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The Impact of an Agile Scrum on Software Testing: A Case Study of Tech Mahindra Limited

by

Dipak S Pagrut (ME, MBA)
TG2, Tech Mahindra Limited, Mumbai (India)

dipakp@techmahindra.com
dpagrut@yahoo.co.in

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Abstract

To define a success criterion for projects and managing changing live requirements is the biggest problem in telecommunication industry. In such a situation, the telecom industry is struggling to maintain profitability keeping into focus the changing consumer interests. This case study based on successful implementation of Agile using Scrum methodology in a large-scale live telecom project in Tech Mahindra Limited. This paper presents an impact of Agile development on software testing under changing requirements, time boxed deliveries, and high quality demands. A comparative study with the waterfall approach will illustrate how Agile methods achieve software quality goal despite of changing requirement.

1. Introduction

Tech Mahindra (formerly known as MBT) was established in 1986.The company is a leading provider of solutions and services to the telecommunications industry. Majority owned by Mahindra & Mahindra, in partnership with British Telecommunications plc (BT).

Tech Mahindra has quality as its focus and solutions that add value to client businesses through well-established methodologies, tools and techniques backed by its stringent quality processes. Tech Mahindra is ISO 9001:2000 certified and assessed at SEI-CMMi -Level 5. Tech Mahindra is also BS7799 certified across all development centers. Now in telecom companies, changing requirements of live environments underlie the big question to meet client expectation at right time. This article presents the case study of one of the telecom project.

2. Exiting Problems in Project

As of 2006, the waterfall model was still common used in this project; hence, it was very difficult to manage changes in requirement of live telecom environment.

For example, clients may not be aware of exactly what requirements they want before they see a working prototype and can comment upon it; they may change their requirements constantly, and program designers and implementers may have little control over this. If clients change their requirements after a design is finished, that design must be modified to accommodate the new requirements, invalidating quite a good deal of effort if overly large amounts of time have been invested into "Big Design Up Front".

Also in this project, it was difficult to manage following issue

- Difficult testing under tight schedule.
- Lack of communication with development, CM and testing teams.
- Every time need to review testing documentation
- Difficult to test by using iterations
- Difficult to meet customer satisfaction
- Not confirm to say delivery commitment date
- Difficult to manage continue changing requirement
- Difficult to track daily progress of development activity

- Difficult to manage scheduled tracking and team progress
- Difficult to report daily progress to test manager due to changing requirement
- As a size of team grow as per changing requirement, face-to-face communication becomes more difficult.
- Difficult to estimate development effort

3. Need of Agile Implementation

The main problem of the waterfall model is the inflexible nature of the division of a project into separate stages, so that commitment made early on, and it is difficult to react to changes in requirements. Iterations are expensive. This means the waterfall model is likely to be unsuitable if requirements are not well understood or are likely to change radically in the course of the project Agile methods, in contrast, produce completely developed and tested features (but a very small subset of the whole) every few weeks or months. The emphasis is on obtaining the smallest workable piece of functionality to deliver business value early, and continually improving it/adding further functionality throughout the life of the project.

The suitability of Agile methods in general can be examined from multiple perspectives. From this Project perspective, Agile methods are more suitable when requirements are emergent and rapidly changing.

Agile methods help to share iterative development's emphasis on building releasable software in short periods. Agile methods differ from iterative methods in that their period is measure in weeks rather than months and work is perform in a highly collaborative manner.

4. Agile Implementation Steps

In order to overcome above problem observed in development and testing, Tech Mahindra has moving toward scrum Agile implementation

Scrum is a software management process that uses an iterative lifecycle and that focuses on communication, particularly feedback loops. Each iteration called Sprint that lasts about four weeks. A Sprint is a block of time in which development of software is completed. Ideally, a complete vertical slice of the application delivered at the end of each Sprint. When each "slice" put together, you have the complete product.

Steps used in Scrum method are as below:-

- Requirements are documented in a product backlog, which is a prioritised list of requirements.
- Requirements in a product backlog are broken down into multiple sprints or iterations. The sprint backlog hence contains a list of requirements that can be delivered in that sprint

- A Sprint is ideally recommended to be of 30 calendars day duration. However this duration can vary from project to project and can range from 1 week onwards
- The sprint backlog is developed in the sprint and progress is tracked through daily scrum meetings
- At the end of the sprint, a deliverable called as product increment will ship out to the customer.
- Sprint Retrospective: At the end of project review the event and learn form the experience.

5. Scrum Impact on Software Testing

The Scrum methodology can pose a challenge for software testers who are used to more traditional waterfall-development processes.

However, after implementation of Scrum methodology telecom project, testing team has found positive advantages that described below in details:-

A. Early Involvement

Because of early involvement of tester in development strategy and requirement planning, Tech Mahindra has observed following impact on testing

Impact on Testing: -

- Tester should get ready with testing data and be proactive in getting information on what needs to be tested.
- Help to cover all testing scenarios while writing test cases
- Tester input help for testing estimation.
- Tester can set his own strategy for execution.

B. Daily Scrum/Stand up Meeting

The daily meeting is an important element of SCRUM as it allows the team to get together, discuss issues, and cross-pollinate ideas.

One of the key governance practices in Agile is the use of 'Daily Stand Up' meeting where everybody on the team reports on three questions - 'what they were working on yesterday', 'what they are going to work on today' and 'any obstacles to getting work completed'. For large projects, each team has a 'Daily Stand Up' with representatives from each team rolling up their progress reports to a project/program level 'Daily Stand Up'.

Impact on Testing: -

- Daily Scrum meetings serve the development and testing to fix the daily issues.

- Help to check out development progress report so that tester can manage testing schedule accordingly
- Help to clear testing doubt /design issues, so that tester can cover all test cases.
- The tester is aware of the actions taken on blocking issues (environment, backend system) occurred during the testing process and resolution for the same along with their progress.
- Help tester to identify dependencies that may or may not affect the individual testers work package.

C. Daily Build /Release

Before Agile, implementation daily builds of software coding, integration and linking and compiling the entire code is one of the challenging and time consuming task. Because of changing requirement every time, need to change coding. Therefore, in this context it is difficult to compiling and linking all the files that make up a computer program. Sometimes developers develop and develop and develop and 6 months later, they finally try to put everything together.

This task was difficult to manage in telecom project for all changing requirement, but in some releases, it was possible to fix daily build.

(For example, if developer wants to check the qualities of code before sending complete iteration)

Impact on Testing: -

- Daily software builds used to raise the visibility of development work and ensure that code modules integrate.
- Daily build really a great help to testing team to test build wise requirement and help to prepared testing documentation at right time.
- Form development prospective it is also help to fix daily defect found in testing.

D. Iteration Wise Testing

In telecom Project currently using Agile methodologies and have scheduled 2 week iterations; sometime we have tested in 1 week also. The selections of iteration week

were normally depended on size of build and requirement complexity. Whenever required we tested and delivered solution by using daily build also.

Tech Mahindra has observed quickly turns into development and testing. Testing quickly turns is as below:-

Impact on Testing: -

- Help to prepare testing strategy well in advance

- Help to manage/assign tester for particular iteration
- Help to track testing individual performance
- Help to tester to understand functionality, dependency while writing test cases
- Help to track tester performance/weakness as per iteration wise

E. Time-boxing Requirements

Agile projects time-box as a matter of course, because they have fixed the people and iteration size, and then decide which features/stories to attack in a particular iteration. Since each iteration is of fixed duration, you only start what you can complete in that iteration; given the number of people, you have available to perform the work. Time-boxing is a technique to force the project team to make structured choices about what fits into the product and what doesn't. The team works on one thing at a time, finishing that piece before going on to the next. If you cannot figure out how to complete all the work in the available time, and you cannot use an Agile lifecycle, use time-boxing to force smaller pieces into fixed periods.

Impact on Testing: -

- Help to plan out testing strategy for particular release with respect to time
- Help tester to complete task within planned schedule.
- Helps test manager to check tester work performance.

F. Requirement Management

It is reasonable to define what you are going to build before you build it; to identify the requirements for something before you code it. What is not reasonable is defining all of the requirements in a comprehensive document before you begin implementation. Then it is much better to rank you requirements as per priority and just categorize them (high, medium, low). Also, check whether changing requirement is dependent on any other requirement; it would help us to estimate development and testing effort.

Team distributed across onshore/offshore the same practice will be through tele-conference and video conference. It is especially critical here to manage hand-offs across time zones and ensure effective communication and management of defects.

Impact on Testing: -

- While identifying requirement tester should know about complexity and dependency of that requirement.
- Easy for tester to cover test case for those requirement which are mandatory for client
- Help to set bug fix priority as per importance of requirement considering client impact
- Based on requirement category, Test Lead can easily estimate testing timeframe.

G. Retrospective Meeting

The sprint retrospective meeting is held at the end of every sprint after the sprint review meeting. The team and Scrum-Master meet to discuss what went well and what to improve in the next sprint. The product owner does not attend this meeting

Impact on Testing: -

- Help tester to plan for new iteration as per development feedback and vise versa
- Help for testing planning for next iteration releases
- Help to improve testing activity as per feedback of development and CM team

6. Comparative Observation–Testing Prospective

By using Agile in telecom project Tech Mahindra has observed drastic changes in development and testing.

Before Agile, implementation managing testing activity is one of the challenging tasks for test manager in terms of test planning, test estimations, tracking of changing requirement. Apart from this, also handling team and there issues is one type of challenge. However, by using Agile, test management activity is now satisfactory job for test manager and reduces the risk associated with testing activity.

Comparison of waterfall model outcome and Agile outcomes with respect to testing activity present in following tabular format.

Table No 1.0: Testing Steps Improvement

Observation	Before Agile	After Agile
Test Planning	Difficult	Easy
Test Estimation	Difficult/Wrong	Right
Tester Training	Necessary	Not Necessary
Testing data	Complex	Easy
Test Case Coverage	Incomplete	Complete
Test Case Defect	Many	Nothing
Test Execution Speed	Average	Fast
Testing Issues /Defect	Many	Nothing
Tester Communication	Average	More
Testing Signoff	Not at Time	At Time
Tester Evaluation	Difficult	Simple

Tester Satisfaction	Average	Excellent
Customer Satisfaction	Poor	High

7. Result Observed in Testing

In changing requirement of live telecom environments, it is very difficult to write test cases from design document. This is also a complex for task for development team to understand specific requirement and respective impact, dependence on other backend systems. However, after implementation Agile, daily standup meet help a lot to track requirement flow and help to cover all test cases required for that changes. Respective before/after agile percentage changes are as mentioned below

Table No 2.0: Percentage Improved

Steps	Before Agile	After Agile
No Of Release Tested	156	15
Test Case Internal Review Defect	15%	3% (Cosmetic Defect)
Test Case External Review Defect	5%	0%
Defect Found During Testing	5%	1% (Minor Defect)
Defect Found After Testing	2%	1% (Minor Defect)
Defect Found But Rejected During Testing	5%	1% (Minor Defect)

8. Observed Advantages after Agile Implementation

After Agile implementation, the result observed are as below:-

- Increase customer satisfaction level compare to delivered in waterfall model
- Live changes modification is delivered frequently (weeks rather than months)
- Even late changes in requirements are welcomed
- Close, daily, cooperation between business people and developers
- Face-to-face conversation is the best form of communication
- Projects are built around motivated individuals, who should be trusted
- Continuous attention to technical excellence and good design
- Help to track testing activity particularly for changing requirement
- Easy to find defect because of iteration wise release and also easy to developer to fix defect if found during testing

- Regular adaptation to changing circumstances
- Observed happiness in testing team
- Increase motivation level of team

9. Tech Mahindra –Agile Approach

Tech Mahindra's Agile Testing Methodology is a set of recommended practices, accompanied by detailed methods, templates, worksheets, and tools that when used in projects will help significantly reduce testing cycle time. It will help quickly establish that with addition of new functionality, what worked before still works, it will also provide development teams with regular insights into the quality of the deliverables

Tech Mahindra has recruited certified Agile staff to coordinate running project under Agile shadow.

After implementation of Agile at organization level, Tech Mahindra has observed valuable gain in term of quality improvement, customer satisfaction and employee satisfaction

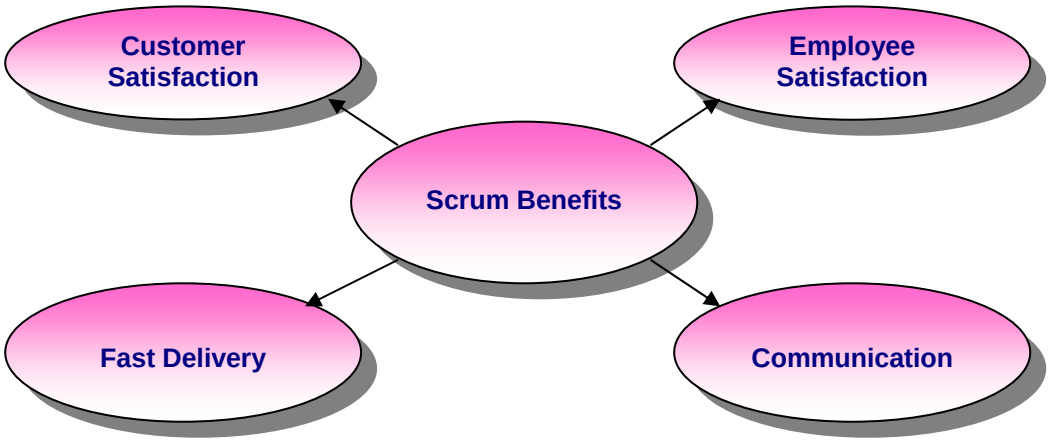

Figure No 1.0: Scrum Benefits

10. Conclusion

After successful implementation of an Agile Scrum methodology in telecom project, Tech Mahindra has observed drastic changes in

- Quality Improvement
- Timely Delivery
- Customer Satisfaction
- Employment Satisfaction

11. References

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