



Scrum: An Agile Method

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ABSTRACT

Scrum, an Agile method has been a topic of much discussion among today's software industry people and professionals. Unlike many other software development and management processes, Scrum is a framework that favours an iterative and incremental approach. Scrum methods were broken by keeping changing requirements of the clients in mind, and so Scrum has not only supported the adaptation of late requirements in software development but also supports self-organizing manner of work. As scrum seems so fruitful, in this paper authors done a review on Scrum for finding out the current working and adaptations in Scrum implementation and this paper will be an add on literature for other professionals interested in Scrum and agile methods development.

Keywords

Scrum, Agile methods, quality, iterative and incremental approach.

1. INTRODUCTION

Software quality has always been a hot topic for software developers and customers as well. This can be achieved only if our software project management framework is up to the mark and so for improving the old frameworks, new ideas came up day by day. Scrum is one of these new ideas. From 2001, with the release of agile manifesto, scrum also made its position in the literature of the software industry. Scrum focuses on project management in situations where it is difficult to plan ahead. Software is developed by a self-organizing team in increments (called "sprints"), starting with planning and ending with a review. Features to be implemented in the system are registered in a backlog. Then, the product owner decides which backlog items should be developed in the following sprint. Team members coordinate their work in a daily stand-up meeting. One team member, the scrum master, is in charge of solving problems that stop the team from working effectively [2].

For example, based on experience, one report claims that Scrum practices such as daily scrum, scrum of scrums, sprint planning and retrospective meetings engage distributed team members in collaboration, help visualization of hidden problems, develop trust and increase team spirit [1]. Daily scrum meetings bring transparency and encourage informal communication among distributed stakeholders; sprints provide frequent offsite work monitoring opportunities; sprint planning meetings provide shared understanding of common goals and improve task awareness, and; sprint "demos" bring transparency to stakeholders and prevent problems early[4]. An open sprint planning among team members provide a full overview and knowledge to every team individual. This review tries to evaluate and present the research findings on Scrum up to present day. This systematic review provides an overview of fields researched, their results and future implications. We hope this review shall be very helpful for the researchers who are enthusiast for discovering something new in the field of Scrum and software engineering.

2. AGILE IN A GLANCE

All Agile manifestos were firstly coined in the year 2001. This manifesto defines some values and principles which are as follows-



2.1 Agile Manifesto Values-

- V1: Individuals and interactions are more important than processes and tools.
- V2: Working software is more valued than comprehensive documentation.
- V3: Customer collaboration are emphasized over contract negotiation.
- V4: Responding to change is emphasized over following a plan.

2.2 Agile Manifesto Principles-

P1: Customer is everything increases his satisfaction by rapid delivery of software.

P2: Welcome and inclusion of late changing requirements.

P3: Continuous delivery of working software.

P4: Enhancement of technical excellence and good design by keeping continuous attention.

P5: Simplicity is essential.

P6: Progress measurement through working software.

P7: Face to face communication is the best communication.

P8: Develop projects in healthy environment with trustworthy.

P9: Have self organizing teams.

P10: Self judgment at regular intervals to become more effective.

P11: Sustainable development, ability to maintain a constant.

P12: Co-operation between developers and business persons.

2.3 Agile Methods-

Table 1 shows the some agile methods and their one line description-

Table 1. Agile Methods and their description[10]

<i>AGILE methods</i>	<i>One line Description</i>
Whole Team Development	Respect every one’s ideas and include every member.
Pair Programming	One coder and one tester on same module. ‘Two minds are better than one.’
	Iterative and incremental approach that welcome changing



SCRUM	requirements of customer.
Extreme Programming(XP)	Continuous integration and testing and risk estimation at all levels.
KANBAN	Ensures that a particular activity is on time and will provide a product.
Planning Poker	Group activity that estimates project scope without influencing any one's ideas.
Code Refactoring	Improve internal structure of code for getting better output.

3. LITERATURE SURVEY

According to Rising and Janoff, A team-based approach for controlling the chaos of conflicting interests and needs to iteratively, incrementally develop systems and products when requirements are rapidly changing. Scrum can improve communications and maximize co-operation. This method is scalable from small single projects to entire organizations [5].

For a complex systems development project to be successful it should be implemented in small steps, each with a clear measure of successful achievement and with an option of rolling back to a previous successful step upon failure [6], and this can be done by following the activities of Scrum. Agile methodologies put a great emphasis on people and their talents, skills, and knowledge, suggesting that for agile development to be effective team members must be responsive, competent, and collaborative [7][8].

In 2013, Scrum Alliance had conducted a survey on the current state of Scrum in the world, in which 499 participants from 70 countries took part. This report has shown that Scrum is the most used method from agile methods and it also shown that more than 80% of their participants have been involved in at least one or more Agile projects, it is no surprise that a majority use Scrum regularly [9].



Fig 2: Highest Business Priorities for Scrum [9]



Some basic terms of Scrum can be defined as [9]-

The *Scrum Master* is not a “master of Scrum” but a role within the framework, something people may misunderstand, especially as this relates to the Product Owner role as well.

The Scrum Master is tasked with being responsible for ensuring that Scrum values and practices are encouraged and that barriers impeding the progress of the project are removed from the team. This person leads by coaching and facilitating rather than by directing and controlling.



Fig 2: Highest Business Priorities for Scrum [9]

The *Product Owner* is the specific individual who has the authority to set business priorities for projects, usually through a Product Backlog. This person usually works directly with the customer.

The *Scrum team* typically numbers 4-9 people and is usually expected to be cross-functional and self-organizing. The Sprint Backlog is an output of the Sprint planning meeting. It consists of the tasks for the Sprint derived from the Product Backlog. “Done” defines what the team means when it commits to “doing” a Product Backlog item in a Sprint. The Sprint Backlog Burn-down is a graph of the amount of Sprint Backlog work remaining in a Sprint across the time left in the Sprint.

A *Sprint* is a one iteration of a month or less that is of consistent length throughout a development effort. Only the Product Owner has the authority to cancel the Sprint.

The *Sprint Planning Meeting* is attended by the Product Owner, Scrum Master, and the entire Scrum team. During the Sprint Planning Meeting, the Product Owner describes the highest-priority features to the team. The team asks enough questions that they can turn a high-level user story of the Product Backlog into the more detailed tasks of the Sprint Backlog.

The *Sprint Retrospective meeting* is a time-boxed meeting where the team discusses what went well in the last Sprint and what can be improved for the next Sprint. The *daily stand-up meeting* is a time-boxed, 15-minute meeting used to inspect progress toward the Sprint goal and to make adaptations that optimize the value of the next workday. The two main outlooks were remarked in Scrum Alliance’s survey[9]-

Outlook 1- Scrum will continue to expand outside of software development.



Outlook 2- Scrum will continue to grow because it is poised for the age of the customer.

4. REVIEW METHOD

For performing this review, we had built up some stages based framework which includes data collection, acceptance and rejection criteria, search strategy, quality assessment and data extraction. These stages are developed by taking, guidance from [4].

4.1 Data Sources and Data Collection-

The data searching strategy included online electronic data searches and manual searches of various national and international conference proceedings. In this context, following online journal's databases were searched-

- ASQ Digital Library
- IEEE Explore
- Springer Link
- Academia.edu
- Research Gate
- Agile Alliance
- Science Direct –Elsevier

In addition we also searched volumes of various conference proceedings-

- ICRTES2013
- ICRTES2014
- CONFLUENCE2013
- ICEA2014
- ACSITEET2014

4.2. Acceptance and Rejection Criteria-

The studies which presented quality data on Scrum or agile methods were accepted. We included the studies of both students and professionals. The language medium of all studies was English. Some very old studies were rejected if they were not up to the mark. The author's main focus was to accept qualitative and agile methods based research studies.

4.3. Search Strategy-

For searching research papers, we used Google search engine and MSN search engine. For this activity, we made some combinations from the area of agile methodology. Some of those combinations are as follows-

- Agile Software Development
- Agile with Scrum
- Agile and scrum
- Scrum Method and Agile
- Scrum and Agile Benefits
- Pros and Cons of Scrum or Agile

4.4. Quality Assessment-

For doing quality assessment, the authors did follow the criteria defined in [4]. The three main issues defined in [4] are as follows-



4.4.1. Rigour.

Has a thorough and appropriate approach been applied to key research methods in the study?

4.4.2. Credibility.

Are the findings well-presented and meaningful?

4.4.3. Relevance.

How useful are the findings to the software industry and the research community?

4.5. Data Extraction-

On this final stage, data was extracted from each of the study. The data were extracted on the basis of parameters like the research method used, agile methods, domain, publication, and remarks. Then we made a table (table 2) is representing this data. This table shows research methods, agile methods, domains remarks and publications of these selected research papers. The list of selected research papers is given after table 2. These research papers were selected by following the review method described in previous phase.

Remarks for Table 2-

RP1- An agile development process implies an environment that is dynamic and to which it is constantly adapting, be it in a controlled, effective way.

RP2- Scrum is an effective and efficient method that when properly implemented leads to improved results.

RP3- Scrum needs to be sufficiently “agile” to adapt to new usage domains for them to continue to be relevant and to survive.

RP4- Scrum is found to offer a good development process for smaller R &D projects.

RP5- Understand Scrum properly before deploying it with Change management.

RP6- Agile methods need to be scaled through the organization in order to achieve max benefits and scrum provides agility in data ware house.

RP7- Scrum is appropriate for projects where we can't define requirements upfront and chaotic conditions are anticipated throughout the development.

The list of selected research papers used in table 2 is as follows-

RP1- Kevin Vlaanderen, Slinger Jansen, Sjaak Brinkkemper, Erik Jaspers, “The agile requirements refinery: Applying SCRUM principles to software product management”, Elsevier publications 2010, pp 58-70.

RP2- Mark C. Paulk, “A Scrum Adoption Survey ”, SQP VOL15, No.2, ASQ, 2013, pp 27-34.



RP3- Emam Hossain, Paul L. Bannerman, and D. Ross Jeffery , “Scrum Practices in Global Software Development Research Framework”, Springer-Verlag Berlin Heidelberg 2011, pp 88-102.

RP4- Torgeir Dingsøyrl, Geir Kjetil Hanssen, Tore Dybå Geir Anker, and Jens Olav Nygaard, “Developing Software with Scrum in a Small Cross-Organizational Project”, Springer-Verlag Berlin Heidelberg, 2006, pp 5-15.

RP5- Dr. Mark C. Paulk, Noopur Davis, Larry Maccherone, “On Empirical Research Into Scrum”, Carnegie Mellon University.

RP6- Susan Mulder, “An Action Research Study on the Use of Scrum to provide Agility in Data Warehouse Development”, University of Pretoria, 2010.

RP7- Linda Rising and Norman S. Janoff, “The Scrum Software Development Process for Small Teams”, IEEE Software, 2000, pp 27-32.

Table 2. A Comparative Study on some Scrum Work

<u>Paper ID</u>	<u>Authors</u>	<u>Profession-al/ Student</u>	<u>Research method</u>	<u>Agile method</u>	<u>Domain</u>	<u>Publi- Cation</u>
RP1	Kevin Vlaanderen, Slinger Jansen , Sjaak Brinkkemper , Erik Jaspers	Professional	Case Study	Scrum	Production Environment	Elsevier
RP2	Viviane Santos, Alfredo Goldman, Ana Carolina M. Shinoda , André L. Fischer	Professional	Qualitative	Scrum	Knowledge Mgmt.	-
RP3	Emam Hossain, PaulL. Bannerman, and D. Ross Jeffery	Professional	Theoretical Contribution	Scrum	Global Software Development	Springer-Verlag



RP4	Torgeir Dingsøy, Geir Kjetil Hanssen, Tore Dybå Geir Anker, and Jens Olav Nygaard	Professional	Action Research	Scrum	Development	Springer-Verlag
RP5	Dr. Mark C. Paulk, Noopur Davis, Larry Maccherone	Professional	Survey/Empirical	Scrum	Adoption/Deployment	PDF from CMU
RP6	Susan Mulder	Research Scholar	Action Research	Scrum	Data Warehouse	Thesis
RP7	Linda Rising, Norman S. Janoff	Professional	Study Based	Scrum	Implementation	IEEE Software

5. CONCLUSION AND FUTURE SCOPE

In this paper, authors did a systematic review on the Scrum methodology and its uses. Various research papers and surveys were included. This review concludes that Scrum is one of the most talked about concept of today 's era. This method not only provides a significant way of working but also a great atmosphere for work with support to self organizing teams.

In future, more changes and advancements can be made to Scrum methods. Other enthusiast researchers can implement Scrum on other domains.

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