

## Is Your Mobile Application Ready For Business?

It is clear that mobile technologies will transform the enterprise. The simple math is that if information and communications are available at any place and any time, business users are more productive and can serve customers better. In a study performed by ABI Research, one company realized a productivity cost savings of 95% when its workers switched from an unconnected device solution to a connected mobile solution.

One of the key components of the mobile solution is the application. The application is the interface between the mobile worker and the device, network, and back-end systems. But one of the least discussed and understood aspects of the application is application testing. Application testing is critical for two reasons. First, user acceptance and worker productivity require a reliable application that does what is expected. Second, applications are not static products. They will change as worker needs change and workers switch or upgrade devices.

In this white paper, greater context is offered around mobile device application testing. Specifically, businesses will learn:

1. The trends that are driving mobility to the forefront of business investments as well as forcing businesses to invest in mobile applications;
2. The ecosystem and processes currently available to enterprises to mobilize with particular emphasis on the application development and testing process;
3. The options for mobile application testing and a review of the competitive environment for application testing services.

### The Race to Differentiate with Mobile Applications

Companies are racing to extend their operations using mobile technologies. But businesses cannot gain competitive advantage by simply having a connected mobile device. Competitive advantage will be achieved by customizing devices using mobile applications. The following trends are forcing businesses to make mobile application development a strategic activity within their mobilization efforts.

#### Smartphones and Media Tablets

By 2015, smartphone penetration among mobile business customers will reach nearly 70%. Media tablets, the larger screen cousin of the smartphones, are the newest mobile devices transforming business processes. Both device classes are relying on applications to maximize their value and overcome limitations of smaller screen size and/or limited processing power.

#### 4G

4G cellular networks will have an even greater impact than 3G on businesses. The reason: 4G offers connection speeds on par with Wi-Fi, and 4G local area networks can be built with picocells and femtocells. As mobile workers use 4G in both LAN and WAN environments, applications will play a critical role. Applications will allow businesses to smartly blend the benefits of local and wide area access with business requirements for data security, IT policy, and content management.

#### Cloud Services

Cloud services will benefit businesses investing in mobility.

Fundamentally cloud services will transform mobility due to the opportunity to extract from vast stores of data to enhance an application. An example is a healthcare augmented reality application which recalls medical equipment maintenance records by simply observing the equipment in the viewer of the smartphone camera. Presently, cloud services are used to help businesses develop mobile applications as well as test them.

## Enterprise Application Ecosystem

The ecosystem developing mobile enterprise applications is expanding. New application development platforms allow writing applications that can be deployed across many mobile platforms. Mobile operators are investing in professional services to enhance their application development resources with business systems mobile integration capabilities. Start-up mobile application solution providers are focused on the large embedded base of unmobilized Microsoft, Oracle and SAP applications. With Microsoft hosted application service offerings, Sharepoint applications can be mobilized without needing to own them.

## Mobile Broadband Plans

Operators now offer limited access plans available on a prepaid and postpaid basis. Because these plans will help businesses manage costs and usage, their impact will be greater adoption and use of smartphones and media tablets and the applications they support.

## Application Development and Testing

The application development process is very complex and involves making a number of choices. This is especially the case for smartphones due to the breadth of operating systems and manufacturers. At a very high level, application development involves four basic steps.

- Determine the mobile platforms for development
- Choose the application development environment
- Test applications
- Distribute applications

## Mobile Platform Choices and Application Development

Businesses have available to them several smartphone brands and platforms. Interestingly, the choice of mobile platform for application development is not always determined by the business. Smartphones may already be deployed for mobile email access. Employees may have bought smartphones for personal use and want to continue using them for business use.

Blackberry smartphones have a significant presence among mobile business customers across most world regions. However in just two years, together Apple and Android will command nearly as much share as Blackberry. With Windows Mobile and Symbian each having a respectable share of business users, businesses and IT managers are forced to deal with at least five major OS platforms. In addition several mobile device platforms including Android are distributed by more than one manufacturer increasing the complexity for application development and testing.

Choosing the application development environment is the next step in the application development process. Many businesses will simply choose to contract with an outside firm focused on mobile application development. As noted above, more and more companies are using devices from more than one platform so the developer will need to have capabilities to develop apps across several platforms. This may involve use of one or more application development environments.

## Application Testing

While application testing has always been an important step in the application development process, its importance is becoming even more critical for the following reasons.

- Mobile applications drive productivity – they must work.
- Device platforms vary – applications developed for one platform must work on other platforms. For example, application performance on HTC Android devices may not be the same as on Motorola Android devices.

- Applications will evolve – as worker’s needs and responsibilities change, applications will be both upgraded as well as downgraded in functionality.
- Cloud systems affect where data is stored. In addition, authorizations and connectivity APIs are not consistent across cloud service providers.
- Multiple wireless networks – businesses connect to different radio networks based on network capabilities, worker needs, and contractual relationships. But all of these conditions can change which will require modifying the application.
- Operator choice – devices commissioned for use on a network in France may be recommissioned for use on a network in Germany. Or a business may change mobile operators. Applications will need to be tested on different operator networks to ensure consistent connectivity when upgrading in-the-field devices.
- Worker demographics will change device type and application. For instance, a younger worker may prefer a touchscreen smartphone, but an older worker may prefer a QWERTY device.

Application testing involves two stages. In the first stage, the application is tested within the development environment using emulators. Emulators demonstrate how the application behaves in the simulated environment of the development platform.

The second stage is actual field testing. Field testing can involve live humans using the new application under actual conditions of operation. Field testing can also be automated using connected devices in a controlled environment.

## Application Distribution

The final step of the application development process is distribution of the application to devices in the field. In this step the business also has two options. One option is to download software from a PC or server holding the final approved app to the device through a tethered

connection. This step can be done by enterprise IT or outsourced to mobile device management firms. Application testing is absolutely critical in this case to avoid recalling devices if the application is not performing properly.

The other option is wirelessly transmitting applications to devices – called Over-The-Air (OTA) distribution. OTA application distribution is inevitable as more and more field force workers and mobile professional are equipped with smartphones. OTA distribution is the best option to maximize device uptime and worker productivity.

Interestingly, OTA distribution can sometimes be the crutch for investing less in application testing. However limiting or even skipping application testing assumes that the worker will accept using multiple iterations of a bad application. Not so! The worker will simply stop using the application or the device and the mobile investment is now next to worthless.

## Application Testing Options

The primary avenues for businesses for mobile device testing beyond the development environment are testing applications in-house, or outsourcing to established mobile application testing suppliers. In both cases, device applications can be tested either using human testers or in an automated environment.

Human testing can be as simple as a group of individuals with devices using them in real world conditions. Companies that develop applications in house will sometimes employ this method of testing. More often, human testing of applications is more rigorous and involves defined test cases using individuals paid to test devices. Mobile application test suppliers offering these services include Mob4Hire and uTest.

Automated testing is another option for validating mobile applications. Suppliers of these test services offer a more disciplined approach to device application testing because devices are tested under controlled conditions. The benefits of automated testing include:

- Rapid application test plan development.
- Reuse of test scripts across numerous platforms.
- Gain results quickly for application revisions and speed application time to market.

The advantage of automated testing over human testers is the speed and control offered by an automated environment. Human testing can take much longer to conduct and more time to decipher the results on a per device basis.

All automated test solutions involve a test platform. This platform allows users to define and create the test plan, track and review test results, and identify problem code. Not all test platforms are the same. The best platforms offer businesses flexibility along a number of dimensions including:

- Extensible test script libraries – Given the range of smartphone platforms on the market, businesses need test scripts that can be used across numerous brands and OS types;
- Test plans that can validate both text and image GUI device screen shots;
- Test plan development using visual and text script editors -- Not every company has personnel adept at the various application development environments. Visual script editors simplify use of mobile application testing environments. Text scripting is available for personnel with programming language skills;
- Integration with established test platforms – many companies already use PC application test tools such as HP's Quick Test Pro and IBM's Rational. Mobile application testing platforms that integrate with established tools offer convenience and speed application development;
- Web-based test results portals – these portals offer distributed teams access to results in real time to speed application development.

Automated test solutions can also differ in the methods used to interact with the device to test and validate the application. There are two different methods used for interacting with actual devices.

In one method, a small piece of software called a user agent is installed on the device to drive device functions such as keypad inputs from the remote test console. User agents are one of the fastest test solutions to implement because they can be written for any device platform. While agents are kept as lightweight as possible, they use device memory and processor resources which means that the application is not being tested under the same conditions as when it is actually deployed.

In a second method, application tests are carried out on devices that are hardware integrated – devices which are electrically connected to the test platform. These connections can be to the input functions of the device such as keyboards, touchscreens and microphones; and to the output functions of the screen and speakers. It can also include connections to live networks for all the radios in the device – Bluetooth, Wi-Fi, cellular – even networks of particular operators. Connections to accelerometers and GPS can also be part of the test environment.

For both device interaction techniques, screen shots or streaming video taken with a camera is an option for measuring an application's device output response. Rather than interacting with output functions of the device through the software of a user agent, or direct hardware integration, camera screen shots or video can speed up the testing process particularly on devices new to the market. However, device screen pixel resolution can be compromised using camera based methods particularly for digitally verifying RGB color scheme pixel values. Proper color coding is important for application presentation but also for reading and comprehending device screen data.

Businesses will choose the solution that best meets their needs including requirements for time to market, costs, device coverage, and testing precision. Table 1 provides a snapshot view of test platform differences for five companies offering mobile application testing products and services.

**Table 1. Mobile Application Test Platform Vendors**

	DeviceAnywhere	Perfecto Mobile	Jamo Solutions	BSQUARE
<b>Device Interaction</b>				
User Agent (inputs & outputs)	✓	✓	✓	✓
User Agent (inputs only / camera output)	✓	✓		
Hardware Integration (inputs & outputs)	✓			
Hardware Integration (inputs only / camera output)	✓			
<b>Application Type</b>				
Native Apps	✓	✓		✓
Smartphone Apps	✓	✓	✓	✓
Web Apps / Browser	✓	✓	✓	✓

- **Solution Quality** – Some industries have less if any room for error in mobile application behavior. Using the test solution that provides the best first time quality is absolutely essential.
- **Operator Relationships** – Mobile application testing vendors that have relationships with operators offer businesses two important advantages. First, testing on live networks offers test results based on real world conditions.

### What Solution Should Businesses Consider?

As highlighted above, the enterprise application testing market is thriving. While there are several options for testing mobile applications, the exact solution is really dependent on a company’s commitment to mobilizing their business. Before choosing a solution, businesses should ask themselves:

- Will the number of employees using mobile devices for business tasks continue to increase?
- Will the business expand worker mobilization to locations elsewhere in the world?
- Will the business continue to evolve application capabilities on existing and new mobile device platforms to improve operational competitiveness and business security?

If the answer to these questions is yes, businesses should assess the products and services of mobile application testing vendors in five areas:

- **Solution Breadth and Flexibility** – Businesses need options for scaling their application testing investment as their operational and competitive needs change.

Second, businesses can gain access to the newest operator devices for application evaluation.

- **Device Breadth** – Smartphones and media tablets come in a variety of configurations across both operating systems and manufacturers. Mobile application test platforms prepared to test the ever-changing array of mobile devices offer companies device choice as well as application development efficiency to speed deployment of devices into the field.
- **Test Platform Functions** – A multi-functional test platform serves companies whose application teams and partners can be dispersed around the world, and whose application test designers may or may not be experienced programmers.

As shown in Table 2, DeviceAnywhere is one company that is strongly positioned to address the short-term and long term needs of businesses committed to mobilizing their workforce. They have been in the mobile application testing business longer than any other supplier, and offer the broadest portfolio of services. Table 2 offers a deeper review of their mobile application testing services.

**Table 2. DeviceAnywhere Services and Solution Review**

Solution Options	
<input checked="" type="checkbox"/> On-Premise Test Center for Enterprise	Enterprises can build their own bank of hardware-integrated test smartphones located behind company firewalls
<input checked="" type="checkbox"/> Hosted Test Center for Enterprise	Enterprises have access to over 2000 hardware-integrated smartphones and media tablets hosted in data centers
<input checked="" type="checkbox"/> Direct to Device Express	An entry-level service using a camera-based hardware integrated solution
<input checked="" type="checkbox"/> Direct to Device Software	A user-agent based solution suitable for testing a few devices connected to the desktop
Solution Quality	
<input checked="" type="checkbox"/> Direct-to-Device™	The only mobile application testing vendor who offers Direct to Device hardware integrated test solutions for smartphones, media tablets and mobile handsets.
Device Breadth	
<input checked="" type="checkbox"/> Smartphones	Mobile operating system coverage includes Android, Apple, BlackBerry, Windows Mobile, webOS, Symbian
<input checked="" type="checkbox"/> Media Tablets	
Operator Relationships	
<input checked="" type="checkbox"/> North America	Test devices connected to over 30 operator networks worldwide
<input checked="" type="checkbox"/> Europe	
<input checked="" type="checkbox"/> Asia Pacific	
Test Platform Functions	
<input checked="" type="checkbox"/> Programmable using graphical tools, test script libraries and Java	
<input checked="" type="checkbox"/> Integrates with HP Quick Test Pro and IBM Rational	
<input checked="" type="checkbox"/> Results validation of image and text screen outputs	
<input checked="" type="checkbox"/> Web-based results portal	

## Summary

Smartphones will become the most used device in a business’s mobile device arsenal. Building on these device’s portability, and voice and data capabilities, applications allow customizing these devices to exactly the needs of the business to drive workforce efficiencies and serve customers. Application testing therefore IS an absolutely critical component of smartphone lifecycle management if businesses expect to meet the necessary ROI and ultimately leverage mobile technologies to outperform the competition.

Businesses have several options for mobile application testing from human testers to automated testing. Automated testing

offers the most replicable and efficient means for testing applications. But even with automated testing, the question is not so much if businesses are committed to application testing but when. The most forward looking companies are evaluating their automated testing options now.

In this white paper, the capabilities of DeviceAnywhere are highlighted. However it is not the only company offering smartphone application testing services. Regardless of the supplier of these services, businesses need to take a long term approach to mobile application lifecycle management. Applications make smartphones one of the most important tools for facilitating any mobile business strategy.

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