INDIUM

Hands On Mobile - Moving towards sustainable mobility

Prepared by   : Sasikanth Prabhakaran
                   Balaji Arumugam

TABLE OF CONTENT

Contents

1 Abstract

The desktop software industry has turned into an exclusive playground where only few players are competing and the malware and crapware are ruling it. Apps that are sold through stores and sandboxed in operation are becoming safe for buyers and easier for developers. With this current trend, more mobile devices are introduced, which makes the users have a plenty of option. PC's are moreover now only for the professionals who works on it just for the need of keyboard & mouse. Others, who rest on their couch, walk on the streets, travelling in a car needs just a device to do their routines and this is why mobile devices are in the verge of ruling the future.

With Mobile being the high tide in the industry, the scope of mobile software testing is considered to be the most wanted. Also, importantly associated with it is the compatible check to provide the same level of usability across the platforms. Plenty of devices to play with and the challenge for testing is to compete with the quality quest of the user expectation. This paper is the step to achieve this with the blend of usability, compatibility and exploratory approaches focused to satisfy the end user with maximum quality. This approach focuses on the better processing of testing across mobile platforms with the implementation of strategies like exploratory & crowd testing.

Key Take away:
• Strategy for maximum test coverage

• Implementation of crowd sourced testing

• Efficiency in Resource utilization

• Reduced IT overheads

2 Need for Mobile testing

The testing methods that have worked for web and desktop app do not meet the testing needs of mobile apps. In the mobile app world, the testing matrices are far too complex and hence companies must test their apps across various environment, location, wireless carriers, handset makers and models. There is always much demand in the requirement coverage when testing on mobiles than on desktop. The test labs for testing units that are operated do not approve a complete test process.

Note: According to the 2013-2014 World Quality Report, the percentage of organizations using mobile testing increased from 31 percent in 2012 to 55 percent in 2013, and it's expected to continue to climb this year. Healthcare and Life Sciences domain is setting the pace.

Increase in SoLoMo

- SoLoMo (Social Media, Localization, Mobility) - integrated virtually into everything
- Ensuring apps to be reliable, scalable, private and secure across a multiple platforms

Required services:
- Functional Testing
- Compatibility Testing
- Usability Testing
- Performance Testing
- Security Testing

3 General Challenges

Mobile is a fast-paced industry that's changes constantly giving up some unique problems. Testing for the mobile market is trending with the scope for QA is generally considered challenging. The key challenge that differentiate mobile testing are mainly,

Usability   Networks

            Fragmentaion   Tools
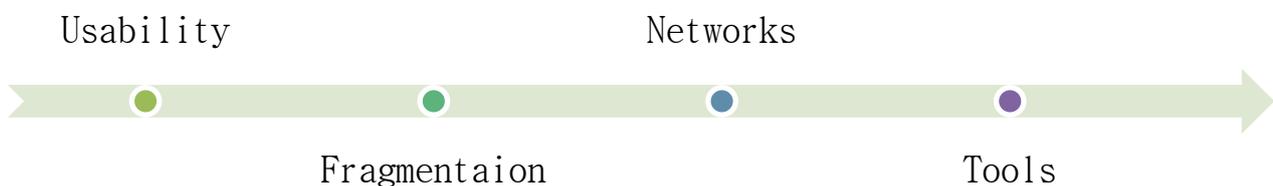
Usability: User interface plays a major role in mobiles and with the touchscreen interaction, it gets tougher for the tester to look beyond the functional aspects of the app and consider usability.

Fragmentation: With different environments and option available for mobile, the expectation of mobile behaviour should be compatible

Networks: The carrier network will have a high impact with the user experience and therefore the scope of testing should be included with the scenarios for testing on network related issues

Tools: Automating the process, testing with tools is always enforced with the mobile testing process in order to reduce the timeline and resources. Hence suitable mobile testing tool should be on consideration

With these main challenges, few other factors are

1. More pressure for mobile apps to be built and tested due to the rapid evolution and shifting of users into mobile stream
2. Test methodology used for web and desktop apps will not work in mobile apps
3. Test area breakdown - Functional, performance, security and usability

These challenge areas cannot be handled with a single process adaptation, but with few available testing methodology and process integration, the challenges can be sorted out in order to ensure the complete test coverage.

4 Efficient Handling

There are multiple processes involved for mobile based testing. These are focussed and adapted according to the needs of the project. On the whole these ideas are evolved as the individual process. Some of them are described below and the objective of the whitepaper is to efficiently integrate and bring a condensed process which serves best when opting for mobile based test strategy.

Below are few processes which are in the market to perform the mobile based testing. In addition to this, some additional inputs are added which are the key factors that are behind the making of the enhanced strategy.

Emulators:
In the initial level of testing, emulators can be highly effective as they allow quick and efficient testing in the agile environment. They are cost effective and provide good options like using scripts, bypassing network problems. Testing can be performed here to find the working of the basic functionality and on the go testing.

As emulator does not provide exact results as in the physical devices, few factors in the process of testing become uncovered. With increased risk and differences in software, hardware, resource and networking environment, the reliability and interoperability that obtained in the real device testing is missed.

Physical Devices:
The physical devices are the real entities and basically cuts down the risk of false positive/negatives in the tests. These devices are performed with live networks as certain application depends on mobile network for its operation. The device testing is a way to truly understand the user experience considering the CPU, memory, screen size, etc., of the device.

Reliability is high when considering the physical device as the results would be accurate with no false or negative predictions. In the Performance testing aspect, it will be easier to expose performance defects with real device which will differentiate the problem with the environment and device.

Usage of mobile cloud platform:
Testing on cloud offers the testers to explore across different environments with the flexibility of switching between devices and operations. The process of deploying, automating and testing becomes easier when moving to cloud based mobile testing.

There are certainly few problems faced in cloud but the advantages are higher considerably.

Some of the challenges are:

- High cost in subscription
- Connectivity issues over the internet

Advantages:

- Highly regulated and pre-configured architectures

- Control over the test environment and working with real devices connected to the network.
- Test mobile apps under different network settings and geo-locations
- Performance monitoring support
- Object-level UI testing
- No maintenance is required
- Web based interface
- Parallel tests on devices

Automation is everything:

Due to the variety and transition across devices and operating systems, pressures of shorter development cycle and quality testing need, the test automation is necessary to reduce the effort and accelerate time towards the reach for the market. With right architecture and tools for automation, the testing would be highly efficient.

Below are few benefits of the mobile test automation:

- Speed and consistency of automated test scripts
- Scripts for automating app installation & GUI interaction
- Key tool for development teams
- Support on continuous delivery and continuous integration
- Re-use across multiple devices

Internal Crowd source testing:

Crowd testing is the upcoming trend where certain additional information is obtained that was uncovered with the regular test approach. Analysis like the app behaviour while it runs with other installed apps, remote logging and crashes under different environments are few examples that can be identified while following crowd testing.

Exploratory strategy:

Exploratory testing is to not only to validate randomly, but also involves strategies based on the experience of the product usage, efficiency of the tester, analysis of previous results and thorough knowledge on the concept of test techniques. This process depends on the situation and style of testing required and can easily be mixed up with other testing techniques like ad-hoc testing, Monkey testing, etc..

5 Improved process:

With the above said processes, how can we ensure that it is fused and optimized for complete test process? The challenge in unifying the process is about making it suitable for all the generalized mobile testing process and the adaptation of it. The sequence of this structure is highly important and plays a major role in the ensuring the test coverage. Below is the proposed series of process flow which helps to organise the testing scope.

This proposed system is explained with a case study which focuses on enhancing the customer experience. This study detailed the modifications carried out to the existing mobile testing strategy and also brings out the importance of using varied test strategy in mobile testing.

5.1 Case Study:

- Requirement   – Story board discussion
- Scope   – Mobile Testing
- Application   – Life Science domain
- Testing Scope   – Functional/Compatibility
- Strategy   – Basic / Advanced / Enhanced mobile testing strategy
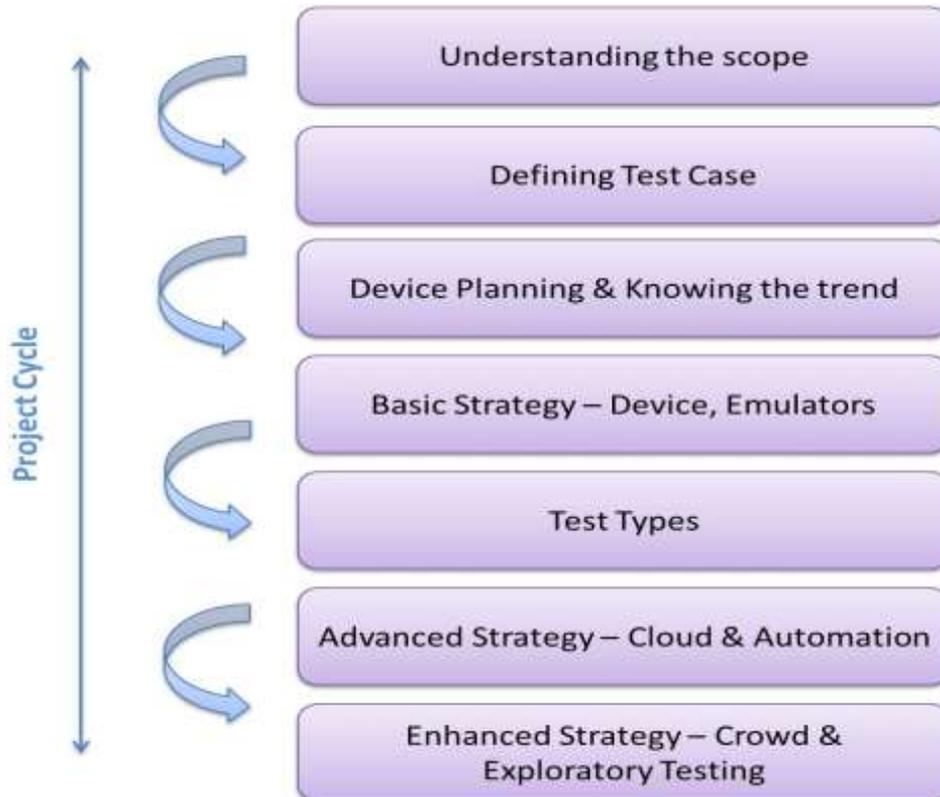
Flow Diagram:

Fig: Process Workflow

5.1.1 Understanding the Scope:

The first process in any testing process would be, knowing the scope and understand it. In mobile testing it is still further complicated as the diversity of the technology and the reach of the product outcome is more. The scope is not just limited to testing the product but also understanding the end user and the customer we work for. Each requirement should be analysed in the systematic approach considering the end user management. As mobile is trending, the level of process completion should be high as any loss in the time management will lead to business loss.

Key:

- End user & Customer
- Systematic Approach
- Process completion level

- Time management

5.1.2 Test Case Definition:

The definition and setting the test cases are challenging in the mobile testing because of the variety of areas to be tested. Defining the test case should be suitable for all the level of test strategy and thus will help in simplifying the process. The definition should satisfy the specification, functional and system flow, procedural understanding, test automation, proposal targeting the crowd and exploratory testing. Hence care should be more on planning to create a custom made test case that fits in all level of testing.

Key:

- Fitting all level of testing
- Variety of areas
- Satisfying

5.1.3 Device Planning & understanding the Trend:

Another most important factor to be considered while going for mobile testing is to know the trend of the market. This makes the planning more clearly and eliminating unnecessary process. In device planning, the research for identifying the device required for testing should be carried out extensively. Considering the market trend, users, application scope, and the duration of testing the devices should be chosen. Knowing the trend is not easy unless the scope is matched with the device usage. Hence this stage is of high importance when testing on mobiles

Key:

- Analysing trend in the market
- Eliminate redundant work
- Users, application scope basics

5.1.4 Basic Strategy - Device, Emulators:

The initial level of mobile testing has two levels i.e. Devices & Emulators. This is the basic strategy carried out for this test process. Each has its own limitations and benefits. Certain functionalities like usability can be tested with real devices as it provides accurate results. Emulators can be used for checking the basic functionalities which seems to be repeatable and hence this can save lot of time and provide flexibility in the testing.

Test Type - Usability, Performance, Security & Compatibility:

The mobile testing process should cover variety of test type to ensure the test coverage is more. Different test type makes sure that the usage is efficient and reliable. Since there users cannot be restricted to use the system in a specified environment, this test types helps to ensure that no problems arise in the usage. Different tools and techniques are available to ensure this process. Considerable amount of time should be spent on making this work.

Key:

- Repeatable & basic functionalities
- Flexibility & time saving

5.1.5 Advanced Strategy - Cloud & Automation:

The next level of test strategy is to use the cloud for testing. Using the cloud could be one of the efficient ways, as plenty of options are available for the testing team to test the application. It provides the varied range of devices and environment which on tested can bring quality to the process. It also saves time in system configuration and cost spent on acquiring real devices. Automating the redundant test process can be highly efficient as it saves time and human resource.

5.1.6 Enhanced Strategy - Crowd & Exploratory:

The most efficient practise and the final stage of mobile testing is performing tests with the help of crowd testing and exploratory testing. These can be more effective as it will provide extensive range of test results.
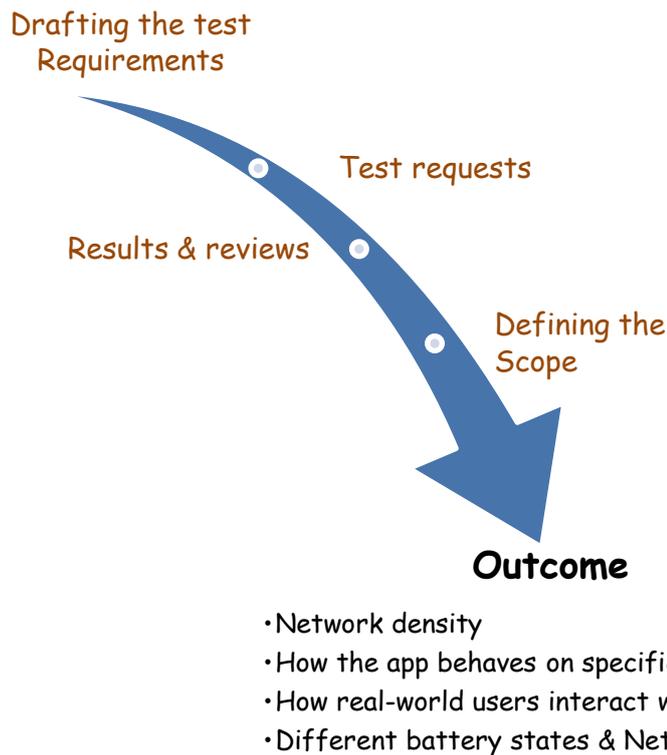
Derived exploratory strategy:

Exploratory is a process that makes the testers to explore all the areas of testing scope. There should be a dedicated time allocated for these processes to effectively use the resources. Often this process is confused with the adhoc test process which randomly tests the application without a strategy. Here in the enhanced process, the general exploratory test strategy is analysed and to benefit more out of it, a derived exploratory approach is proposed in the system

- Team Setup
  - Convert any resource to handle the process
- Planning
  - Domain & User
  - Data Analysis
  - RCS & Environment
  - Scripts from suite
- Execution
  - Standardized Charter
  - Soap Opera Testing
  - Negative Testing
- Reporting
  - Parallel Documentation
  - Procedure supervised
- Maintenance
  - Trackers
  - Fine Tuning scripted tests

Internal Crowd Test strategy:

Crowd testing can be carried out internally within the organisation or externally which depends upon the confidentiality of the process. The advantage of crowd is that the resources are of varied environment which in fact will provide different results.

Drafting the test
Requirements

Test requests

Results & reviews

Defining the
Scope

Outcome

• Network density
• How the app behaves on specific devices
• How real-world users interact with the app
• Different battery states & Networks

Managing Crowd:

In implementing crowd strategy, the crowd is pulled to test by inviting them through a medium that specifies the scope of mobile test that is required. Every organisation has quite a source of passionate testers who is involved in crowd based test activities. Different tool set can be implied to manage this crowd strategy. This case study uses an open source management tool to receive the test results from the crowd. All the defects, clarifications, suggestions are recoded using this tool. A high level check list based scenarios on the requirement are shared through Google Spread sheet which is meant for the crowd to know the scenarios and record the status of the test.

The idea behind the crowd strategy is:

- Representative scenarios from the real user base
- Diversity among the pool of testers
- Varied test bed for mobile testing

Key:

- Defining the expectation
- Being transparent
- Focusing on quality
- Values & Rewards

Iteration result:

Testers	Module1	Module2	Module3	Out of scope	Suggestions	High Severity Issues	Med Severity Issues	Low Severity Issues
Internal (Dedicated Resource)								
Tester1	5	1	8			1	11	2
Tester2	4		6			2	4	4
Tester3	4	2	8			2	5	7
Tester4	4	3	4			1	4	6
Tester5	7	1	3			1	1	9
Tester6	8	1	4			1	6	6
Internal Crowd Testers								
Tester1	2		3	2			5	
Tester2	2	1	2	12	4	1		4
Tester3	1	1	1	9		2		1
Tester4	4		1	6	3		4	3
Tester5	3		4	4	1	3	2	3

Note: Results based on 3 iterations after removal of duplicate defects

Report:

- No of defects by internal resource – 79
- No of defects by crowd resource - 26
- No of out of scope issues (Crowd) - 19
- No of Suggestions (Crowd) – 8

Suggestion areas:

- Compatibility issues specific to combinations
- UI enhancement for better visibility
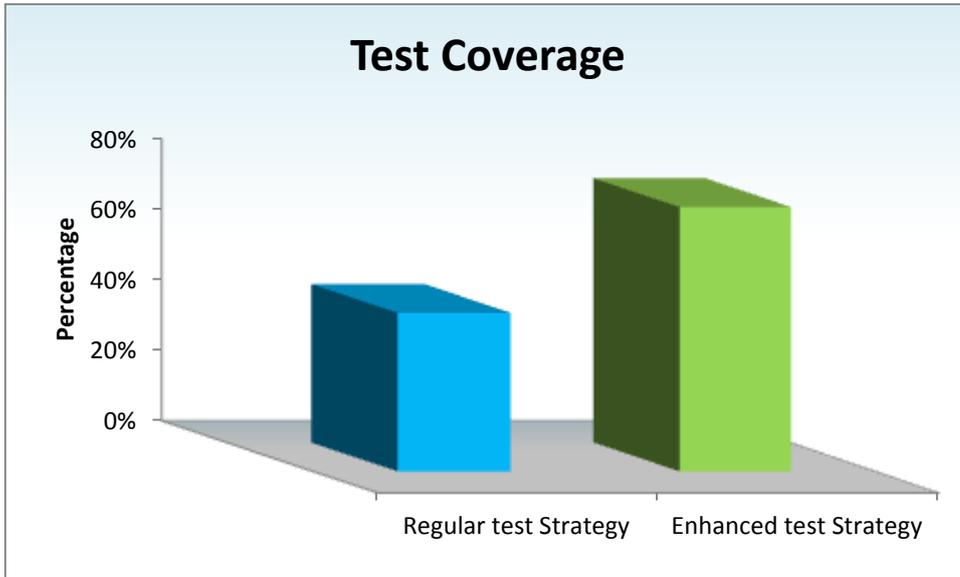- User difficulties in understanding
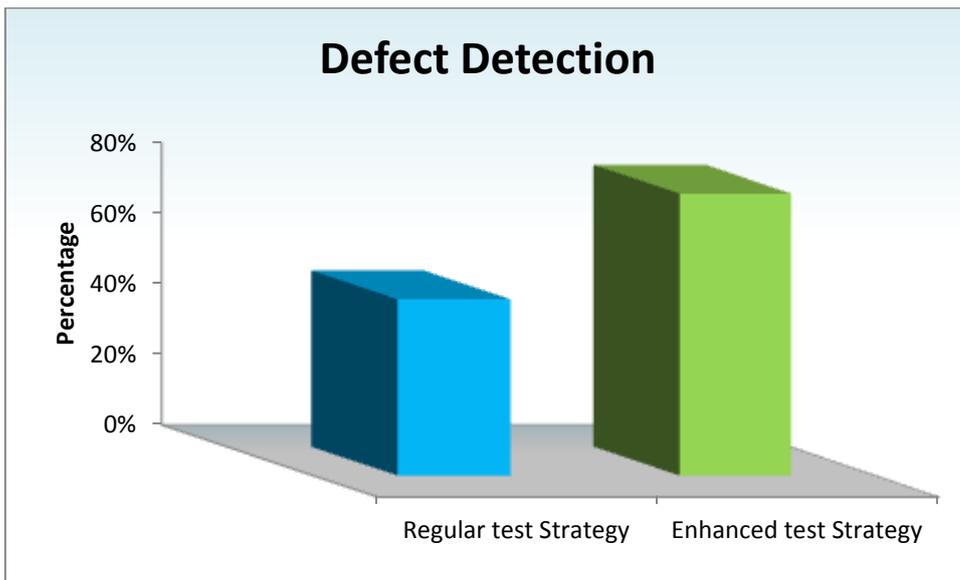
Metrics:

Fig: Test Coverage comparison

Fig: Defect Detection comparison

6 Eye on the course:

Security Focus:

- Sensitive information usage
- Spotlight on consumer IT security
- Need for comprehensive security and penetration testing
- Test new smartphones & tablets as soon as they reach the market

Note: A survey for the World Quality Report identified efficiency and performance as the primary focus for mobile testing, at 59 percent, but security was a close second with 56 percent—up 18 percent from last year.

Choosing the Devices:
- Know your customer - different characteristics and devices - web analytics tool
- Research and look for trends - spot trends in data
- Develop a test priority list
- Customer information – Demographics, special needs, and considerations
- Mobile trends – Tool usage to know statistics and trends - reflecting the needs
- Trends on the site – Web analytics tools to see what your customers use

Drawbacks in adaptation:
When adapting to a new process there are always few challenges which hold back the team. These challenges when understood properly and practised with efficient modulation can be highly beneficial.

Some of the drawbacks in adapting the process are:

- Time consuming
- Complete knowledge on the process
- Sequence of process following
- Cost involved in implementation
- Tester's mind-set and flexibility

7 Expectation Meter:

Resource Management:
The resource management is a highly expected factor in the mobile testing process. In the current, any resource employed for testing should be readily available for working on mobile as well as desktop. This on the go will be a mandatory expectation from the industry. As the mobile will override the desktop, there are high expectations on the resource to handle both the streams. The adaptability and flexibility will have a big impact in completing the process effectively.

Social Networking Adaptability:
Mobile & Social networking are interlinked and therefore it is necessary for the mobile app developers and testers to keep an eye on it while the process is carried out. All the mobile related processes are mostly linked with the social networking nowadays and this has an impact with each another. Social network has become the key factor in influencing the scope of mobile testing.

8 Bottom Line:

This paper is formatted with considering the difficulties that prevailed in the mobile testing. Also by tweaking the process and with the addition of few other process, the entire test cycle is improved which resulting in maximum test coverage. The inclusion of crowd testing and

exploratory test strategy which when practised along with the generalized test technique will enhance the test process and therefore providing a varied test results. This methodology can also offer recommendations and a proposal for the fix.

The resource utilization is another important factor that can be improvised to a greater extent on following the streamlined process. Reducing the IT overheads and configuration management are added benefits from this service.

Benefits to look for:

- ❖ Add-on to basic test strategy
- ❖ Innovative ideas & solution for development team
- ❖ Crowd enabled - Automatic Compatibility testing
- ❖ Specialized test scenarios

Impact:

- ❖ Repeat customers
- ❖ More defect detection
- ❖ High test coverage

9 Author Biography

Sasikanth Prabhakaran, Senior Test Engineer began his testing career with Indium Software more than 4 years ago. He has completed his MBA from the University of Madras and is also an engineering graduate from DMI engineering college. He is presently pursuing his M.Tech. Given the challenge of testing mobiles to achieve maximum coverage in short time frames, encouraged him to write this paper. Playing cricket and enjoying music are his hobbies. He is a marathon runner and has more interest in fitness.

Balaji Arumugam comes with more than 3 years of experience in manual testing with Indium Software. He holds an engineering degree from Arunai engineering college. His experience in analyzing and planning mobile testing strategies is the drive behind this paper. He spends his hours of leisure watching movies and he loves to travel.