

Mobile Testing Strategies and Tactics for Quality in Context

A Guide to Real Device Testing in the Cloud for Mobile App QA Teams



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Summary

The growth in mobile devices and mobile apps has led to the Mobile Imperative – the requirement to provide high-quality mobile access to your users. This in turn requires that software companies move beyond the QA models that have traditionally worked for desktop applications toward mobile testing strategies and tactics.

But marshaling a variety of QA skill sets and ramping up to thousands of test devices running native, web and hybrid apps on remote wireless networks is daunting. QA managers need a means of executing their tasks while keeping an eye on “Quality in Context,” the broader vision of QA that helps companies make better informed product decisions.

This paper introduces the benefits of cloud testing using real mobile devices as the best-case scenario for mobile testing, with actionable strategies and tactics for mobile testing. Readers will find ways in which they can position their QA teams for Quality in Context, perfect the QA of their mobile apps through cloud-based real device testing and overcome diversity in devices, apps and their own organization.

Main Messages:

- The main challenges QA managers face in testing mobile apps and websites are device diversity, app diversity and organization diversity.*
- Through connections to remote devices over the Internet, real mobile device testing in the cloud offers a path to QA that overcomes most common challenges,*
- Freed up from routine testing tasks, QA managers can focus on Quality in Context, providing information that leads to better decision making and increases the value of QA to the business as a whole.*

Why is Mobile Testing Necessary?

For several years the sales curves have been bending inexorably toward mobile devices and away from PCs. In fact, the likelihood of tablets alone (not including smartphones) outselling traditional PCs is at hand¹. Trends like Bring Your Own Device (BYOD) and the continued growth of app stores point to the increasing importance of mobile and a corresponding “Mobile Imperative” among software developers.

The Mobile Imperative

A few statistics illustrate the quantitative side of mobile in daily life:

- According to Gartner, users downloaded 102 billion mobile apps in 2013².
- Another Gartner prediction calls for mobile apps to have generated \$77 billion in total revenue by 2017³.

¹ [“Gartner: Device Shipments Break 2.4B Units In 2014, Tablets To Overtake PC Sales In 2015,”](#) TechCrunch, July 6, 2014.

² [“Gartner Says Mobile App Stores Will See Annual Downloads Reach 102 Billion in 2013,”](#) Gartner, September 19, 2013.

³ [“Gartner Says by 2017, Mobile Users Will Provide Personalized Data Streams to More Than 100 Apps and Services Every Day,”](#) Gartner, January 22, 2014.

- Forrester reported that mobile is the number-one technology priority among retailers⁴.

The equally important, qualitative side of mobile rests on two main points:

1. Users are demanding access on their smartphones and tablets, whether through consumer apps or internal business programs. At some point, your mobile sites and apps are going to be as important as or more important than your desktop-oriented websites and software, and you need to prepare for that day.
2. A low-quality mobile experience impacts sales and perception. Users now expect sites that are designed well and perform well for mobile.

So the Mobile Imperative is the requirement to provide high-quality mobile access to your users. The best way to meet the Mobile Imperative is to include mobile testing in the software development cycle. App developers ignore this at their peril.

Mobile testing and Quality in Context

Although testing can be expensive and time-consuming, it is necessary to ensure that all of your users have a positive experience every time they use your mobile applications. When you fail to do a good job of testing, your customers end up doing it for you, and unlike your testing team, few of them have the tools, time or patience to report problems back to you. When your bugs affect them, they simply stop using your app or, worse yet, they tell their friends and followers.



Of course, the goal of testing should be a high-quality mobile site or app. The key to this is to ensure that QA learns about new features in time to design appropriate test suites. Organizations that add in-production real device testing to exploratory manual testing, real-user experiences and usage patterns have the inside track in the race for market acceptance of their mobile apps.

You should not limit your mobile testing to finding and fixing bugs. Instead, your goal should be to understand the quality of your app or site. Does it work? Does it function as you planned? Does it meet the needs of your consumers and keep them coming back repeatedly?

Although there are many ways to understand quality, from a five-star rating in an app store to efficiency on wireless networks, QA context is generally limited. In an age where analytic tools are no longer bound by simple pass/fail data points, QA teams can now operate in a wider context. They can understand the quality of an application by performance, network issues, external dependencies and the location of bugs before and after production, to name a few.

⁴ [“Retailers Modify Objectives In 2014 As Mobile Tops Priority Lists,”](#) Forrester, January 29, 2014.

In a business context, quality means ensuring that a mobile app or site works as intended so that it can generate revenue. It means shedding light on why it is passing or failing, how it performs in the real world and how it stacks up against competitors. Beyond assuring quality, it means giving context to the quality so that a company can take information from its QA team and make better business decisions; for example, deciding to invest in improving an app because its competitor has more downloads, or switching development resources from the native app to the Web app.



Quality in Context is the next threshold of QA.

What Are the Challenges in Mobile Testing?

Companies are looking for alternatives to maximize their mobile testing efficiency while keeping budgets in check. Some outsource their mobile testing overseas to reduce labor costs, but relying on overseas assets introduces its own set of challenges. Hardware and network access, for example, become much more difficult to manage.

In short, mobile testing is not the same, one-size-fits-most world of desktop app testing.

The top 5 mobile testing challenges

“[The State of Mobile Software Quality, 2014](#),” is a research study conducted by Keynote. It found that almost half of 1,600-plus participating mobile app developers, QA testers and IT managers believe that the quality expectations for mobile websites and apps are the same as for desktop apps, and 35 percent of respondents believe they are higher.

At the same time, participants note that the QA resources (including headcount) allocated for mobile testing are lower than for desktop testing. In other words, they have fewer resources with which to meet equal or higher expectations of quality.

More concretely, participants rated the challenges they face in testing mobile apps and websites as follows:

1. Availability of mobile testing tools
2. Having enough time to test
3. Access to mobile devices
4. Implementing the right testing method/process for mobile
5. Availability of mobile testing experts

This same survey found that 58 percent of companies perform most of their mobile testing on real mobile devices. However, given the number-one and



number-three challenges they reported, getting those devices and tools into the hands of mobile testers is obviously still a problem.

Real Device Testing in the Cloud

Mobile testing requires a newer approach than scrambling for tablets, smartphones and the tools with which to test them. Real device testing in the cloud is a big step toward overcoming the main challenges associated with mobile testing.

Device diversity

Thousands of different client devices could run your app or load your mobile site, and you must take them all into account when testing, as depicted in Figure 1. You'll need to reduce the number of test devices to a practical limit, but the fewer devices you test against, you greater the probability of locking out potential customers.

Developers face three particular kinds of diversity in devices:

- Platform – All platforms require testing: Android, iOS, Windows Phone and other platforms. This includes different versions of each platform and, in the case of Android, different manufacturers. Covering all these bases can stretch a QA strategy thin.
- Connectivity – Testing must contend with everything an ordinary networked product does, plus the over-the-air (OTA) connection. Taking OTA performance into account, your testing must involve graceful failover procedures and small downloads that can withstand a slow connection.
- Hardware – Your application must function and display correctly, regardless of screen resolution or available controls. It's important to ensure that your mobile product satisfies the smartphone and tablet configurations of greatest importance to your ideal user.



Figure 1 - Device diversity

App diversity

Compounding device diversity is the changing preference among web, native and hybrid technologies. The market has yet to settle definitively on any single mobile technology, and each one is optimal for different types of apps.

HTML5 continues to grow in potential, making the future of web-based and hybrid apps seem promising. However, the reality is that there will be a mix of mobile technologies out there for years to come.

Figure 2 depicts the native-web-hybrid breakdown of apps in a typical financial institution. Even in this small set of high-priority applications, the affects of app diversity are apparent.

Organization diversity

Finally, as a relative newcomer, mobile apps face the reality that the test groups and functions in most companies were created around desktop tools and processes. Consider the potential mix of these QA resources:

- HP Quality Center and IBM Rational Quality Manager users
- HP Unified Functional Testing users
- Business process testers
- Automation engineers and programmers
- Manual testers

It's important to be able to make use of existing skill sets while bringing into the mix new tools and capabilities specific to mobile.

Overcoming diversity with real device testing in the cloud

Real device testing in the cloud is a big step toward overcoming the problems of diversity. It consists of real mobile devices physically connected to remote control units capable of pressing keys and capturing screen images (see Figure 3).

The remote control units are in turn connected to the Internet, allowing a distant user on a PC or web client to press buttons in a software application and see what is happening on the remote device. These devices provide an



Figure 2 - App diversity



Figure 3 - Real device testing in the cloud

elegant solution that can be connected to either live or simulated networks and that can record screen display for subsequent replay, a useful function in regression testing.

Real device testing in the cloud is testing on demand, letting you rent testing time on a shared resource that is managed for you. Once you have opened an account, you purchase testing time with a given make and model of device whenever and wherever in the world you need it.

Real device testing eases the problem of device diversity by allowing remote access to the combinations of platform, network and hardware needed to assure quality for target users; it addresses app diversity by enabling simultaneous testing of native, web and hybrid technologies; and it accommodates typical skill sets found even on QA teams new to mobile.

The Business Advantages of Real Device Testing in the Cloud

The combination of lower costs and higher productivity is making real device testing in the cloud an increasingly appealing option for app developers.

Eliminates complexity

Real devices connected to live mobile operator networks are the most accurate way to reproduce real-world conditions. Remote testers see results from target devices almost instantly and can test on different devices and platforms. Instead of requiring hours or days for in-house QA and monitoring, testing becomes an on-demand activity. Developers can test a mobile website or service on a variety of mobile devices from any desktop in the world, while simultaneously testing multiple devices for functionality.

Customer Case Study: Shorter Time to Market

The director of QA at a major financial institution was responsible for running each build of a native mobile investment app through Build Acceptance Test (BAT) with 300 hundred test cases across one Android and one iOS device. Manual tests tied up two QA engineers for two weeks; in the meantime, engineers had to wait for feedback. The QA team had QuickTest Professional (QTP) skills and managed the process using Quality Center (QC).

The team automated BAT using real device testing in the cloud and QTP, and shortened the QA time for 300 test cases to 24 hours. All of the test results are saved in QC and the testers have been freed up to test new or more complex features.

Offers a virtual workbench

Testing in the cloud ensures continuous access to a variety of devices and networks, reducing the amount of time needed for rigorous QA. On a virtual workbench, testing can begin immediately, with no limitations on geography or time zone. Developers can find out precisely how their mobile apps, websites and content perform on actual browsers, networks and mobile devices. Companies can ramp up and scale back quickly, a difficult feat to replicate outside of the cloud.

Keeps pace with market changes

With the constant flow of new devices, platforms, firmware releases and technologies, real device testing lets companies stay ahead of the curve without the need to update in-house test benches. Cloud-based

testing assures them of access to the most popular devices in their target market, with upgrades and patches. Cloud testing also makes it easy to work on older versions of each device model.

Adapts to your needs

Companies with particular application, performance, security and compliance requirements may have reservations about depending so heavily on the cloud. Top cloud testing vendors can build a test system inside a customer's firewall for security, while still costing less money and increasing productivity. Real device testing also allows for keeping the display private and wiping the device – deleting downloaded or installed applications, clearing the browser cache, removing other traces of usage like text or picture messages – at the end of each session.

Customer Case Study: Improved Product Quality

The VP of engineering at a major bank outsourced the mobile test process for the company's consumer mobile banking app to a manual test house. The budget allowed enough person-hours to complete the 900 regression test cases on only one device. Test results and issues moved back to the bank in unwieldy word processing documents. As app adoption increased, real-world problems heightened the need to assure quality across a variety of mobile platforms and devices.

With real device testing in the cloud, the bank can now run the same 900 test cases across 20 devices in half the time. Test results with screenshots are automatically available online. The app is meeting the needs of users and gaining adoption even faster than before.

Mobile Testing Strategies and Tactics

Real device testing and a focus on Quality in Context fit in with best practices for mobile testing.

1. Test according to device, app, customer and trend.

The way in which your app is built determines not only the way you go about testing, but also the tools you use to test. App type (native, Web, hybrid) and platform (Android, iOS, Windows Phone, etc.) are the main factors in selecting test tools. Focus first on the app type and find the best tool for testing that type of content. To ensure that your app is being tested properly, it is important to understand how your customers expect to use it. Being alert to how your customers use their mobile devices helps build a familiar feel to your application and increases adoption.

2. Don't rely solely on desktop methods.

Because the mobile experience differs so much from the desktop experience, it makes sense to think mobile when laying out an approach to testing. The Mobile Imperative calls for finding a tool with a mobile orientation that can easily capture test results.

4. Focus on more than pure automation.

Automation is not a panacea. Mobile apps with features that depend on proximity, location and hardware may require testing on an average user's device. It is important to establish clearly what you are willing to

sacrifice in order to automate. Think about your desire to automate in terms of features rather than overall percentage of total tests.

5. Maximize exploratory testing.

Automate what you can, however, so you can free up your QA resources to perform as much exploratory testing as possible. Automating in order to reduce headcount is short-sighted, because the rapid growth in mobile means that the number of mobile testers in your organization should be increasing as well. Free up existing QA resources for exploratory testing by augmenting their repetitive testing with automated scenarios.

6. Integrate testing to your build/development system.

You can increase productivity and streamline your testing process by integrating with the build system your developers use. Test tools can connect through a plugin, API or command line interface to receive builds automatically, push them to all of your mobile test devices, call up a set of programmed tests, run them on a designated set of devices and append the test results to the build. This level of integration can save minutes per device and hours per day of testing time otherwise spent manually moving builds around and installing them.

7. Verify object scripting.

Object scripting allows reuse across the same type of content (web) or across the same platform (native). While it can run a script based on elements and objects, it cannot truly tell you whether the object rendered properly; that is, whether the picture actually displayed, properly aligned, without pixelation and so forth. Good mobile testing tools switch smoothly between object validation and image validation on the fly and provide a simple framework for organizing your validations.

8. Reuse your automation scripts for other testing.

Pre-production testing gets your app into the hands of your users. Once the app goes into production, QA switches to monitoring the app. Try to reuse the work of creating your automated scripts in the monitoring step so you can better understand end-user experiences. A good mobile testing tool can pass the same scripts to your production monitoring/operations team and gauge their faithfulness to real-user situations. That will cut down on the time required to pinpoint a flaw or failure in production and help create a unified baseline across different teams in your organization.

Conclusion

Meeting the Mobile Imperative means meeting the needs of users, even as their expectations continue to rise. Test organizations face the obstacles of device diversity, app diversity and diversity in their own QA resources, but they can overcome them with mobile-oriented testing strategies and the emerging technology of real device testing in the cloud, which remotely connects manual and automated testers to geographically distributed mobile devices over the Internet.

The business value that companies derive from real device testing in the cloud is the potential to base decisions on more than just pass/fail test results. When the organization has the data to understand the

quality of its mobile sites and apps in broader contexts like the overall marketplace, the competitive landscape and the areas of the product that need improvement, it can focus its development effort more strategically.

About Keynote

About Keynote

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