Implementation of Agile Methodologies in Software Engineering and Project Management

[1]**Bathe Pooja Prashant**
[2]**Malusare Sonali Anil**
[3]**Kolpe Monika Dilip**

[1, 2, 3] Rajgad Dnyanpeeth's technical Campus,
Shri Chhatrapati Shivajiraje College of Engineering
Dhangwadi,Pune.
[1]bathepooja9619@gmail.com, [2] sonalimalusare.991@gmail.com, [3] kolpemonika15@gmail.com

ABSTRACT :
Agile Methodologies are widely spread and used around the world. There are 20 different agile methodologies and their types. Agile development methodologies have been gaining their importance in the present scenario. The usage of agile methodologies has been increased over past few years for development of software applications. This paper helps the people to get better understanding of implementation of agile methodologies in both software engineering and project management: Introduction adoption usage analysis of agile in both the streams. Also it explain limitations of agile in software engineering and project management

KEY WORDS : *Agile Methodology, scrum.*

Introduction

Successful Software is one which provides Quality Products in given time & cost Delivering quality Software in time is difficult task. In recent year there is a growing interest in context specific and growth oriented methodologies ,which provides a useful compromise between no process and too much process. The Agile movement seeks alternatives to traditional project management .Agile approaches help teams respond to unpredictability through incremental, iterative work cadences and empirical feedback. Agile methodologies are less documentation oriented and more code oriented that is source code is most important. Agile method is a method of software development that focus on customer satisfaction through early & continuous delivery of useful software components. Few agile process their impact on different software development processes and challenges faced during implementation of methodology.

Introduction to software Engineering:

Software engineering can be defined as the systematic design and development of software products and process management"[1] The IEEE [IEE93a] has developed a more comprehensive definition when it states: Software Engineering: (1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. (2)The study of approaches as in (1) [2]. Software engineering is a framework in theory that describes the activities and tasks that need to be performed in a sequence to optimize the cost and productivity of software development. Software projects can be so large that we have to do careful planning. Implementation is no longer just writing code but it is also following guidelines, writing documentation and also writing unit tests. Once we are finished coding, that does not mean that we are finished with the project: for large projects maintaining software can keep many people busy for a long time. Since there are so many factors influencing the success or failure of a project, we also need to learn a little about project management and its pitfalls, but especially what makes projects successful. The Software Engineering Institute (SEI) has established a comprehensive model that is based on a set of software engineering capabilities that need to be present as organizations reach different levels of proficiency. To meet the software development goals, organization must incorporate an engineering strategy that encompasses the underlying process, methods and tools. This strategy is often referred to as a Software Engineering Paradigm. These methodologies or methods are chosen based on the nature of the challenges and requirements of software.

Introduction to Agile Software Development:

Agility is ability to respond to unpredictable changes with quick response and profitability. Agile Development is a type of development that encourages customer satisfaction and early incremental delivery of the software; small, highly motivated project teams; informal methods; minimal

software engineering work products; and overall development simplicity.‖ It puts an emphasis on delivery and communication with clients . In fact, the clients are a part of the 3 stakeholders in development, along with the users and the

developers. There are various methods of agile development, with two of the most popular being extreme Programming and Scrum.

There are 12 principles of Agile Engineering:

1.Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

2.Welcome changing requirements, even late in development. Agile processes harness change for competitive advantage of customer.

3.Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter time scale.

4.Business people and developers must work together daily throughout the project.

5.Build projects around motivated individuals. Give them the environment and support they need, and trust them to do the work.

6.The most efficient and effective method of transmitting information to and within a development team is face-to-face conversation.

7. Working software is the primary measure of progress.

8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

9. Continuous attention to technical excellence and good design enhances agility

10. Simplicity—the art of maximizing the amount of work not done, is essential.

11. The best architectures, requirements, and designs emerge from self–organizing teams.

12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

These principles set the ground rules for agility. They are not always applied equally, and sometimes a few are left out completely of an agile process, but the general themes remain the same: focus on delivering small, quick iterations of the software, and focus on pleasing the customer or client.

The key features of Agile methods are continuous requirements gathering; frequent face-to-face communication; Pair Programming; refactoring; continuous integration; early expert customers Feedback; and methodologies based on the agile principles are Extreme Programming (XP) and Scrum. However, other methods such as Feature-driven Development, Dynamic Systems Development Method, Crystal Clear method, and Lean development have been also used. There are many benefits of the agile approach. Organizations are claiming that agile leads to improved time-to-market, increased quality, reduced waste, better predictability and better team moral, although not all of this is supported by empirical evidence. [5]

Project management introduction:
Lot of projects fails because of the low project maturity level so it shows that well-defined and tailored PM methodology is needed for the enterprise. Implementation of an agile project management (PM) methodologies is one of top trends of the software development process restructuration[4]. Different applications of the agile PM methodologies have been attempted since publication of an agile manifesto and different researches have been performed about successful or failed implementation (e.g. 3,4). The success factors of the agile PM methodology implementation have been related to people factors, training, customers, team (size, capability, motivation), company culture, planning, scheduling, etc.5

Literature Review:
Agile software development incorporate aspects of lean software development and many helps to accept the change in requirements and mainly focusing on customer collaboration in entire Software engineering process. The development cycle is very less and team maintains late process. Adopting light weight methodologies in software engineering give a greater advantage to change the requirements at any stage. As Software applications are not multidisciplinary and mainly focus on functionality only few team are assigned for a project that would help team to make decisions in ease. As architectural design is minimal teams can work on parallel on architectural design without any issues. Applying agile practices can reduce cost and can focuses on current requirements and no detail documentation is needed and developers can focus on requirements. Adopting agile principles in software engineering gives better results when compared with web engineering. There are many methodologies proposed that applies agile principles to build software application very fast. All the methodologies aim to deliver the idea of agile principles. However they work in different ways. The Most common methodologies are:

a. Scrum

C. Feature driven development

Agile Methodologies:
All the above methodologies are proposed specifically for software applications and solved the problems that occur in software development process.

Extreme programming: This focuses on the development rather than managerial aspects of software projects. According to the book ―Extreme programming explained‖ by Kent beck [7] concluded that XP mainly focus on coding, changing requirement, preceding without knowing everything about the future, relying on other people and he also explained how XP is used in different projects and its life cycle. Unlike XP for web XP has no cross functional teams. Each team member works on the same component.

Scrum: This is a project management model applied

to software engineering. It mainly focuses on how team should work together to produce a flexible software to accept the new change. The development cycle is 1 or 2week reviews are conducted every day. It involves iterative and incremental cycles called sprints. The key practices in scrum are Product backlog, Sprints, Sprints planning meeting, sprint backlogs. Both XP and Scrum can be used together to produce effective product. Feature driven development: It does not address all the agile principles. It cannot be applied in entire software development, it is only applied in design phase and build phase. Though agile principles are applied in different ways in each method, some of the properties are common in all methods that include Feedback, Learning, Customer involvement, Frequent meeting, accepting a change in middle of the process focusing on business problems etc. Adopting methodology is dependent on the types of application and environment in the software organization. Agile methodologies work best for teams with relatively small number of members as teams are very few in software engineering agile principles are very easy to apply in software engineering.

A. Agile Frameworks:

Frameworks define which methodologies are useful for software development [9]. Different methodologies can be combined to achieve good results. Frameworks will not specify how to carry methods to achieve agile principles following frameworks are used

1). Dynamic Systems Development Method
2). Adaptive Software Development (ASD)

Dynamic System Development (DSDM): This is a framework to implement RAD development. Dynamic System Development can be used along with XP and Scrum is just a framework. Martin Fowler, one of the writers of Agile Manifesto, believes, ―DSDM is notable for having much of the infrastructure of more mature traditional methodologies, while following the principles of the agile methods approach‖ [9]. There are nine practices to deliver the idea of DSDM .It also includes active user interaction, testing throughout the life cycle. Teams mainly focus on adaptive change and quality.

Adaptive Software Development (ASD): This is a framework to apply agile principles in software engineering it uses some of the techniques of extreme Programming, This method is based on complex adaptive systems and it is mainly useful for applying principles in intense pressure and more adaptive change environment. Adaptive Software Development and crystal method can use any software engineering technique. Object oriented models are used to design models for development.

Project Development:

Ralston describes a list of ten values to be a project Manager of an agile team: proactively demanding integrity of all stakeholders, building long-term relations, delivering according to the requirements, effortlessly encouraging learning, being able to define, delegate and exercise role and authority, recognizing that people are the ultimate value, encouraging talented people, fair play with customer, delivering in time result-oriented working products and building an excellent team. However, this list of ten values is not comprehensive, and a customized list per team and organization structure must be outlined. According to Baker and Thomas, agile principles are unique because they are applicable to the product- and service-oriented companies for operational work and management. Consistently implying the agile methodology will help to establish a pool of multi-skilled managers, who can work at different positions in different departments. The idea is a concept to use survival for the fittest, which is also called the meme idea. Memes are used to introduce and effectively sustain a culture of leadership such as customer satisfaction through short- cycle releases, the incremental improvement to improve the quality instead of delivering software as a complete package after the deadline, and communication problems are solved by introducing daily meetings [10].

Advantages:

It encourages you to start; so many good ideas and projects never even get off the ground out of fear. Agile by definition encourages you to at least get on with it, by identifying a minimal viable product you can at least end up doing something. (In my case actually fixing a system that means I did not wake up to a cold house or no hot water). It encourages you to learn new skills and take opportunities. A key ingredient of agile is that it encourages you to embrace new possibilities, to see if things might work, this encourages you to learn.

It allows for serendipitous possibilities. Twitter is often cited as the most obvious example when it was born out of Odeon. In my case along the way of fixing my heating by learning how to access underneath my floors I was able to install new plug sockets and install floor insulation; all of which would never have happened if I had not started out. It achieves results, by forcing yourself into a repetitive design/implement, design/implement cycle you do actually achieve good things (in my case a warmer house). The results are better than industry standard, by launching on a cycle of design and refinement you find yourself pushing yourself and with very good results (in my case a far better heating system with features that do not appear in most other houses).

Limitations of Agile methodologies in project management:

Something's should not be developed by agile. Heating systems are known quantities with proven technology; even complicated ones should just work. In this case I was trying to fix inexcusable poor design which I should not have had to do, unfortunately the same applies to the use of agile in the project management world – something's should

just work with no excuses. Agile can be expensive, especially if you do not have the resources in house. The only reason I could afford to fix my heating system by this process was that I was willing to commit time to learning new skills and equipment. If I had paid a professional plumber to carry out the same process for me it would have been very expensive indeed! Agile can lose sight of what it is trying to achieve. You can become locked into the process of improvement for improvement's sake, sometimes something is just fine and does not need to be tweaked or improved. Agile does not work in the context of a customer who requires a fully developed solution from day one. My heating system worked so badly that anything would be an improvement so in that sense I had nothing to lose. Agile requires sacrifice. When moving from an existing website to a new website and you plan to use agile you need to be sure that you or your key stakeholders ready to accept the minimal viable product that will be initially developed and then rapidly iterated as users use it. It is a fallacy that you can run well for instance two websites, a live beta as well as an old one. Users will only ever want to interact/update one. In my case I could not run two heating systems side by side.

Limitations of Agile methodologies in Software engineering:

This literature shows that agile methods are not completely suitable for software engineering. Perhaps these methods are based on object-oriented paradigm. The limitations we observed are the following: Agile methodologies mainly focus on pair programming and informal reviews to build reliable software. However, this type of technique is not yet been proven for reliable product. These methodologies involve the end user in the development process. Clients may be busy and involving client is not possible sometimes. Keep it simple requires some extra work. Contracts can be a problem, as with other approaches to iterative development. The main limitation of agile practices is implementing agile practices in companies small firms require skilled personals. Other limitation of agile practices is regarding documentation as it mainly focuses on customer informal reviews documentation is not given a higher priority. However, documenting requirements and process flow is best practice to cope up with future problems. Continuous testing is needed throughout the life cycle and this may increase the cost of resources of the project. Agile principles given in the agile manifesto can be achieved only for certain software application. There is still a debate whether agile principles are advantageous when compared with traditional methodologies. However, agile model has some limitations and advantages as it provides a solution for most common problems but not all.

Conclusion: As for the application of agile development, there are many different applications of agility to software engineering parallel the many different applications of agility to project management: because the methods are flexible, and the rules need not be followed strictly, the agile principles can help improve almost any application's development. Different companies follow their methodologies based on the environment the methodologies that we have discussed in this paper are proposed to solve the most common problems

REFERENCES:

[1]. I.J. Education and Management Engineering, 2016, 5, 1-14 Published Online September 2016 in MECS (http://www.mecs-press.net) DOI: 10.5815/ijeme.2016.05.01 Agile Methodologies in Software Engineering and Web Engineering Arun Kumar Kamepalli a, Tejaswini Nalamothu

[2.] Software Engineering A Practitioner's Approach seventh edition by Roger S.Pressman, Ph.D.

[3] Ralston, L., 'Agile project leadership-My top 10 value driven principles'. Proc. of the Agile Conf., Canada, 2008,pp. 417-422.

[4] Pressman, R. S., 'Software Engineering' (McGraw Hill,
2010). Routing Minimizing Average Number of Hops" IEEE Journal on Selected Areas in Communications Vol 21 No 9 November 2003

[5] Cubric, Marija. "An agile method for teaching agile in business schools." The International Journal of
Management Education 11.3 (2013): 119-131.

[6]Erande, Ameya S., and Alok K. Verma. "Measuring agility of organizations-a comprehensive agility
measurement tool (CAMT)." International Journal of Applied Management and Technology 6.3 (2008).

[7]Beck, Kent. Extreme programming explained: embrace change. Addison-Wesley Professional, 2000.

[8]Paulk, Mark C. "Agile methodologies and process discipline." Institute for Software Research (2002).

[9]Strode, D. E. "Agile methods: a comparative analysis." Proc. 19th Annual Conference of the National
Advisory Committee on Computing Qualifications (NACCQ 2006), Wellington, New Zealand 2006.

[10]I.J. Modern Education and Computer Science, 2017, 1, 52-59
Published Online January 2017 in MECS (http://www.mecs-press.org/)
DOI: 10.5815/ijmecs.2017.01.06
Adaptive Framework to Manage Multiple Teams Using Agile Methodologies

M. Rizwan Jameel Qureshi
Faculty of Computing and Information Technology, King Abdulaziz University, Jeddah, Saudi Arabia
Email: muhammad@kau.edu.sa
M. Kashif
Department of Medical Sciences, Uppsala University, Sweden
Email: sheikhkashif@yahoo.com