User Experience Monitoring: Enabling the DevOps Conversation

Introduction

Designed for application support engineers and DevOps champions, this paper outlines how to measure true user experience. It details companies can use that data to bridge the gap between development and operations. As companies foster a DevOps culture they can speed time to market, hone requirements and strategically build superior mobile solutions.

Mobile app development faces mounting challenges. The pace of innovation is relentless, forcing developers to accommodate a continuous flow of new devices and OS options. Network conditions fluctuate and emerging technologies and plugins rarely live up to SLAs on a continuous basis. Service delivery models have become exceedingly complex creating additional points of failure. Unfortunately, customers do not care what happens behind the scenes. They expect instant service. Any glitch can cause them to rethink their choices, abandon the solution or trash it via social media.

To keep up, release schedules for mobile apps are now measured in weeks instead of quarters. However, in many organizations, bottlenecks in the design/development processes are hindering their ability to deliver. The increased complexity has forced engineers to adopt to new development techniques and deployment solutions on the fly. Operational teams are learning in real-time how to set meaningful requirements as they transition from server-side technologies to more responsive client-side solutions. Typically, neither side has access to the data they need to fully understand how these decisions are impacting users.

To be successful in today's dynamic, fast paced environment, companies must rethink processes and incorporate agility, collaboration and Continuous Quality. Shifting towards a DevOps culture will improve outcomes from requirements to production. The key to bridging the gap between operations and development lies in carefully defining user experience KPIs and then using the empirical data to make more intelligent decisions throughout the development lifecycle.

Integrating user experience monitoring into an agile DevOps model allows companies to realize key business objectives:

- Eliminate the technical reasons that limit widespread adoption

- Meet tight delivery schedules without sacrificing quality

- Improve collaboration from requirements through delivery

- Accurately assess the impact of new technologies and design ideas

- Cost engineer third-party commitments

- Hone Quality of Experience over the entire app lifecycle

Focusing on User Experience

To successfully deliver mobile solutions, organizations must change how they specify development goals and define requirements. In the past, requirements documents focused on defining functionality, specifying UI and provisioning backend servers while developers focused on ensuring code was developed without defects. As a result, user experience was an afterthought – if everyone did their job properly, everything should turn out OK.

Today, providing a great user experience becomes a functional requirement – not a "nice to have"

In the mobile world, this approach often fails. Here, the true measure an app's success is user adoption, engagement and retention. In this model, providing a great user experience becomes a functional requirement – not a "nice to have". To ensure that user experience goals are met, specifications for UX-related KPIs must be included. For example, a traditional functional requirement, such as load page, changes to load page within 4 seconds.

Focusing on user experience allows Development and Operations to find the common ground they need to collaborate to create innovative apps that delight customers.

Creating Meaningful KPIs

Each organization has different goals for driving adoption, engagement and conversion rates. Customizing user experience KPIs to align with these objectives provides the insights needed to optimize solutions throughout the development cycle. Although CPU utilization, packet loss, memory leaks and other traditional performance related metrics can enrich understanding, the set of metrics that will provide a holistic understanding of true user experience should be defined locally for each app.

Take the time to collaborate on UX-specific KPIs. Uniting Ops data residing in Operations with the knowledge gained in Development ensures optimized requirements on an ongoing basis.

Once specified, these metrics will act as baselines that organizations can use to assess production-readiness for near-term releases. More importantly, they enable efficient communications as Operations and Development collaborate over time on requirements, technology choices and design options. The following should be considered for inclusion:

Load time:
Although users had no problem waiting 10-12 seconds for desktop browser applications to run, in the mobile world user thresholds have changed. Now they expect immediate results, typically 2-3 seconds. Load times that exceed that mark will cause a user to consider their next move (wait for service, choose another solution, fire off a Tweet, etc.).

When delays do occur, developers may assume that they are a result of network or device fluctuations. However, there are additional factors to consider. Pages designed with heavily weighted objects and those that do not prioritize above the fold rendering will take longer to load. Embedded third-party function, such as options for Facebook, Twitter or PayPal, can cause delays if the app has to wait too long for content to be delivered.

To efficiently isolate root cause, first identify which transaction caused the delay. Perform a network analysis and examine

transaction-specific waterfall charts to see where a slowdown is occurring and/or which element fails to be delivered. Enriching this data with device vitals (battery life, memory capacity, radio connectivity) will help determine if the issue is externally created or code/design-related.

UX monitoring solutions that include video playback on what a user sees as pages load will help DevOps teams make smart choices when it comes to efficiently balancing the content/response equation and optimizing user experience as a whole.
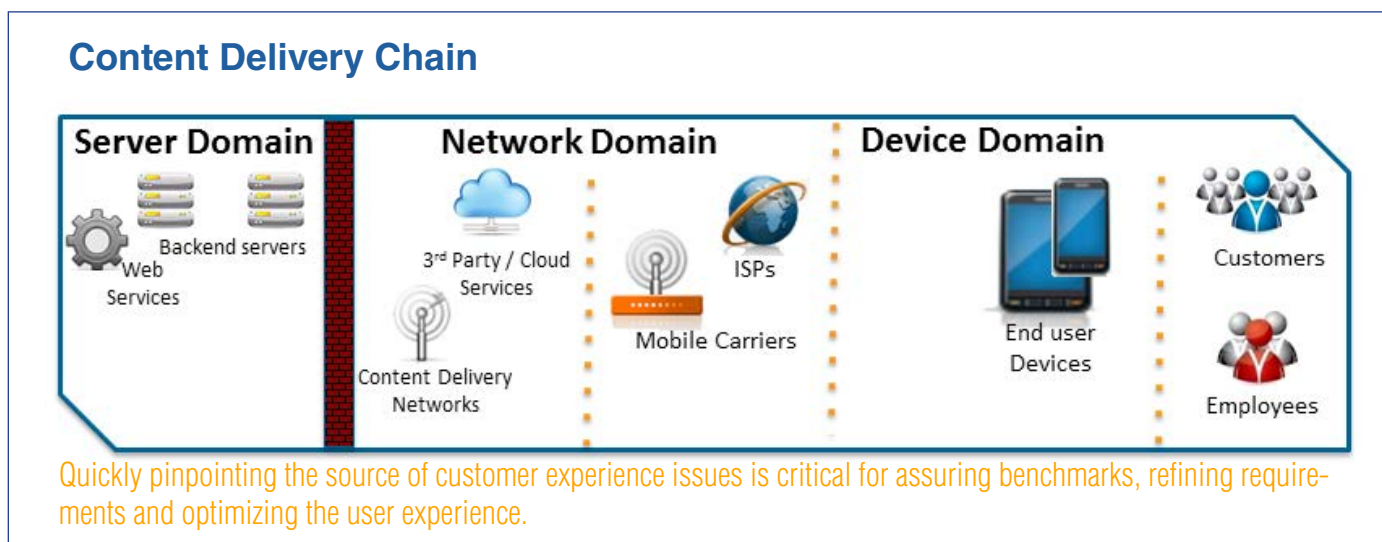
Availability:
Obviously, every organization targets 5-nine availability for any mobile app. Typically, the biggest impact on availability happens at the network level when service is disrupted for some reason. However, inconsistencies with back-end connectivity and problems with critical third-party products can cause apps to fail outright. Availability issues tend to increase overtime as usage overstresses provisioned resources. Correcting any factor that causes an app to fail must take priority and should be considered a reason to delay any release.

Transactional turnaround:
KPIs defining specific transaction times are app specific, typically based on unique engagement, adoption and conversion requirements. However, the longer it takes to confirm user requests, the higher the anxiety level – especially if the user made a financial commitment.

If and when KPIs exceed acceptable limits, companies must look for ways to improve performance. Because mobile transactions are so complex – integrating multiple backend, storage, database and third-party solutions – many factors can degrade user experience. Monitoring the entire transaction from end-to-end will pinpoint the source of the problem. Many transactional slowdowns also increase as usage grows. To preempt issues, monitor performance under heavy load conditions and understand when additional resources will be needed to keep performance in line with user expectations.

Content Delivery Chain

Server Domain — Web Services, Backend servers

Network Domain — 3rd Party / Cloud Services, Content Delivery Networks, Mobile Carriers, ISPs

Device Domain — End user Devices, Customers, Employees

Quickly pinpointing the source of customer experience issues is critical for assuring benchmarks, refining requirements and optimizing the user experience.

Third party content:
Third party apps that do not perform against SLAs can significantly impact user experience. With development organizations are stretched to their limits, many rely on numerous plugins to provide critical functionality under tight deadlines. Only those companies that fully understand how each piece of code and/or third party solution impacts user experience can make informed

in-house v integration decisions. Additionally, knowing which "external issue" is likely to delay transactional success can help DevOps teams design follow-on icons and messages that will help soothe the user and build app loyalty when problems do occur.

To be successful, companies need to define transaction-specific KPIs and monitor their performance from end-to-end. Once benchmarks are established, DevOps can determine how well they are delivering against expectations and strategically optimize solutions over time.

Response time:
Much like load time and transactional turnaround KPIs, these metrics focus on how quickly (and accurately) an app responds to requests such as nearest location, product options, order status and more. When needed, organizations can prioritize optimization work and focus on speeding responses for requests that delight users and/or lead to higher conversion rates.

Notification delivery rates:
Apps pioneering complex algorithms that use contextual data to prompt user actions must meet stringent performance requirements to function properly. For example, retailers using beacon technology only have 100 yards (or 2-3 seconds) to push relevant in-store offers – shoppers that receive a coupon for diapers after they have left the baby section are less likely to act upon the message.

> **When it comes to selecting a mobile-specific UX monitoring solution, follow industry best-practice recommendations:**
>
> - Proactive monitoring on real devices connected to active networks worldwide
>
> - On-demand anytime, anywhere access to performance data
>
> - Support for advanced mobility functions (speech, contextual notifications, call features, etc.)
>
> - Proactive end-to-end analysis of high value transactions

To optimize conversion rates, organizations must set realistic requirements that square user expectations with the technical capabilities of emerging technology.

Sharing User Experience Insights

It is clear from the discussion above that both Operations and Development requires access to empirical data on true user experience. Without it, Operations cannot accurately specify requirements, Development cannot ensure production readiness and no one will know how apps are delivering against expectations in the field. More importantly, neither group can make smart decisions for future releases if they have no idea how changes will impact user adoption, engagement and conversion rates.

UX monitoring is critical to overcoming these challenges. Creating a core set of monitoring scripts for measuring performance against

Collaboration fueled by monitoring insights guarantees a great experience.

defined KPIs ensures that everyone has access to real-time insights as they work towards a common goal. However, sharing the results across the organization enables more collaborative DevOps conversations:

- **Requirements Definition**
Without performance-level specifications, Operations cannot accurately communicate requirements to Development teams. However, simply picking a number (6 seconds to process a PayPal transaction, 2 seconds to load an order status page) is not

helpful if there is no way to achieve it technically. Organizations need data to set realistic user experience benchmarks for every transaction – and then find ways to refine them over the application lifecycle.

- **Pre-deployment:**

Because performance metrics have become functional requirements for mobile apps, developers need continuous feed-back to quickly correct issues and fully validate solutions prior to release. By communicating insights on major issues (the camera plug-in had a 30% failure rate, a specific video added 2 seconds to every page load, etc…), companies can make adjustments in subsequent releases.

- **In-production:**

Expecting an app's Quality of Experience to remain a constant under highly dynamic and evolving conditions is unrealistic. Instead, companies need to a Continuous Quality program, one that proactively assess performance in the field and makes adjustments to as usage increases. Intelligence gained at this level (iPad users are experiencing above average response delays, back-end connections time out when more than 10,000 requests are received simultaneously) can be used to further refine requirements documents and guide infrastructure-level decisions.

Transforming to a DevOps Culture

By definition, the DevOps culture stresses communica-tion, collaboration and integration between the opera-tional groups that define the business requirements and the development groups that bring them to fruition. In the past, these groups tended to work as distinct entities and seemed to have their own language, priorities and concerns.
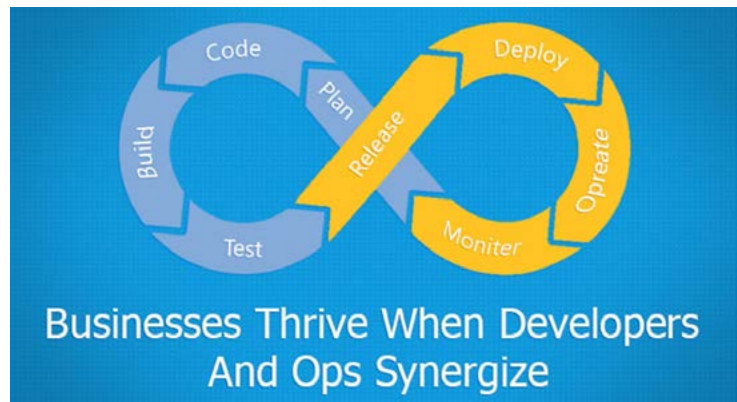
This approach will not work in the mobile world for very long. To succeed in such a dynamic, fast moving market, compa-nies need to get everyone involved – from product owners and developers to operational leads and testers – on the same page and working together to deliver a flawless experience every time. The DevOps model offers a tremendous opportunity to strategically enhance mobile initiatives by improving feedback between Operations and Development.

Companies can begin the transition by collaborating on KPIs and sharing insights as these benchmarks are monitored throughout the development cycle. It enables group discussions on user complaints as well as the technical and design issues that consistently degrade their experience. When open communication occurs on a continuous basis, the company

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as a whole can refine requirements and make smarter decisions throughout the design/development process.

Concentrating on user experience brings the discus-sion to a higher plane. For example, say marketing really wanted to add a set of instructional videos to an existing support app but developers discovered that load time has

gone from 2 to 12 seconds, a number that far exceeds acceptable rates. Now, the two groups can collaborate on the number of videos to include, how dense they should be and where to place them using empirical evidence from the UX monitoring solutions to optimize the results.

Data-driven conversations will enhance productivity on a daily basis. When data from in-field monitoring solutions shows a steady increase in both usage rates and the time it takes to process downloads, organizations can quickly justify purchasing additional resources. When development notices that payments are timing out when a third party solution is used on an a specific device, they can easily report how many users will be impacted and why a new workaround is required.

Data-driven conversations enhance productivity on a daily basis

Creating a DevOps culture and arming employees with key insight will ensure a responsive design process. In this way, companies will continously find elegant ways to balance stringent user expectations against added development challenges (complex service delivery models, emerging technologies, etc.).

Bottom Line

Today, the pace of innovation has both increased technical complexity and cut the average time-to-release down to weeks instead of months. All at a time when consumers will no longer stand for delays or apps that fail to live up to their expectations. Given the current environment, cultivating agile DevOps processes is every bit as important as developing the stories for the next big release.

Luckily, today's cloud-based solutions have arrived to provide on demand access to more robust UX monitoring solutions designed specifically for mobile apps. Now there is no need to develop in the dark. They provide the key data points data companies can rely on to accurately specify requirements, drive development efficiencies and assure user experience as environments evolve. Most importantly, they unite Development and Operations and ensure that everyone is working together towards a common goal.

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In the long run, shifting to an agile DevOps program – with the UX monitoring tools needed to empower it – is critical to success of any mobile strategy. Collaborating over real world empirical data will ensure optimal adoption, engagement and conversion rates over an app's lifecycle. In the end, these conversations will lead to apps that truly delight users at every touchpoint.

About Perfecto Mobile

Perfecto Mobile is transforming the way enterprise organizations go mobile, enabling them to develop, test, deploy and monitor their mobile applications and services and go-to-market with confidence. Perfecto Mobile's cloud-based MobileCloud™ Platform and end-to-end mobile quality product suite enables users to remotely access a large selection of real mobile devices connected to local cellular networks around the world and leverage them throughout the mobile application delivery lifecycle – from development, functional and performance testing to monitoring and support. The MobileCloud™ is available either as an enterprise private cloud or a sharable public cloud.