Agile Methodology: Hybrid Approach Scrum and XP

Farrukh Musa, Muhammad Ali Tariq

Abstract— Nowadays, agile is the most usable process model in IT industry. There are plenty of agile methodologies in the market but all of them have some drawbacks that must be solved. Most commonly used agile methodologies are scrum, extreme programming (XP), lean development etc. This research paper is basically to introduce the new agile methodology i-e hybrid of scrum and XP that overcome the drawback and issues we face in previous agile methodologies. Further there is detail that how it works and when to use along with some advantages.

Index Terms— hybrid software engineering methodology, agile approach, Scrum, XP, extreme programming, Scrum with XP.

1 Introduction

AGILE methodology is now becoming most popular and usable process model in IT Development industry. In this methodology we discuss certain models such as by nature its Incremental because in this software is developed in incremental, rapid cycle. Results builds in small incremental release and each release is thoroughly tested to ensure the software quality maintainability [1, 2]. In it we invest lesser time on analysis and design phase as compare to other because here we do not build the whole design at once, it is done task by task on bases of its priority.

Agile process model is more flexible by its nature than others. It recommends minimizing the documentation and spending more time on development. It allows the involvement of end user and inter-communication between work team and client to assure the quality. Some necessary things we do in agile are such as develop small increment release and iterate, Focus on frequent delivery of product, complete each feature before moving on next, and last but not the least a collaborative and co-operative approach between all stakeholders is essential. In this clients really enjoy their involvement by seeing and discussing their desired project step by step and achieve the best result [3].

Basically in agile work in the form of sprints, it divides the whole project into small project and developed those small projects one by one according to their priority. In this methodology the project management team moves forward slightly different; the team rely far more on the project manager. So it's necessary that manager's negotiation skills are good and have good co-ordination with client, to understand the software requirements and plan the work to fulfil the maximum requirement of the client [4].

We can use agile approach when changes are needed to be implementing in a project because by using this changes can be implemented at very little cost, secondly to implement new features in software project, the developers need to lose only the work of few days to roll back and update according to the new one. As compared to other models, such as waterfall, rapid prototype etc. agile process model requires very limited planning to get started with the project. Changes and enhancement can be discussed and implement later on as per client demand to get more efficient and better results.

The paper is distributed in some major sections; section II will be comprised of related work on the different agile methodologies which are already existing and up to date, while Section III deals with the proposed methodology. Section IV consists of case study and the final section: section V consist of conclusion and future work.

2.1 Related Work

(2015, Jan Vlietland, Hans van Vliet) Large companies operating in the information intensive industries increasingly adopt Agile/Scrum to swiftly change IT functionality because of rapid changing business demands. IT functionality in large enterprises however is typically delivered by a portfolio of interdependent software applications involving a chain of Scrum teams. Usually, each application from the portfolio is allocated to a single Scrum team, which necessitates collaboration between the Scrum teams to jointly deliver functionality [5]. They identified six issues in chains of co-dependent Scrum teams; coordination, prioritization, alignment, automation, predictability and visibility.

(2013, Stephen Wood, George Michaelides, Chris Thomson) Developing a theory of agile technology, in combination with work, must include assessing it performance effects, and whether all or some of its key ingredient account for any performance advantage over traditional methods. Like 40 small-scale software development teams which used Extreme Programming (XP). We measured the teams' adherence to XP methods, their use of XP-specific team practices, and standard team attributes, as well as the quality of the project's outcomes [6].

(2010, Rick Freedman) XP has received the lion's share of interest among agile methods. XP drew attention because it converged with many of the practices that developers were dis-

covering in real project work because its initial success that might cause problem in the coming time.

XP is unique among the agile methods surveyed here because it is focused on software development, and it is not presented as a project methodology. XP doesn't scale to teams larger than 10 or so, and it's not well suited to virtual or dispersed teams. XP is presented as a series of principles that agile developers should follow and that are the planning game, small releases with high-value element, simplicity, refactoring, pair programming, testing, sustainable development. XP's broad exposure, and the debate it has engendered, has given the project management and software development communities a chance to consider their ideas and work [7, 8].

(2014, Stavros Starvu) Industrial surveys on agile method usage describes that the practitioners and researchers often claim that agile methods have moved into the mainstream for the last few years. To support this claim they refer to recent industrial surveys which tend to report high rates of agile method usage. However, many of these industrial surveys are conducted by agile consultants to make the tasks more accurate and in time. Initial considerations about the trustworthiness of recent industrial surveys on agile method usage and suggest a number of recommendations for increasing the quality and value in the coming time [9].

(2014, Jennifer Perez, Jessica Diaz, Juan Garbajosa, Agustin Yague) Agile architecting is a key issue to scale agile to develop large software systems. They describe a set of mechanisms that make agile architecting feasible. These mechanisms are smoothly integrated in a Scrum for agile architecting by defining product requirements in terms of features by using feature pools and feature trees to provide the portfolio and roadmap visions of a product, designing highly flexible architecture called working architecture, software architecture through features and design decisions as traceability mechanisms, systematically assisting agile practitioners by conducting change impact analysis of features through various iterations of the agile process [10].

2.2 Commonly used Agile Methodologies

There are various methodologies and life cycles use in market daily that are also known as agile. Agile development methodology provides opportunities to assess the direction of a project throughout the development lifecycle. Agile approaches help teams respond to unpredictability through incremental, iterative work cadences and empirical feedback. Agile propose as an alternative to waterfall and for traditional sequential development. The various agile Scrum methodologies share much of the same philosophy, as well as many of the same characteristics, each agile method has unique processes that set it apart. A common characteristic in agile software development is the daily basis meeting to follow up the schedule and plan to remain update with the progress. Some of Agile methodologies are discuss below as mentioned in Figure 1.2:

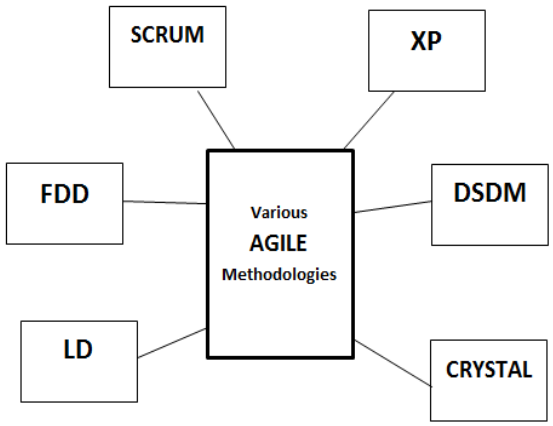

Figure 1.1: Some Agile Methodologies

A. SCRUM

Scrum is an iterative and incremental agile software development framework for managing product development. Scrum is the most popular and widely adopted agile method. Mostly this used because it is relatively very simple to implement and fulfil client needs more efficient in less time.

B. XTREME PROGRAMMING (XP)

Extreme programming also one of the famous agile methodology. In it, developer does every work means everyone has command on all phases and needs no specialization of role. Pair programming is done in it means two developers works while sitting on one machine.

C. DYNAMIC SYSTEM DEVELOPMENT MODEL (DSDM)

DSDM is probably known as the most complete agile methodology. DSDM was even present when the term agile was invented. Later on, it updates with the nature of agile and the criteria we use in it. Now, DSDM depends on all the principles of agile. DSDM is probably the most complete agile methodology whereas SCRUM and XP are quite similar and are easier to implement.

D. FEATURE DRIVEN DEVELOPMENT (FDD)

FDD is a process model that provides the functionality of multi-tasking. This agile methodology is used when the applications are complex because in it we communicate through reports. This cannot be used for small project because of its complexity that why this is not commonly used in market.

E. LEAN DEVELOPMENT (LD)

LD is quite similar to scrum, it actually consists of three main phases i-e start up, steady state and transition. LD removes all the useless material from the project because of which is quite useful and accepted by the business leaders.

F. CRYSTAL

Crystal method is basically a collection of methodologies that focus on communication channels and interaction of team, skills and project prioritization. This AGILE model is mostly used when the project is critical and user does not have clarity that what they required.

2.3 Comparison

These are the most popular agile processes but all of them have some advantages and disadvantages, not even a single one you can say is perfect [12]. Describe in Table 1.1:

Methodologies	Advantages	Disadvantages
SCRUM	- High level of communication is observed. - Client participation and guidance - Self organizing team (expertise) and feedback	- Poorly Documented - can easily get off track - changing requirements, Clients keep demanding more new functionalities.
XP	- End user actively involved - frequent feedback opportunities. - strong technical practice.	- Clients are not clear about what they want. - lack of disciplines.
DSDM	- strong control on project life cycle - Requirement priority approach.	- Documentation is complex and time consuming. - expects continuous users involvement
FDD	- Multiple teams working in parallel. - easy to understand because of documentation.	- Less communication within and out of team. - Complexity is so much for small projects.
LD	- Cross functional teams. - eliminates all projects waste.	- does not specify technical values. - Complex to adopt due to constraints.
CRYSTAL	- High Risk and Highly important component given first. - effective team communication	- the planning and development is not depended on requirements - Adjustments are required in all projects.

Table 1.1: Advantages and Disadvantages of Agile Methodologies

team moves forward slightly different; the team rely far more on the project manager. So it's necessary that manager's negotiation skills are good and have good co-ordination with client, to understand the software requirements and plan the work to fulfil the maximum requirement of the client [13]. We can easily understand the working that how we work in this by the Figure 1.2 that after completing and testing each sprint it moves to the next sprint, as first it completes task of sprint 1 and then move on to sprint 2 and then 3 and so on.

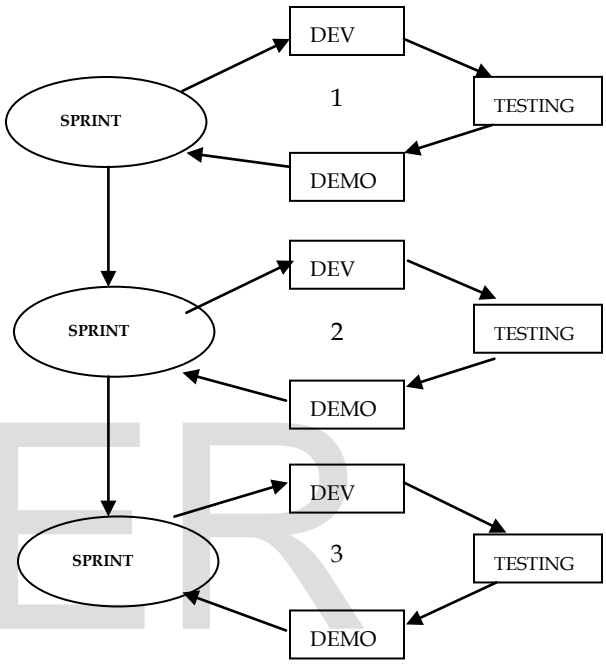

Figure 1.2: Working in sprints

3 Proposed Methodology

As we see above, agile project management methodology has been widely used in recent years. Although numerous authors have pointed to the advantages of agile, with its emphasis on individuals and interactions over processes, customer collaboration over contracts and formal negotiations, and responsiveness over rigid planning, there are, to date, very few large-scale, empirical studies to support the contention that Agile methods can improve the likelihood of project success. There are number of agile methodologies nowadays in market but all of them have some drawbacks and difficulties. Scrum and XP are the two most running process life cycles that are facing problems in requirement gathering. So going to introduce hybrid of scrum and XP, by combining these two methodologies with some enhancement in documentation (requirement gathering) and by removing drawbacks in both processes we can get our best agile process model.

A. How it works?

This agile methodology basically works in the form of sprints just like scrum, it divides the whole project into small project and developed those small project one by one according to their priority. In this methodology the project management

A. When to use?

To implement new features in software project, the developers need to lose only the work of few days to roll back and update according to the new one. This agile method anticipates change and allows for much more flexibility than traditional methods. Clients can make small objective changes without huge amendments to the budget or schedule. As compared to other models, Such as waterfall, rapid prototype etc. Agile process model requires very limited planning to get started with the project. This agile method is based on giving high priority to customer participation, from the very beginning of the development cycle. The objective is to keep the client involved at every step so that they have a product that they are happy with at the end. This method saves the client money and time because the client tests and approves the product at each step of development.

Some major benefits of this hybrid agile methodology are:

- Lower cost.
- Enables clients to be happier with the end product by making improvements and involving clients with development decisions throughout the process.
- Encourages open communication among team members, and clients.

- Providing teams with a competitive advantage by catching defects and making changes throughout the development process, instead of at the end.
- Speeds up time spent on evaluations since each evaluation is only on a small part of the whole project.
- Ensures changes can be made quicker and throughout the development process by having consistent evaluations to assess the product with the expected outcomes requested.

4 Analysis & Discussion

Different agile processes work almost in the same way like requirement gathering, designing sprints, sprint backlog and so on. But it differs from each other in terms that are discuss in Table 1.2:

State	SCRUM	XP	DSDM	FDD	LD	CRYSTAL
Documentation	minimum	minimum	more than XP & scrum	far more than DSDM	more than XP & scrum	minimum
Project size	any size	Small size projects	any size	any size	any size	any size
Team Meetings	Informal daily stand up disc.	Informal daily stand up disc.	share info. through doc.	share info. through doc.	Informal daily stand up disc.	face to face meetings
End user involvement	involve when needed	fully involve	participate in all release	participate through reports	involve when needed	involve in all release
Summarizing Phrase	Prioritized business value	Simplicity	Current business value	Business model	Accepted by business leaders	Size and criticality
Small team	Suitable	Suitable	Suitable	Not Suitable	Suitable	Not Suitable

Table 1.2: Present Agile Processes (Similarities & Differences)

So to get more perfection in our processing, hybrid methodology is a good way. Requirement gathering can by make more accurate by using prototyping. In this way, the size of the documentation is going to be small. This hybrid process is suitable for projects of any size. Informal daily basis meeting takes you to excellent result and also saves time that is wasted in formal meeting. End user should be fully involved to get what he/she wants [14]. Small team can also use this hybrid model because in this we take everyone as a multitasked.

5 Conclusion

Scrum, XP, LD, DSDM and other agile methodologies are used in market on daily basis but with the passage of time each them have to face some problems. It does not concern methodologies that would be suitable for all projects; they find their place in smaller developing teams. But the hybrid scrum and XP is suitable for almost all the small and large projects. They can be used in projects where the customers do not have a clear idea about the output product. High level of communication among all team members and customers plays an important role in the success of this methodology. An advantage of this methodology was its possibility to react fast on customer's changes in requirements and possibility to adapt the program to users without any loss, even at the cost of removal of a great part of already written code. The methodology prefers fast reaction to a change before the plan completion, which proved to be important in the case of the developed software.

- *Farrukh Musa is currently pursuing master's degree program in Computer Science in University of Engineering and Technology, Pakistan, E-mail: farrukhmusa@hotmail.com*
- *Muhammad Ali Tariq is currently pursuing master's degree program in Computer Science in University of Engineering and Technology, Pakistan, E-mail: alitariq16@gmail.com*

References

[1] Xiaodan Yu and Stacie Petter, "Understanding agile software development practices using shared mental models theory", Volume 56, Issue 8, Pages 911–921, August 2014.

[2] Ayca Tarhan, Seda Gunes Yilmaz1, "Systematic analyses and comparison of development performance and product quality of Incremental Process and Agile Process, Information and Software Technology", Volume 56, Received 12 April 2013, Issue 5, May 2014, Pages 477–494, Hacettepe University Computer Engineering Department, Beytepe Kampusu, 06532 Ankara, Turkey.

[3] Laurie Williams, "Agile Software Development Methodologies and Practices, Advances in Computers", Volume 80, Pages 1–44, 2010, Department of Computer Science, North Carolina State University, North Carolina, USA.

[4] Bjørnar Tessem, "Individual empowerment of agile and non-agile software developers in small teams", Volume 56, Received 30 July 2009, Issue 8, Pages 873–889,, August 2014, Norway.

[5] Jan Vlietland, Hans van Vliet, "Towards a governance framework for chains of Scrum teams", Volume 57, Pages 52–65, January 2015.

[6] Stephen Wood, George Michaelides, Chris Thomson, "Successful extreme programming", Volume 55, Issue 4, Pages 660–672, April 2013.

[7] Rick Freedman, "Four variants of agile development methods, Tech Decision Maker", May 26, 2010.

[8] Rostislav Fojtik, "Extreme Programming in development of specific software", Volume 3, Pages 1464–1468, 2011.

[9] Stavros Stavru, "A Critical Examination of Recent Industrial Surveys on Agile Method Usage", Volume 94, Pages 87–97, August 2014.

[10] Jennifer Perez, Jessica Diaz, Juan Garbajosa, Agustin Yague, "Bridging User Stories and Software Architecture: A Tailored Scrum for Agile Architecting", Pages 215–241, 2014.

[11] Russ J. Martinelli, Dragan Z. Milosevic, Peerasit Patanakul, James Henry, Jaffrey A. Leach, "Agile Project Execution", Febuary 2016

[12] Martin Blom,"Is Scrum and XP suitable for CSE Development?", Volume 1, Issue 1, Pages 1511–1517, May 2010.

[13] Hrafnhildur Sif Sverrisdottir, Helgi Thor Ingason, Haukur Ingi Jonasson, "The Role of the Product Owner in Scrum-comparison between Theory and Practices",Volume 119, Pages 257–267, 19 March 2014.

[14] Nils Brede Moe,Torgeir Dingsoyr, Tore Dyba, "A teamwork model for understanding an agile team: A case study of a Scrum project", Volume 52, Issue 5, Pages 480–491, May 2010.