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# DXI for Mobile Experience: Privacy, Performance, and Bandwidth

No matter where you are in the world, smartphones have become a ubiquitous part of modern life. Almost one-third of the world's population owns a smartphone, and 85% of Americans have one. You might have one in hand or in a pocket right now (and might even be reading this on yours).

Smartphone users will tap, swipe, and click their phone 2,617 times a day, and 35% of US smartphone users check their phones more than 50 times a day.

While the sheer number of mobile experiences have grown, the quality of those experiences has failed to take off. Over one-third of retail sales now come via mobile device–otherwise known as mCommerce–driving over $47 billion worth of revenue in 2020.

Navigation is particularly important in retail, as many users switch to desktops to complete purchases as they find the navigation easier. That is, if you're lucky. Many visitors get frustrated, then leave, never to return–61% of whom are likely to go to a competitor's site instead.

Simply put, optimizing the mobile experience matters, now more than ever.
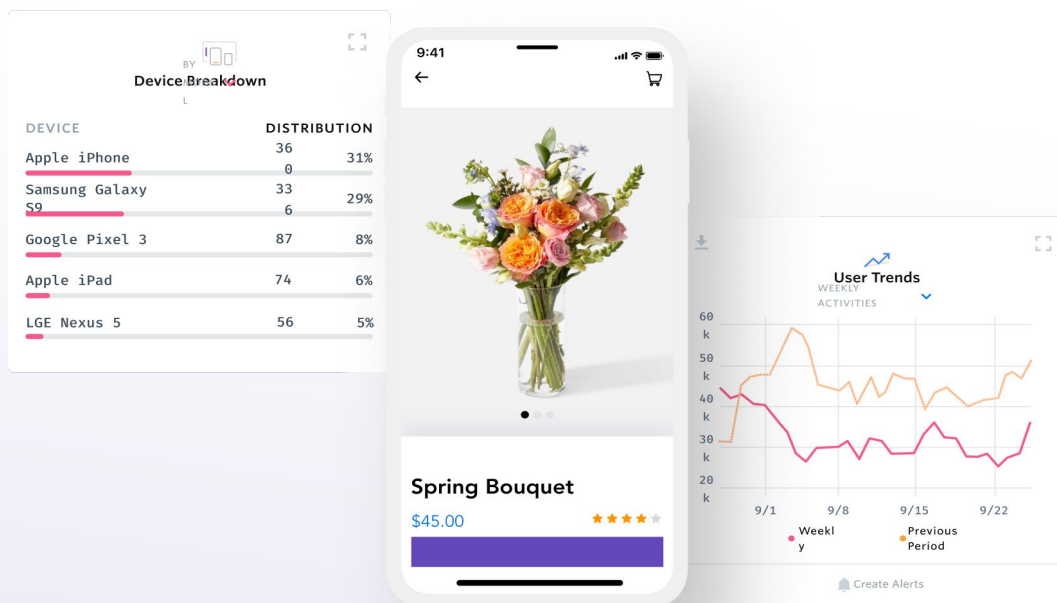
Why the mobile experience needs DXI

While mobile experiences are under greater scrutiny, those in charge of building and maintaining them know that categorizing mobile experiences uniformly is a challenge.

There's no single common technology; mobile experiences may involve unique operating systems, code bases, independent development teams handling Android and iOS apps, performance engineers, and cloud operations. When every engineering team has its own monitoring requirements, teams can easily end up with multiple, overlapping monitoring solutions. Simple recording technologies, which capture a video or images from a mobile session, fall short in meeting this demand for flexibility.

That's precisely the situation Digital Experience Intelligence (DXI) seeks to help resolve.

Done correctly, the DXI within a mobile application can unify teams by guiding product management work beyond product improvement to deliver continuous improvement of the entire digital experience. This supports increased revenue through better conversion, boosts customer growth and retention, and improves organizational efficiency. It also provides teams an opportunity to observe, listen and learn directly from the end user–regardless of the device they've chosen.

What can be learned from end users breaks down into two buckets: qualitative and quantitative.

Qualitative versus quantitative: Where DXI is different

Creating competitive advantage requires understanding both what is happening in your mobile application and why it's happening.

Historically, to get this information, app developers have viewed screenshots, screen recordings, and touch events of how a user interacts with an app. This information provides the developer with visibility into where users click, what they type, where they scroll, and how they navigate their app.

But the data provided by these tools only shows the tip of the iceberg. As mentioned earlier, mobile applications have unique operating systems, code bases, development teams, performance engineers, cloud operations—essentially, no two are identical. Legacy visual recreation tools lose the interactions between the different technologies and teams.

Seeing what a user does in an application is useful, but seeing how the application works to power that experience is invaluable. This is why DXI is the only way forward for mobile engineers and product teams.

Through DXI, the teams behind mobile applications can not only access session replay alongside qualitative and quantitative guidance—but do so in an air-tight, efficient environment.

> *DXI solutions do not use screen recording, but instead capture the structure of a native app by integrating with the platform toolkit on a deep level.*

At the heart of best-in-class DXI solutions are three main components: privacy, playback, and bandwidth. With these, product and engineering teams have access to more mobile analytics than ever before possible.

Taking a privacy-first approach

Terms such as "session record" or "screen recording" get tossed around as synonyms. In reality, especially in the context of privacy, they're miles apart.

Recording everything a user sees on their device falls short on several fronts around privacy.

Recording whatever is displayed on the screen can include sensitive data such as credit card numbers, addresses, or social security numbers—information that should be treated with the utmost attention.

> *Many session recording tools simply block, redact, or "grey out" video files with this sensitive information. With that method, it's only possible to determine if private data has been accurately blocked by actually viewing the recording—accessing the information intended to be stripped out in the first place, and potentially saving it in a secondary location.*

This recording—intentional or otherwise—of end users' personally identifiable information (PII) without a business need leaves your business open to security breaches and leaks of that data.

Recent headlines indicate the issues that weak privacy guardrails cause for businesses. In 2019, Air Canada's iPhone app failed to properly mask recorded sessions, exposing passport and credit card data and resulting in a data breach impacting 20,000 users. Other apps, including Expedia and Hotels.com, also recorded screens capturing personal details like email addresses. Additionally, regulatory frameworks like GDPR place stringent requirements on acceptable uses of personal information.

Leading DXI platforms, however, completely circumvent this risk through a vector-based approach to mobile session recreation. DXI tools provide a privacy-first recording model, where privacy rules are evaluated on the end user's device during recording. Elements of the app that are marked for exclusion (because they contain PII, for example) are entirely excluded, ensuring they're not recorded at all.

DXI tools also know that privacy rules can be fluid, that applications change, and that users need to update settings. Accordingly, it's best practice to change mobile app recording rules from within web apps, allowing users to update rules without needing to ship a new release.

Essentially, DXI affords privacy by default, not privacy as an add-on.

This sets users up for success—and stymies issues before they occur—by capturing only the structure of the app without any user data from the outset. This way, users can unmask just the elements that provide value without auditing the entire app for sensitive fields.

Inherently, DXI solutions are built on top of the structure of an application—instead of relying on its visuals—so additional checks for extremely sensitive data, such as credit card numbers, can be quickly introduced. This allows the tool to quickly scale with your team's needs, unencumbered by visual shifts of an app or other mobile experience.

All in all, a DXI solution should be an asset that helps you improve the quality of your app, not a liability that sets you up for bad press and potential lawsuits.

Balancing performance and detail

In addition to privacy-related benefits, DXI's vector-based approach also opens doors for addressing fidelity and performance concerns.

In the past, screen recording tools forced users down one of two paths: recording in native screen resolutions (resulting in gigantic video file sizes), or downscaling recording (resulting in choppy, low-fidelity playback). It's been a trade-off mobile teams have had to make for years.

Advanced DXI tools have recognized and resolved this concern. With an SDK that ensures both optimized file size and high fidelity through the inclusion of build-time tooling for your app, modern platforms allow for the upload of static assets, such as images or fonts, ahead of time. **This direct access streamlines the recording process and ensures static assets are rendered at full fidelity during playback.**

Voila—no more choosing between unwieldy or low-fidelity files.

Maximizing bandwidth

The outcome of a private-by-default approach is dramatically minimized risk. The outcome of high-fidelity playback is complete clarity into user activity. But why does performance matter?

Performance has a direct correlation to bandwidth.

Between areas with spotty service, cell phone plans with miniscule data caps, and unreliable coffee shop Wi-Fi, slow apps that abuse bandwidth can easily cause a user to kick them to the curb.

Historically, screen recording has worked by using general-purpose video codecs, the compression technologies used when recording video files, to encode the screen contents into video. These operate on the output of apps' drawing process, using the on-screen pixels as input. While these codecs provide compression of things like identical screen contents, their efficiency is fundamentally limited by only having access to what's on the screen and without visibility into the structure of the app. This reliance on the visual creates an unrealistic, unsustainable burden.

Through a vector-based approach, best-in-class DXI tools instead generate a compact codec of the contents powering the session.

> *Instead of stitching together snapshots of an application's output, DXI tools work at a structural level to provide much more advanced compression.*

For example, it's now possible to recognize when only the contents of one control on the screen change, as well as reuse previously recorded information about portions of the app. For example, when a user switches back to an earlier view, users of leading DXI tools can simply reference the previously reported state, isolate the change, and send only that tiny bit of data as a result.

This novel approach to capturing the contents of mobile applications also provides a key advantage by aligning much more closely to the way mobile apps draw themselves.

Video codecs are designed to encode arbitrary graphical data and work on a pixel level. DXI tools encode the actual drawing commands used in the application, including lines, shapes, and colors. You can think of this as the difference between using a raster image format, such as .png, rather than a vector image format, such as .svg.

When dealing with modern smartphones with extremely high screen resolutions, the difference in quality between the two can be staggering. Raster-based compressors also have to repeatedly compress and upload images within the application, whereas DXI's approach can upload these in advance, saving user bandwidth.

Through DXI, product and engineering teams get the quantitative and qualitative information needed to create better experiences—without bogging down the experience itself.

The DXI expertise of FullStory

Digital experiences have become increasingly sophisticated, and the ability to collect information from these sessions, learn from them, and use them to perfect a user's experience has never been more important. More than that, the way in which data is collected has escalated in complexity—desktop experiences aren't always mirrors of the mobile experience, both behind the scenes and for what the end user experiences.

More and more, mobile devices are the platform of choice. Accordingly, the technology used to measure and understand what and why mobile interactions happen should be modernized—not just stitch together pictures.

That's why FullStory took a different approach. As the industry leader in Digital Experience Intelligence, FullStory believes that you should be able to drive value from your digital experience solution, in a privacy-first, high-fidelity, bandwidth-friendly way without wasting valuable developer resources on endless instrumentation.

Our advanced, vector-based approach leverages the application's existing structure to deliver flexibility and visibility without incurring the additional overhead due to app changes and app store review. FullStory for Mobile Apps is a unique solution, specifically formatted to gather the data app developers need to improve their offering.

[Top smartphone users](#) spend 4 hours and 30 minutes per day on those devices—a number that's only shooting upward. Help your users and your organization make the most of those experiences.

Request your demo of the FullStory platform today.
Visit fullstory.com/demo.