

The background of the entire page is a vibrant blue with a white dotted pattern. On the left side, there are three white icons: an Android robot, an Apple logo, and a Windows logo. Scattered across the page are white outlines of various mobile devices, including smartphones and tablets, some of which are partially cut off by the edges of the page. The main title is centered in two overlapping colored boxes: a red one on top and a green one on the bottom.

## BEST PRACTICES IN MOBILE

## QUALITY ASSURANCE & TESTING

How to prepare your app  
for survival in the app jungle

### CONTACT US

Kanda Software  
200 Wells Avenue,  
Newton MA 02459

✉ Email: [contact@kandasoft.com](mailto:contact@kandasoft.com)

☎ Phone: 617-640-3850 ext. 0

Mobile applications market represents a highly competitive landscape with a diverse set of mobile devices, carrier restrictions and constantly changing iOS, Android and Windows operating systems. Each year app users get more opportunities to directly influence the success of the applications, and their requirements and expectations are growing exponentially. The quality of a mobile application is a corner stone of its success in the marketplace. To get those desired five star ratings, a mobile application needs to rise above these challenges and deliver high performance under varying conditions. Mobile app users don't want to wait for the bug fixes, performance improvements and better usability. Instead, they delete the app and easily find a replacement one on the app stores. The tolerance of mobile app users is much lower than that in the desktop era.

The robust mobile quality assurance process helps developers and businesses successfully deliver and launch mobile solutions by overcoming major challenges that negatively impact development, release and distribution.

Following the best mobile testing practices will not only help ensure that your app works on a variety of devices and your users have an annoyance-free experience – It will help you reach many more users via positive referrals, ratings and reviews

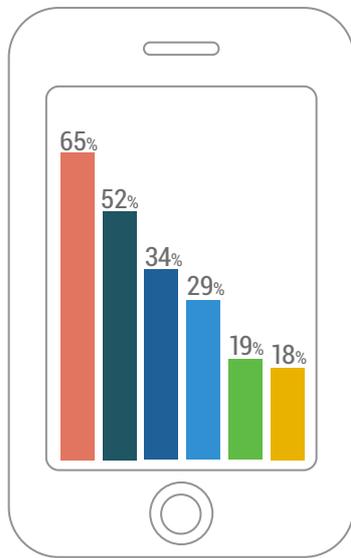
The best practices in mobile testing take into account all the restrictions imposed by hardware and software, app store requirements and numerous SDKs.

*“Application abandonment rate due to poor performance is more than 50% Only 39% of the apps are used more than 11 times.”*

*- Source: Localytics study 2014.*

## COMMON MOBILE TESTING CHALLENGES

1. Multitude of mobile devices
2. OS Fragmentation
3. Different mobile app types (Native, Hybrid, HTML5)
4. Numerous test interfaces
5. Variety of testing tools
6. Performance testing under natural conditions



- DO NOT HAVE THE RIGHT TOOLS TO TEST
- DO NOT HAVE THE DEVICES READILY AVAILABLE
- DO NOT HAVE THE RIGHT TESTING PROCESS/METHOD
- NO MOBILE TESTING EXPERTS AVAILABLE
- DO NOT HAVE IN-HOUSE TESTING ENVIRONMENT
- NOT ENOUGH TIME TO TEST

## MOBILE QA AND TESTING BEST PRACTICES

### #1 Separate Mobile Testing Strategy from the Desktop one

#### EMULATORS

- All applications can be deployed and tested on emulator without investing in Mobile Handset for various OS.
- Emulators are mostly available free, and we can also perform UI, Stress and performance testing on that.
- 30-40% test

#### CLOUD TESTING SOLUTION

- The Mobile devices can be accessed through web interface i.e. Browser.
- Application can be deployed, tested and managed.
- Automation module is available and solution is secure if private cloud is used with no maintenance.

#### PHYSICAL DEVICE

- Up to 100% test coverage can be achieved.
- Real device testing will give the most realistic view of test results.
- All possible types of testing activities can be performed including that are dependent on hardware.

While emulators and simulators are useful in testing on the early stages of development, the app needs to be tested sufficiently on actual devices too. Testing on real devices ensures test results are realistic and gives the tester a better idea regarding the look and the feel of an app and its general usability.

Only by having the exact device (manufacturer and model) can you be 100% sure that the application is compatible and runs smoothly. At Kanda, we have more than 300 mobile phones and tablets to ensure our clients' applications are working properly.

None of the alternative testing methods, even those that come with the official SDKs, are 100% reliable.

The best approach is to determine a list of devices that you anticipate the majority of the users will use. Correctly chosen device will help to reduce the cost of testing significantly and ensure the success of the application.

## HOW DO WE DO IT AT KANDA?

### 1. Define the requirements

- What is the purpose of the application and it's target audience?
- What are the market tendencies?
- Collect all available device statistics
- Analyze hardware and software characteristics
- Investigate implementation characteristics

### 2. Define the most popular devices in the region/world among the target audience

### 3. Compose the list of the devices for testing

There are times when the company can't afford to have all needed devices from the list for a variety of reasons. In this case, try a mixed strategy. Use an emulator on the early stages of app development. Keep adding real devices into the testing later down the development cycle. This way you can verify that all the requirements and goals are being covered.



*Avoid testing devices and OS' that are no longer supported by the manufacturers and vendors. This will significantly increase the cost of QA without the reward of the higher user satisfaction rates.*

## #2 Ensure high quality of the application by performing a comprehensive suite of tests

### User Experience Testing

- Functional testing and user journeys execution
- UI consistency, visual issues and UI behavior
- Responsive design behavior for different screen sizes and resolutions
- User interaction visualization and custom device feedback
- User experience of application-specific functionality



*Start with the simple interface testing, validate all elements of the application on each screen and overall navigation flow consistency. Move on to usability testing : research navigation logic, information collection process, text sizes, etc.*

## Performance and connectivity

Performance testing is one of the most important steps in mobile quality assurance process. Users abandon the application if it loads slowly or unable to perform required actions. While conducting Performance testing it is essential to check the following:

- Application memory & processor usage
- Network bandwidth usage
- Application behavior on insufficient resources
- Application behavior in multi-tasking environment
- Application behavior with different connection types, e.g., Wi-Fi, 3G, EDGE
- Application behavior on transitions such as switches between Wi-Fi and 3G/EDGE
- Weak signal conditions
- Temporary Web service unavailability
- Offline mode and synchronization



*Start with trying out various connection types (WIFI, 3G, 4G, etc.). Are the app response times aligned with the industry averages?*

*Get rid of the redundant code. It can lead to higher battery consumption and more CPU cycles. Check for memory leaks. For the apps that use GPS or camera make sure that these resources are freed after the application is closed.*

## Security Perspective

- Data transfer and synchronization testing
- Mobile messaging testing
- Remote storage
- Web services used



*Encode all sensitive data. Use Encryption and Authentication. How does the app interact with the third party services or software?  
Detect potential areas that can receive malicious information.*

## Interoperability and integration with other software or services

- Data transactions / bandwidth usage optimization
- Content retrieval on mobile devices optimization
- Seamless embedding Web service features into a mobile device

## OS, Device and Hardware Compatibility

- OS testing
- Application compatibility with onboard hardware
- Device compatibility check
- Operation under defined conditions
- New capabilities verification
- Hardware/software synchronization



*Validate your application on devices with OS versions you have defines as the most used among the users. If the application is integrated with third-party services, in what way can it affect them? How will your app behave in scenario when integration server changes?*

## #3 Test Native and Web-based Mobile Applications differently

There are several distinctive things to consider when testing native versus web-based mobile applications:

### Native Mobile App Considerations:

- Testing cycle should start from the installation and launch process
- The access to the device ID might be needed
- If the app uses third-party APIs, make sure to include API connection testing

### Web-based Mobile App Considerations:

- Connection testing is important since the application requires Internet connection (WIFI, 2/3/4G, GPRS, etc.)

- Various web browsers can show application pages differently
- Performance and load testing should be performed and the results need to satisfy the requirements

More frequently individual developers and companies are using cross-platform SDKs to develop mobile applications that work on several OS' and devices. The most popular tools for cross platform development are PhoneGap, Appcelerator, Adobe AIR, Sencha and Qt. When you develop a cross-platform native mobile application, make sure that it is tested on all supported OS'.

## #4 Automation Performance Testing and Rerun it on every change, no matter how small

Mobile app test automation can significantly improve development process and, although associated with increased initial effort, will quickly pay off. Automated tests can run frequently and are well suited when testing in an agile environment that requires the ability to quickly adjust to changing mobile development goals and processes. New test cases are generated continuously and can be added to existing automation processes without interfering with the development process.

When making a decision which tests should be automated, their value and the required effort need to be compared. High-value/Low-effort tests should be automated first.

### **In general, the most appropriate tests for automation are:**

- Repetitive tests that run for multiple builds
- Tests that tend to cause human error
- Tests that require multiple data sets
- Frequently used functionality and compatibility tests
- Tests that require significant effort and time when manual testing.

### **Performance Testing Automation requires:**

- Clearly defined objectives
- In-depth knowledge of the application infrastructure
- Valid application usage models
- Cross-team collaboration

# CHOOSE AUTOMATION TOOLS WISELY!

Identifying the best automation tool is critical to the success of the testing project. There's a great variety on of automation tools on the market, but the selection process should depend on several factors:

- The application functionality and technology stack
- Testing requirements
- Skill level of the testing team
- License costs

## Popular Mobile Test Automation tools

<i>Tool</i>	<i>Paid/Open Source</i>	<i>Native Apps</i>	<i>Web</i>	<i>Hybrid Apps</i>	<i>Android</i>	<i>IOS</i>	<i>Windows</i>	<i>Blackberry</i>	<i>Library/ Tool</i>
Robotium	Open Source	Y	-	Y	Y	-	-	-	Library
Sikuli	Open Source	Image Based	Image Based	Image Based	Y	Y	Y	Y	Both
Selenium WebDriver	Open Source	-	Y	-	Y	Y (but obsolete)	-	-	Library
NativeDriver	Open Source	Y	-	-	Y	Y	-	-	Library
Appium	Open Source	Y	-	Y	Y	Y	-	-	Tool
MonkeyTalk	Open Source	Y	Y	Y	Y	Y	-	-	Tool
SeeTest	Paid	Y	Y	Y	Y	Y	Y	Y	Tool
M-eux (JamoSolutions)	Paid	Y	-	Y	Y	Y	Y	Y	Tool
EggPlant	Paid	Image Based	Image Based	Image Based	Y	Y	Y	Y	Tool
mAutomate	Paid	Y	Y	Y	Y	Y	-	-	Web Based
Ranorex	Paid	Y	Y	Y	Y	Y	-	-	Tool

# ABOUT KANDA

Kanda has been developing mobile applications and responsive UIs for a variety of clients for nearly 5 years. We are constantly pushing the boundaries of what's possible on mobile. We make sure that your idea is transformed into a beautifully designed, user friendly and engaging mobile solution of a superior quality.

In 2014 Kanda was ranked by Inc. Magazine in the Top 500 List of the annual Inc. 500|5000 - an exclusive ranking of the nation's fastest-growing private companies in America. Kanda was named 13th among Massachusetts-based companies and 459th out of 5000 fastest growing US companies for its sustained and rapid three-year growth.



Kanda provides a full spectrum of mobile app development, QA and testing solutions.

## Some mobile testing services include:

- Functional testing
- Risk-Based testing
- Acceptance, Usability and Accessibility testing
- Performance (Stress and Load) testing
- Regression
- Installation and Configuration
- Security
- API testing
- Smoke tests
- Memory leakage, interrupt, carrier and protocol validation testing
- Functionality testing
- Geo-Fence testing
- And more...

## CONTACT US

**Kanda Software**

**200 Wells Avenue, Newton MA 02459**

✉ Email: [contact@kandasoft.com](mailto:contact@kandasoft.com)

☎ Phone: 617-640-3850 ext. 0