e-point

PWA in practice

Technology overview and 11 case studies showing the benefits of upgrading websites and commerce platforms to PWAs

Table of Contents:

Executive Summary

Over the last decade the digital world has experienced a "mobile revolution" in which applications native to smartphones and tablets have overtaken websites accessed from desktops as the digital user's medium of choice. Literally millions of downloadable mobile apps have been introduced which were intended to satisfy every conceivable consumer need. "There's an app for that" had become the saying of the day.

Within the last couple of years, however, this mobile app trend has begun to show signs of weakness, whereas web technologies have started to adapt to a new paradigm. Responsive Web Design, HTML 5, Mobile First Design and other web technologies have even traveled down the path from the desktop to the smartphone. Something called PWA is the latest proposition within this paradigm shift. This "revolutionary" web technology offers users the best of the desktop and smartphone worlds, namely browser "click and go" convenience (customers DO NOT have to download large amounts of software or take up precious device memory) combined with native mobile app benefits such as fast loading, push notifications and offline performance.

This ebook contains a brief overview of PWA technology as well as case studies illustrating its business benefits. We wrote it for companies that have Customer Experience at the heart of their digital transformation strategy. As you'll see, upgrading your website or transactional platform to become a PWA (Progressive Web Application) can deliver better user experience in not just one but literally every digital channel you operate. And over time it will save you significant money.

Sound interesting? We hope we've piqued your interest and wish you good reading. And let us know if we can help you upgrade your website or platform with a custom-built PWA front end or our ready-to-go PWA Commerce Accelerator.

Marcin Żuchowicz
Chairman of the Supervisory Board, e-point SA

Part I. Why PWA?

By 2014 the "mobile revolution" that arrived with the introduction of the Apple iPhone, Apple iPad and wide range of Android-based devices had become so dominant that mobile internet consumption exceeded that from the desktop.

And since then the trend has gotten stronger: smartphones

> **In 2016 60% of Google search queries were launched from mobile devices[1].**

and tablets have become the most important tools for web browsing, shopping and communication. Entrepreneurs have responded to this shift in consumer habits by developing downloadable, native mobile applications for their every conceivable need. And although this "download" approach would seem ideal and unstoppable, it turns out the mobile app phenomenon has ultimately not panned out in the way everyone expected.

What's the problem with mobile apps?

Let's first review the benefits of the native mobile app. Foremost, it provides the user a desired product or service while simultaneously allowing the App Provider to be "close" to their target audience, or more specifically, take selected actions in selected circumstances. For example, send them push notifications when near a physical store, make them aware an order status has changed or provide them access to purchase discounts at certain specific times. And, just as importantly, downloadable native apps allow the App Provider to collect data on customer habits to better understand their personal preferences and prepare even more highly personalized content for use in the future.

Despite these benefits, however, it turns out users actually prefer reviewing content on web browsers, not mobile apps. Why? Because a browser does not demand usage of "precious resources"- the user's time for downloading the app or device memory for installation. Their attitude is "if I just want to read a blog or have a quick look at an online product, why install an application?!"

Indeed, research has shown that after installing a first set of applications on a new device, the vast majority of users never install additional ones. And that 87% of consumers regularly use at most just 3 apps, typically Facebook, Chrome and WhatsApp, leaving the rest to languish.

1. https://searchengineland.com/report-nearly-60-percent-searches-now-mobile-devices-255025

This creates a major challenge for companies whose apps are at times extremely useful but not necessarily on a daily basis, such as Airbnb (which allows people to search for holiday accommodations or communicate with a landlord) and PayPal (do online purchases or execute money transfers). It would appear these companies actually need something different from the standard mobile app, something that users won't mind "installing".

Best of the mobile and desktop worlds

This "different" solution has recently become available in something called a PWA (Progressive Web Application) which combines the best of a desktop web browser with that of a native mobile application. Like a web browser, a PWA allows easy and direct access to content from a search engine without requiring the download of large amounts of software. And like a native mobile application, it provides enhanced functionality such as push notifications, QR/barcodes, camera usage and geolocation.

Progressive Web Applications - Key Benefits

Mobile-friendly
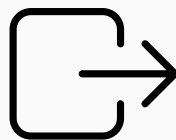
Quick response

SEO

Quick launch

Offline mode

Security

2. https://techcrunch.com/2017/08/25/majority-of-u-s-consumers-still-download-zero-apps-per-month-says-comscore/

What exactly is a PWA?

A Progressive Web Application (PWA) is a website or transactional platform that has been upgraded with certain state-of-the-art IT tools to enhance its capabilities, efficiency and performance on mobile devices. It features:

- very fast response times
- push notifications
- background and offline operational modes
- native device functionality (camera, GPS, gesture navigation and more)
- home screen buttons

Conversion of a site or platform into a PWA is performed using a specialized framework featuring an enhanced JavaScript library and includes, among other things, the addition of a new manifest file (to define desired website and mobile features) and Service Worker technology (to enable background and offline modes). Compliance to PWA criteria is verified using a Google benchmarking tool called "Lighthouse".

What can a PWA-enhanced website or platform mean in practice for Consumers and Businesses?

Benefits for the Consumers

Upgrading your website to a PWA provides 3 key benefits known from the mobile app world.

A. Offline Functionality

PWA functionality enables a website or platform – or, at minimum, selected key elements – to operate when a site user does not have access to the Internet. To achieve this, PWAs download a small amount of data whenever they are online that's later utilized, if necessary, when the user does not have access to the Internet, such as during travels.

B. High Speed

According to the Google PWA standard, PWA-enhanced websites should be interactive, that is, loaded and free from slow-loading scripts, in less than 5 seconds (or 2 seconds when Service Worker technology is used). In practice, PWAs can be interactive in less than 1 second.

C. Consistency

PWAs can be launched from any type of device, mobile or desktop, and work exactly the same across all devices in order to provide a consistent user experience at all times.

Benefits for Business

Experience has shown upgrading a site or platform to a PWA increases its cost effectiveness, usability, and "stickiness". This happens thanks to…

A. Independence from the back-end

A PWA can be economically created from any existing site or platform, even from older e-commerce sites operating in outdated server-side technologies, typically without having to do any costly changes to the back-end. This is possible because the PWA-module exists as a separate front-end that communicates with the back-end via an API interface – in accordance with current online software best practice. This is particularly beneficial for companies utilizing older platforms because it allows them to avoid or postpone transitioning to a more modern technology – something that is always a time consuming, risky and costly.

B. Cost and staff optimization

Upgrading a site to a PWA also provides additional cost, time-to-market and staff optimization benefits. How so? To date companies have had to staff and maintain several separate mobile app teams and technologies to insure "presence" across all the important mobile operating systems- iOS, Android, Windows Phone, etc. By upgrading your primary desktop website to a PWA you can to do away with these specialized teams. You do the desktop and you're simultaneously done with all the mobile operating systems, typically losing nothing with respect to performance and features.

C. Higher user engagement and conversion

One of the nice features of upgrading to a PWA is that an icon can be added to the home screen, thus making the site easier to launch than from a URL. And it's possible to use push notifications to deliver important notifications such as order status changes or current promotions and thereby enhance user engagement. This in turn results in higher conversion rates.

On average, upgrading to a PWA results in a 20% higher conversion rate[3].

D. Simplified updates and implementation (DevOps perspective)

The fact that the PWA code is located entirely in the site's front-end means that future updates can be done invisibly to the user.

And should an appropriate DevOps approach be adopted, entirely new versions of a site can move from beta to production at any time of day or night – regardless of whether it's to urgently fix errors or simply add new functionality.

3. https://mspoweruser.com/starbucks-claims-their-pwa-is-a-massive-success/

Part II. Case studies

Below we present 11 inspiring examples describing how major global leaders leveraged PWA-enhancements to solve major business challenges and unlock the full potential of their digital sales channels.

⊛ Alibaba

Challenge

Alibaba, the largest B2B marketplace in the world, has always been mostly based on m-commerce. But the company wasn't happy with their mobile app's conversion rate or the number of active users on certain devices. So they decided to upgrade their site to a PWA to address the needs of new users (high accessibility, no app installation) and regular users (loyalty enhancement and engagement via push notifications).

Changes

- Adjustments to comply with Google's PWA standard
- Visual and navigational changes
- Addition of "Add to Homescreen" button to site menu
- Push notifications at same open rate as mobile app

> **37% of all internet users and 53% of e-commerce customers make their purchases from mobile devices[4].**

Results

- 76% higher rate of conversion*
- 30% more active users on Android
- 14% more active users on iOS

*conversion defined as contact with vendor

---

4. Raport mShopper 2.0.
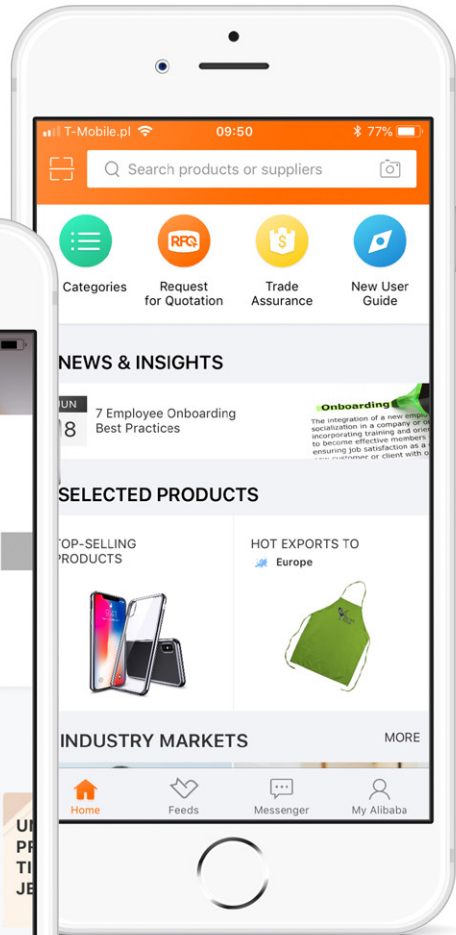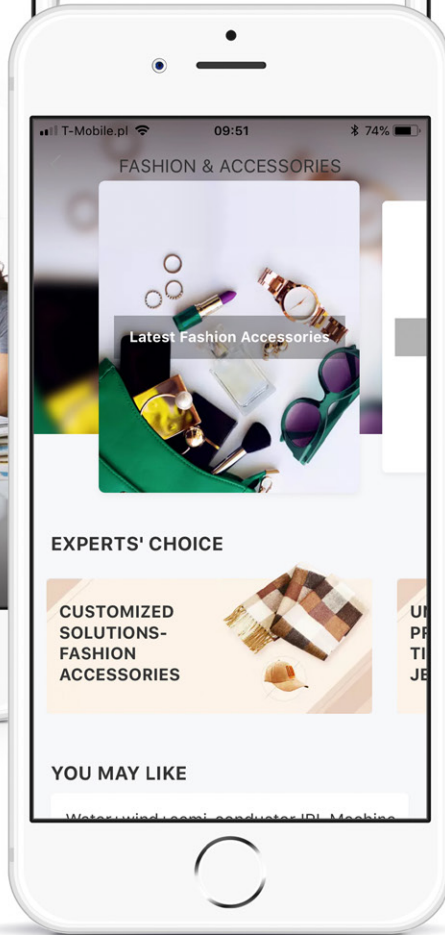
⍟ West Elm

Challenge

West Elm, part of the Williams-Sonoma Group, is one of the largest furniture retailers on the American market. The company wanted to deliver a better mobile experience to customers and needed a solution that fit today's typical furniture purchase process.

This process involves customers browsing a brand website for inspiration and then going to a physical store to see, touch and experience the item of interest in real life. When satisfied, they then use a mobile device to make the purchase. So West Elm had to account for this online/offline purchase routine in any new solution and ultimately decided on using upgrading their site to a PWA.

89% of furniture purchasers use smartphones when looking at furniture in stores or showrooms.

Changes

- Greater emphasis on visual communication
- Navigation and interaction with visuals based on gestures
- Focus on sales function

Results

- 15% longer average customer time spent on website
- 9% higher revenue per visit

Sources:
https://www.youtube.com/watch?v=PsgW-0M67TQ&feature=youtu.be&t=34m4s
https://www.mobify.com/insights/17-progressive-web-apps-for-your-inspiration/
https://blog.usebutton.com/the-unexpected-how-west-elms-largest-products-hit-historic-growth-on-mobile-fa6ec689c011
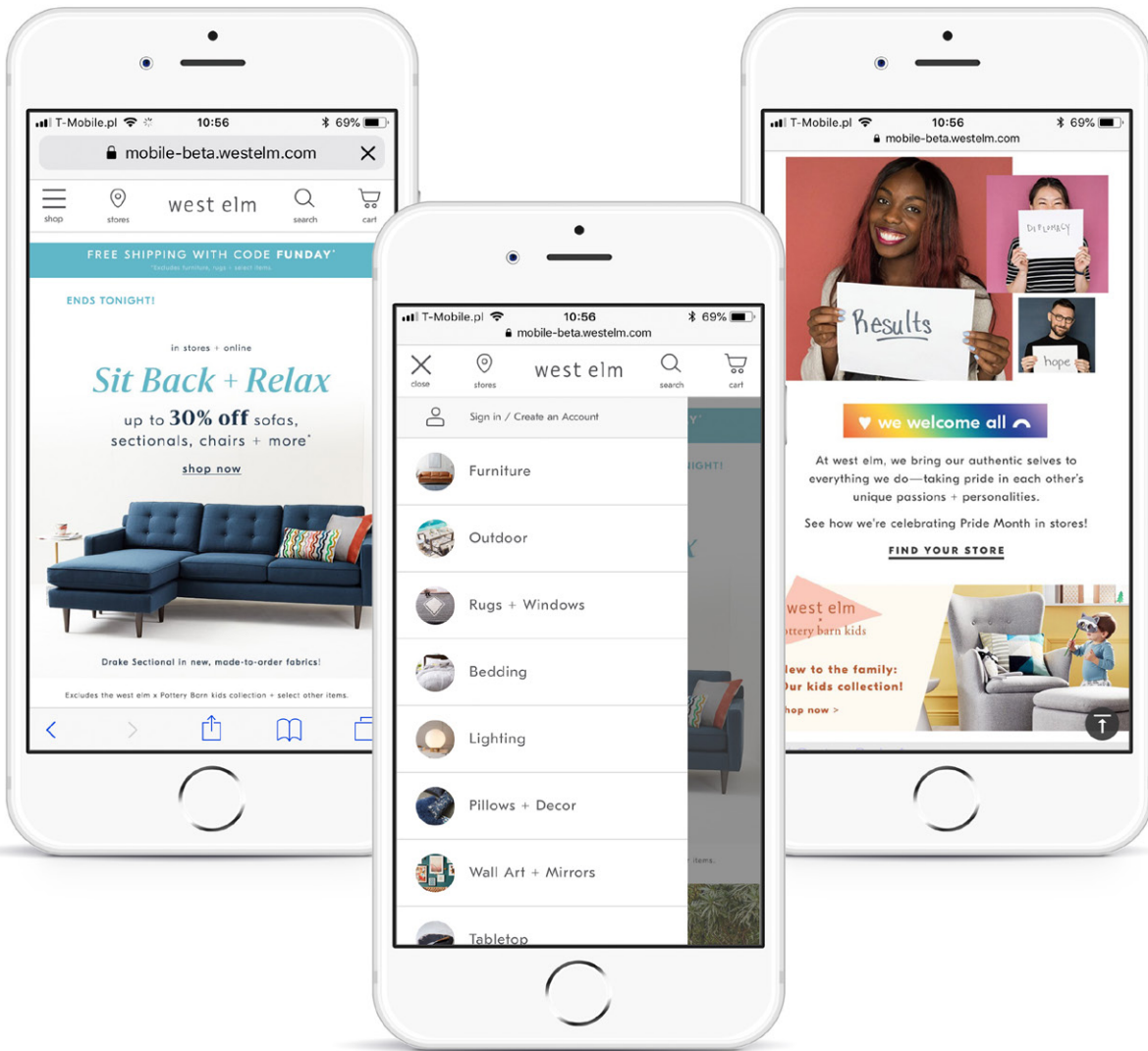
⊛ Flipkart

Challenge

Flipkart, India's largest online marketplace, decided to address via a PWA the needs of users who wanted to make purchases from mobile devices but had limited access to the Internet as well as those who were interested in the service but did not have space on their device for another mobile app.

Changes

- Mobile users encouraged to add Flipkart Lite icon to homescreen

- Flipkart PWA 100x smaller than Android app with same functionality

- Push notifications implemented (even when web browser closed)
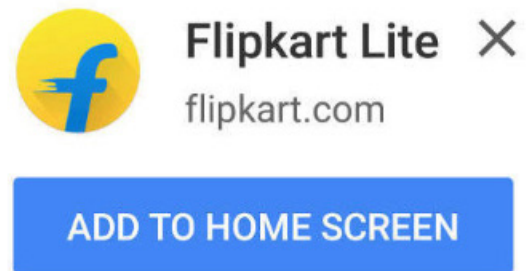
Results

- 60% of visits launched via homescreen icon

- 70% higher conversion compared to previous website

- 3x longer user visits (average time spent per session extended from 70 seconds to 3.5 minutes)

- 40% higher re-engagement rate
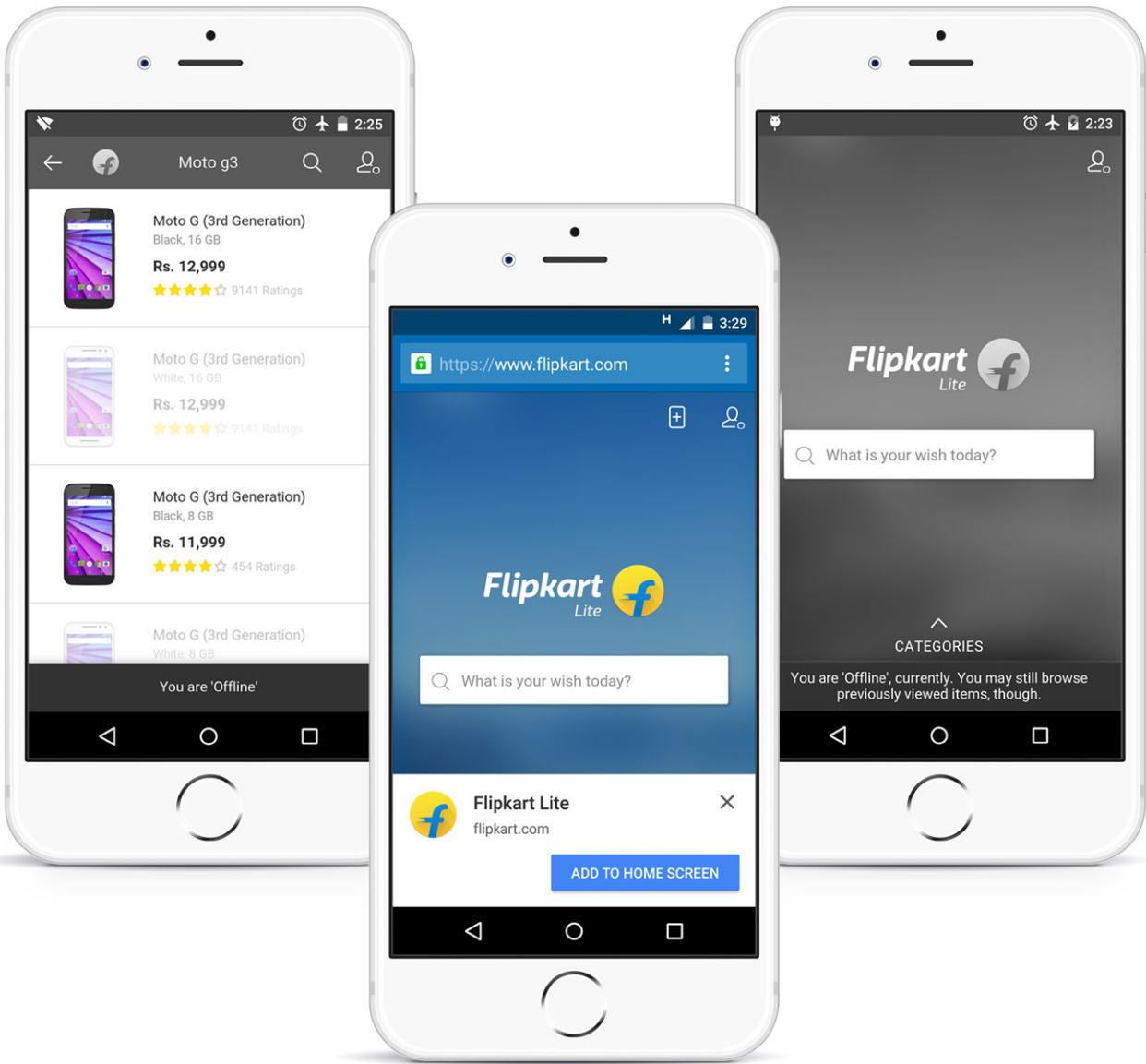
Sources:
https://medium.com/progressive-web-apps/building-flipkart-lite-a-progressive-web-app-2c211e641883
https://developers.google.com/web/showcase/2016/flipkart
https://tech.economictimes.indiatimes.com/news/internet/for-flipkart-this-app-makes-rural-connect/59676200?redirect=1
https://gadgets.ndtv.com/internet/features/five-engineers-42-days-how-flipkart-built-an-app-for-the-mobile-web-763729
https://inc42.com/resources/progressive-web-apps-ecommerce-startups/

⭐ Forbes

Challenge

On the 100th anniversary of the magazine's establishment, Forbes decided they needed to do "something different" to better address the needs of modern audiences that consume news from mobile devices. They decided on a PWA.

Changes

- Forbes now talks about a "whole new mobile experience" when describing the changes brought about by their PWA.

- Visual aspects and gesture-based navigation enhanced such that site now reminds users more of Snapchat and Instagram Stories

Results

- Website loading time decreased to 0.8 second.
  (improvement of 2 to10 seconds per visit for 38 million users)

- Number of sessions per user: up 43%

- Session duration: up 100%

- Advertising revenues: significantly increased

⭐ Starbucks

Challenge

As part of an expansion into new markets where Internet access was limited, Starbucks, the world's largest coffee shop chain, needed an offline-first approach for browsing and order placing. Their answer was a PWA.

Changes

- Site navigation simplified to comply with Customer Experience best practice
- Website restructured to allow orders & payment by phone
- Website upgraded using JavaScript React.js library (same as Facebook PWA)

Results

- Homescreen PWA faster than iOS mobile app & uses only 4% of mobile app phone memory
- Menu browsing and ordering possible in all markets
- 2x increase in number of active users (per day and per month)
- Higher number of orders placed in both mobile and desktop channels
- 19% higher System Usability Score (SUS) on mobile and 14% higher on desktop devices

Sources:
https://formidable.com/work/starbucks-progressive-web-app/
https://mspoweruser.com/starbucks-claims-their-pwa-is-a-massive-success/
https://developer.microsoft.com/en-us/events/build/content/starbucks-progressive-web-app
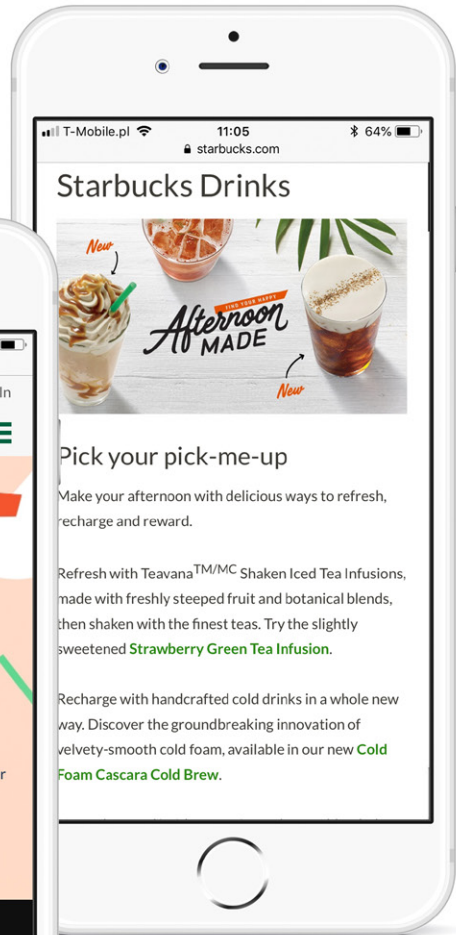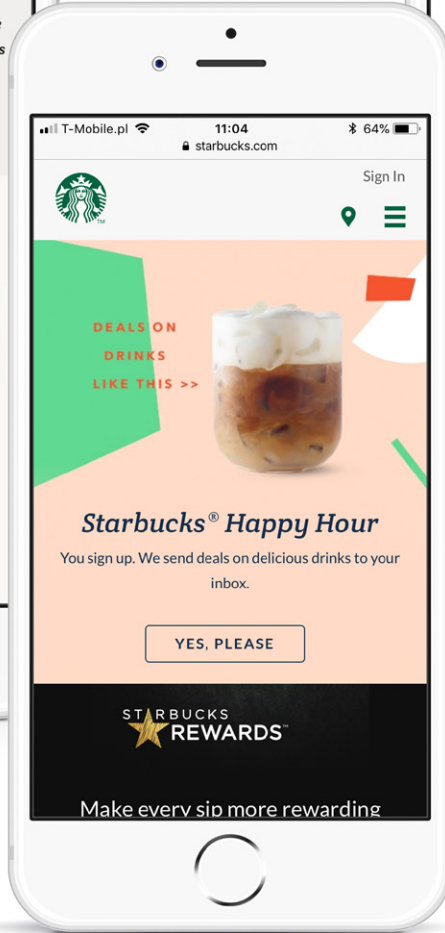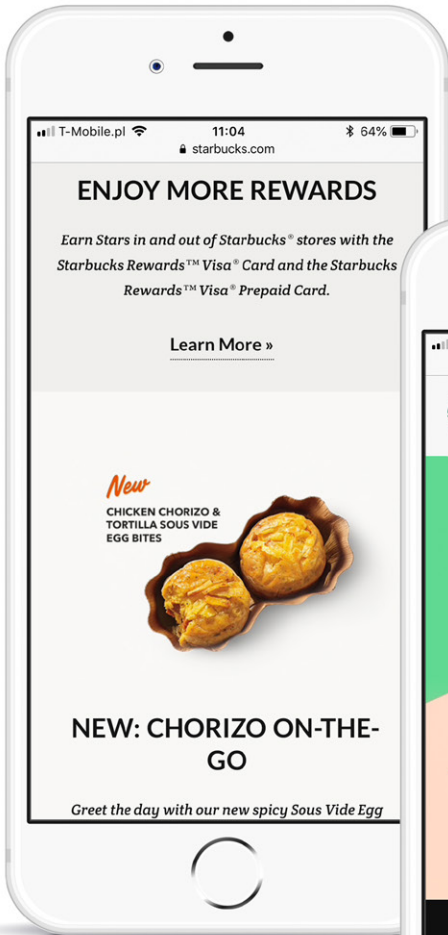
⊛ George

Challenge

George, a clothing brand owned by ASDA Walmart, was looking for a way to quickly increase conversion in their mobile channel. They decided upon a PWA enhancement carried out in Scrums using Agile as the development approach.

Changes

- Adjustments to comply with PWA Check List
- Mobile device Customer Experience streamlining
- Incorporation of "Add to homescreen" button

Results

- 3.8 times faster load time, on average
- 2x lower bounce rate
- 31% higher conversion rate on mobile devices
- 20% more sub-pages browsed per visit
- Visits begun via homescreen button lasted 28% longer than previous visits
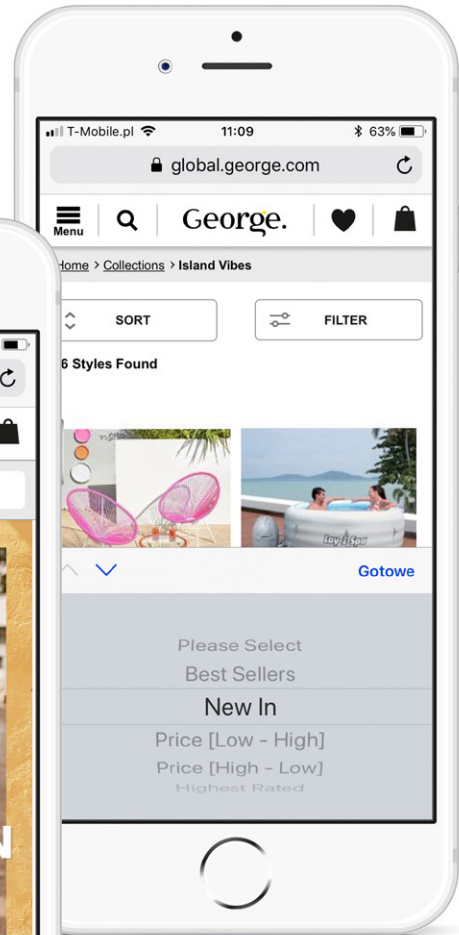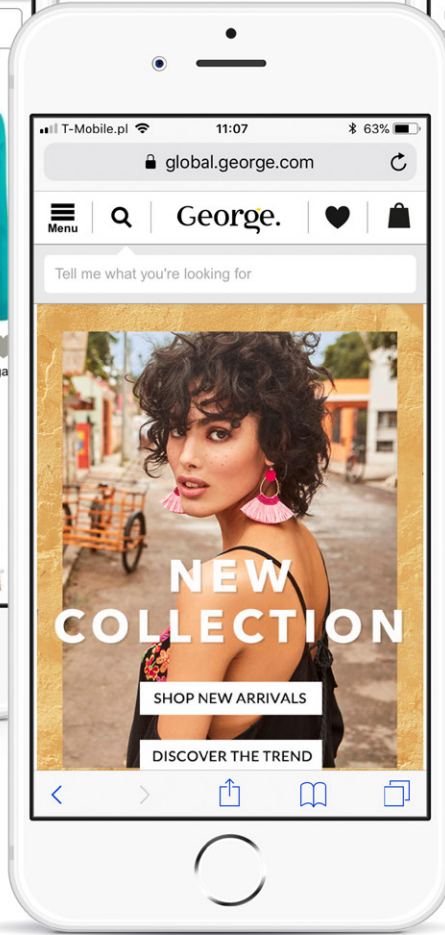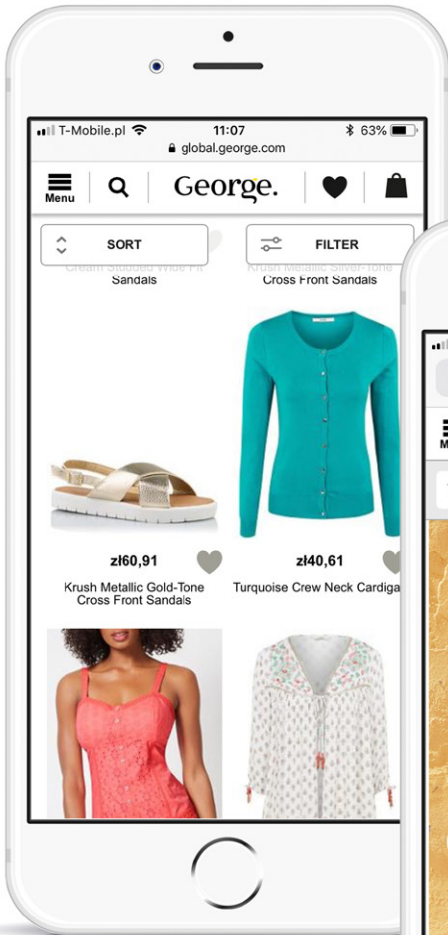
⭐ AliExpress

Challenge

After research showed their mobile app was not fulfilling user acquisition and engagement expectations, and that downloading was a particular barrier, Chinese e-commerce giant AliExpress decided to try a PWA.

Changes

- Insure consistent experience across all browsers and all devices
- Add "homescreen" button
- Implement offline mode

Results

- 104% growth in new users across all browsers
- 82% higher conversion rate (on iOS)
- 2x more pages visited during typical session
- 74% longer session duration

Sources:
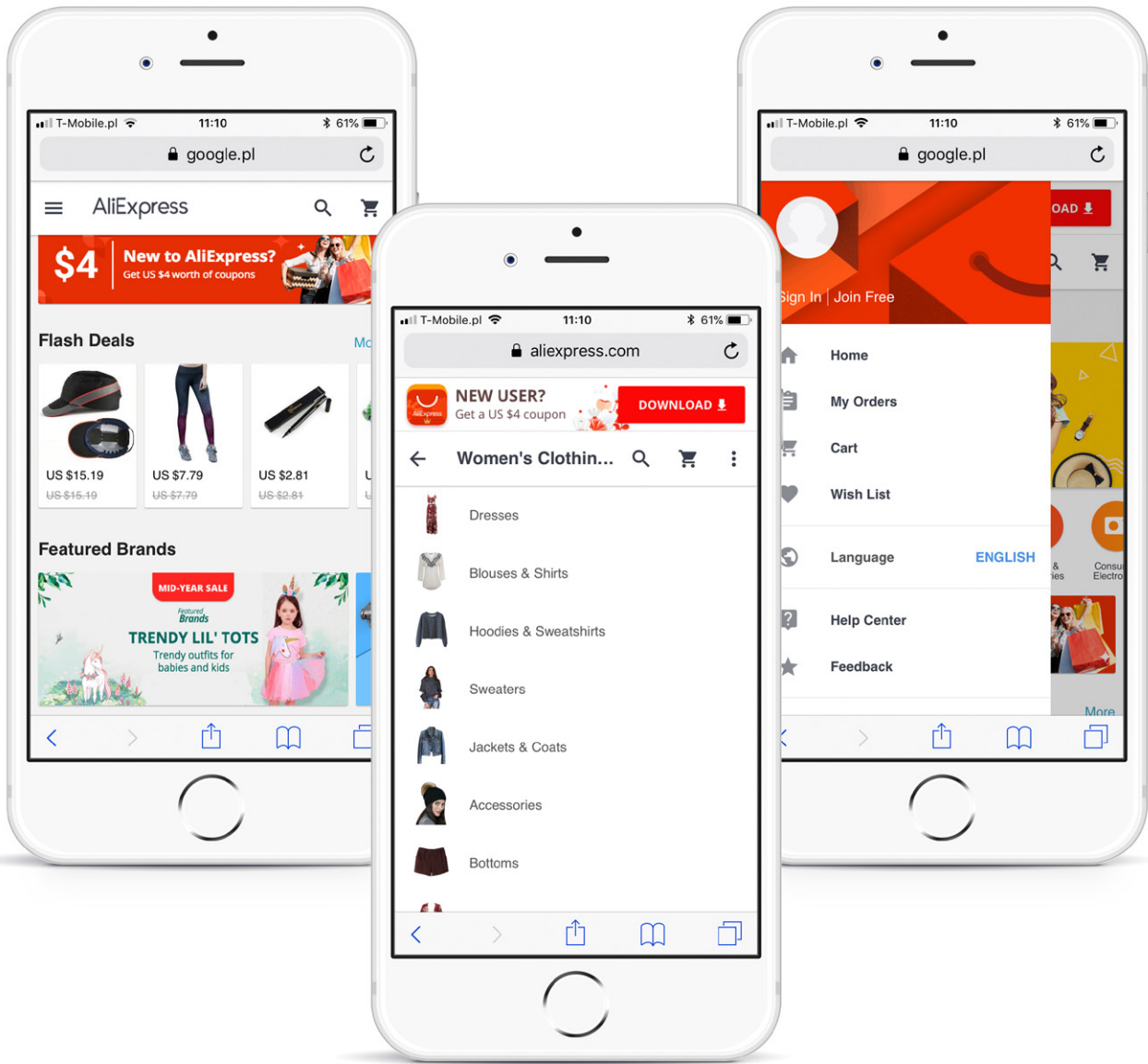
https://developers.google.com/web/showcase/2016/aliexpress
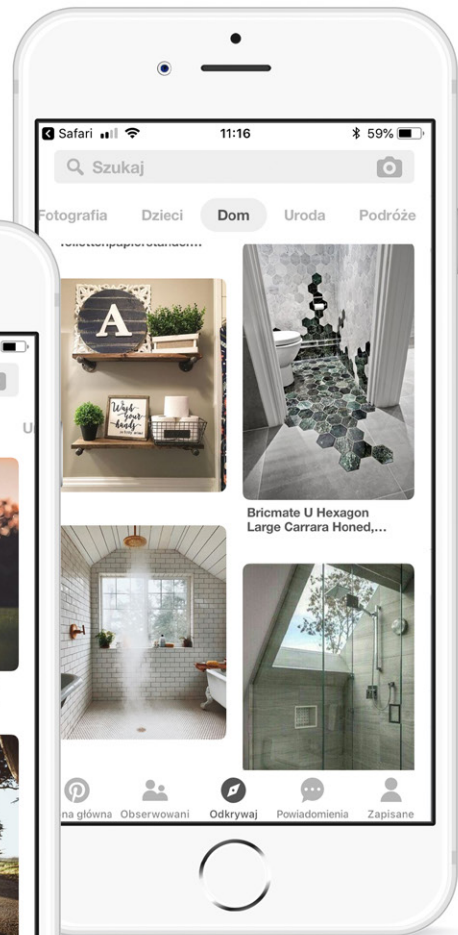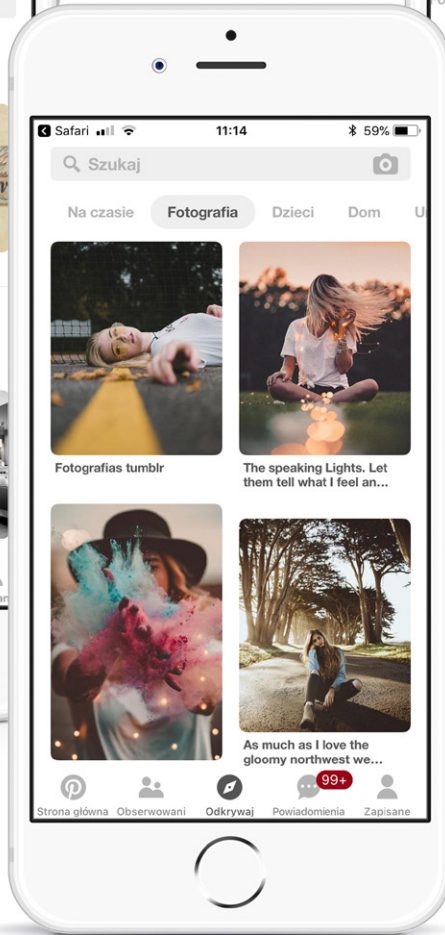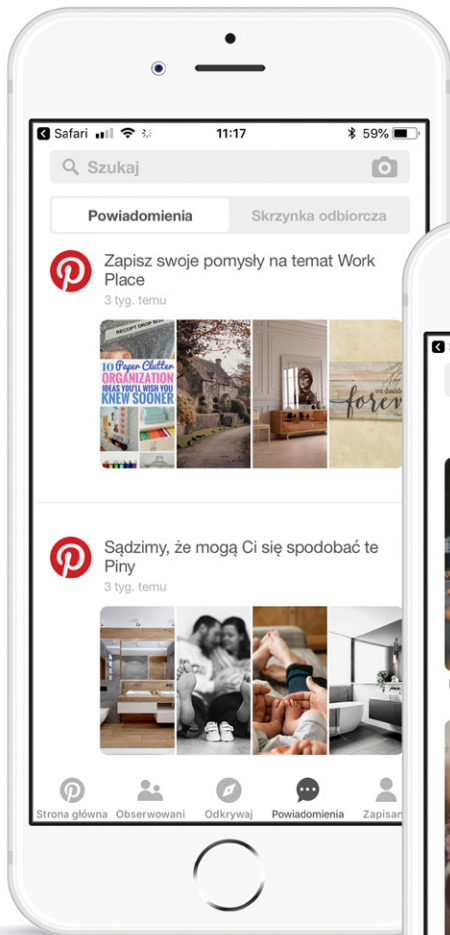
⊛ Pinterest

Challenge

Pinterest's decision to move to a PWA grew from a need to expand to new countries, which implied an increased focus on mobile, and recognition that their existing website was slow and difficult to use (unregistered user conversion rate was around 1%).

Changes

- Entire website re-written in 3 months using the React.js PWA ecosystem

- Website front-end size substantially reduced

- Navigation and visual layer significantly improved

Results

- 60% higher user conversion rate (on mobile devices)

- 50% higher advertising revenues per user

- 40% longer average session duration

- Loading time reduced from 23 seconds to 5 seconds

Sources:

https://medium.com/dev-channel/a-pinterest-progressive-web-app-performance-case-study-3bd6ed2e6154

⊛ Lancôme

Challenge

Luxury cosmetics leader Lancôme realized something was wrong with their mobile channel when they observed that although the number of site visitors was acceptable its conversion rate was far below their desktop channel's. They decided they needed to identify and remove barriers preventing customers from finalizing orders on smartphones and tablets. A key conclusion was that a specialized mobile app was not the answer – cosmetics were bought too infrequently to expect customers to download one. So they chose go with a PWA.

Changes

- Objective: build mobile experience that was convenient and easy
  (particularly with respect to transaction completion)
- Ensure website resembled a mobile app
- Focus on simplicity

Results

- 17% higher conversion rate on mobile devices
- 53% more sessions on iOS
- 15% lower bounce rate
- Push notifications highly effective, particular one reminding user about abandoned
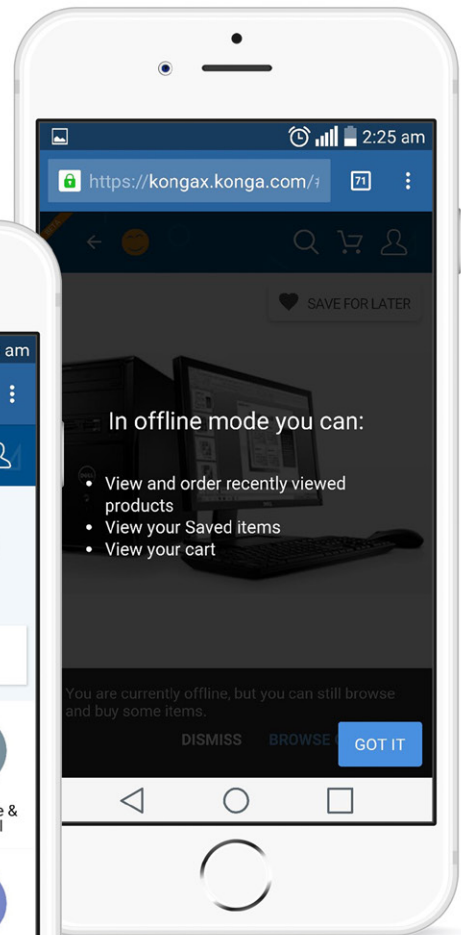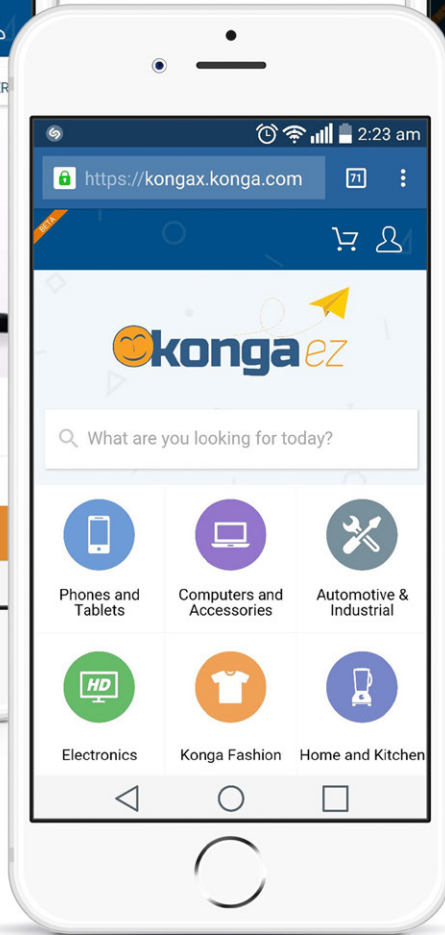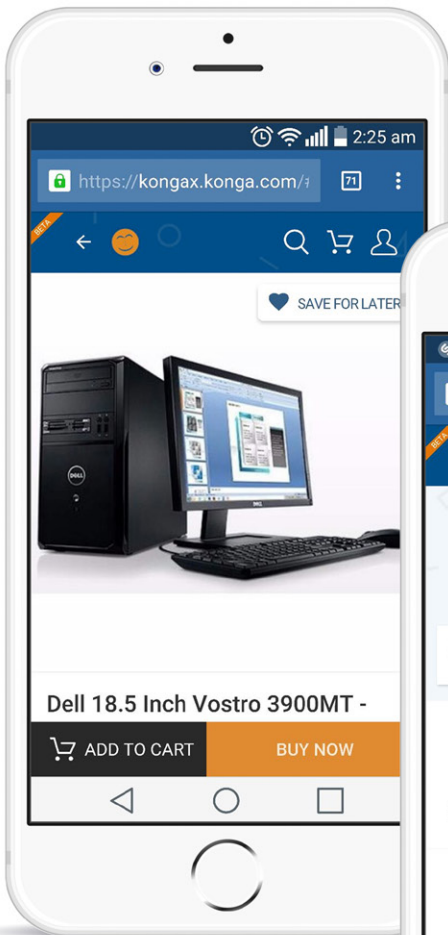 shopping cart: 8% subsequently completed purchase
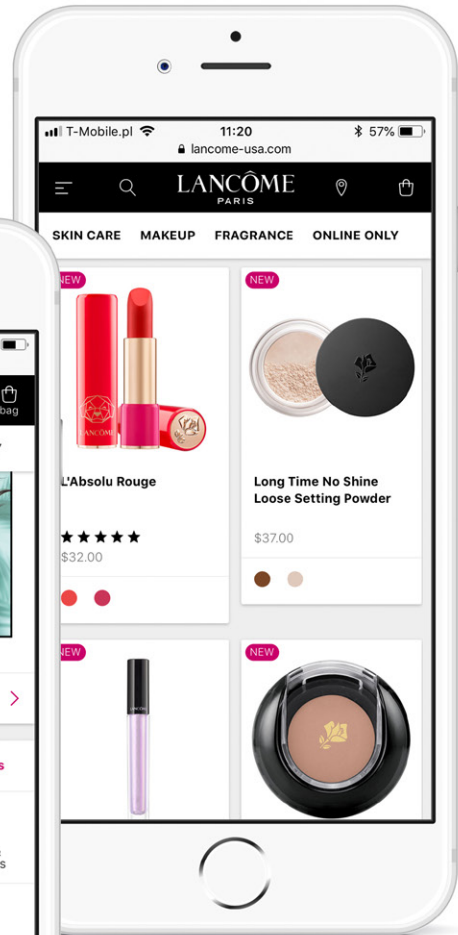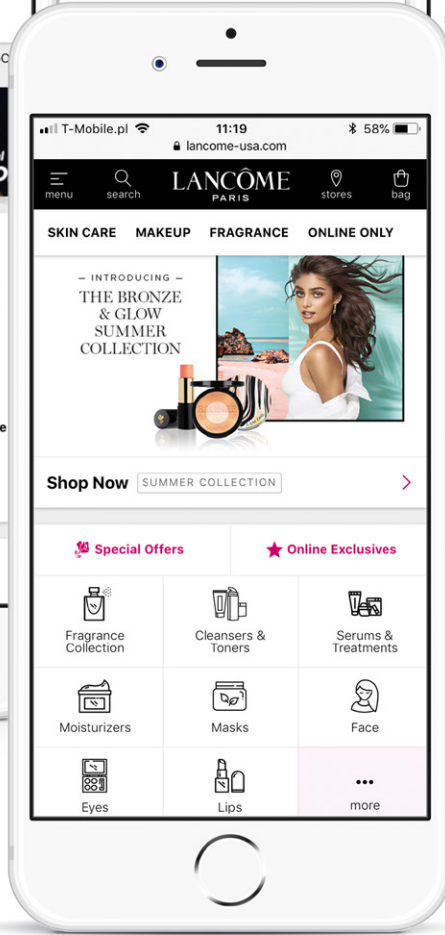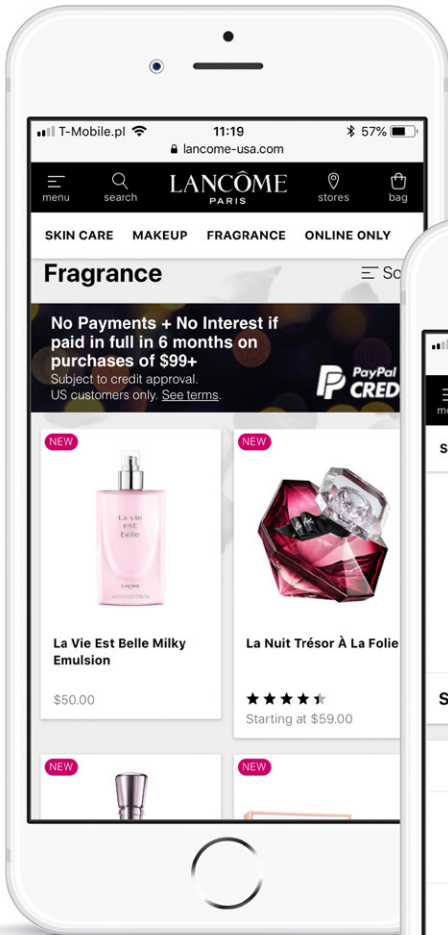
⍟ Konga

Challenge

Nigeria's leading e-commerce brand, Konga, receives the majority of its website traffic from mobile devices (57%) due to the country's limited landline infrastructure. Yet their mobile app was highly problematic as a result of extremely long page loading times. Because the company wanted to deliver a great mobile experience, they decided to adopt a PWA.

Changes

- Adopt an offline-first approach

- Minimize front-end size

- Focus on simplification and ease of use

- Stay within PWA development cycle of 6 weeks

- **Results**

- 92% less data transferred upon initial website load (as compared to native mobile app)

- 82% less data needed to complete first transaction (as compared to mobile app)

Sources:
https://developers.google.com/web/showcase/2016/konga
https://cyberomin.github.io/engineering/2016/07/30/pwa-and-konga.html
https://dev.opera.com/articles/pwa-nigeria-kenya-interview/
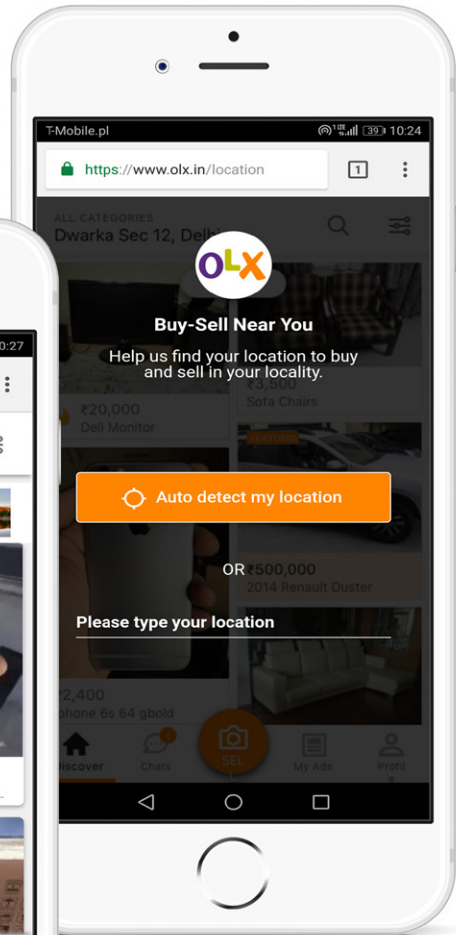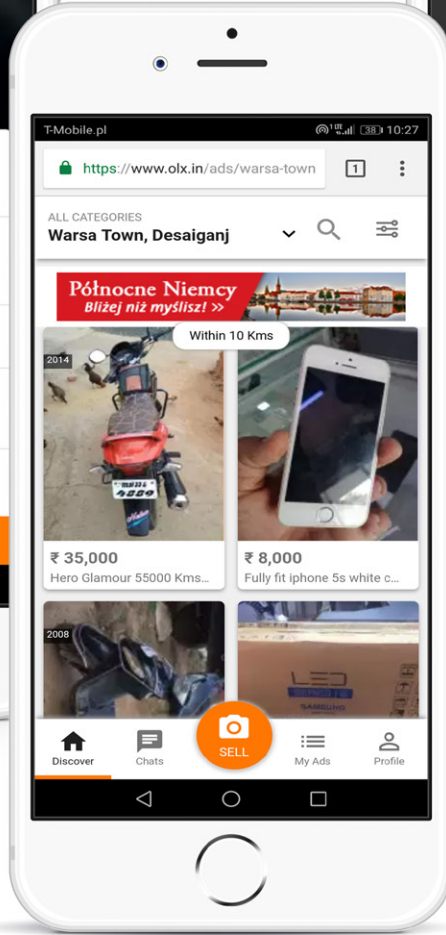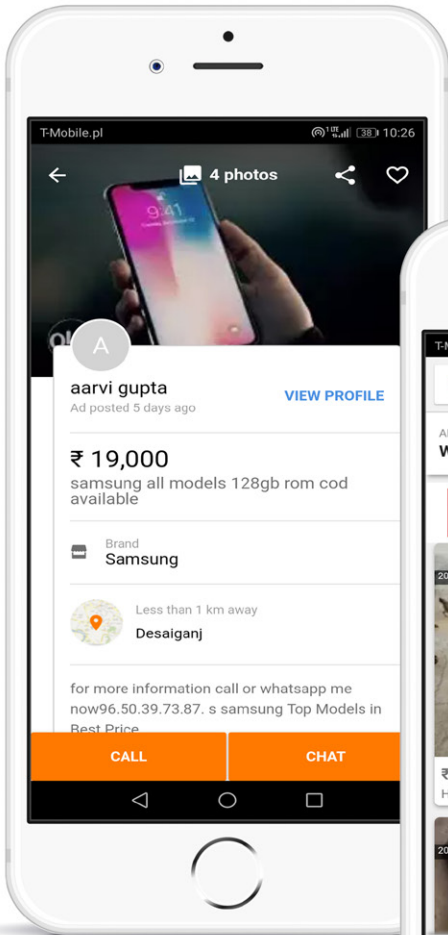
⊛ OLX

Challenge

The Indian branch of buy/sell site OLX observed that despite 90% of user traffic coming from mobile channels (of which 50% came from its mobile app and 50% from its mobile website), the conversion rate for the mobile website was very low. This indicated the website was cumbersome and users went to the native app to make purchases. They suspected the key problem was slow website loading.

Changes

- A refreshed design that resembled the newsfeeds found in popular social media apps

- Geolocation to point out sellers/buyers near OLX customers wanting to make a trade

- Push notifications showing relevant offers (based on search history and previous purchases)

Results

- Dramatically faster loading times

- Advertising CTR increased by 146%

- 80% lower bounce rate

Sources:
https://cfatech.ng/olx-aims-to-solidify-its-number-one-position-with-pwa/
https://developers.google.com/web/showcase/2017/olx

Technology

Successful development of a PWA (Progressive Web Application) requires usage of a robust and stable PWA framework. The most popular on the market today are:

Angular - Created and developed by Google, Angular is one of the most popular PWA frameworks. It uses the TypeScript language to expand standard JavaScript capabilities and offers a complete toolset and user interface elements to create fully functional PWAs.


React.js - Developed by Facebook (and implemented in its website), React.js features a web component library competitive to Angular's that's optimized to ensure fast operating speed. It utilizes the JavaScript language enriched by JSX technology specialized in website template creation.


Vue.js - is also a popular PWA framework known for its simplicity that was created by a former Google employee who worked on the Angular framework. Developers like it for its ease of use.

New implementation possibilities
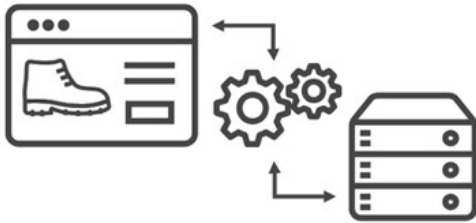
Service Worker

- Intermediates between the app and the browser

- Responsible for saving data that may be re-used (files, content, AJAX queries, etc.) on the client side

- Enables offline operation
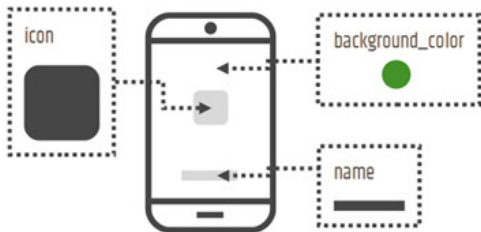
Web App Manifest

- A configuration file attached to the PWA app

- Allows the assignment of an icon to the app, hides the URL bar, defines the app name as well as its homescreen
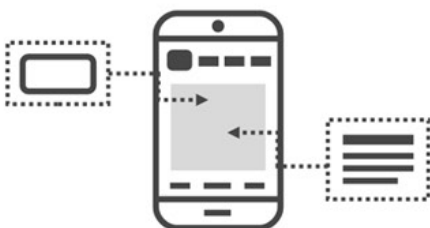
Application Shell

- App template transferred during first loading

- Template contains the defined website layout (HTML, JavaScript, CSS)

- Template saved in device memory

- Template supplemented with appropriate content during each entry to website

PWA Commerce Accelerator

To help e-commerce merchandisers enjoy the benefits of the PWA standard, e-point has developed a ready-to-go PWA Accelerator for use with back-office platforms such as SAP Commerce (formerly Hybris Commerce), Broadleaf Commerce and others. The intent is to allow customers to economically streamline and accelerate their current B2B or B2C platform to a fully functional commerce-specialized PWA. e-point's Accelerator has been developed specifically with ease of integration in mind and its content data model is adaptable to any industry.

Expert's view

"The possibility to create a Progressive Web Application (PWA) as a front-end module provides the opportunity for companies to implement highly popular Facebook or Gmail-type user interfaces and dramatically enhance performance without having to re-write their entire IT system. This is particularly useful for older e-commerce platforms for which back-end adjustments would be extremely costly and complicated (at minimum this would require integration of new business logic and administrative panels into external accounting, warehousing, online payments, and other systems). Moreover, the conversion to a PWA allows companies to opt out of dedicated mobile apps and significantly lower overall maintenance costs."

Marek Berkan
PWA Commerce Accelerator
Technological Lead, e-point SA

Why e-point?

e-point has a solid record of rapidly rolling out PWA front ends that fully meet Google standards and PWA best practice, providing customers "quick wins" (e.g. page loading times in as little as 0.4 seconds)

e-point PWA solutions are based on React.js, one of the most proven and stable PWA frameworks (also used by Facebook and its ecosystem)

e-point specializes in combining technology with best-in-class UX, ensuring an outstanding Customer Experience

e-point has deep experience developing and implementing large multi-country projects for some of the world's leading brands

e-point uses design thinking and other state of the art methodologies to deliver best in class solutions

e-point is an award-winning software house specialized at Cloud solutions

SCHEDULE A 30-MINUTE DEMO >

Or write to us

Michał Szklarski

Solutions Architect

michal.szklarski@e-point.pl

+48 512 152 876

e-point

For over 21 years e-point has been helping market leaders pioneer competitive advantage in digital transformation.

Our customers

ING   Amway™   INTER CARS   BGŻ BNP PARIBAS   ALEO

BIK   C·H·BECK   KOMFORT   LINK4   LION'S BANK PRIVATE BANKING

MENNICA POLSKA   NN investment partners   pwc   PZU   Raiffeisen BANK

e-point

E-mail:

contact@e-point.com

Phone No.:

+48 22 853 48 30

Address:

Filona 16

02-658 Warsaw

Poland

www.e-point.com