International Journal of Innovation and Applied Studies
ISSN 2028-9324 Vol. 9 No. 2 Nov. 2014, pp. 541-546
© 2014 Innovative Space of Scientific Research Journals
http://www.ijias.issr-journals.org/

Testing Automation in Agile Software Development

Rana Muhammad Saleem, Salman Qadri, Imran ul Hassan, Rab Nawaz Bashir, and Yasir Ghafoor

Department of Computer science & IT,
Islamia University Bahawalpur,
Bawalpur, Punjab, Pakistan

ABSTRACT: In recent years agile development methods has gain very much popularity due to associated advantages with the agile practices like faster developments, stakeholder involvement, short iterations and quality oriented development. Agile development methods strongly focus on close customer collaboration, short iterations and quick deliveries. Literature review and industry practices reveals agile methodologies have paid little emphasize on software testing. Though agile doctrine present agenda of continuous testing, but it is usually limited to current iteration. Agile practices include very little testing practices at the release of artifacts, which are considered essential for a quality software product. Most of the existing agile methods have employed unit testing which is limited to the current iteration. Agile method seldom agile development methods can be more beneficial if they include a formal framework for testing. The focus of this study is one the development of agile based testing framework to be integrated with existing agile methods and practices, to take full gain and potential of agile methodologies. The proposed agile based frame work will be based on the automation of testing, building and managing of effective testing teams, and a real continuous testing environment.

KEYWORDS: Agile Testing, Test Automation, Continuous testing, Acceptance testing, Productivity

1 BACKGROUND

Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test [1] . Agile has its roots in iterative developments during which customer is involved at very early stage by delivering the software system very early to the clients and users. Agile methods are characterized in terms of emphasize collaborative, integrated teams, frequent deliveries and ability to meet business changing needs.

The one of the most desirable attribute of agile process is the capability to adjust with the changing needs the project, organization and even change in development environment. Agile development believes on very early deployment of the software product to the customer, customer can have a view and have a fair chance to review errors, suggest improvement and changes as he deem fit. In this way, agile methodologies involve the user in development process very early by providing feedback to the team very early [2].

The manifesto for agile software development has changed the way companies plan, develop, test and release software. Throwing away years of accumulated orthodoxy, agile development methods have now become the new and accepted way to develop software. Agile development gives preference to the left side over the right side elements. It values the items on the left more [3].

Most of agile development methods endorse collaboration, teamwork, communication with stakes holder, iterative nature of development and process adaptability through the entire development life cycle. Agile methods focus on small iterations with minimum planning. Small iterations help to get rid of long term planning. These iterations completed in short time span though also known as “Time box”, typically span over from one to four weeks [4].

2 Material and Method

Over the last few years with the increase in use of Agile practices in software development industry, there is also increase in concern of how we should go about testing in agile based projects. There are different strategies propose with time to time. Keeping in view of all these strategies, we would like to propose agenda of test automation with agile practices. Let we understand the basic philosophical groundwork of agile testing.

Let us start by setting the philosophical groundwork:

- In agile development frameworks, you would like to test as quickly as possible, because in most of the cases the impact of the defect bounces back exponentially over time. In fact, all agile frameworks prefer to "test-first" approach.
- Agile frameworks believes on the philosophy of frequent testing in order to increase chance to find defects. However, it may increase the cost but this investment in testing would return in the form of improved quality of the system.
- Agile practices believe on the notion of "enough testing, means to do testing that justify the situation. Critical natured system, like to deploy at nuclear reactor and in aviation, require more testing as compared to other discipline.
- The last is the idea of "pair testing" as pair programming is an excellent idea. Pair testing has lot of advantages as compared to individual's efforts.

The one difference between the agile and traditional development methodologies is short loop or iterations to incorporate the user feedback at regular interval in the overall system development process. Automation of testing process helps to shorten this loop. Automation help to save cost and test smallest piece of code of the system and things can do quickly and reputedly. It help to test the same code gain and again and test the code for each update and help to shot the feedback process shorter and shorter as shown in the automated test life cycle in the picture. Reduce feedback is consistent with the agile philosophy of short iteration. Automated testing also offers other advantages in the form of repeatability, consistency and better coverage by driven data [5].

In order to reduce risk we proposed testing with test automation also included in short time-boxed efforts called iterations. The proposed optimal approach of small testing groups working with denote goal. The proposed approach try to complete the testing life cycle in quick time but also ensure that quality testing would be in practice. It will be produce effective results in effective time. Testing intends to make the product available to deploy a new functionality at the termination phase of iteration.

2.1 Automated Testing

Automation testing requires less human intervention as compared to manual testing and incurs less cost and time. Agile software testing is more effective when it exploits the potential advantages of automated testing. Automation testing is helpful to save time and for effective testing it is very difficult to optimize all testing, and it is necessary to determine that what technique works in what condition. It is good to employ automated testing at agile whenever possible. Tests that require large data as input and have to perform frequently as regression testing are strong candidates for automation. Test automation is best suitable for scenarios, which are repeatable in nature. Followings are the potential advantages of automated tests:

- Automation testing is best suitable for repeatable testing
- Several automated tests can run simultaneously on different machines and saves time by running sequentially
- Reduce testing cost and saves time

2.2 Decide automate testing or Manual Testing

There are two possibilities for management about testing, manual and automated. Each one of these two has their own associated benefits and pitfalls. Deciding to which streams the project wants to fallow depends upon the nature of project, management intentions and available resources. Manual testing require extensive knowledge of the domain and expertise in testing process while automated testing suited to long codes, where test cases have repeatable behavior. In order to save time and money most of the organizations rely on automated testing but still there are scenarios, which require manual testing approach.

Automated testing is the testing process without intervention of the human being. Automate testing is suitable for scenarios which are not crucial for the success of the project. It performs well when there is repeatable code to test. It can save time and cost of the by running sequentially on multiple machines.

However, there are some disadvantages of automated testing approach. It takes time in initial configuration. Cost of the automated testing is high when there is short term testing after frequent intervals. Expert suggest that automate testing does not believe to be work for all scenarios, it perform well in already well-defined scenarios. The major drawback of the automate testing is that it tool also has limitation for testing in some scenarios like those that visual references cannot be automated.

Manual testing on the other hand is also available to support where human interventions are available. Test engineers perform manual testing, at their own. This approach require comprehensive domain knowledge and testing abilities in term of innovative, speculative, creative, open minded, innovative and skillful. It is suitable to cases when a test case have not to run in a repeatable fashion. New kind of bug exploration is possible. However, keep in mind it is more time consuming and costly [6].

The project manager can decide the type of approach he wants to fallow on the project. It should keep in mind that previous study reveals that only 10 to twenty percent of bugs can found by automatic testing while they may extends to 80% with the manual testing approach. It reveals that human contribution is very important in the bug exploration process. Following is the criteria of automated testing [7].

- Tests are repetitive in nature.
- It is best suited to frequently changing scenarios to catch regression in a timely manner.
- Test that evaluating high-risk condition.
- Tests are difficult and costly to perform manually.
- Test where same action required for multiple data values.
- The test is base line in nature to test with different configurations.
- Automating the repetitive and boring tests provide the opportunity to involve in more interesting test scenarios.

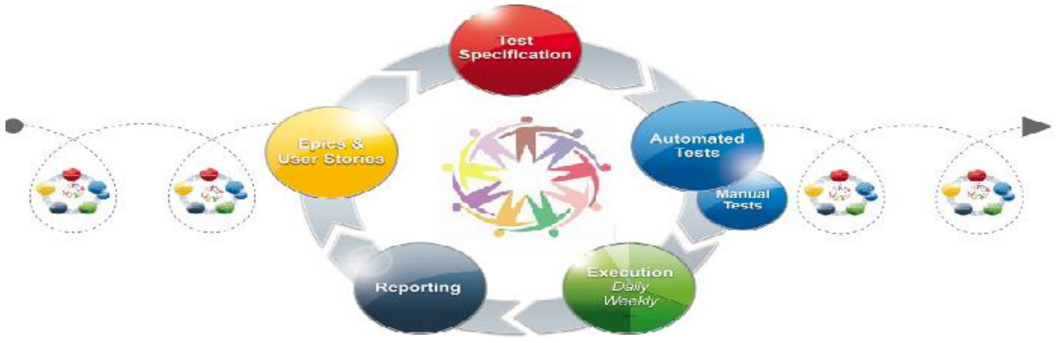

Figure 1: Automated test in iteration

2.3 METHODOLOGY FOR AUTOMATING TESTING

Test automation methodology is given in fallowing lines.

A. SET UP YOUR APPLICATION FOR AUTOMATED TESTING.

Automation tools require well-defined properties and controls in order to identify and locate them. For example if the label of button change from the OK to submit the test script have to inform about this change otherwise it will fail. In any such change, developer should inform the tester so that necessary changes can make to the script of testing. Ideally, there should be unique names for controls so that automation tools perform well.

B. CHARACTERIZE A STANDARD DISPLAY RESOLUTION

In some cases when no unique names for control the tools have to rely on the coordinate in order to locate location. Any change in display setting would change the script execution. It recommended, uses a standard display setting, and if automated testing has to perform in different display setting use different script or subroutine for different setting.

C. Prepare Automation Team

First, identify the skills and potentials of you team in order to exploit them for best. Definitely some will be best at writing test cases and some at writing test scripts. Tester with Programming background proved to best on writing and running scripts.

D. Define Process

Define and standardize the all process activities help to achieve tasks at time and better for the team members in understanding and cooperation on activities.

E. Generate Autonomous plan

It is always advantageous to define your plan in term of your goals. For example, goals can define as:

- Improve test coverage.
- Ensure consistency.
- Improve reliability.
- Speed up testing to speed up release.

F. Define measurements of success.

Define the parameters of effective testing. Define how you can tell that testing is efficient. Some of the potential measures of successful automations are:

- It takes less time.
- More features tested in equivalent time.
- There is reduction in cost of testing due to automation.

G. Develop test cases.

Creating test cases and writing script take time. Avoid automation of those tests that have to perform few times. Only automate those tests that are clear in terms of their goals, pre-requisite in addition, expected outcomes. Ensure that tests have specific purpose and you can verify results.

2.4 Implementation of agile automation testing

There can be certain problems in term of implementation of automated testing. Writing and management of lot of scripts is a major issue. Test automation requires lot of planning but on the other hand agile frameworks works on loses design and involve a little planning. Actually, there is a little scope of planning in the agile based development and testing. This may lead to some problems, as automation is a complicated task and require extensive planning. One recommended solution is that team should plan for automation when development team is designing the system. [7]

First, it is necessary to create an automation testing standard document. Describe how to organize test cases and scripts after they recorded and define structures of the scripts. It is necessary to adopt standardize naming conventions for scripts before recording them. Also, note all the automated tests and their purpose in a separate document. Apply appropriate comments to explain the logic of tests. Try to create and maintain reusable and maintainable automated tests. Prepare small scripts instead of large one. Small scripts are easy to understand, maintain and for reuse in other scripts. Long scripts increase the complexity of the system.

2.5 Why automated testing in Agile

Automated testing is best for repeating scenarios but cost can be very high when scripts have to be written again and again and configuration have to be change repeatedly.

- We cannot automate visual references.
- Automation tools also have some limitations.
- Selection of automated testing tool is a difficult task.
- In case of short term, testing cost of automation is also high.

However, automated testing only is not sufficient for complete insurance of quality but certain advantages associated with the automated testing can be streamlines with the basic philosophies and objectives of agile development methodologies [8].

3 RESULTS

A few organizations selected, which have applied the agile testing frameworks, and some radical and substantial results found. I have applied raw data from a real project in order to conclude findings and results. Results offer new evidences that agile testing practices work and dramatically improve quality and productivity. We describe organization success using agile testing keeping in view efficiency in test design, efficiency in activity execution and productivity in defect management using purposed framework for agile based testing.

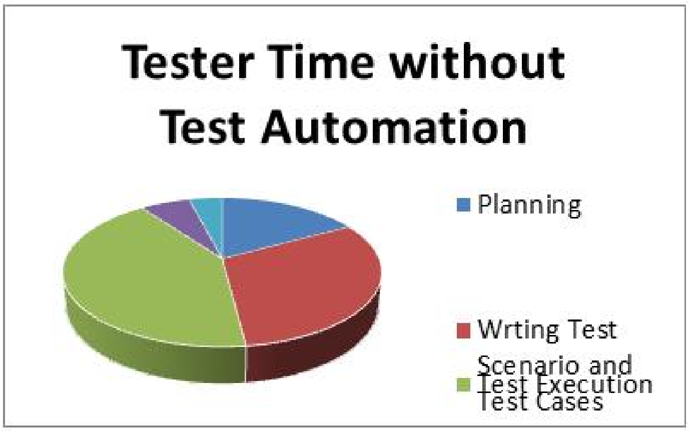

Figure 1 : Tester time without test automation

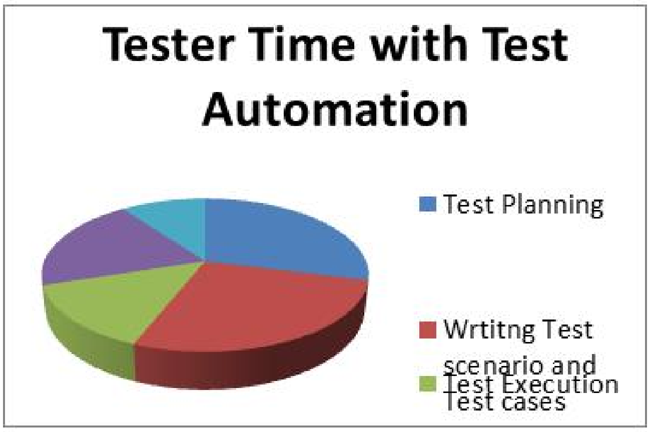

Figure 2 : Tester time with test automation

These two statistics compare scenario of tester time with test automation and without test automation. Figures clearly reveal that with test automation project can avoid substantial cost and time. Tester saved time can used in training other team members and in collaboration and communication tasks. During this time tester can involve in other quality assurance activities.

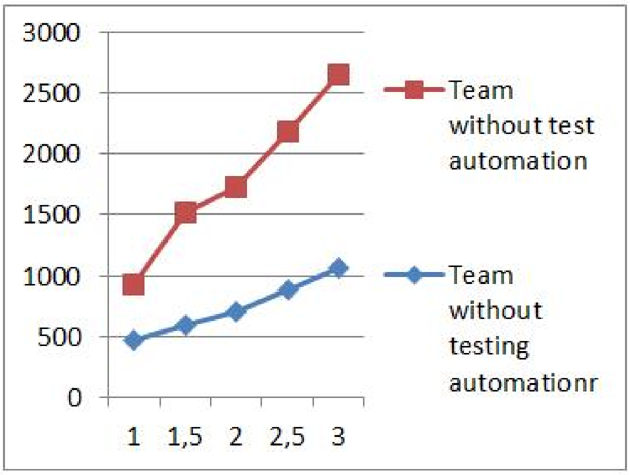

Figure 3 : No of Tasks Completed

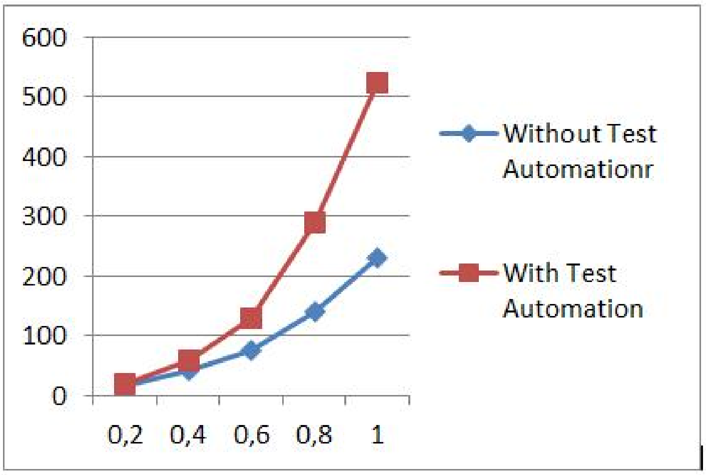

Figure 4: No of Iterations Completed Over Week

Above figure reveals that with test automation team can complete more number of task as compared to team without support of test automation. In the figure, we can see observe an analysis of no of iteration over the time. With test automation team remains above the schedule, while team without test automation team usually falls below the schedule. In the above analysis of data, we can clearly infer that team can handle more defects with support of test automation.

4 Discussion

Purposed frame testing framework evaluation present substantial results. It can be very advantageous when integrated with existing agile frameworks. Let conclude results.

It save time of developer, tester and other team members that allows team member to focus on other quality assurance activities in the project. During this extra time developer can write more code and tester can involve in training other team members in writing unit test cases. Tester can also devote more time to the customer in understanding, writing and execution of acceptance tests.

Defects managed efficiently with the use of test automation. From the previous analysis, it can be observed that team empowered to handle and tackle substantial number of test cases with support of purposed framework.

When team members handle increase amount of defects and complete more number of tasks team will in position to deliver the iteration on time. There will no chance to lag behind the schedule, which results in goodwill of the team and organization as well.

It is also observed that average longevity of defects in the iteration reduced to substantial amount. Regression testing is good but with framework, it will be under control. Test documentation management help to keep record of similar faults and reuse in future for same type of defects.

5 Conclusions

It strongly recommends that testing automation should integrate with existing agile framework. It can have synergic impact over the working of agile development framework. Though it may incur initial cost but return on investment are huge. Biggest return is in term of quality, which is source of customer satisfaction, goodwill, growth and survival of organization. Test automation in agile development improves team productivity and performance and also ensures that quality of the final deliverables is up to the mark and on deliveries are on time.

References

[1] Cem Kaner, "Quality Assurance Institute Worldwide Annual Software Testing Conference," in *Exploratory Testing*, Orlando, 2006.

[2] Ian Somerville, *Software Engineering*, 7th ed.: Pearson, Addison Wesley, 2004.

[3] P. Abrahamsson, *Agile software development: Introduction, currant status and future*, 1st ed.: VTT Publications, 2005.

[4] David (2005) Anderson. (2013, August) Declaration of Interdependence. [Online]. http://pmdoi.org/

[5] Scott W. Ambler. (2013, August) Agile Testing startegies. [Online]. http://www.ambysoft.com/essays/agileTesting.html

[6] Sandeep Johri. (2013, September) http://www.tricentis.com. [Online]. http://www.tricentis.com/en/tosca/agile

[7] Madhu B.K., Lokesha V Harish R., "A sophisticated study on best prectices of agile software testing," *International Journal of Electronics communication and computer engineering*, vol. 3, no. 1, pp. 26-30, 2012.

[8] Ken Arneson. (2013) Automates testing in Agile environment. [Online]. www.tampabayqa.com/ Images/Agile.ppt,