

Quality Assurance for Product Development using Agile

Anil Agarwal

R Systems International Limited
Noida, India
Anil.agarwal@rsystems.com

N K Garg

R Systems International Limited
Noida, India
nkgarg@rsystems.com

Avirag Jain

R Systems International Limited
Noida, India
avirag.jain@rsystems.com

Abstract— Achieving the highest level of quality for the software product being delivered is the goal of any IT organization. Every organization wants to implement processes and practices that would help achieving this goal of increasing the quality of a software product. There are so many models available today that an organization can use for developing a software but considering the dynamics of today's world where technology is changing at a fast pace and innovative products are hitting the market at great speed, these organizations do not want a software development model that consume lot of time and efforts, and hence most of the business houses are moving towards Agile approach for software development. With this change in approach for software development, the big question is that how to ensure Quality of product developed using Agile model. The traditional approach has a separate phase for testing a software product which ensures that an independent team has validated the product per specified requirements. However, with Agile way of software development, this leverage of involvement of independent test teams and test levels has taken a back. This paper, will highlight broadly the role of QA within Agile development model, with focus on fresh thoughts and approaches to improve the overall quality of product developed using Agile methodology. The use and importance of Metrics for accessing the Quality within Agile model will also be discussed.

Key Words — Quality, Agile, Development Model

I. INTRODUCTION

Achieving the highest level of quality for the software product being delivered is the goal of any IT organization. Every organization wants to implement processes and practices that would help achieving this goal of increasing the quality of a software product.

There are so many models available today that an organization can use for developing a software but considering the dynamics of today's world where technology is changing at a fast pace and innovative products are hitting the market at great speed, these organizations do not want a software development model that consume lot of time and efforts, and hence most of the business houses are moving towards Agile approach for software development.

With this change in approach for software development, the

big question is that how to ensure Quality of product developed using Agile model. The traditional approach has a separate phase for testing a software product which ensures that an independent team has validated the product per specified requirements. However, with Agile way of software development, this leverage of involvement of independent test teams and test levels has taken a back.

This poses a series of questions like:

- What is Role of QA in Product development using Agile
- Is QA a skill that every developer should possess in Agile model
- Do Agile teams actually need members with QA backgrounds
- What does it really mean to be an Agile tester
- Are we ready to hand over the testing keys to the developers

This paper, will highlight broadly the role of QA within Agile development model, with focus on fresh thoughts and approaches to improve the overall quality of product developed using Agile methodology. The use and importance of Metrics for accessing the Quality within Agile model will also be discussed.

II. TRADITIONAL VS. AGILE

The two basic development methodologies are:

- Waterfall - More properly called the 'Traditional' approach. It is the linear approach to software development. It represents a distinct stage of software development, and each stage generally finishes before the next one can begin.
- Agile - It is an iterative, team-based approach to development. This approach emphasizes the rapid delivery of an application in complete functional components.

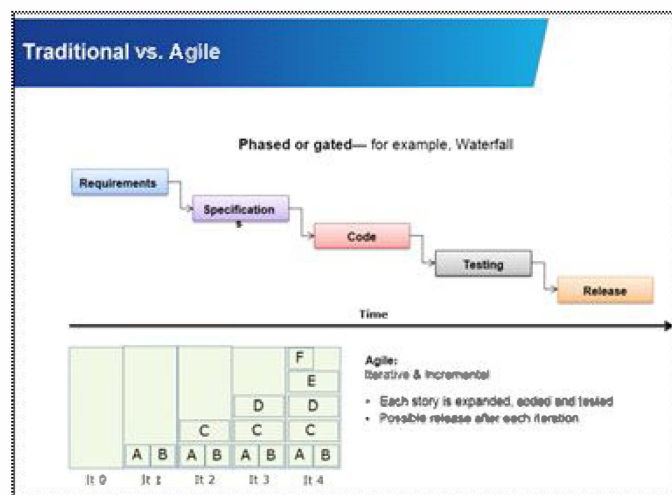


Figure 1 – Traditional versus Agile

III. HOW AGILE IS DIFFERENT

- Incremental & iterative development
- Greater Collaboration (Process vs. People-oriented development)
- Responds to changes quickly & efficiently
- Requires far greater discipline throughout the development cycle
- Testing is done concurrently with implementation
- Requires cross-functional teams and
- Every user story must satisfy the acronym INVEST:
 - Independent
 - Negotiable
 - Valuable
 - Estimable
 - Small
 - Testable

IV. AGILE – CHALLENGES

Although agile technique has a potential to produce lots of benefits to produce better results and adapt to a new process has always been a challenge. In this section we would try and list down some of those challenges and see how an overall product quality can be put to risk, if those challenges are not addressed in time.

- Requires change in Mindset & Approach
- Continuous Tracking & Monitoring
- Knowledgeable and Experienced teams
- Communication and Collaboration
- Continuous integration and release of new builds
- User story estimation
- Involvement and Sign-off from Product Owners

V. AGILE – TESTING STRATEGY

Practices that QA should follow within Agile model:

Involve QA right from the beginning - With agile development a common practice that has to be followed is the involvement of quality team (or individual) right at the start of the project (or sprint). This would include not just the involvement in discussion of user stories but may be in architectural discussion as well. This entire process would help them understand the project better, relate them with user stories, identify the test environments and conditions and hence would be more beneficial for overall quality and cost of the project.

Testing is a key component of agile development - The widespread adoption of agile methods has brought the need for effective testing into the limelight. Agile testing involves all members of a cross-functional agile team, with special expertise contributed by testers, to ensure delivering the business value desired by the customer at frequent intervals, working at a sustainable pace. Agile projects have transformed the role of testers.

Encourage performing Multiple Roles - A developer can play a role of a QA and at the same time the QA can play a role of business analyst providing his/her feedback on user stories, helping in preparing prototypes, reviewing user stories, conducting quick tests on development machines, doing quick setups and creating data conditions and also doing a code walkthrough with developer to check coverage and areas that may get impacted due to a particular fix.

Development and Testing should move in parallel –

In agile software development, testing and development of software runs parallel in order to achieve higher level of quality. Testing can be valued as the backbone of QA activities and a vital step to attain quality in software product. In agile development process an error or bug is fixed as soon as it is known. Adopting this manner, bugs and errors are detected and fixed in early stages. Fixing bugs and errors sooner, implies to save time, cost, resources and maximization to quality.

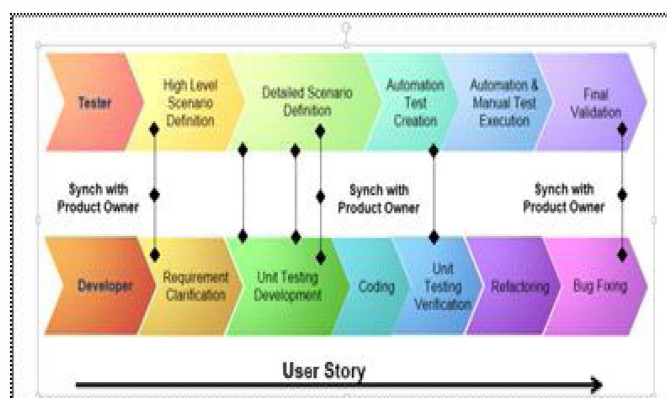


Figure 2 – Development and Testing in parallel

- Take feedback, improve and move ahead - Scrum teams (that is usually group of developers, business analysts and testers) are considered as experts for the task that is assigned to them and hence it is important that continuous improvement plan is prepared by each individual team member. Improvement may be in a domain, technology or process but it should be a common practice that every individual in scrum team plan for continuous improvement in his/her competencies.
- Testing throughout the SDLC – To understand how testing activities fit into agile system development it is useful to look at it from the point of view of the system delivery lifecycle (SDLC). Figure 3 is a high-level view of the agile SDLC, indicating the testing activities at



Figure 3 – Testing throughout the SDLC

- Inception / Sprint 0 - The goal of this phase is to initiate the team and get your team going in the right direction. Testing/validation activities include beginning to set up your testing environment and tools as well as potentially reviewing the initial models, plans, and vision or stakeholders goals document.
- Construction Sprints. During each construction iteration (iterations 1 to N in Figure 3) the goal is to produce more potentially shippable software. Agile teams will take a whole team approach where testers are embedded in the development team, working side by side with them to build the system. The independent test team will perform parallel independent testing throughout the project and will typically be responsible for the end-of-lifecycle testing performed during the release/transition phase of the project. This independent test team will focus on more complex forms of testing which are typically beyond the ability of the "whole team" to perform on their own. Independent test team can support multiple project teams. The goal of independent testing effort is not to redo the confirmatory testing which is already being done by the development team, but instead to identify the defects which have fallen through the cracks or not detected.

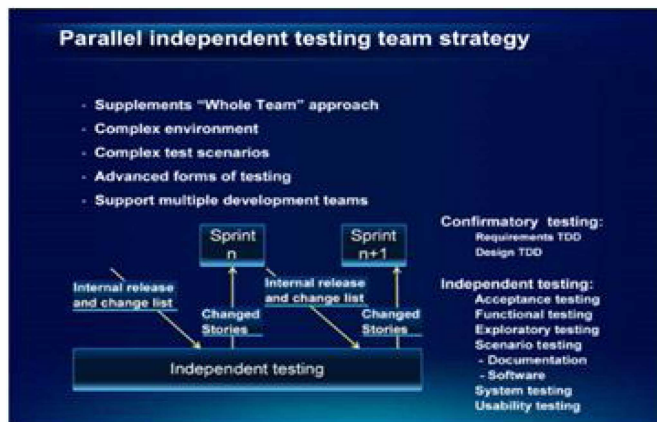


Figure 4 – Parallel independent testing

o Transition. The goal of the Transition phase, is to successfully deploy your system into production. This can be quite complex in practice, including training of end users, support people, and operations people; communication/marketing of the product release; backup and potential restoration (if things go bad); pilot/staged deployment of the system; final translation of the UI and documentation; finalization of system and user documentation; and so on. During the release iteration there is still some testing at the end of the lifecycle to ensure that the system is ready for production. Test Driven Development (TDD). It is a software development process that relies on the repetition of a very short development cycle. Test driven development is related to the test-first programming concepts of extreme programming. In test driven development, each new feature begins with writing a test. This test must inevitably fail because it is written before the feature has been implemented. (If it does not fail, then either the proposed "new" feature already exists or the test is defective.) Next you run your tests, often the complete test suite although for sake of speed you may decide to run only a subset, to ensure that the new test does in fact fail. You then update your functional code to make it pass the new tests. The fourth step is to run your tests again. If they fail you need to update your functional code and retest. Once the tests pass the next step is to start over.

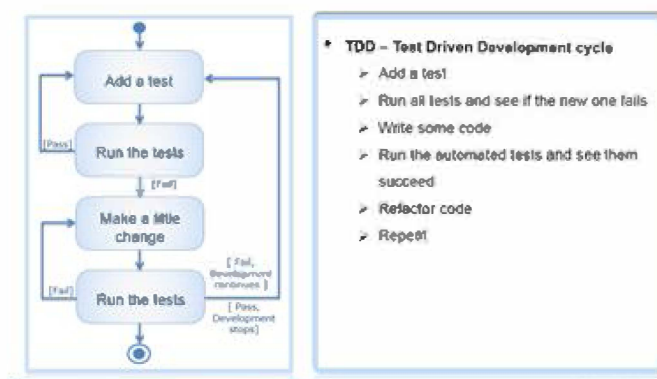


Figure 5 – The Steps of Test Driven Development (TDD)

VI. STRATEGIES FOR IMPROVING QUALITY

- Bring SQA as a whole in Agile & not just Software testing
- Involve team members performing multiple roles
- Development & Testing move in parallel
- Get continuous feedback from Customers, improve & move ahead
- Continuous improvement in team competencies (domain/ technology / process)
- Improve quality of user stories
- Avoid setting up over ambitious targets
- Automate as much as possible
- Keep Test Criteria, Entry & Exit levels
- Advanced Pair programming (pair QA alongside with Developers)

VII. MEASURING QUALITY IN AGILE

Managers and executives need a way to measure Agile development so they can make informed decisions.

Metrics have always been used to help guide managers with decisions about their organizations. However as technologies and methodologies have evolved, metrics must evolve as well.

Few of the metrics that can be tracked for measuring quality in agile are:

- Sprint wise open issues
- Escapes per sprint – issues reported by client
- Impediments count per sprint
- Sprint Health Dashboard (Green / Yellow / Red)

VIII. CONCLUSION

Agile software development approach has changed the way the Software's are built today, unlike traditional development approach. Agile prefers short iterations (sprints) during software development and it would not be wrong to state that it has moved development from process oriented to people oriented. Agile methodology encourages people collaboration through the project and it responds to change quickly and efficiently as it is incremental and iterative.

Due to the dynamic approach of Agile methodology the role of Quality Assurance becomes all the more important to ensure that that products are delivered to the client with highest level of quality as quality has always been the core focus of any company.

REFERENCES

- [1] Pettichord, Bret, "Agile Testing What is it? Can it work?", 2011
- [2] Hendrickson, Elisabeth, "Agile Testing, Nine Principles and Six Concrete Practices for Testing on Agile Teams", 2011
- [3] Huston, Tom, "What Is Agile Testing?", 2013
- [4] Kevin Aguanno, "Managing Agile Projects", 2011
- [5] James Shore, Shane Warden, "The Art of Agile Development", 2011
- [6] Kent Beck, "Test Driven Development: By Example", 2012