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# Scope of Agile Approach for Software Testing Process

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***Abstract*—Today, the most vital step is software testing, especially in product quality. Agile software development is exceedingly difficult and has contentious issues in literature and business. Since most Agile techniques place more emphasis on development than software testing activities, different people have varying opinions about how software testing fits into these methodologies. Agile places a high emphasis on frequent deliveries and tight client connections. However, software testing is complex because agile does not incorporate many destructive testing techniques typically required for a product of higher-quality. The study reveals industry-wide Agile testing procedures and the main problems that arise when Agile development is used. Additionally covered are the differences between manual and automated testing, best automation practices, and ways to lead different testing teams in an agile testing environment. This study covers every facet of the Agile software testing process. Agile development has shown that testing is not a distinct stage but rather a crucial component of software development along with the coding. The agile team employs an overall strategy to produce software products of the highest quality. As part of an agile team, testers collect customer samples of the desired behaviour and collaborate with the developer's team to help the coders translate these examples into executable specifications. Coding and testing are done iteratively and incrementally, developing every item until it is valuable enough to release in production. It addresses several testing modalities. The classification provided by its quadrants aids teams in determining and organizing the necessary tests. To increase quality assurance, this article will examine various and improved Agile Testing Processes and methodologies. Additionally, the topic of Agile development's software testing method is covered. Agile development processes can be improved and more advantageous by incorporating testing procedures.**

***Keywords: Open-Source Testing Tools, Testing Automation, Agile Testing, Software Testing***

## I. Introduction

Agile refers to modest, straightforward releases that are made often and incrementally. Agile is an iterative project management and software development method that helps provide team support to offer more value to clients rapidly. In software development and agile testing, "agile" denotes something that can be completed quickly and without delay. Agile testing ensures the delivery of a high-quality product by removing bugs or faults during the project's initial development. The agile testing process is a clever method of testing complex software, which accepts more effective outcomes than traditional testing techniques. The Agile Process approach is one of the most effective and simplest methods for turning a business or a client's requirement into a proper software solution. Software development methodologies include planning, improvement, continual learning, evolutionary development, teamwork, and early delivery. All together comes under the term "agile." It encourages adaptable change reactions. Together with other development team members, agile testers participate in every stage of the software development process. They support the development of the product to client requirements and help make it feasible to write code thanks to improved design. Achieving quality is the only goal the agile testing team works on in a single group. Iterations and loops, the shorter periods used in agile testing. This methodology, also known as a delivery-driven technique, offers a better forecast of the usable goods in a shorter time.

## II. Background

The approach of Agile Process is an effective and simple method for turning a vision of a business or a client's requirement into a proper software solution. Software development methodologies include continual planning, improvement, learning, evolutionary development, teamwork, and early delivery, referred to as "agile." This helps in promoting adaptable reactions to changes. Together with other development team members, agile testers participate in every stage of software development cycle. They support the development of the product to client requirements and help make it feasible to write code thanks to improved design. Achieving quality is the only goal the agile testing team has as a single team. Agile testing is conducted in short time frames called loops or iterations. The methodology, also called the Delivery-Driven Approach, offers a better forecast of usable products in a shorter duration. The following would be essential for an agile testing approach to succeed.

## III Agile Process/Phases

Agile testing life cycle spans six stages. The six phases of the agile methodology—concept, genesis, iteration, release, maintenance, and retirement—are shown in Figure 1. The life cycle of an Agile project changes according to the strategy chosen by the project management team.

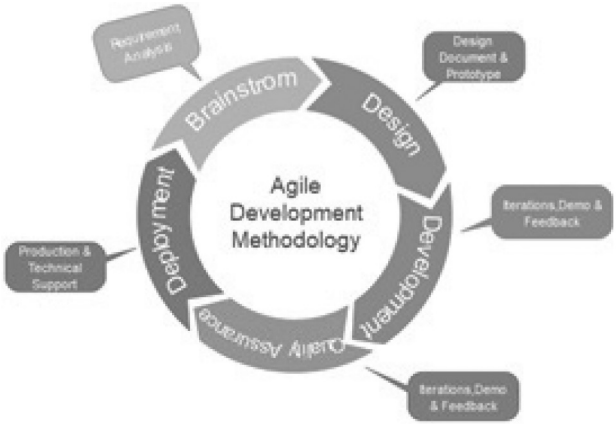



Fig. 1: Agile Model

The six phases of the agile methodology—concept, genesis, iteration, release, maintenance, and retirement—are shown in Figure 1. The life cycle of an Agile project changes according to the strategy chosen by the project management team.

- Concept: Conceptualisation comes first. During this stage, the owner of a product would estimate the scope of a project. In the case of multiple numbers of projects, the important ones will be given high priority.
- Creation: The software development team must be together once a notion is dictated. The best candidates for the project would be selected by the product owner, who would provide them access to essential materials and equipment.
- Iteration: Next is the third stage, sometimes referred to as building. Since this is the stage when most of the work is finished, it often is the lengthiest process. Before turning the design into code, the developers collaborate with UX designers for incorporating all user feedback and product requirements.
- Release: When the software is almost prepared for release. The quality assurance team must initially perform a series of tests to ensure that the software is completely functional.
- Maintenance: Customers may now use the software to its maximum potential. It then enters the maintenance phase after completing this.
- Retirement: A software can be retired for two reasons: either a replacement is being developed or a system is outdated and is not compatible with the requirement.

### *A. Agile Testing Strategies*

Iteration 0: Sprint/Iteration zero comes before the first development iteration, as seen in Figure 2. The team completes various tasks required for the project to start during sprint zero, including setting up environments, developing a product backlog, and ensuring they have a release strategy.

Construction: The goal of the building phase is to finish the system and get it ready for pre-production testing. The group should now order the specs and fulfil the requirements.

Release: The system is almost ready for production deployment at this stage. The team must support operations and train end, users. Along with promoting the product release, the team has to finalise the system, perform backup and restore, and provide user documentation.

Production Phase: After being deployed to the end-user, the systems must be usable and productive. This is the goal of the production phase. Different organisations and systems may have different versions of this phase.

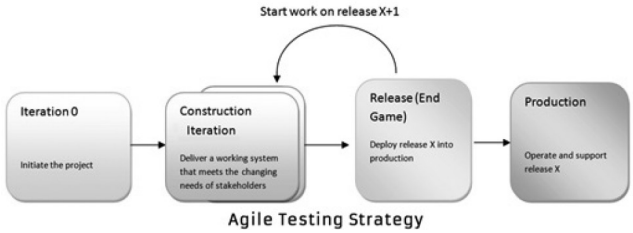
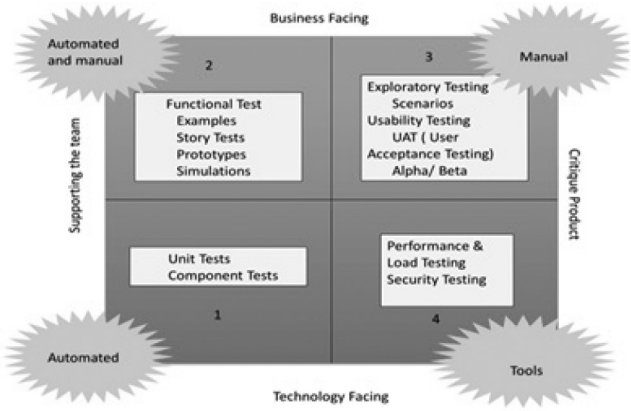



Fig. 2: Agile Testing Strategy




- Q1: Testing technology with programming support (Testing technical requirement, Does the software do what was intended by the developer?).
- Q2: Business Testing with programming support (Testing Business requirement, Does the code do what it is written for?)
- Q3: Business Testing for product critiques (Testing for business defect, Does the code do an improper action? Are any prerequisites missing?)
- Q4: Technology Testing for product critiques (Testing for technical defect, Is it fast enough? Can it handle a load? Are there leaks?).

## IV. Literature Review

After reading and analysing numerous articles, it has been determined that agile methodology is becoming more and more well-liked. Agile techniques have been beneficial, and they are revolutionising the software sector. Here are some of the review's results.

Table 1: Table Type Styles

| S. No. | Title | Author | Technology | Findings | Year |
|---|---|---|---|---|---|
| 1 | "A Comparison Study of Software Testing Activities in Agile Methods" | Samera Obaid Barraood, Fauziah Baharom Haslina Mohd. | Agile | Although each approach serves a unique purpose, they are identical when tested. Agile's nature, which accepts requirement modifications and is incremental and iterative, emphasises the need for testing to be completed within each iteration. | 2021 |
| 2 | "A framework for generating agile methods for product development" | Jonas Heimicke<br>Albert Albers Gha-Leng Ng<br>Madita Kruger<br>Katharina Duhr | Agile | Agile software development methodologies cannot be adopted without additional work to get high-quality results. | 2021 |
| 3 | "A Comparative Study of Agile Methods, Testing Challenges, Solutions & Tool Support" | Attique Ur Rehman<br>Muhammad Ali<br>Ali Nawaz<br>Tahir<br>Muhammad Abbas | Agile | Agile testing focuses not on documentation; however, some documentation is required to enhance the process more effectively. | 2020 |
| 4 | "Significance of Agile Software Development and SQA Powered by Automation" | Bilal Gonen<br>Dipali Sawant | Agile | Software companies must get together and seek appropriate agile processes and automation solutions that can support them and provide long-term advantages. | 2020 |
| 5 | "Agile Software Development Methods For Prototyping of Innovative Concepts in Manufacturing Automation" | Nasser Jazdi Vicente. De Lucena Jr. | Agile | The work focused on the scrum method, which is more effective than any other modal. | 2020 |
| 6 | "DevOps automation and Agile methodology" | Sikender Mohsienuddin Mohammad | Agile | Agile and DevOps are distinct, yet both help teams operate more quickly and effectively. Where consumers are delighted, and high-quality work is produced. | 2017 |
| 7 | "Agile Approach for Software Testing Process" | Rijwan Khan<br>Dilkeshwar Pandey<br>Akhilesh Kumar Srivastava | Agile | The software uses three development models (Waterfall, V-Model, and Agile). Each has benefits and cons of its own, and the choice of model is up to the organisation. | 2016 |
| 8 | "Strategies for Agile Software Testing Automation: An Industrial Experience" | Eliane Collins<br>Vicente F. de Arilo Dias-Neto<br>Lucena Jr. | Agile | It offers the notion of using test automation methodologies in agile software development for Scrum. We can see how agile values affect how teams are organised and how tests are automated. These lessons demonstrated the viability of project team collaboration in finding solutions and looking for integrated testing tools while maintaining the administration and structure of a software testing and scrum process. | 2012 |
| 9 | "Strategies for Agile Software Testing Automation: An Industrial Experience" | Eliane Collins<br>Vicente F. de Arilo Dias-Neto<br>Lucena Jr. | Agile | It provides an idea of implementing test automation methodologies in Scrum-based agile software development where the impact of agile ideals on team structure and test automation may be seen. These experiences have shown that project team collaboration is possible to find solutions and seek integrated testing tools while maintaining the management and structure of a software testing and scrum process. | 2012 |
| 10 | "A study on Agile Software Testing: Emergence and techniques" | B. K. Madhu<br>V. Lokesha Megha Jigalur | Agile | The AST must be a key component of the development process, effective review procedures must be put in place, and schedules may be fulfilled using agile methodology if the testing process is to succeed in the Agile life cycle. | 2010 |

*Table 1 (contd)...*

*(Contd.) Table 1...*

| | | | | | |
|---|---|---|---|---|---|
| 11 | "Agile Software Development: Introduction, Current Status and Future" | Pekka Abrahamsson | Agile | New product development has seen a 3x reduction in lead time, a 50x quality improvement, and a 5x decrease in cost thanks to an agile production frame! Mentioned 12 agile principal more focused on mobile development | 2010 |
| 12 | "Software Testing Process in Agile Development" | Ahsan Nawaz<br>Kashif Masood Malik | Agile | A distinct but integrated testing team should be used with agile development procedures. There should be a division of work between software testers and developers and a mix of automated and manual testing. Additionally, it is necessary to inform the client of the benefits of using Agile. | 2008 |
| 13 | "Software Testing Research: Achievements, Challenges, Dreams" | Antonia Bertolino | Agile | Transversal challenges | 2007 |
| 14 | "Agile Software Development Evaluating the Methods for Your Organisation" | Kent Beck | | Regularly evaluating how well your process is doing and making modifications to increase its effectiveness is crucial to keep it agile. Retrospectives are ideally conducted often during the project rather than just once at the conclusion, as the Agile philosophy advises. This enables the maximum amount of learning and the chance to fine-tune the procedures while the project is still in progress. Mid-project process adjustments may not always be the best option, but there will be many instances when they are the right course to follow. | 2005 |
| 15 | "Software Quality and Agile Methods" | Ming Huo<br>Liming Zhu<br>June Verner<br>Ali Babar Muhammad | Agile | While agile approaches are relatively new and have gained huge popularity in business, certain agile practices are not new. Developers have a critical need to learn more about the quality of the software generated. To achieve the calibre they need, developers must also be able to modify or customise their agile methodologies. | 2004 |

## V. Conclusion

AST is a crucial element in the entire software development process. A suitable review procedure must be implemented for the testing to benefit from the Agile life cycle. It is necessary to form a development and testing team that works together. Agile, when done well, is not at all chaotic. In truth, it allows testers to work at their best and developers to run amok. The agile technique can be used to view a clear image of goals and meet deadlines since a self-motivated group will work on ongoing fundamentals. Any testing methodology is used, including Waterfall, V-Model, and Agile models. Each has advantages and cons of its own, and the choice of model is up to the organisation. Agile-based testing is preferable if the customers' requirements regularly change and the software requirement is required to be quickly delivered with trained resources. When the project is large, the customer's requirements are clear, and developers have lots of time, waterfall testing is acceptable. When requirements vary, a project is extremely large, and adequate validation is required for each step, testers utilise the "V-Model." However, we can confidently state that the Agile Testing Approach is the most effective technique the sector should use for completing projects with quality and in less time due to constrained timetables and high client expectations. As per the industry requirement, the Agile Model best suits enhancing the product and maintaining quality standards..

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## References

[1] Samera Obaid Barraood, Haslina Mohd. And Fauziah Baharom "A Comparison Study of Software Testing Activities in Agile Methods" Knowledge Management International Conference (KMICe) 2021, 1 February 2021.

[2] Samera Obaid Barraood, Haslina Mohd., Fauziah Baharom1 "A framework for generating agile methods for product development" 31st CIRP Design Conference 2021.

[3] Attique Ur Rehman, Ali Nawaz, Mohammad Tahir Ali, Muhammad Abbas "A Comparative Study of Agile Methods, Testing Challenges, Solutions & Tool Support" 14th International Conference on Open-Source Systems and Technologies 2020(ICOSST).

[4] Bilal Gonen, Dipali Sawant "Significance of Agile Software Development and SQA Powered by Automation" 3rd International Conference on Information and Computer Technologies (ICICT) 2020.

[5] Nasser Jazdi, Vicente. De Lucena Jr. "Agile Software Development Methods for Prototyping of Innovative Concepts in Manufacturing Automation" 2020.

[6] Sikender Mohsienuddin Mohammad "DevOps automation and Agile methodology" Volume 5, Issue 3 August 2017 | ISSN: 2320-2882.

[7] Rijwan Khan, Akhilesh Kumar Srivastava, Dilkeshwar Pandey "Agile Approach for Software Testing Process" 5th International Conference on System Modeling & Advancement in Research Trends, 25th_27'h November 2016.

[8] Eliane Collins, Arilo Dias-Neto, Vicente F. de Lucena Jr "Strategies for Agile Software Testing Automation: An Industrial Experience" IEEE 36th International Conference on Computer Software and Applications Workshops 2012.

[9] B. K. Madhu, Megha Jigalur, V. Lokesha "A study on Agile Software Testing: Emergence and techniques" Mathematics and Computer Science Research Vol. 3(11), pp. 288-289, November 2010.

[10] Pekka Abrahamsson "Agile Software Development: Introduction, Current Status and Future" 1.12.2010 (C) VTT Electronics, 2010.

[11] Ahsan Nawaz, Kashif Masood Malik "Software Testing Process in Agile Development" MCS-2008-25 June 2008.

[12] Antonia Bertolino "Software Testing Research: Achievements, Challenges, Dreams" Future of Software Engineering (FOSE'07) IEEE 2007.

[13] Alan S. Koc "Agile Software Development Evaluating the Methods for Your Organisation" International Standard Book Number: 1-58053-842-8 British Library Cataloguing in Publication Data 2005.

[14] Ming Huo, June Verner, Liming Zhu, Muhammad Ali Babar "Software Quality and Agile Methods" 28th Annual International Computer Software and Applications Conference (COMPSAC'04) 0730-3157/04 IEEE 2004.

[15] K. Schwaber and M. Beedl e "Agile Software Development with Scrum" Upper Saddle River, NJ, Prentice - Hall, 1st Edition, Oct 2001.

[16] L. Rising, N. S. Janoff "The Scrum software development process for small teams IEEE Software, Issue 17, pp. 26-32, 2000.

[17] K. Beck, "Embracing change with Extreme Programming" IEEE Computer, Vol. 32, Issue 10 October 1999.