

> "
> Brands are no longer competing with the best experience in their category, they are competing with the best digital experience a consumer has ever had.
>
> Why great mobile experiences should be a priority for marketers (February 2017)

In today's always-on culture, the hunger for instant gratification and the need for smooth self-service will continue to motivate brands to invest in optimising their end-to-end ecosystems. In short, consumers have a priority for great experiences.

They want satisfying browsing and content consumption, simple paths to purchase and lots of credible help when faced with a barrier in their journey. The crucial piece is that they want all of this quicker.

The need for speed is more than tantamount to the need for a great experience. It is the driver. This means that the emphasis on minimising latency in mobile performance is only going to deepen in 2020 and beyond.

Study *in* Detail
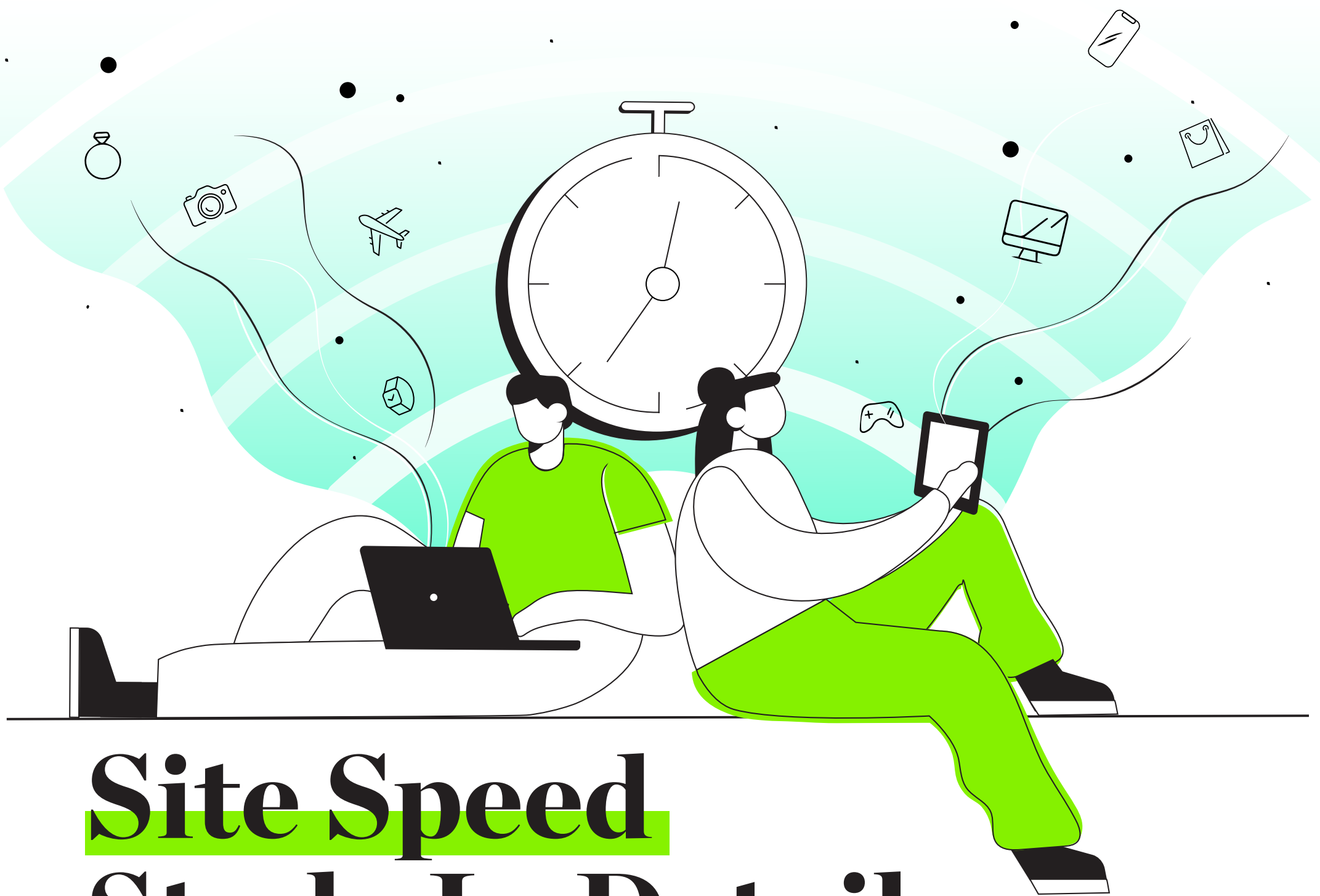
Site Speed Study In Detail

The purpose of this study is to isolate speed as a performance metric and to observe how it effected browsing and conversion behaviour, specifically for mobile sites.

The findings are based on real data from 37 brands accounting for 30m user sessions over a 4 week period. Participating brands were from retail, luxury, travel and lead generation verticals, primarily from Europe and the US.

Retail - *15 brands*

Lead Generation - *6 brands*

Travel - *6 brands*

Luxury - *10 brands*

In the context of this study a brand was categorised as part of the lead generation vertical if the purpose of its website was to generate leads (i.e. get users to fill in a form - for example, to ask for an insurance quote) which could then turn into conversions (i.e. purchasing an insurance plan) online/offline.

Retail

Consumers are most sensitive to speed in the pre-checkout stage of their journey.

Key Findings

These findings are based on 20.5m user sessions with an improvement of 0.1s of each of the four speed metrics explained in the methodology section.

Improving site speed observed positive change in progression through the purchase funnel on mobile devices.

Consumers were most sensitive to speed when moving from product detail pages to add to basket.
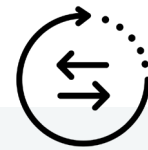
User transactions were measured to increase by 8.4% when there was a 0.1 second improvement in the 4 site speed metrics.

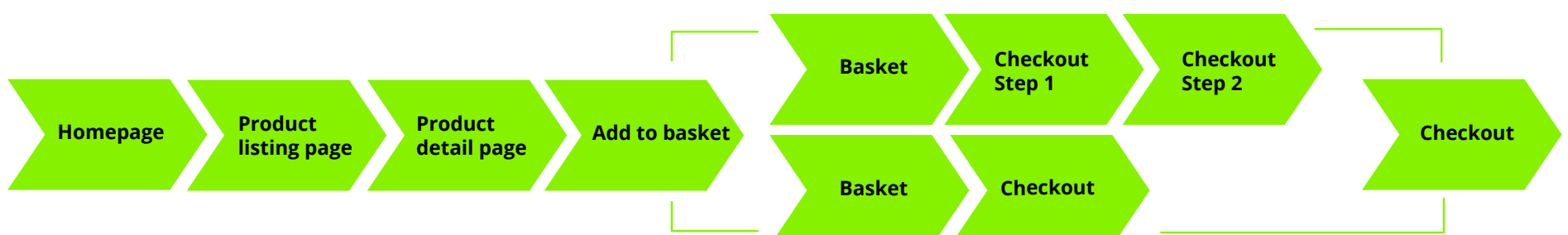Average order value increased by 9.2%.

Product listing page bounce rate on mobile reduced by 5.4% for 4 in 10 brands.

In general, we measured a positive change on page views per session, conversion rate and average order value.

Conversion Journey

The key steps and page types in the retail conversion journey are shown below. Two journeys were analysed; (a) a simple one-step check out and (b) a two-step check out
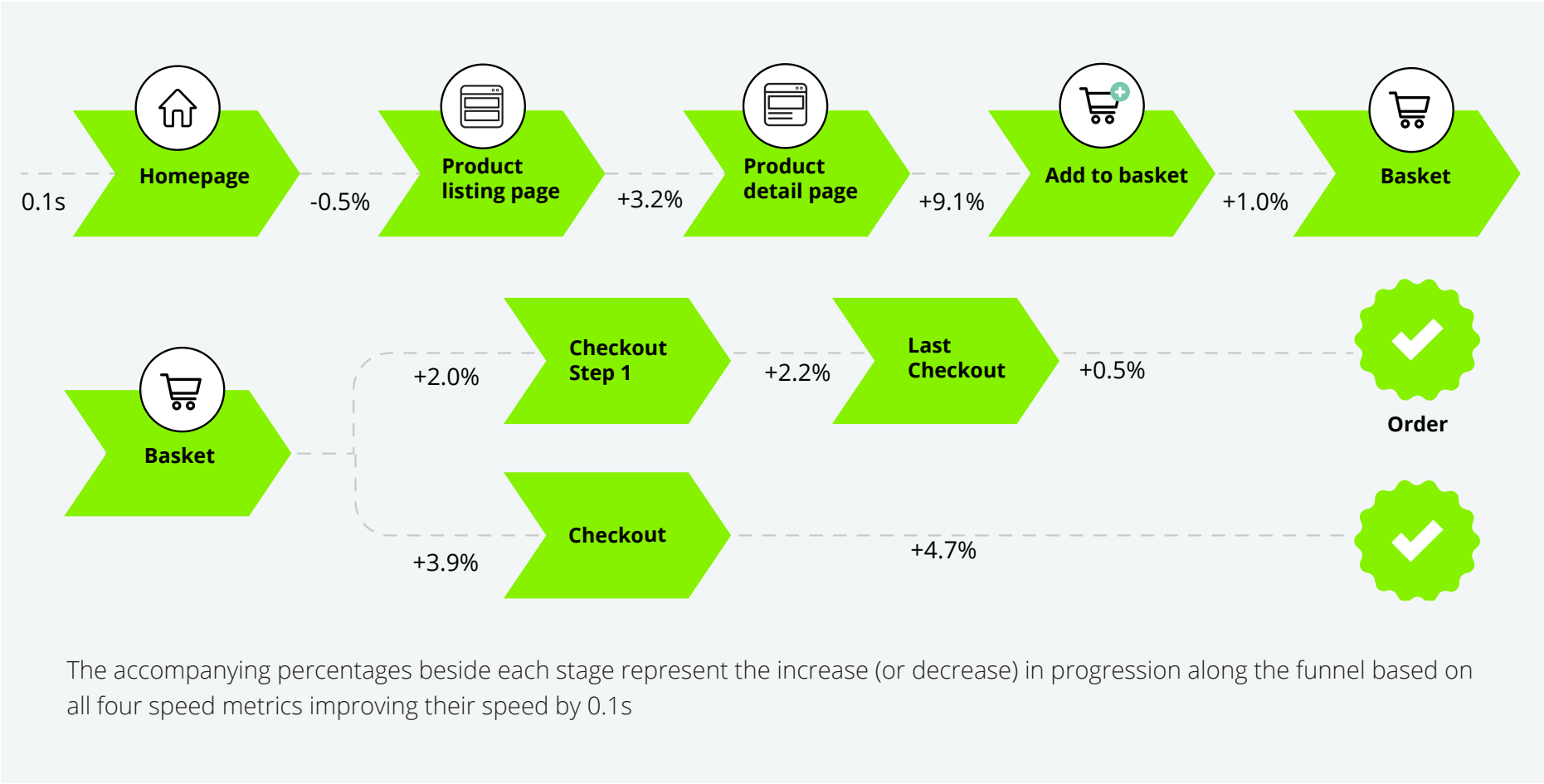
Homepage → Product listing page → Product detail page → Add to basket

Basket → Checkout Step 1 → Checkout Step 2 → Checkout

Basket → Checkout

Funnel Progression Rate

Speed on product pages is vital. An increase of 3.2% was observed from product listing page to product detail page, and a 9.1% increase when progressing to add to basket. This results in consumers, on average, spending 9.2% more on mobile.

By splitting the funnel into pre and post checkout engagement we see most improvement during pre-checkout phase, when consumers are exploring product options and content. The observed improvement reduces to just 1% when consumers proceed to basket. We saw a negative effect of speed improvement on homepage to product listing page progression. Although counter-intuitive, this can sometimes be explained by people clicking more on promo banners when they load faster rather than jumping into a product category.

In retail, it is often more important to focus on the load times of your product detail page instead of your homepage. This is because many people visiting your homepage are already loyal to your brand while those going straight to the product page might be coming from an ad they click while searching for this item on multiple sites. It will be easy for them to bounce and go to a competitor if your site doesn't load quickly enough.

The accompanying percentages beside each stage represent the increase (or decrease) in progression along the funnel based on all four speed metrics improving their speed by 0.1s

Arguably, the most critical part of the journey is within the checkout environment. Consumers are sensitive to a 0.1s speed increase in both one click and two click scenarios. Overall, we observe least influence when progressing from basket to order to checkout in both journeys.

Bounce Rate Improvement in %

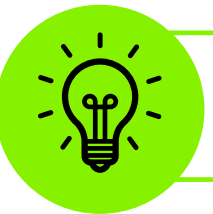|	Homepage	Product listing page	Product details page
	MOBILE USERS	MOBILE USERS	MOBILE USERS
0.1s	**-0.6%**	**-5.7%**	**-1.9%**

Insight: A decrease in bounce rate for mobile users was measured on the homepage, product listing page and product detail page.

Page Views, Conversion Rates and Average Order Value Improvement in %

When site speed improved 0.1 sec we observed a positive correlation in consumers viewing more pages per session, transacting more and spending more. The data also showed a positive correlation between speed improvement and potentially the most important KPI - average order value. On average, users spent 9.2% more on mobile.

	Page Views per session	Conversion rate	Avg. order value
	MOBILE USERS	MOBILE USERS	MOBILE USERS
0.1s	**+5.2%**	**+8.4%**	**+9.2%**

Insight: An uplift was measured in sending mobile users to; transact, spend more and visit more Page Views per session.

Travel

Conversion rates were observed to be most heavily influenced by site speed improvements

Key Findings

These findings are based on 7.4m user sessions with an improvement of 0.1s of each of the four speed metrics explained in the methodology section

An improvement in site speed sees the most positive influence on consumers progressing through the conversion funnel on mobile devices.

A 10.1% increase in conversion rate on mobile was measured when there was a 0.1 second improvement.

Product listing page bounce rate decreased by 5.4% on mobile.
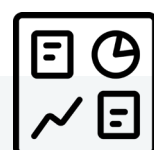
Page Views per session increased by almost 3%.

Conversion Journey

The key steps and page types in the travel conversion funnel for mobile users are shown below.

Homepage → Product listing page → Add-ons/ Form Step 1 → Form Step 2 → Form Submission

Funnel Progression Rate

Even though site speed had the least positive influence on funnel progression when analysed, travel consumers were less sensitive than retail. Progression uplift can be seen incrementally throughout the funnel, culminating in a 2.2% increase in form completion to form submission. A 2% increase was identified in the add ons/form step 1 to form step 2, where travellers are configuring their trips i.e. adding speedy boarding, selecting plane seats or purchasing car hire.
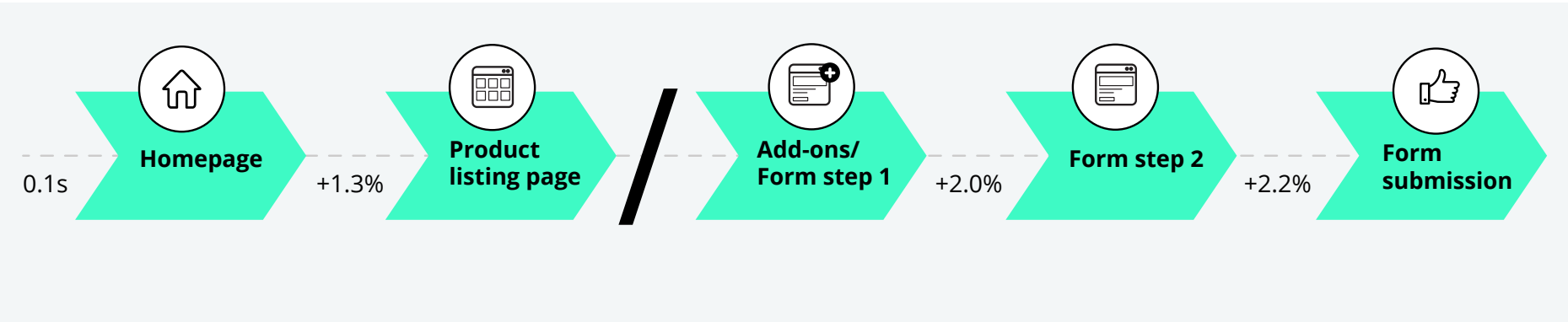

We should be mindful that travel journeys are typically less flexible than retail journeys, meaning that users are more than likely to have a specific need to satisfy within a certain time window i.e. "I need to travel to Madrid for a conference between 10th – 13th July". The availability of travel 'solutions' is typically rather finite and as such users have a higher degree of patience when progressing through the funnel. In retail, for example, it is much easier to abandon and buy from an alternative brand.

Travel configuration can often be a clunky and frustrating experience due to extremely long pages, multiple options and the constant push to cross and upsell. Increasing site speed may reduce user's cognitive load and encourage progression to the next stage in the funnel.

Bounce Rate Improvement in %

Improving site speed of all four key metrics observed a decrease in bounce rate for mobile users on the Homepage and Product Listing Pages by 6.5% and 5.4% respectively.

Homepage

MOBILE USERS
-6.5%

Product listing page

MOBILE USERS
-5.4%

0.1s
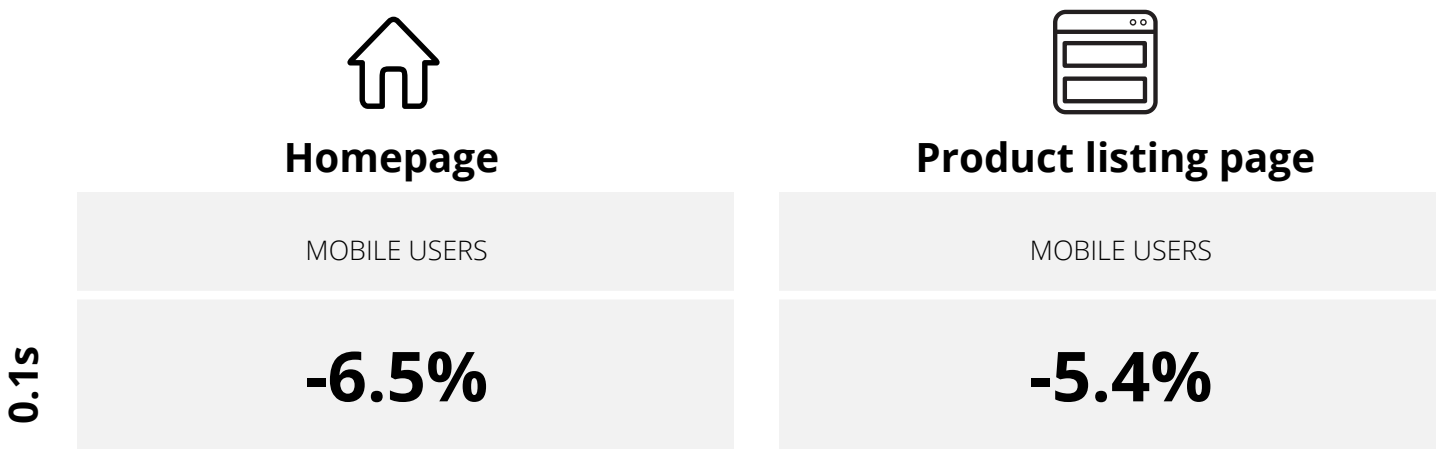
Page Views, Conversion Rates and Average Order Value Improvement in %

By improving site speed by 0.1s, users were observed to transact, spend more and visit more pages per session. The most substantial gain from site speed improvements is in the conversions.

	Page Views per session	Conversion rate	Avg. order value
	MOBILE USERS	MOBILE USERS	MOBILE USERS
0.1s	+2.8%	+10.1%	+1.9%
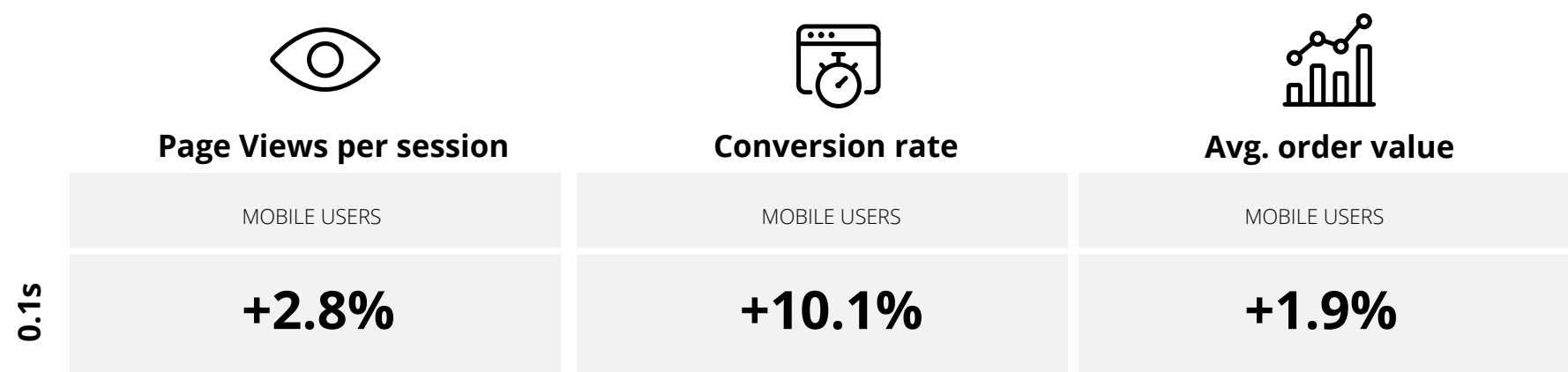
Simpler mobile experiences on travel sites can make it easier for users to make choices when given multiple options. Furthermore, a faster loading site drives conversion rates up.

Mobile traffic is growing in the Travel sector but conversion rates are way behind due to consumers preferring the security and accuracy of finalising their experience. However they need to be aware that there is a lot of cross-device behaviour when consumers are researching and comparing, prior to purchase.

Luxury

Consumers were the most sensitive to speed in the latter stages of the conversion journey.

Key Findings

These findings are based on 2.1m user sessions with an improvement of 0.1s of each of the four speed metrics explained in the methodology section

Out of all verticals studied, luxury consumers are the most sensitive to speed improvements.

An improvement in speed correlates with longer sessions and an increased likelihood to convert for mobile users.

There was a highly significant 40.1% increase in users moving from product detail to add to basket.

Bounce rate on product listing page for desktop users increased by 4.8%, yet decreased by 3.8% for those on mobile.
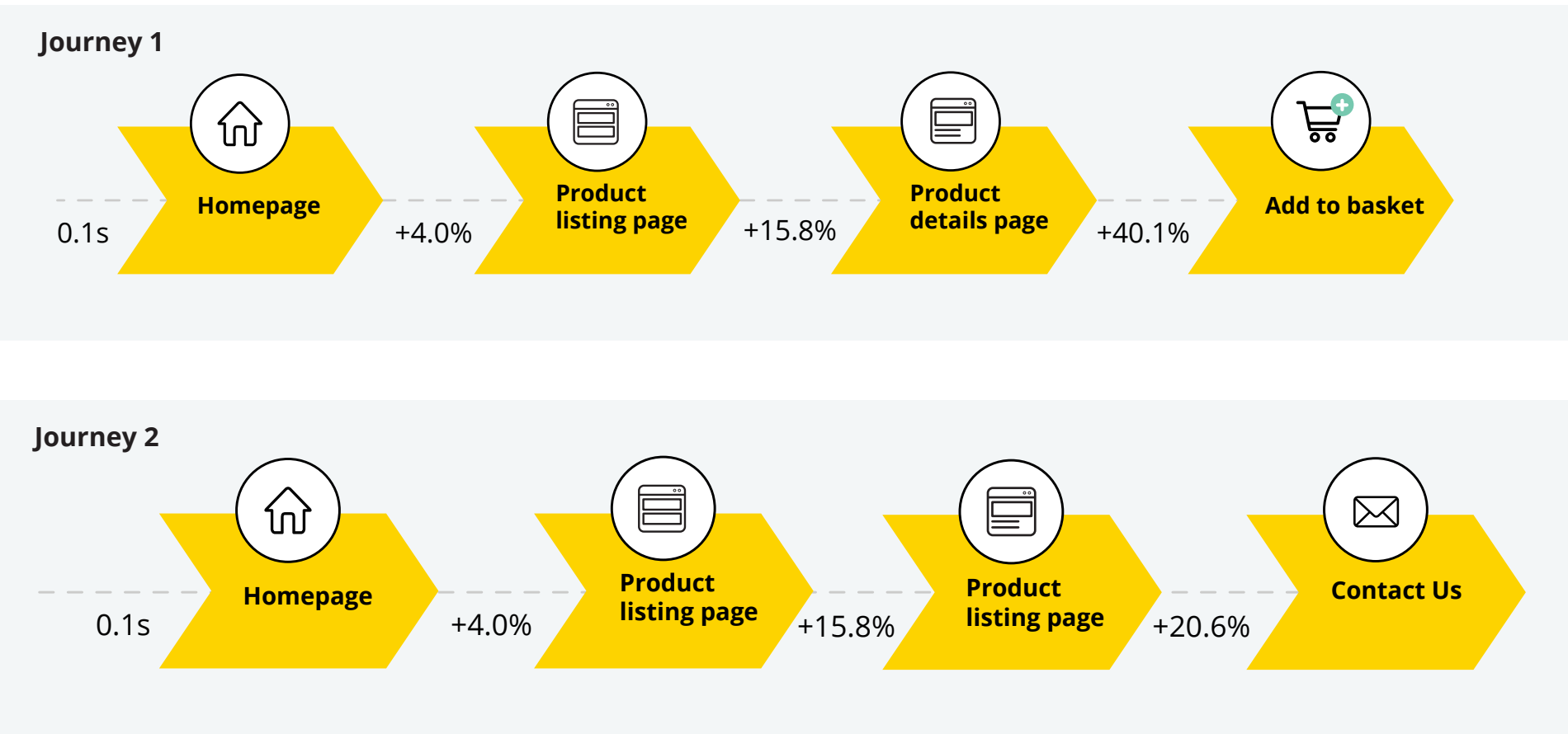
Conversion Journey

With high-value purchases, consumers are sometimes reticent to complete transactions online and prefer to make an appointment and buy-in-store. Two user journeys were analysed within the luxury vertical to reflect typical conversion behaviours.

Journey 1 → Homepage → Product Listing page → Product Detail Page → Add to Basket

Journey 2 → Homepage → Product Listing Page → Product Detail Page → Contact Us

Funnel Progression Rate

Within the homepage to add to basket journey we can see an incremental progression increase of 4% from the homepage to product listing page, and an impressive 40.1% when adding to basket. There was also a significant uplift in the shorter contact us journey, with a 0.1s improvement correlating with a 20.6% uplift. Clearly, speed matters most in the latter stages of the luxury funnel.

Journey 1

0.1s → Homepage +4.0% Product listing page +15.8% Product details page +40.1% Add to basket

Journey 2

0.1s → Homepage +4.0% Product listing page +15.8% Product listing page +20.6% Contact Us

It needs to be noted that luxury consumers will often use the add to basket functionality as a wish list, so progression to the basket does not necessarily equate to all items being purchased, and overall progression rate beyond product detail page is very small.

Some UX studies show that many luxury brands struggle with on-site conversion rates and as such are making a concerted effort to become more digitally progressive. The key takeaway for these brands is that their consumers are more sensitive to speed improvements than any of the other verticals analysed in the study.

Bounce Rate Improvement in %

Improving site speed observed a decrease in the bounce rate for mobile users on the homepage, product listing page and product detail page. Conversely, the product listing page bounce rate on desktop increased by 4.8%.

	Homepage	Product listing page	Product details page
	MOBILE USERS	MOBILE USERS	MOBILE USERS
0.1s	**-0.2%**	**-3.8%**	**-4.6%**
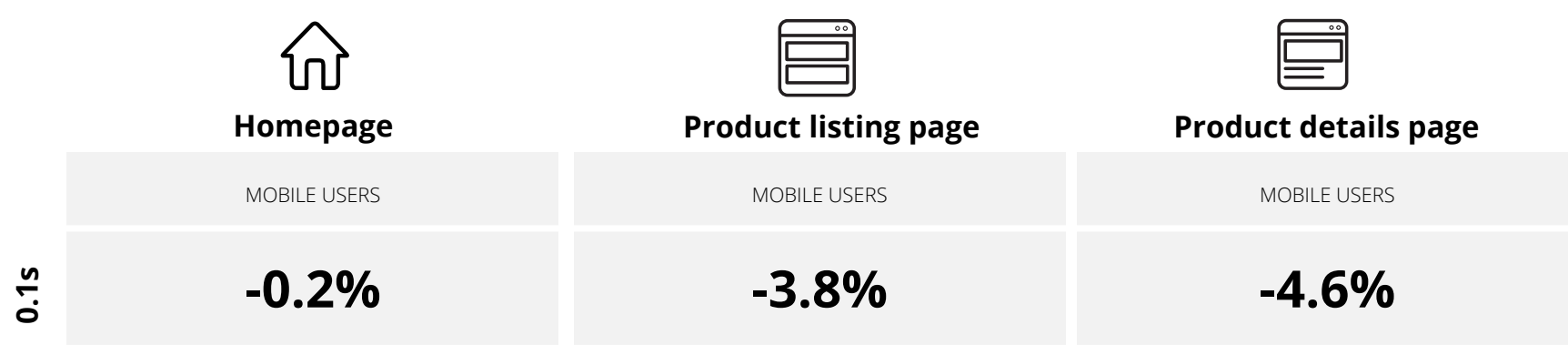
Page Views and Conversion Rates Improvement in %

Luxury consumers typically spend more time perusing and comparing product content during the consideration phase than their retail counterparts. In the main, this behaviour is driven by higher value products and also the exclusivity of the purchase.

	Page Views per session	Conversion rate
	MOBILE USERS	MOBILE USERS
0.1s	**+8.0%**	**+3.6%**
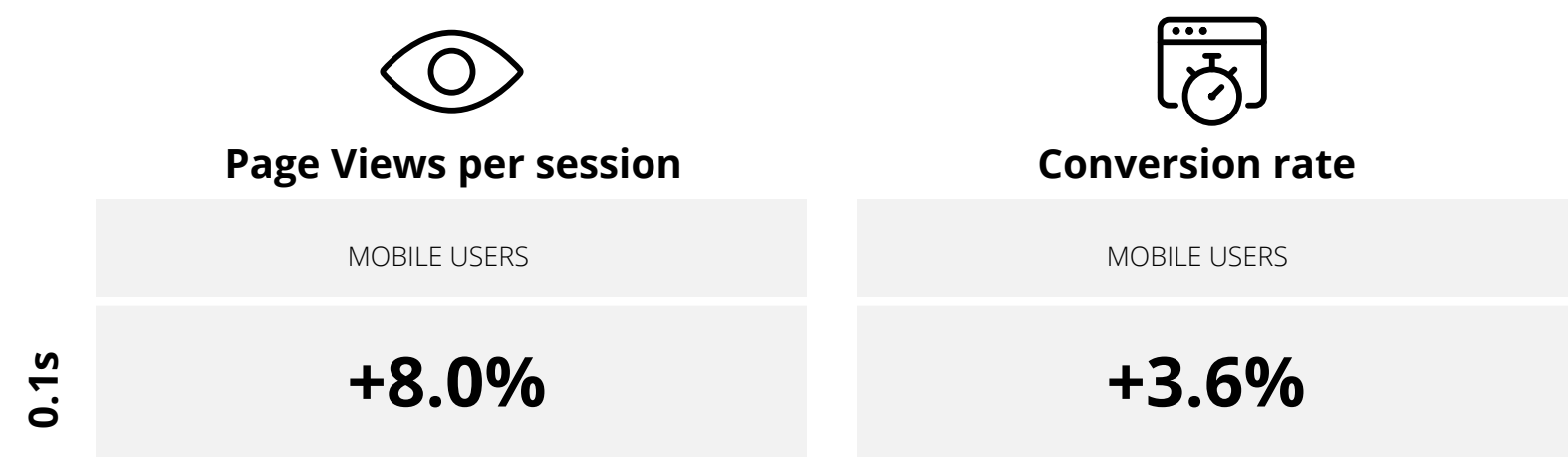
Luxury brands want to give the best experience to their consumers everywhere, including on their websites, even if online sales make up a fraction of their revenue. These brands are very attentive to their website experience but often have strict brand guidelines they would not sacrifice even if they contradict good practices of speed or UX - like certain fonts, colours and layouts. The "usual suspects" slowing down these sites are high-resolution imagery and video content, as well as 3rd party tags and an overall unoptimised structure of the site.

Lead Generation

Consumer engagement and likelihood to convert were most effected by site speed.

Key Findings

These findings are based on 505k user sessions with an improvement of 0.1s of each of the four speed metrics explained in the methodology section

A site speed improvement of 0.1s observed an uplift of 21.6% from the first step of the form to the form submission page.

Bounce rate on mobile decreased by 8.3%, yet increased by 3.4% on desktop.

A 6.7% increase in sessions was observed when page speed improved.

Conversion rates on both mobile and desktop decreased when site speed was seen to improve.

Conversion Journey

Similar to luxury brands, a lot of lead generation brands want to steer consumers towards an offline meeting with the brand representative, where most of the sale will happen. This means they are not as focussed on providing the best and fully functional mobile experience, but instead they want to get as much information on the customer and their needs upfront as is possible to make the first conversation productive. As a result, conversion funnels are typically much shorter and simpler than in retail and travel contexts.
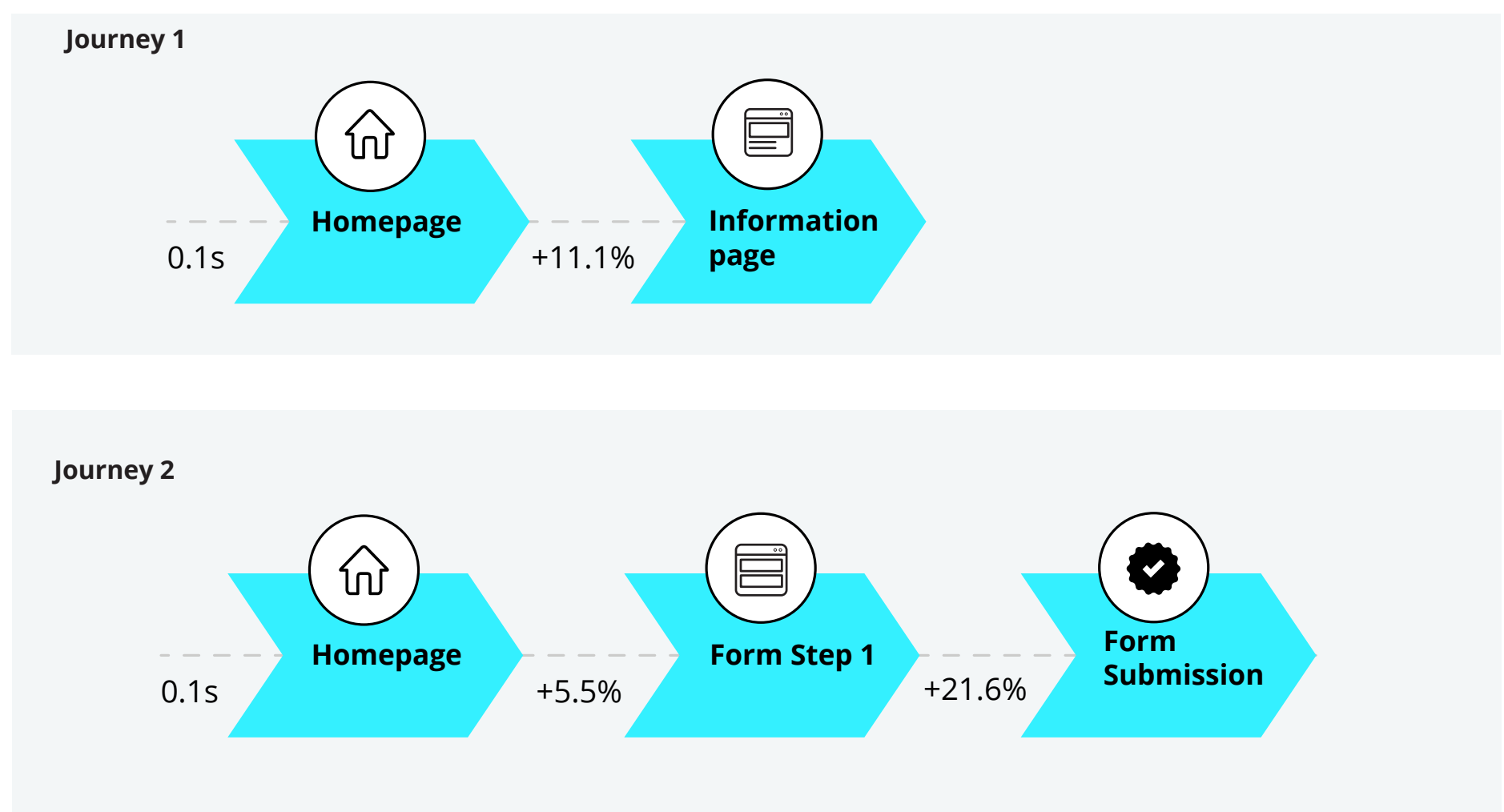
In the context of lead generation, an Informational page is essentially any page on the website other than the homepage, checkout and form pages. It is a page whose purpose is to inform the potential customer about the products/services offered.

Journey 1   Homepage   Information Page

Journey 2   Homepage   Form Step 1   Form Submission
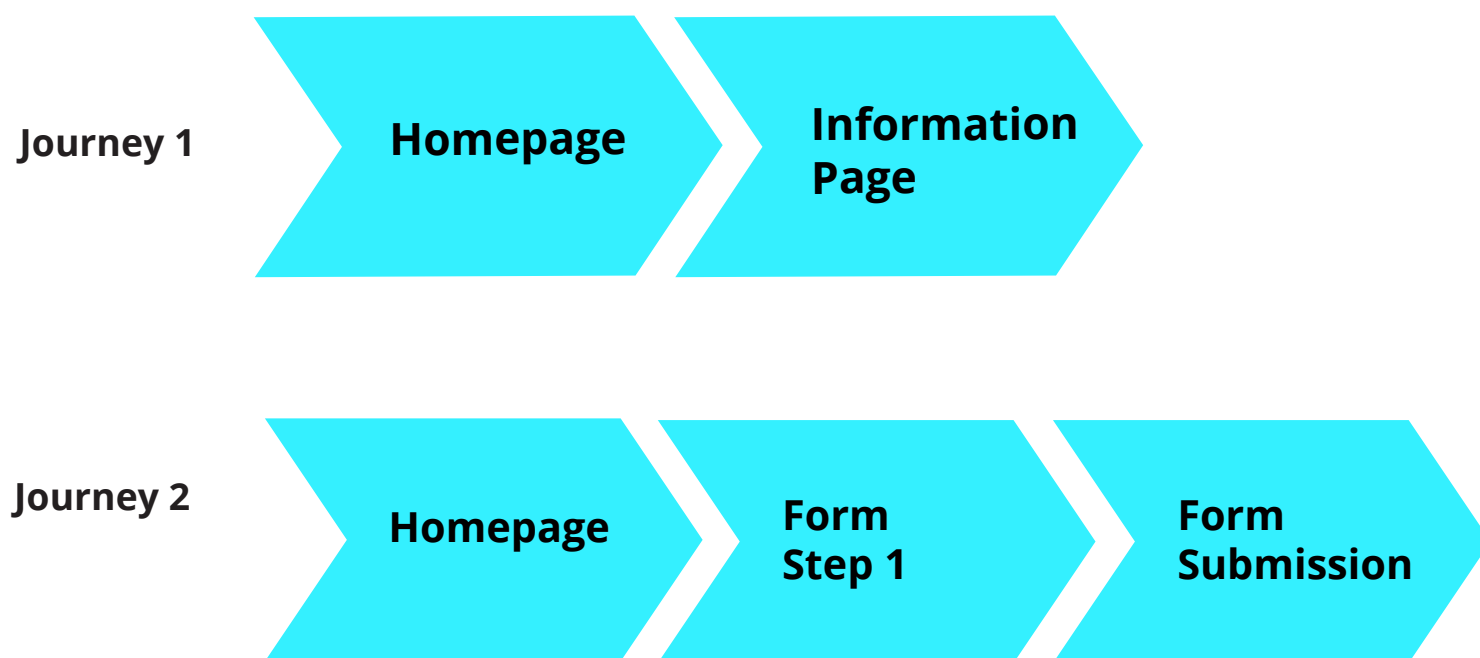
Funnel Progression Rate

While speed had a positive influence on funnel progression in both journeys, the biggest change was seen in the more typical conversion scenario where users submitted a contact form. There was a substantial uplift of 21.6% when progressing from form step 1 to form submission.

Journey 1

0.1s   Homepage   +11.1%   Information page

Journey 2

0.1s   Homepage   +5.5%   Form Step 1   +21.6%   Form Submission

Bounce Rate Improvement in %

Homepage and informational pages both benefitted from a reduced bounce rate when page speed increased.

	Homepage MOBILE USERS	Informational page MOBILE USERS	Form page MOBILE USERS
0.1s	-3.9%	-8.3%	--
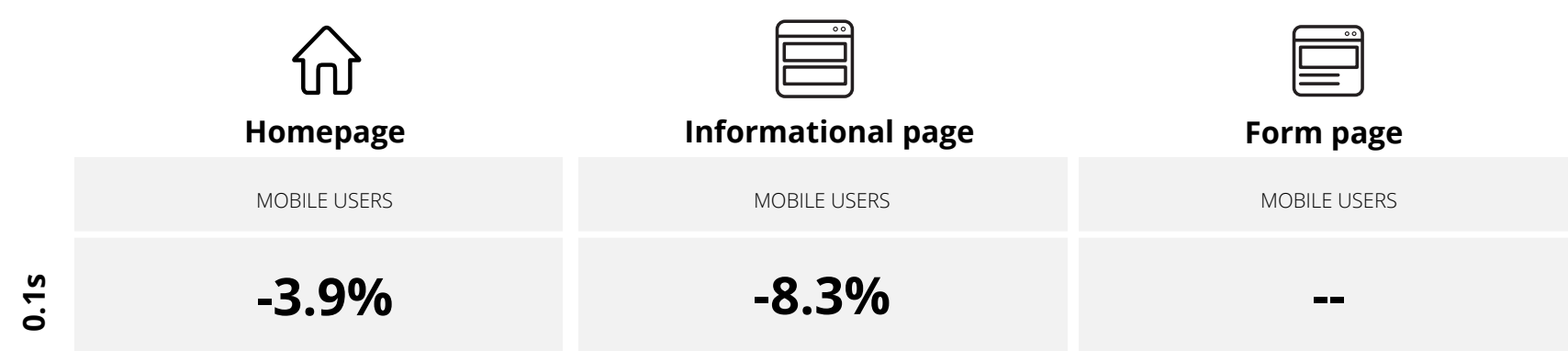
Page Views and Conversion Rates Improvement in %

A faster speed page showed an improvement in consumer engagement by almost 7%. However, conversions rates on mobile decreased by almost 2%.

	Page Views per session MOBILE USERS	Conversion rate MOBILE USERS
0.1s	+6.9%	-1.9%
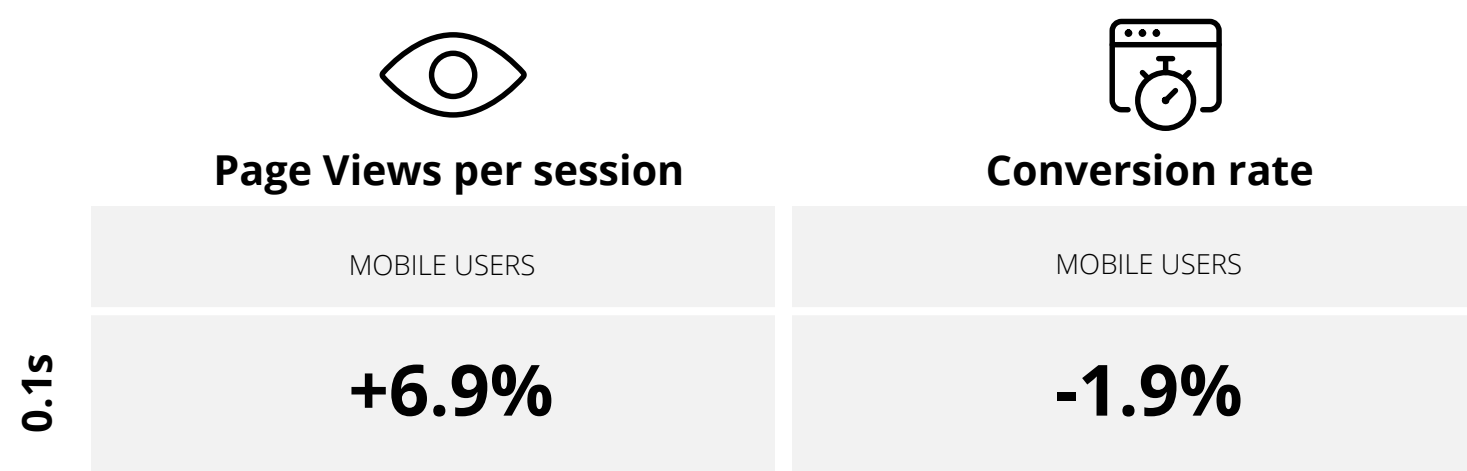
Companies in finance and insurance sectors with lead generation sites tend to be quite traditional in their culture, with site updates happening rarely, maybe every 1.5-2 years. Newcomers to the industry are changing the game which will ultimately increase pressure for longer players to invest more in their mobile experience.

Success
Stories

The following case studies have been taken from the Think with Google site, a one-stop shop for consumer trends, marketing insights and industry research.

BMW

JÖRG POGGENPOHL,GLOBAL HEAD DIGITAL MARKETING AT BMW GROUP, MAY 2019

CHALLENGE

The BMW website didn't look, feel, or behave like a website built by BMW, where our brand is synonymous with performance. With speed.

So we decided to rebuild our mobile website from scratch, to create a mobile site experience that would reflect what BMW represents. We had four goals for the new site. The first goal was speed. The second and third goals? Speed. Our fourth goal was to leverage our consumer insights to create a dynamic and resourceful marketing outlet.

APPROACH

As a performance automobile company, we know well at BMW that building great products starts with choosing the right components. To create a best-in-class website built for speed and great user experiences, we chose Progressive Web Apps (PWA) and Accelerated Mobile Pages (AMP).

PWAs are reliable and load instantly, even in uncertain network conditions, and provide an engaging, immersive, app-like user experience on mobile devices. And AMP's open source initiative was designed to create webpages that load quickly on mobile browsers. As an added bonus, because the AMP framework is constantly being updated to ensure it's reliable, we don't need to spend ongoing developer resources to ensure it stays fast.

> " Before the first line of code was written, our creative and design teams agreed to abandon any feature that would slow down the site.

The result was a mobile site that serves as the perfect vehicle for the kind of content that embodies what the BMW brand is all about: design, innovation, and performance. We were very happy with the look and feel of the new site. It's fast, beautiful, informative, engaging — everything we wanted it to be. We rebuilt our mobile site with the expectation that it would improve performance. And the results we saw far exceeded our expectations.

Traffic to the BMW Sales Site increased from 8% to 30%
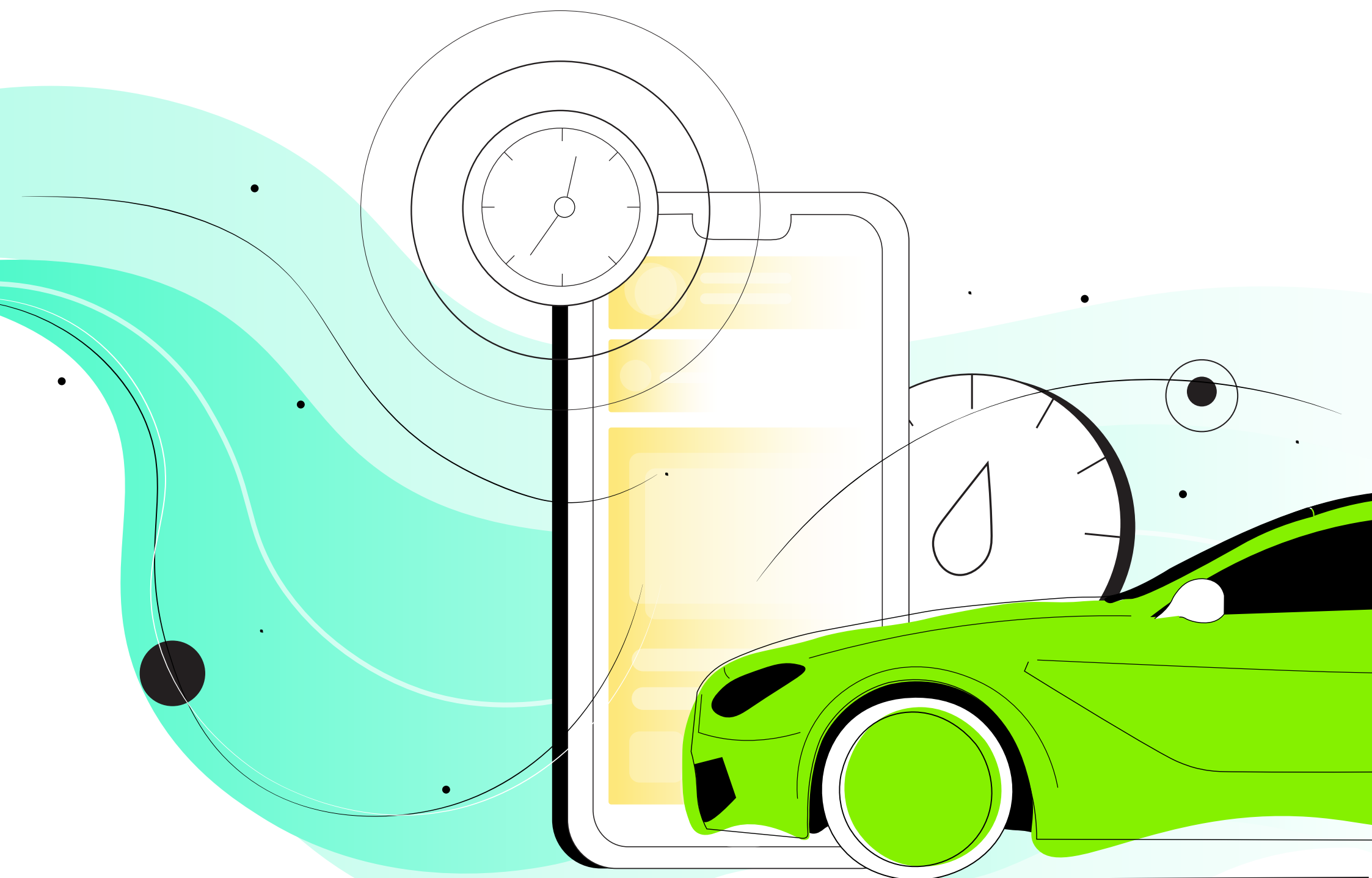
Pfizer

RISA WEXLER, HEAD OF PFIZER'S MEDIA LAB, FEBRUARY 2019

CHALLENGE

The challenge at Pfizer was the same as every company operating today: navigating how they do business in a world that's moving at breakneck speed.

With around 40 promoted brands, and 12 to 15 operating full-throttle sites with lots of functionality at any one time, they were seeing similar mobile speed problems across the whole portfolio. The sites weren't fast, weren't accessible, and didn't offer great experiences. One of their sites took 21 seconds to fully load!

APPROACH

They needed a strategy to fix that, but first, they had to get Senior Leaders and Marketers on board with this change. After reviewing their portfolio of sites with Google they realised they needed to do better for patients. They needed to rebuild their mobile experience.
Pfizer introduced the idea of setting a "speed budget," the amount of time they would accept for a site to load. Any new images or functionality that was introduced into a site can't blow their speed budget. Pfizer was ruthless with this, and often it meant something else would have to go.

They also developed a new generic site infrastructure so we could adapt and scale quickly for each brand. And it worked: The site that took 21 seconds to fully load? Now it takes 5.2 seconds.

Risa Wexler, Head of Pfizer's Media Lab stated 'Mobile is great at helping people cut through the clutter. But that requires creating experiences that are just for mobile. While there are similarities between desktop and mobile, creating a mobile-responsive site for both platforms should only be a temporary fix. It's critical to build for each platform so you're providing the experience people expect, regardless of the platform on which they seek your information'
Pfizer also kicked off their "digital wallet" initiative.

It's their copay card version of checking in at the airport on your phone. Patients don't need to remember key chain tags, passwords, or which phone number to plug in where. They can complete the whole transaction via their phone with their mobile wallet.

" The appliance has obviously improved conversion and revenue for us. When you affect conversion by 9%, that is very significant on an annual basis

RESULTS

The Pfizer sites load 38% faster with the bounce rate reduced by 20%.

Pfizer sites load 38% faster

Postbank

PUBLISHED ON THINK WITH GOOGLE

CHALLENGE

In view of the highly competitive financial market in Germany, Postbank wanted to stand out from the competition with a faster mobile website. The aim was to determine how a higher speed affects the cost per lead when accessing via mobile devices. On this basis, the decision about further investments in modern web technologies would then be made.

APPROACH

Postbank selected a landing page with many hits. With Accelerated Mobile Pages (AMP) , a new version of this page was created. AMP is an open source development framework for shorter website load times.

The team created five Google Ads campaigns using designs and tests. These A / B tests then ran over a period of 30 days. In this way, it collected data on the performance of the different page versions: number of leads, cost per lead, click rate, cost per click and hits.

> " In campaigns with general keywords, there was a significant increase in efficiency with AMP: 58% more leads at a 37% lower cost per lead. The click rate was 11% higher , the cost per click 8% lower. Postbank achieved 8.5% more hits overall at the same cost.

Postbank achieved 8.5% more hits overal at the same cost. The click rate was 11% higher with the cost per click 8% lower.

The click rate was 11% higher , the cost per click 8% lower

TUI
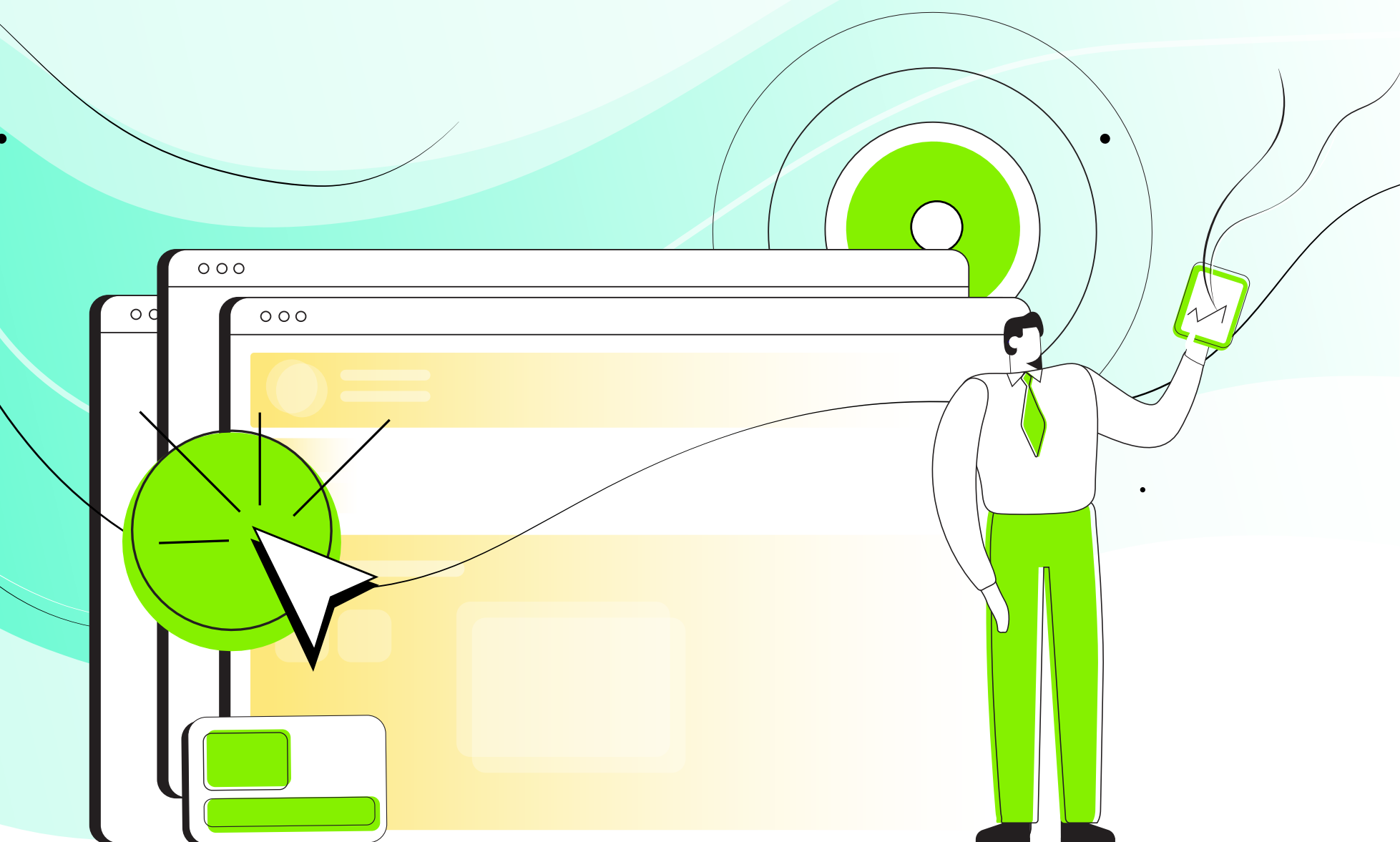
LINA HASSAN, CONVERSION SPECIALIST GOOGLE SWEDEN

CHALLENGE

Travel operator TUI in the Nordics undertake a large-scale overhaul of their internal organisation and processes in order to prioritise site speed improvement. Speed projects require structural support, and often a whole new attitude to development. TUI in the Nordics knew that to make the most of this opportunity for growth they needed a fresh approach.

It's easy to assume that fixing site speed is solely the engineers' responsibility. But for a speed project to get off the ground, the whole organisation needs to be on board, with dialogue between management, stakeholders and developers, silos broken down and agile processes put in place.

APPROACH

TUI found that adopting a few key premises was fundamental to their success:

– Buy-in from management, all the way up to CEO Alex Huber.
– Establishing cross-functional teams, allowing for dialogue between business representatives and developers.
– Welcoming a test-and-learn mindset.

For a speed project to really take off, the management mindset needs to be forward-thinking and adaptable, with engineers given as much autonomy and accountability as possible. Various new development techniques can help to facilitate this agile approach:

– Adopt a Kanban system.
– Set up mob programming where all developers work together on one task at one screen, alternating at the keyboard.

– Use metrics like time to market and defect rate to prove that the new way of working results in both quality and speed, increasing trust and support from the business.

– Shift to a platform that allows frequent site changes, cutting release cycles and enabling a test-and-learn culture.

"

Without operational support, speed projects often end up stuck in backlogs - or get forgotten by the next campaign. Fixing site speed is not only about code. To get it right you need the right organisational setup and mindset.

Martin Bystedt, TUI Nordic Head of User Experience and Digital.

RESULTS

Since implementing these new processes and technologies, tui.se has seen a 31% decrease in bounce rates and a 78% reduction in load times. This is a significant improvement: not only because speed is an important ranking factor, but because many studies show a direct correlation between speed and conversions on both desktop and mobile.

The TUI case demonstrates a particularly notable impact on mobile visitors, with an 11% increase in mobile conversion rate relative to desktop. As mobile gradually becomes the primary device, developing this area will become more and more central to growth.

TUI has seen 31% decrease in bounce rates and 78% reduction in load times

Ebay

ADDY OSMANI, ENG MANAGER WORKING ON CHROME AND WEB PLATFORM

CHALLENGE

Speed was a company-wide initiative for eBay in 2019, with many teams determined to make the site and apps as fast as possible for users. In fact, for every 100 milliseconds improvement in search page loading time, eBay saw a 0.5% increase in "Add to Cart" count.

Through the adoption of Performance Budgets (derived after doing a competitive study with the Chrome User Experience Report) and a focus on key user-centric performance metrics, eBay was able to make significant improvements to site speed.

APPROACH

The improvements eBay made were possible due to the reduction or "cuts" (in the size and time) of various entities that take part in a user's journey. This post covers topics that are relevant to the web developer community at large, rather than eBay-specific topics.

Reduce payload across all text resources - eBay reduced their text payloads by trimming all the unused and unnecessary bytes of JavaScript, CSS, HTML, and JSON responses served to users.

Critical path optimization for above-the-fold content - eBay introduced the concept of the critical path for Experience Services (service architecture layer). When a request comes to these services, they work on getting the data for above-the-fold content immediately, by calling other upstream services in parallel

Image optimizations - eBay standardized on the WebP image format for search results across all platforms, including iOS, Android, and supported browsers.

Predictive prefetch of static assets - A user session on eBay is not just one page. It is a flow. For example, the flow can be a navigation from the homepage to a search page to an item page. So why don't pages in the flow help each other? That is the idea of predictive prefetch, where one page prefetches the static assets required for the next likely page

Prefetching top search results - When a user searches eBay, eBay's analytics data suggests that it is highly likely that the user will navigate to an item in the top 10 of the search results. So eBay now prefetches the items from search and keeps them ready for when the user navigates.

Eager downloading of search images - eBay now immediately sends the first 10 item images to the browser in a chunk along with the header, so the downloads can start before the rest of the markup arrives. As a result, the images will now appear quicker. This change is rolled out globally for the web platform

Edge caching for unrecognized homepage users - eBay decided to cache the unrecognized user content (HTML) on their edge network (PoPs) for a short period. First-time users can now get homepage content served from a server near them, instead of from a faraway data center. eBay is still experimenting with this in international markets, where it will have a bigger impact.

RESULTS

All the performance "cuts" eBay made collectively contributed towards moving the needle, and it happened over a period of time. The releases were phased in throughout the year, with each release shaving off tens of milliseconds, ultimately reaching the point where eBay is now:

A 0.1 second improvement in load time resulted in a 0.5% increase in Add to Cart count

Recommendations
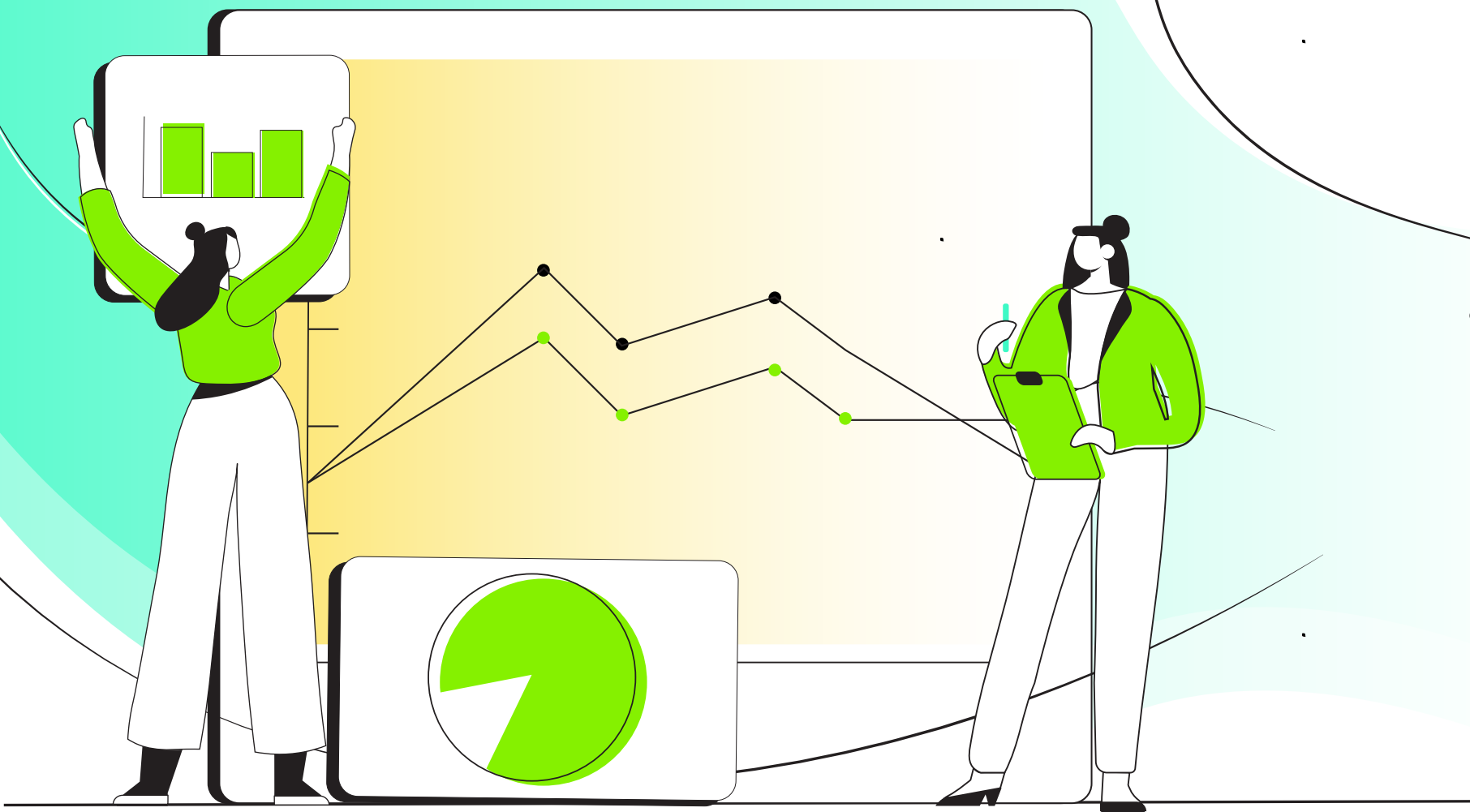
Recommendations

The mobile web remains the most widely used platform in a world where people have more ways than ever before to search, browse, and shop. But it's no longer enough to have just a mobile presence. Business growth requires the fast mobile experience that people expect and demand today. Speed is a foundational aspect of good user experience. Latency on mobile sites can cause:

– **A reduction in mobile sales.**
– **A decrease in consumer engagement.**
– **Increased consumer frustration and higher likelihood to bounce.**
– **Negative brand perception and reduced consumer advocacy.**
– **Increased abandonment in favour of a competitor who offers a better mobile experience.**
– **Loss of competitive advantage.**

> "
>
> Give customers the kind of mobile experience they expect, or be prepared to watch those customers go elsewhere — and fast.
>
> Think with Google

Investing in mobile site speed will help unlock revenue and brand loyalty. There is no reason why every brand providing a mobile experience can't capitalise on these opportunities if they take steps from cultural, strategic and tactical perspectives.

Understand your speed status and strategy setting:

1. Understand the speed status: In order to choose where and how to invest in speed, you need to know how your site is currently performing in a stand-alone context and also in comparison to your competitors. Google have created an easy to use Test My Site Tool to enable you to understand, measure and benchmark your mobile site speed. The lighthouse is another useful tool which allows you to understand your site speed in the context of different devices.

2. Be clear on the potential impact of mobile site speed on the bottom line: Being equipped with this data will help you to sell and prove the validity of considering speed as a primary performance metric.

3. Adopt a mobile-first strategy: Mobile-first is essentially a design strategy, more appropriate for satisfying today's consumers than the responsive approach. While it may use a mobile responsive framework, it considers mobile users' needs first and foremost.

Make it happen:

4. Identify speed as one of the primary performance metrics: It's essential to build consensus to make speed a priority KPI and performance metric. Site owners, designers, strategists, developers and suppliers need to keep speed top of mind when undertaking any mobile site improvements or overhauls.

5. Introduce page speed budget to project teams and clients: Page speed budget or web performance budget is a set of constraints that project teams will use to ensure the mobile site meets performance standards and loads quickly across devices and platforms. It's easy for a website to grow in size with new functionalities, content and design items but it's essential to understand the impact on customer time and bandwidth. Performance, especially speed, should never be compromised for an aesthetic or functional site addition.

By introducing a speed budget, the impact of each site amendment or update can be assessed to understand the positive or negative consequence. Anything that does have a negative consequence should be reconsidered.

6. Use the right tools in the right way: Make sure you are using the right tools for both measurement and reporting. Your analytics package needs to be set up correctly, with a strong focus on conversion point, funnels and appropriate KPIs.

7. Create the right culture with the right people: Nurture a performance-centric culture where speed is considered a priority metric by leadership, strategists, developers, designers, content practitioners and project managers.

The reality is that speed matters. An increase in speed can lead to an increase in revenue, advocacy, trust and brand perception. These are some of the fundamental growth pillars for all businesses.

Now is the time for brands to be investing in mobile, especially mobile speed. In order to stay competitive and grow, brands need to start making speed one of their priority performance metrics, and they need to start today.

Appendix

Methodology

A methodology was created to enable us to identify which brands would qualify for the study, isolate vertical specific KPIs, extract site data and apply a statistical model to gain most meaningful insights.

STEP 1

Brand Recruitment

Google, Deloitte Digital and Fifty-Five collectively approached over 70 brands to participate in the study. Focus verticals were retail, luxury, travel and lead generation primarily across Europe, and the US.

Brand Site Audits

37 brands qualified for the study after passing analytics, technical and qualitative audits.

Technical Audit

– Flag any technical constraints which could have disrupted user experience or distorted tracking of user behaviour.

– Analysis of how brands were tracking their main KPIs and page types on their website.

– Verification if page views were being tracked correctly.

Qualitative Audit

– Checked for any upcoming promotions or site changes which could have affected results.

– Notification of any changes/redesign or A/B site tests during the data collection which could have impacted the study.

Analytics Audit

– Sought to understand if key metrics were properly tracked within the brand's web analytics tool(s).

– Cross-checked revenues to ensure that conversion results were reported correctly in the web analytics tools.

KPI Framework Established

A KPI framework mapped out all the conversion funnels and metrics to be measured in the study. Each vertical had its own KPI framework as funnels were different.

Retail – *15 Brands*

Funnel progression rate, bounce rate, add-to-basket rate, revenue and AOV.

Lead Gen – *6 Brands*

Funnel progression rate, bounce rate & form submissions.

Travel – *6 Brands*

Funnel progression rate, bounce rate, add-to-basket rate, revenue and AOV.

Luxury – *10 Brands*

Funnel progression rate, bounce rate & form submissions.

Data Collection

Speed data was measured via Google Lighthouse and aggregated with brands' Web Analytics data. Approximately 4 weeks' worth of hourly data was collected to reach statistical significance.

Statistical Modelling

To understand the impact of site speed, a logarithmic regression model was used. Regression modelling is a statistical technique used to uncover the relationship between a set of predictors and an outcome variable.

A logarithmic model was chosen as it allows for a multiplicative effect, allowing us to look at the effect of % increases/decreases in site speed across a variety of pages and website with differing speeds.

Identification of Key Speed Metrics

Four key speed metrics were identified as most meaningful after feeding the data into a logarithmic regression model. These were:

Max Server Latency

When users navigate to a URL, the server receives a request and returns the contents of the page. Server latency measures the time for the server to respond to the main document request.[10]

Estimated input latency

This is the estimated time that your pages take to respond to user input. A lighthouse value of more than 50ms may mean that users perceive your pages as laggy.[11]

First Meaningful Paint

This metric measures the time at which the user feels the primary content of the page is visible. This is essentially when the biggest above-the-fold layout change has happened, and web fonts have loaded.[12]

Observer Load

The amount of time it takes the page to load, from initiation of the pageview (e.g. click on a page link) to load completion in the browser. [13]

Data Analysis and Synthesis

Once data had been collected and fed into a ogarithmic regression model, we were in a position to analyse the data and extract meaning. We built the logarithmic model to correlate speed with the identified KPIs and progression rates.

Points to note:

We looked at the correlation between a 0.1s improvement in mobile page speed and performance metrics typical for a given vertical. For progression rates we specifically analysed page speed and for the other KPIs we analysed site speed *(See further reading section)*. Fluctuations in speed all occurred naturally and were not artificially created on any of the sites.

For the study, conversions per vertical were considered as:
Retail: Number of users that transacted
Travel: Number of users that transacted
Luxury: Number of users that added to basket or clicked on 'contact us'
Lead Generation: Number of users that completed a form.

For each coefficient, a minimum level of 95% statistical significance was required before results were considered for analysis. Each brands' site was impacted differently, and by a unique combination of the four meaningful speed metrics. The four speed metrics did not always have a significant effect on each funnel progression step or KPI analysed. This means that the coefficient for that funnel step did not reach 95% statistical significance

The 0.1 second improvement was the cumulative impact of all four speed metrics.

(10) https://developers.google.com/web/tools/lighthouse
(11) https://developers.google.com/web/tools/lighthouse
(12) https://developers.google.com/web/tools/lighthouse
(13) https://support.google.com/analytics/answer/2383341?hl=en&ref_topic=1282106

Speed Impact study - Limitations and Areas for further research

– The study managed to find statistically significant correlation between site speed and revenue-related metrics however readers should be mindful of the few existing limitations:

– The results of this study are based on a sample of 37 websites, which were tested over a 4 week period. These results may not fully reflect the Internet as a whole. Since results are aggregated by vertical, they may not fully reflect an individual site's product offering, design, or seasonality

– The study presents only mobile web data. We have looked also at the correlations between site speed and site performance for desktop but found a lot of contradicting parameters. We believe that this is due to the differences between browsing behaviour and overall desktop users being less sensitive to load times.

– Speed was measured with Google's lighthouse tool which pulls simulated lab data to isolate pure speed impact versus other influencing factors such as connection type, devices used, etc.

Further Readings

1. **Deloitte's Mobile Consumer Survey:** This survey gives further insights into consumer behaviours and attitudes to Smartphone usage and dependency

2. **MOZ 2020 website speed best practices:** This MOZ article gives some great tips on how speed impacts organic search, along with some best practice tactics.

3. **Google Mobile Speed Playbook:** A one-stop-shop giving insights into what speed is, why it matters, how to measure it, how to improve it and how to stay fast.

4. **Speed optimisation techniques:** Design and development-centric speed optimisation tactics covering pieces such as image optimisation, enabling compression and leveraging browser caching.

5. **How to build a mobile-first organisation:** This handbook gives a step-by-step guide on how to navigate corporate complexities which are getting in the way of a good customer experience.

End Notes

(1) https://www2.deloitte.com/uk/en/pages/press-releases/articles/more-than-10-million-uk-workers-could-be-using-smartphones-to-boost-productivity.html

(2)

(3) The Five Fixes To Increase Mobile Checkout Conversion: Optimize Your Mobile Checkout To Capture More Mobile Web Sales. May 9, 2017 | Forrester

(4) https://unbounce.com/page-speed-report/

(5) Must-Have eCommerce Features Road Map: The Retail eCommerce Playbook April 18, 2019| Forrester

(6) Jonas Christensen, Google Denmark/June 2019/Mobile, https://www.thinkwithgoogle.com/intl/en-154/search/#?query=Mobile

(7) E-Marketer

(8)) Mobile Shopping Is Stalling, But Don't Panic – Forrester, May 2018

(9) Forrester: The New Mobile Mind Shift Index: Global Use The Mobile Mind Shift Index To Guide Your Local Strategy December 21, 2018

(12) https://developers.google.com/web/tools/lighthouse

(13) https://support.google.com/analytics/answer/2383341?hl=en&ref_topic=1282106

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Disclaimer

Report background

The purpose of this report is to communicate the findings of a study which examined the correlation between mobile site speed and mobile site user behaviours. Site speed fluctuations were natural and not artificially controlled or induced by any party.

This report has been commissioned by Google and prepared by Deloitte Ireland LLP, based on data and statistical information provided by Fifty-Five. Fifty-Five were recruited directly by Google to collect and analyse the statistical data, from 37 brand sites, over a four week period, in relation to the impact mobile site speed has on funnel progression, bounce rates, page views, conversion rates and average order value.

Brands in the study came from retail, travel, luxury and lead generation verticals across Europe and the US.

Results of the study are based solely on the 37 brands analysed and may not fully reflect the impact of speed on sites not included in this study. Furthermore, the results are aggregated by vertical - meaning that they may not always fully reflect an individual site's product offering, design, economics and seasonality.

The results communicated in this report are based on the accuracy of the data provided by Fifty-Five, following the 4 week assessment period from 28/10/19 to 24/11/19. Deloitte LLP did not audit nor validate this data.

The scope of Deloitte LLP's work has been limited by the website data made available by Fifty-Five.

Methodology

1. **Brand recruitment** - Over 70 brands were approached to take part in the study
2. **Brand audits** - 37 brands qualified for the study after passing analytics, technical and qualitative audits
3. **KPI framework established** - A KPI framework mapped out all the conversion journeys and metrics to be measured in the study
4. **Data collection** - Speed data was measured via Google Lighthouse and aggregated with brands' web analytics data
5. **Statistical modelling** - A Logarithmic Regression Model was used to understand the the impact of site speed
6. **Identification of key speed metrics** - Four key speed metrics were identified as most meaningful after feeding the data into the statistical model
7. **Data analysis and synthesis** - Once data had been collected and fed into a Logarithmic Regression model, we were in a position to analyse the data and extract meaning

The results published in this report are the combined effect of the four speed metrics – only considering statistically significant results for each brand. In this context, statistically significant means a direct correlation was identified. In some instances, the increase in speed was observed to have minimal or zero effect on funnel progression and/or the KPIs for the vertical. These observations were not included in the report.

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