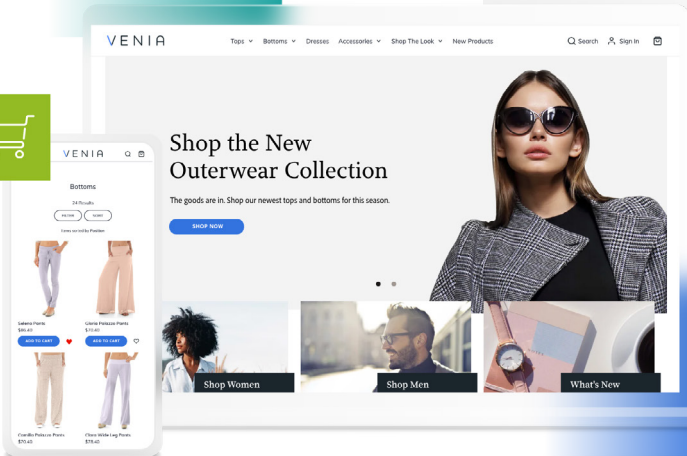




The progressive web app primer for modernizing merchants.

The future of mobile commerce is built on PWAs.



PWA

With the emergence of next-generation smartphones and handheld devices in the late 2000s, ecommerce broke free from the desktop. Complemented by technologies including responsive web design and native apps, mobile commerce—or “m-commerce”—was soon embraced by consumers on a global scale. This technological revolution resulted in a dramatic transformation of traditional business models within a very short time.

Today, m-commerce is a daily fixture in the lives of millions—and yet today’s most prevalent mobile experience technologies are limited in scope. Slow speeds, subpar user experiences, and dated functionality have prevented businesses from tapping mobile’s full potential. In a time when consumers demand digital commerce experiences that are seamless and ultra-fast, yesterday’s technologies are at a disadvantage. However, a powerful solution exists in the form of progressive web apps.

Progressive web app (PWA) technology helps merchants deliver an ecommerce experience which meets the expectations of today’s digital, mobile-first consumers. PWAs offer the experience of a native mobile app through a mobile web browser, delivering a faster and lower-friction experience for mobile users. Combined with lowered development and deployment costs, it’s no surprise PWA technology continues to be enthusiastically adopted by businesses of all types.

This educational primer explains the essentials of progressive web apps and how this emergent technology is actively transforming how B2B and B2C brands are shaping the mobile commerce experience.

The potential of mobile experiences.

Whether your business is B2B, B2C, B2B2C, or even D2C, mobile commerce matters. Nearly everyone owns a smartphone, creating a vast digital marketplace brimming with potential. And physical and online commerce experiences continue to blur. The customer doesn't shop channels—they shop everywhere. And mobile commerce continues to grow.

In PwC's latest *Global Consumer Insights Survey*, 41% of respondents report shopping daily or weekly via smartphone, compared to 39% six months ago and just 12% five years ago. According to Grand View Research, mobile shopping behaviors are now closing in on in-store shopping—with just six percentage points separating the two. And Adobe reports that during the 2021 holiday shopping period alone, 43% of US ecommerce purchases (US\$88 billion) were made via mobile.

\$728.3B

Retail mobile commerce sales are projected to hit \$728.28 billion by 2025.

Source: eMarketer, April 2022

33.4%

33.4% of consumers plan to complete their purchase on mobile retailer websites (vs. 17% on mobile retailer apps).

Source: eMarketer, August 2022

155M

155 million US shoppers will open a shopping app at least once per month.

Source: eMarketer, August 2022



“ Mobile ate the desktop back in October 2016.

Aaron Gustafson

Web Standards and Accessibility Advocate

Microsoft

The current limitations of mobile.

The majority of mobile commerce experiences are driven by either responsive web design (RWD) or native apps. Both technologies were developed in response to the impracticality of replicating desktop browser environments on a mobile scale. However, the needs of today's mobile-savvy consumers are straining the capabilities of these once-dominant digital solutions.

Native apps

Native apps are purpose-built smartphone applications installed on a user's device through an application store, such as Apple's App Store. According to Statista, over 3.5 million apps are available for download on the Google Play store, while 2.18 million apps are available on the Apple App Store as of 2022. Along with their simplified interface, native apps enhance the user experience by tapping a device's features like the camera, microphone, and GPS.

Here are some of the experience limitations for native apps:

Time-consuming downloads

Native apps require an initial time investment to load and use on a device. Heady reports that 78% of shoppers have abandoned transactions when brands require an app install to do business with them.

Data consumption

If Wi-Fi is not available, native apps require cellular data for download. Data is also required for most apps when they're running in the background. For example, your typical weather app needs background data running to ensure a continually updated forecast.

Costly development

Developing and maintaining a native app can be costly, especially if compatibility across multiple platforms and mobile devices is required. The average development cost is estimated at \$50–100K, and up to or over \$500K for enterprise-level organizations. Different platforms also require specialized technical expertise.

No guarantee of acceptance

Getting listed in an app store can be a long process with no guarantee of acceptance. Even if your app clears review, there's no guarantee it will catch on with users or drive traffic to your brand.



Responsive web design

Responsive web design (RWD) is based on a one-size-fits-all grid system. RWD scales a browser's content and associated elements to fit within the user's screen. By resizing site components in relation to one another, it delivers smoother, contextual browsing. Although RWD has helped address mobile's spatial restrictions, modern experiential demands have exposed the limitations of RWD.

Here are a few experience limitations for RWD:

Lack of mobile optimization

RWD folds a website down into a condensed form factor for mobile. Attempting to replicate your desktop browser experience on mobile is out of touch with m-commerce users who have differing expectations, interactions, and intents.

Functionality without the frills

RWD's web-based orientation does not allow it to utilize smartphone features which enhance the overall customer experience. These include essentials like the camera, microphone, and GPS-based location services.

Same code, different platforms, slow performance

RWD downloads the same code to display a site on mobile as it would on a desktop system, increasing load times. Multiple studies have shown mobile sites with longer load times have higher bounce rates, negatively affecting conversions.

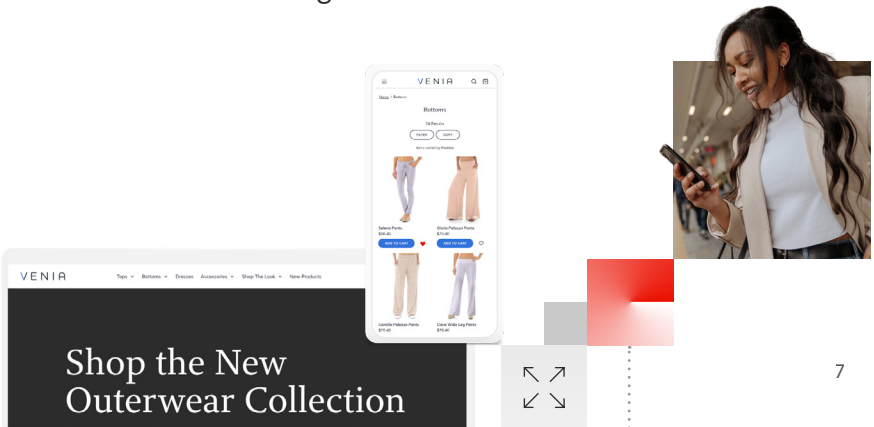
Progressive web apps transform the mobile experience.

Consumers are ready for a next-generation answer to the mobile engagement question.

What are PWAs?

The answer is progressive web apps (PWAs), a browser-based application software constructed and delivered via the web using an app-like interface. PWAs represent a significant advance in the evolution of the mobile web, similar in scale to the transition from conventional desktop sites to responsive web design. PWAs blur the lines between mobile apps and sites by equipping merchants and developers with a highly flexible web architecture.

PWAs are capable of seamless, cross-device functionality while progressively utilizing native platform features to enhance the user experience. PWAs bridge the gap between mobile apps and mobile sites to deliver faster performance, reliable connectivity, and fluid site navigation. These and other benefits are proven to invigorate user engagement, drive conversions, boost average order value, and accelerate revenue growth.



General benefits of PWAs

Inviting interface

PWAs present only the most essential user content, supplemented by smooth animations, fluid page scrolling, and intuitive navigation experiences. This mobile-first visual environment encourages user engagement and active site exploration.

Fast, responsive browsing

With PWAs, pages load incredibly fast with quick transitions, eliminating awkward rendering and sluggish page loads. The average load time for PWAs is just 2.75 seconds, eight times faster than the average mobile landing page.

Continual service and security

PWAs are enabled by service workers, a script your browser runs in the background to intercept network requests and store data locally. This delivers secure, offline browsing during lapses in network connectivity, reducing dependence on internet connections.

Support for emerging markets

PWAs are mindful of low bandwidth and limited data plans while delivering consistent functionality regardless of unreliable networks. This benefits individuals in emerging mobile markets where data is at a premium.



Low data consumption

PWAs use a fraction of mobile data compared to native apps, recognizing individuals operating on limited cellular data plans. They also have minimal storage requirements, ensuring they perform consistently across a range of devices.

No downloading required

PWAs are right at the user's fingertips via their web browser without the need to download or install a separate app. When installed, PWAs run in their own independent window and are launched from the user's home screen, dock, or taskbar.

Always up to date

PWAs actively update themselves in real time like a website. This eliminates the need for periodic updates from an app store.

Browser-supported

PWAs are supported by modern web browsers for iOS and Android, including Firefox, Chrome, and Safari.

PWA benefits for B2B and B2C merchants.

Increased average order value

User-friendly layouts and navigation help shoppers quickly browse products and services. This motivates your customers to add additional items to their cart prior to checkout, increasing average order value.



Saved development time and resources

By developing on a single codebase for all mobile and desktop devices, PWAs cost significantly less to develop and deploy compared to a native app. As PWA development standards are refined, the total cost of ownership and time to market will continue decreasing.

Freedom to deploy

PWAs enjoy unrestricted, flexible distribution since they do not need to be listed in an app store. This means freedom from the restrictive terms of service and revenue share agreements imposed by these entities.



PWAs—more than just a mobile marvel.

Many of the benefits of PWA, from super-fast page speeds to automatic updates, also carry over to desktop and other devices. PWAs can even be installed on a desktop just like a native app—but they'll be faster, more reliable, and take up much less space on a user's preferred device.

Discoverability

Once your PWA is built, anyone can access it through a browser interface they're familiar with. As opposed to the gatekeeper element of an app store with app rankings and searching, PWAs show up in Google search results as any web page would.

The progressive future of retail.

PWAs have the potential to replace legacy point-of-sale systems and retail associate platforms as part of the in-store experience. This will create an efficient, cost-effective way for store associates to locate products online and in store, provide self-checkout, service returns, and more—all from an employee's smartphone.

The proof is in the numbers.

As a pioneer of PWA technology, Google has compiled a wealth of data on Web.dev supporting their effectiveness:

- The average bounce rate of a PWA is **42.86% lower** than a similar mobile website.
- Mobile sessions on PWAs are **increased by nearly 80%**.
- Overall engagement is **137% higher**, with some brands having boosted engagement even higher.
- The average load time for PWAs is just **2.75 seconds**, eight times faster than an average mobile landing page.



“ PWAs represent a seismic advancement in the evolution of the mobile web, similar in magnitude to the transition that happened five years ago from conventional desktop sites to responsive web design.

Peter Sheldon

Former Senior Director, Commerce Strategy
Adobe

Embrace the mobile moment.

As progressive web apps reimagine mobile commerce, consumer brands, industry wholesalers, and media providers alike are recognizing the technology's potential. With PWAs combining the best features of mobile web and native apps, a brand's mobile audience can grow exponentially—at a fraction of the costs associated with native apps. Early adopters are discovering PWAs deliver significant returns against the initial cost of development and deployment.

- The Twitter Lite PWA generated a **65% increase** in pages per session, **75% more** tweets, and a **20% decrease** in bounce rate.

- After switching to a PWA, Nikkei saw **2.3 times more** organic traffic, **58% more** subscriptions, and **49% more** daily active users.
- Hulu replaced its native desktop experience with a PWA and saw a **27% increase** in return visits.
- Tinder's PWA experience, Tinder Online, means users can now access the popular digital dating service from either mobile or desktop devices, expanding the targetable market.
- After launching its PWA, *The Washington Post* improved its page load times **by 88%** versus conventional mobile web.

50% of all consumer-facing apps in 2020 will be replaced by PWAs.

Source: Gartner Research

“ PWA Studio is positioned to lower the cost and complexity of adopting progressive web app experiences.

Forrester

Say hello to PWA Studio in Adobe Commerce.

PWA Studio offers the tools you need to develop a modern, mobile-first digital storefront that performs well. And it works for all Adobe Commerce or Magento Open Source deployments. PWA Studio comprises a rich suite of tools for building online stores with app-like shopping environments. This helps merchants solve the mobile conversion dilemma while creating highly personalized commerce experiences.

Core features of the PWA Studio in Adobe Commerce include:

- Tools to personalize content and add local preferences
- The ability to build and manage all channels and experiences via one code base, one deployment, and one app
- An intuitive, marketer-friendly user experience with integrated Page Builder content management capabilities
- Modularized component architecture and extensibility framework to grow opportunities for extension resellers
- Purpose-built developer tools for fast prototyping, helpful debugging, rich feedback, and increased productivity
- The Venia reference storefront, which accelerates time to market with prebuilt UI and style components from home page to checkout



“ PWA Studio is an amazing toolset which helps you create PWAs without having to do the heavy lifting yourself.

Jordan Eisenburger

Adobe Commerce Technical Architect

Adobe

Getting familiar with any new framework takes time, and PWA Studio was built with the developer experience in mind. It lowers the barrier to entry with robust developer tooling, extensive documentation, and user tutorials to get started.

Reimagine mobile sites with PWA Studio.

Whether you're a B2C or B2B business, PWA Studio can go to work for you. There are currently over 210 Adobe Commerce stores built with PWA Studio, and the following case studies provide examples of how a PWA experience investment can deliver significant returns.

ELEMIS London

ELEMIS

LONDON

Transforming mobile shopping with PWA Studio.

When ELEMIS London, a global skincare brand, found that over 70% of its traffic had shifted to mobile, the company knew that becoming a mobile-first company was critical to its long-term success. Seeing PWA as the answer, ELEMIS built a progressive storefront on top of Adobe Commerce, something no other beauty brand had done before.

“ Our previous site wasn't described as 'snappy,' but now that's one of the first three words people use to describe it. That's really nice to hear.

Luigi Raffo

Senior Director of Global Digital Experience,
ELEMIS London





The ELEMIS's progressive web app helped capitalize on the shifting expectations of its customers, and as a result, the brand has seen major improvements both on its core business metrics and brand perception. From its new shopping and checkout experience that makes it fast and convenient to place orders to being able to rapidly create new content and experiences, ELEMIS continues to reap the benefits of PWAs.

137%

increase in mobile transactions

39%

average page load time

85%

growth in mobile conversion rate

Selco Builders Warehouse



From brick-and-mortar retailer to digital trailblazer.

Selco, the UK's fastest growing builder's warehouse, supplies a vast catalog of 15,000 different materials to tradespeople and construction companies. Having outgrown its existing commerce platform, Selco partnered with JH, an Adobe Commerce enterprise solution partner, to initiate the upgrade to Adobe Commerce 2. This would position Selco to develop a modernized mobile commerce experience using PWA Studio.

300%

faster than the
previous platform

82%

revenue increase

23%

increase in
conversion rates

Working with JH, Selco is now one of the first B2B merchants to launch a mobile experience using PWA Studio. The results have grown a huge competitive advantage in the market due to improved site speed and multiple enhancements to the user experience.

“ The latest update to Selco’s website is the first-ever progressive web app to be deployed for a B2B merchant on the Adobe Commerce platform.

Jamie Huskisson

CEO and Founder

JH

What to consider when adopting PWAs.

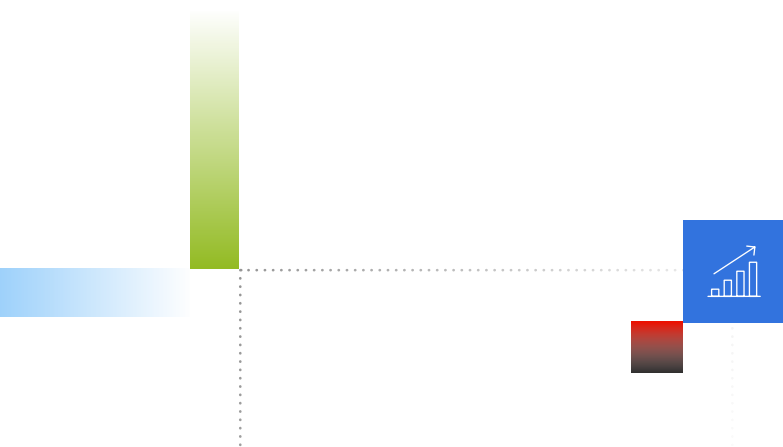
As PWAs continue gaining traction, early adopters put themselves at an advantage over their competitors. However, as with any technology integration, you'll want to be sure you do a careful assessment of business objectives and available resources before moving forward. Try to keep questions like the following in mind.

Is your site due for a refresh?

Take a trip through your site to see whether it's ready for a front-end refresh. Does your site readily communicate its purpose? How does the site view across various platforms and browsers? Is it easy to navigate? Is content presented in a clean, straightforward manner?

Is traffic dictating demand?

Your mobile sales and traffic numbers can help gauge whether to push toward a mobile makeover. If more than 50% of web traffic or more than 25% of online orders come from mobile, you have the numbers in place to start developing a PWA.

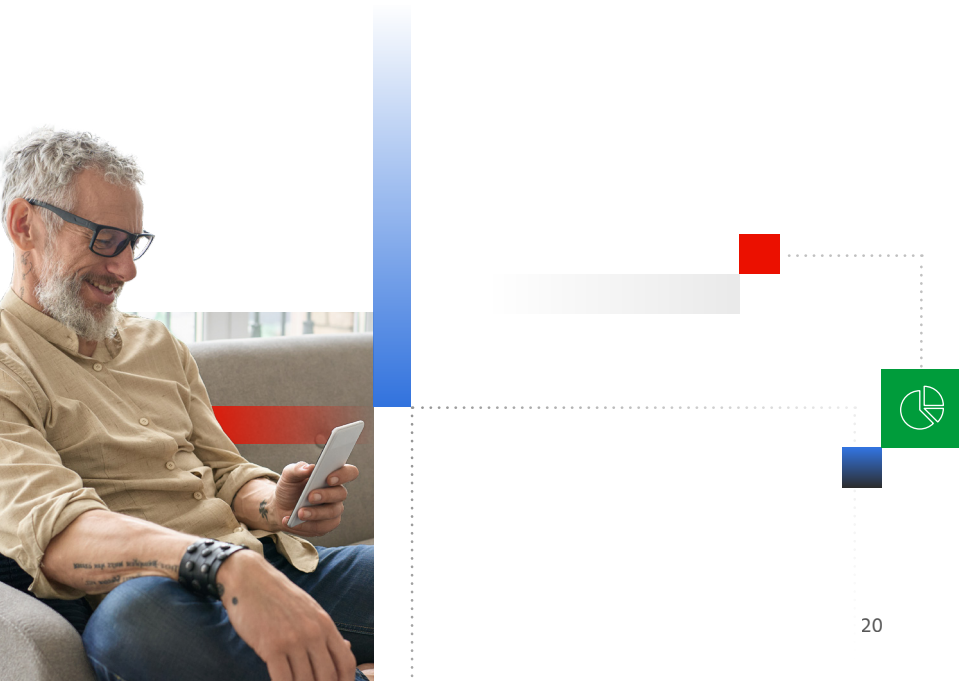


Is a PWA development in your budget?

Overall cost for a PWA with Adobe Commerce will vary based on development time and complexity of your current commerce platform. As more Commerce storefronts are created using PWAs, including marketplace-ready extensions, the overall cost of development will decrease significantly.

Can you divert app development budget or resources to PWAs?

If initiating PWA development is a stretch for your budget, look at projects you have underway. If you have a native app currently in development, consider redirecting a portion of its budget and resources toward a PWA instead.

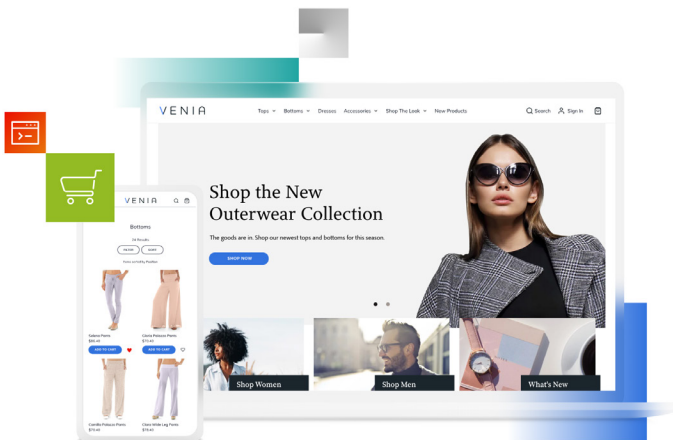


PWAs are here to stay.

PWAs are a significant push forward in the ongoing evolution of m-commerce. The technology blurs the lines between native apps and mobile sites by equipping merchants and developers with the ability to build app-like shopping directly in the browser. Given their power, speed, and flexibility, it's difficult to imagine a digital commerce experience which cannot be improved upon using PWA technology—including yours.

Learn more about how PWA Studio in Adobe Commerce can help you on your journey toward modern, seamless commerce experiences.

[Get details](#)



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