

Study on Agile Software Development, Benefit and Challenges

Sumit Srivastava¹, Prof (Dr.) Baldev Singh²

¹Research Scholar, VGU, Jaipur

²Dean Engineering, VGU, Jaipur

Abstract - In the current era of software engineering the business process is measured in terms of customer satisfaction as their progress rather than any other criteria like optimization of data, meeting deadlines for delivery of product, architecture of the project etc. Day by day customers are becoming more demanding because their expectations are growing from software development units. To achieve the customer satisfaction the Agile is the effective development model for software industry which is looking forward for the interest of customers. Agile methods are fast, light and efficient to develop and support the customer business. Agile software methods are people oriented rather than process oriented. This paper focuses on two parts, first is to discuss the various methodologies of Agile and second part is to focus on handling traceability, in development and to organize the theoretical framework with the systematic approach. Despite the advantages of Agile this paper also discuss the criticism of agile methodology that it will fail to pay attention to the architectural and the design issues.

Keywords - Extreme Programming, Agile, Scrum, XP, Crystal Methodology, Project Development Methodologies, Kanban.

I. INTRODUCTION

The software development industry is highly competitive and dynamic. These organizations need to accommodate various and frequent changes in their customer needs, technology and regulations to maintain their competitive advantage. At the same time software organizations need to deliver the product in shorter period of time with excellent quality and low cost budgets. To provide the solution for this condition the flexible approach is emerged that is Agile software development. Over the years many different software methodologies have been introduced and used by the software engineering community. Developers and users of these methods have invested significant amount of time and energy in improving and refining them. The method they choose for software development depends on the type of organization, the type of project and the type of people involved. Agile Methodologies are based on incremental and iterative development. The four major characteristics of agile methodologies are: adaptive planning, iterative & evolutionary development, rapid and flexible response to change and promote communication. Its major concern is in obeyed the principles and being people oriented and communication

centered. Agile means an ability to think and understand quickly. Agile means denoting the quality of agile readiness for motion, activity, dexterity in motion etc [1]. This paper is organized as follows in section I there is an introduction about the framework of paper; section II is for the development of Agile; section III will explain the methodologies of Agile; Section IV have the various parts like benefits of Agile, limitations and challenges of Agile. Last but the most important part is the conclusion and future research covers in section V.

II. METHODS OF AGILE

Agile methodologies are used to achieve higher quality software in a shorter period of time, with customer collaboration, self organizing teams, less documentation and reduced time. The agile methodology exactly addresses the challenges of a disordered business, unpredictable and technology environment. Agile methods break the task into smaller iterations with the minimal planning. These iterations are the short time frames which involve a team working through a full software development cycle, including planning, requirements analysis, design, coding, unit testing, and acceptance testing. This will minimize the overall risk and allow the project to adapt the changes quickly. It is a family of lightweight methods which includes Scrum, eXtreme Programming (XP), Adaptive Software Development (ASD), Dynamic Systems Development Method (DSDM), Crystal and many more [2]. Extreme programming is a disciplined approach and it is also a deliverable approach to software development. It stresses the customer satisfaction and it allows its customer and software developers to change in requirements at the last stage of the life cycle too. Scrum is developed to manage the system development process. In this approach the ideas of industrial process control were applied to the software development and it reintroduces the flexibility, adoptability and productivity ideas. It also concentrates on how the team members should produce system flexibility in a constant changing environment. DSDM is a nonprofit and non rapid framework for rapid application development maintained by the consortium of DSDM. Its fundamental idea is to fix time and resources and then after adjust the amount of functionality instead of fixing the amount of functionality at the initial level. Adaptive software development (ASD) is a lightweight software development method which accepts continuous change as a norm. ASD emphasizes on continuous learning,

reevaluation, constant change, peering into uncertain future and intense collaboration with customers, end users and developers. ASD was designed for high speed, uncertain and high change projects. It follows a dynamic life cycle instead of traditional static life cycle [3]. The crystal family includes a number of methodologies for select the suitable methodology for the project. It includes the principles of methodologies to fit the different circumstances of different projects. A team should be crystal clear, which have the following policy standards like incremental delivery on regular basis, progress tracking, direct user involvement, testing of functionality, two users reviewing per release. These all methodologies are compared in a table 1.1 given below [4]

Table 1.1 Comparison of methodologies

Concept	XP	SCRUM	DSDM	CRYSTAL	FDD
Team Size	3-16	5-9	2-6	4-8	6-15
No. of Teams	1	1-4	1-6	1-10	1-3
Volatility	high	High	Low	high	low
Team Distribution	No	No	Yes	Yes	yes

III. BENEFITS

Agile methodology should be adopted during the software development because of its key benefits [5]. These benefits are shown in the figure 1.1 given below and thereafter discussed in detail-

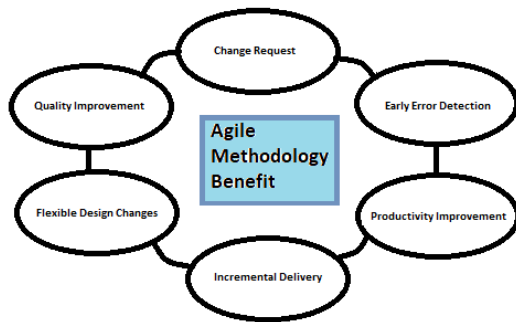


Fig1.1. Benefits of Agile Methodology

• Change Request

Planning phase is improved dynamically according to the need of the user and customer. Due to the direct involvement of customer in the development process and the customers are directly able to process the projects by on site interaction, so that the requirements truly reflect the current needs of end users.

• Early Error Detection

Testing is performed during iteration, the faults are detected earlier and they can be fixed before they can increase the severity of faults with a plan driven model. Continuous testing improves the feedback and also improves the code developed in future iterations.[6]

• Productivity Improvement

Team productivity increases by daily meetings which provides valuable information and to fine tune improvements

continuously. It also has the ability to fragment the large project into smaller parts and the design concepts which encourages the teamwork. Better communication leads to great team morale, self organizing team, knowledge sharing and a good team work which will increase the better performance and good return of investment.

• Iterative Delivery

Plans, design, requirements, code and tests are created initially and updated incrementally as needed to adapt to project changes. The project delivery is divided into small functional parts and they manage the risk and to get the feedback from the customer and end users.[7] The progress can be checked and monitored much frequently.

• Flexible Design Changes

Flexibility means an ability to change. Flexibility is based on the development process of the project. The major feature of Agile Methodology is to be flexible in the change of design which are made easily according to the handling changes and requirements of customer.

• Quality Improvement

Refactoring and test driven development is used for higher code reuse and better quality of software. This improved communication leads to faster turnaround time for blocking bugs.

IV. LIMITATIONS

There is nothing in this world which doesn't have any shortcomings and limitations. Here are some limitations of Agile methodology which are discussed as follows:[8]

- It focuses on processes for getting requirements and developing code and it will not focus on the design of product. So one can say that it emphasize on development rather than design.
- It requires high testing and due to this it may lead times and low test coverage.
- Team will require high coordination and communication with team leaders.
- It does not perform well on large products where number of iterations is required to complete the desired project.
- On a large project costing is also high due to Agile methods.
- High time is devoted for a single and small feature.
- Management overhead is also increased due to heavily team work.

V. CHALLENGES

There are various challenges in the field of agile methodology some of them are discussed here [9].

• Language barriers

To communicate with the colleagues the Agile will use the discussions based on phone calls, video conferencing. By this they can planned the short issues to solve them faster but it is

highly uncomfortable to have a technical discussions on phone or video conferences.

- **Agile is for highly Motivated and Skilled individuals**

Agile Methodology is meant for highly skilled and motivated personals; because the work assignment is not done in a separate process it is a team work and no control over the estimation.

- **Reverse Planning**

The team has to start the a reverse planning of the project for the time already committed, because the team has to spend the long hours to finish their tasks even they do the night outs to finish their tasks and finish the task at the committed time[10].

- **Flexible Scope**

Most of the projects are customer driven projects and to make the customer happy the team always had to accept the change without moving the deadline. Agile is known to accept the requirements at any stage and it is very difficult to estimate the efforts, critical budgeting and the team will get the more tasks to perform in ordered task and time which will affect the estimation.

- Another criticism is time management for meetings as well as completing the tasks. Agile demands in good time management skills from each and every stakeholders of the project.

VI. CONCLUSION AND FURTHER RESEARCH

Agile Methodology is not a cup of tea. It is perfectly fine decision which is provided to the customers and end users which is made up of facts rather than assumptions. A tertiary study can be performed when there are a sufficient number of secondary studies. There are different types of secondary studies like systematic literature Review, Literature review, systematic mapping, case studies etc. Researchers get an overview to better understand with these secondary studies but the tertiary studies are for consolidate the findings. The outcome of this survey is a mapping of Agile with their impacts on projects and its empherical studies to make them project better. This paper discusses the benefits, limitations, challenges of Agile. Instead of this it also discuss the software development methodologies which are Extreme Programming, Scrum, crystal etc which will focus on software production, adaptive towards requirement changes, collaborate with customers. The future work of this research includes the analysis the characteristics for the team which can help during the adaptation and implementation of Agile methodology. The future scope is also for the improvement of processes, practices for the motivation of team and proposed methods will be used to new case studies.

VII. REFERENCES

- [1]. V. Esther Jyothi and K. Nageswara Rao, "Effective implementation of agile practices A collaborative and innovative

framework", CiiT International Journal of Software Engineering and Technology, Vol 2, No 9, September 2010,p 64-70.

- [2]. Salem, A. M., "A Model for Enhancing Requirements Traceability and Analysis", International Journal of Advanced Computer Science and Applications - IJACSA, vol 1, issue 5, 2010,p 14-21.
- [3]. Peter Maher, "Weaving Agile Software Development Techniques into a Traditional Computer Science Curriculum", Proc. of 6th IEEE International Conference on Information Technology: New Generation, 2009, p 1687-1688.
- [4]. Xiaofeng Wang, "The Combination of Agile and Lean in Software Development: An Experience Report Analysis", IEEE Agile Conference, 2011, pp. 1-9.
- [5]. Morampudi, Naga Sri; Raj, Gaurav, "Evaluating Strengths and Weaknesses of Agile Scrum Framework using Knowledge Management", International Journal of Computer Applications Volume 65- No.23, March 2013,p. 885-892.
- [6]. Adam Solinski, Kai Petersen,"Prioritizing agile benefits and limitations in relation to practice usage", Software Quality Journal, Volume 24, Issue 2, June 2016, pp 447-482.
- [7]. M. Rizwan Jameel Qureshi, Fuad Bajaber, "Comparison of agile process models to conclude the effectiveness for industrial software projects", Sci.Int.(Lahore),vol. 28, issue 6 ,2016,p. 5119-5123.
- [8]. Hamed, A.M.M. and Abushama, "Popular Agile Approaches in Software Development: Review and Analysis", 2013 International Conference on Computing, Electrical and Electronics Engineering, Khartoum, 26-28 August 2013, p.160-166.
- [9]. Hummel, M., "State-of-the-Art: A Systematic Literature Review on Agile Information Systems Development", 47th Hawaii International Conference on System Sciences, Waikoloa, 6-9 January 2014,p. 4712-4721.
- [10]. Abrahamsson, P., Warsta, J., Siponen, M.T. and Ronkainen, J., "New Directions on Agile Methods: A Comparative Analysis", 25th International Conference on Software Engineering, Portland, 3-10 May 2003,p. 244-254.



The author is having 20+ years of IT experience in multi-functional areas with specialization in software project and program management. Extensively using agile methodologies like XP, Scrum etc. An eminent speaker and presented various presentation, training and lectures on Scrum.



The author is a Dean Engineering in VGU, Jaipur. His research interest areas are Neural Networks, Cloud computing. More than 20 books and research papers has been published.