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Scrum: An Effective Software Development Agile Tool

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Abstract: Present days the world is surviving with respect to the software products. The development of the software product is a challenging issue and to run with the competitive world rapid development of software products are necessary. It is not enough to go with the traditional software development products like waterfall model, spiral model and all. Here we proposed the SCRUM TOOL, one of the effective techniques of Agile Methodology. Agile is an incremental and timeframe iterative approach. It supplies the software developers with a working framework for traditional software development practices like waterfall model. Although the traditional models are best suited for small products where there is no changing requirements but not suitable for the products which have rapidly changing requirements and thus here we recommend SCRUM methodology. In this approach we can develop the software product by taking the regular feedback from the customer through review meetings. So whenever the customer requests the changes we can upgrade the product with respect to those changes and can also develop the product more efficiently and rapidly.

Keywords: Rapid Development, Scrum Tool, Agile methodology, Incremental, Iterative, Timeframe approach.

1. Introduction

Present days every field of work requires an essential thing that is a computer to perform the required tasks. The development of a software product plays a major role in the automobile, telecommunication, retail, governance, banking, and etc the. The software product development follows various steps such as requirements gathering, application creation, testing, product delivery to the customer and the maintenance. The software development life cycle includes various models some are sequential and some are iterative in nature [2]. With the simple techniques means sequential models software development will become most critical task, models which are sequential cannot produce effective results for the products which have frequently changing requirements. This kind of drawbacks of sequential processes has been recovered by the iterative nature of the agile processes.

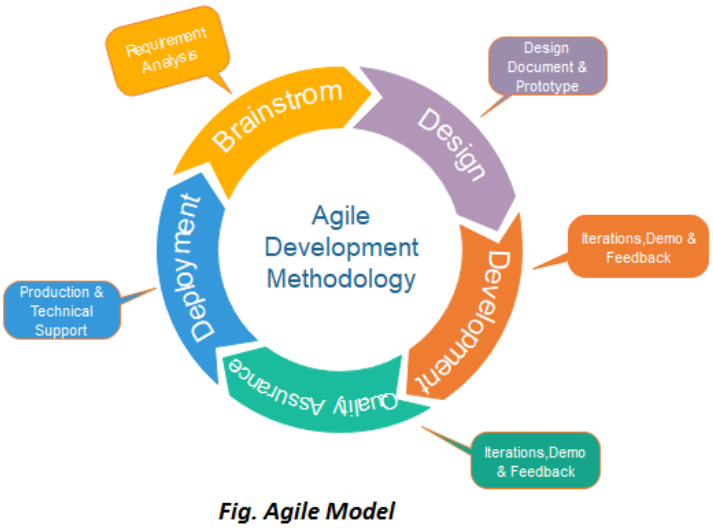


Figure 1 Agile Model

With the agile methodology we can develop a software product rapidly within short period of time [1]. The agile methods follow the various steps of SDLC, which follows the different practices to manage the software products. Agile processes usually encourage discipline management and teamwork. It follows regular inspection and adaptation in supporting industries to maintain the products with frequently changing business requirements. There are 12 principles on which Agile technique depends [1,6], some of the important high points are; customer priority, adaptation of changing requirements at any time, high priority to the customer, acceptance of changing requirements at any stage, frequent deployment of the working product, team work, work is done by the specified time.

Agile Methodologies:
Some of the agile practices from paper [3] mentioned below
1. SCRUM.
2. XP
3. Crystal.
4. Pragmatic programming.
5. Feature driven development.
6. Dynamic Systems Development Method (DSDM).
7. XBreed.

From our paper, the major discussion is made with respect to the SCRUM. With the help of scrum the development of a software product can be done within a short duration. This paper presents how a software industry benefited with the scrum over some of the simple traditional software development techniques like waterfall model and spiral model.

SCRUM:
The various definitions of SCRUM from different papers:

- Ken Schwaber and Jeff Sutherland are the developers of Scrum and the Scrum Guide. According to them the Scrum is defined as “A framework that allows people to solve complex compatibility problems, productively and creatively deliver high value products.”
- Scrum is a collaborative agile development framework describes a group of meetings, set of tools, and roles that supports teams work together to manage product development.

- According to Jeff Sutherland and Ken Schwaber in 1993 [4, 7] and Takeuchi and Nonaka [4, 8] who are the explorer of the Scrum keyword, declared in the year 1986. They did extract the policy of Scrum by the Rugby game, the game in which the team has the comprehensive and self-organizing structure.
- From the papers [4, 9], it is a thin practice, produces potentiality of team to focus on complex challenges according to changing requirements in developing and deploying of high range projects by upgrading association, inventiveness and fertility.

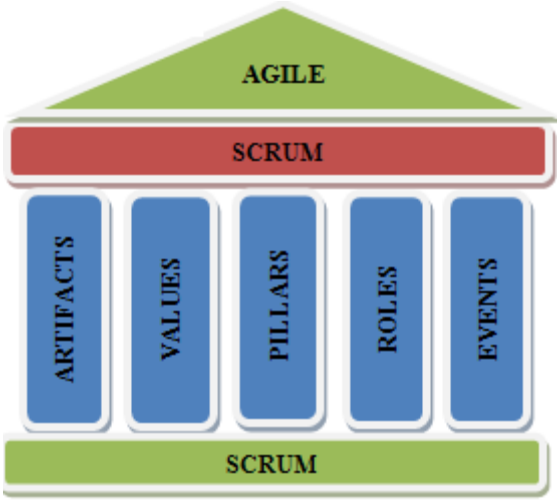


Figure 2 Base and Roof of Scrum

2. Literature Survey

Dyba and Dingsøyr's systematic review of 33 experiments on agile product development [11] presented as the agile practices are based on the XP and its techniques.

A recent survey from papers [12], [13], [14] on the agile development has discussed that frequently, there is a need of an increasing emphasis on teaching Scrum.

From the paper[15] survey is done that, scrum is a simple, easy to understand and a tough master method to manage, control process and sustain critical products to develop a software that satisfies the business requirements, incrementally and pragmatically, first described in the year 1996.

Perera and Chandana Ranasinghe exhibited that how scrum method reduce the issues and challenges of OSD and also discussed that success achievement in OSD. Here OSD stands for offshore development used to collaborate engineering applications using scrum [16].

Esteves Maria, et al. defined the advantages provided by scrum and its applications for the evolution of various applications those are academic integrative using Java, IoT, BigData, and Cloud computing [17].

According to Scott, et al. this model of processing dimension and focusing on the Felder-Silverman Learning Style Model matching the teaching practices using meshing hypotheses method [MH]. Consequently, the authors have confirmed that undergraduate students are more likely to use their learning styles as they are exposed to teaching methods. The writers suplied exhibits as proof to help the mentioned method MH [18].

De Souza, et al. present development of the capstone project and evaluation of scrum adaptations [19]. A survey is also done to illustrate the acquisition of Scrum to monitor the capstone project.

Pauly, et al. described a method to evaluate the scrum principles at an electronic-commerce industry. By means of deep case studies the authors presented that all scrum methods are not applicable in each context [20].

From [21], the discussion is made to present the relationship among the SCRUM and SDLC methods. This paper presents the collaboration of scrum and SDLC practices while developing a software product with the user's experience. In addition, the writers used Human Factors Institute recommended user experience design metrics, which include experts training, developing and maintaining metrics to assess usage, and builds a successful case database to provide training. Paper [22] studies on how scrum works over Brazilian small scale industries.

Raj, et al. presented a revised scrum practice that how its test a software product using test as a service technique to obtain the faster outputs with low cost [23]. This survey says that agile practices like scrum are also used for test a product more efficiently.

3. Proposed Method

The traditional software development models are not enough to produce an effective software product [27]. Say for example if we take waterfall model, it is suited for only small products with the well defined and clear requirements. But it is not enough for the projects or products where there are frequently changing customer needs[28-31]. Because waterfall model is a sequential method so, in middle of the development process we cannot go to the previous stages to do the modifications with respect to the customer. To avoid these problems here we introduce an iterative process called agile with scrum. It is a good technique to the large as well as the small products with the frequently changing requirements.

a. Define SCRUM?

Scrum is a one the agile practices, it is an incremental approach and iterative in nature used to manage the complex work means develop the complex software products with the frequently changing business requirements [3].

b. Roles of SCRUM :

Scrum consists of predefined roles and which also has a group of processes. Scrum roles include:

- SCRUM Master: Keeps up scrum processes.
- Owner of the Product: Stake holder or customer.
- Scrum Team: 7 people.

Whole product is divided into small increments which are shippable deliverables that can be checked at the each sprint's end [3].

c. The Application of the scrum:

The scrum application is done through ceremonies or meetings. The main scrum ceremonies are the sprint meeting, the daily scrum, the sprint review and the sprint retrospective.

Here sprint is a little and time-boxed period needed for the team development to complete the set of tasks within the period. Release planning meetings are used to plan and speculate the group of sprints, these meetings are optional.

d. **Scrum Events[4]:**

- **Sprint** -Controls the dragging mechanism that limits inflow overload.
- **Sprint planning** Permits self- assessment of each task that initiates lucidity and growth with regards DoD (Definition of Done).
- **Daily Scrum development** enhances the coordination among team to show and express their ideas.
- **Sprint review** Includes scrum team along with the other stockholders. Which takes the feedback from the scrum team and also inspection has been taken here.
- **Sprint retrospective** supplies a chance to examine obstacles for the moment and to receive supplements for the coming sprint.

e. **Scrum working nature:**

A group of features of the product backlog described in the sprint (priority list of high level customer needs). The identification of these backlogs has been done during Sprint planning conference. The team works for the present sprint. Nobody has the acceptance to modify the backlog tasks while the meeting is going on. After the sprint's end, the team will illustrate the use of advanced software.

From the diagram given below we can have an idea about the working procedure of the scrum

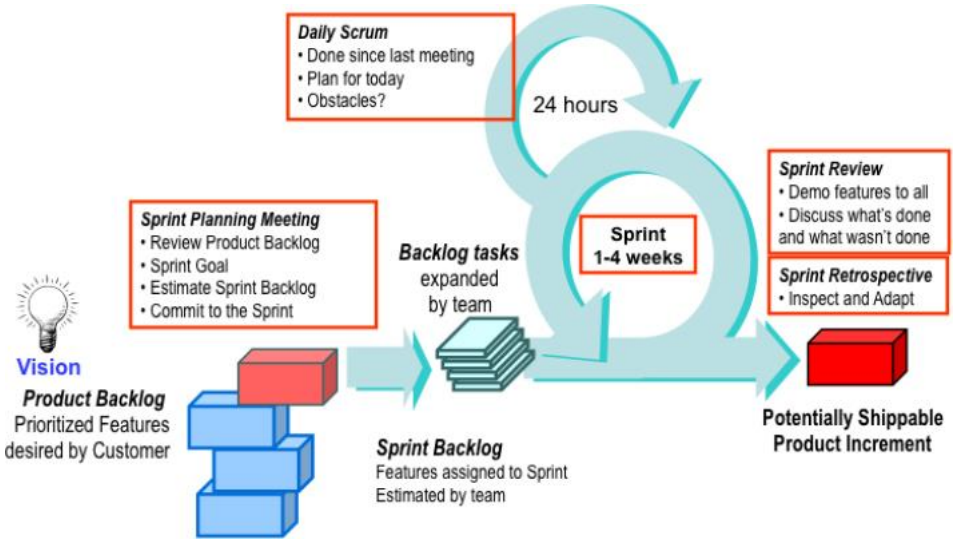


Figure 3 Working flow of SCRUM

The product work initiated with a clear vision and a bunch of product characteristics for emphasis by the business organization. These characteristics are included in the product backlog, managed by the customer or the owner of the product. The job is done majorly with the help of a sprint a time box, commonly known as a iterative process, is the time allotted to the team to finish the selected tasks. The length of the sprint is 1 to 4 weeks, and that length is continued to the project's life. The team chooses tasks from a product backlog and has a belief that the tasks should be finished in a sprint, and generates a sprint backlog with attributes and functions included in the sprint-plan session.

After the team has exhibited the sprint backlog, the activity will be beginning. At this time in the sprint, the team is preserved from disturbances or intrusions and has a focus on reaching the sprint goal. Modifications are not accepted to the sprint backlog; however, any changes required included in the coming sprint.

At the sprint time, there is a minute meeting will be takes place for 15 minutes it is known as scrum. Here the discussion is made like what did them yesterday? What is their plan for today? And what is the progress with respect to the product?

At every sprint's end, the team presents the task they have done to the stakeholders and get the responses that will help to do improvements in the next sprint. They also created an idea for the improvements. This meeting is essential because with no meeting we can't able to get the needs from the stakeholders.

f. **Outline of the Scrum structure:**

- Product owner generates product inventory (Specifically, priority based things of the project).
- The Scrum team presents a sprint planning session where the duties are necessary to complete items based on wish list is divided into small and easily maintainable blocks.
- The creation of the sprint backlog and updation is also done by the scrum team.
- The time duration of the sprint is decided by the team (The most common breaks are probably two weeks).
- Everyday there is a meeting will be held among the team called scrum meeting (also called as Daily Standup) to share their views to obtain the progression of the product work.
- The validated scrum master provides the guidelines to the scrum team and encourages and motivates them to focus their work.
- A review meeting will be held by the shareholders and product owner at each sprint's end.

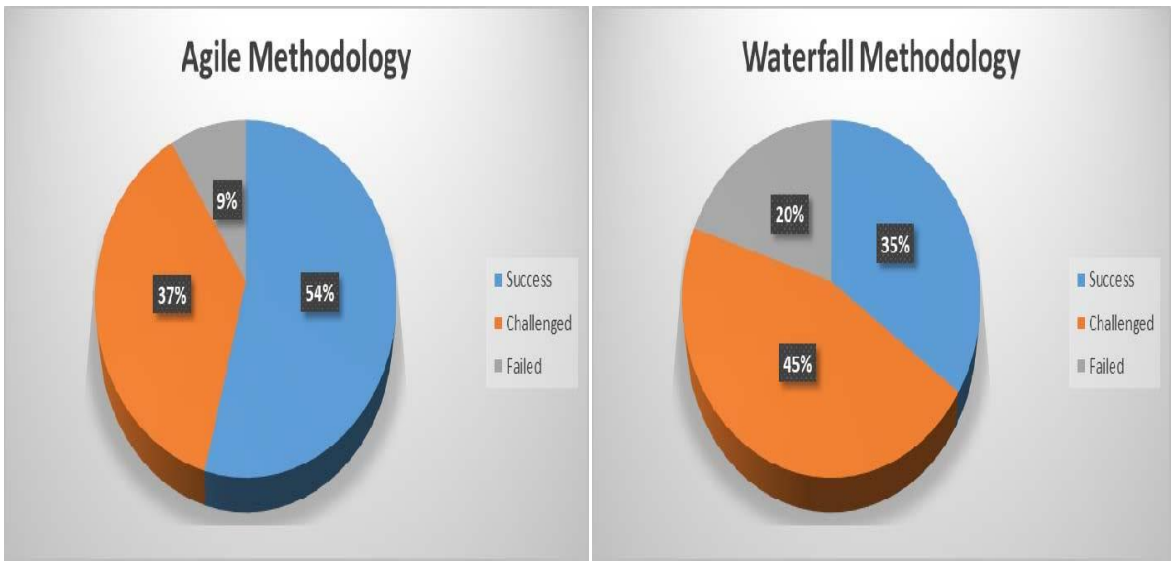
This is a cyclic approach taken by the scrum team to develop a software product. The Product Owner, the Scrum Team and the Scrum Master work cooperatively and play an essential role to achieve the product success.

g. **Scrum benefits:**

- Scrum supports teams to complete their products rapidly and coherently
- Scrum guarantees efficient use of money and time
- Big projects are divided into quick maintainable sprints
- Developed products are coded and tested throughout the sprint analysis
- Every task is done properly for rapid software development
- The team members can achieve a clear idea with scrum meetings
- Get the feedback from customers and stakeholders for better improvements
- The self effort of every team member is seen in every scrum meeting

4. Results & Discussion

Given graphs show that the success rates of the waterfall model as well as agile model. From these grades we can say that most of the organizations go with the agile techniques because, the development of the software products and the software industries growth is directly proportional to the success rate.



Graph of Agile Methodology Graph of waterfall Methodology

Figure 4 Result analysis of Agile over Waterfall model

In the paper [4] there is a discussion made that Scrum is a software development framework takes the fundamental umbrella activities of agile and become the trending technique to develop the software product.

4.1 Future Enhancements [24]

Scrum's future is shine, as 95% of defendants plan to keep using it, and further areas are fruitful to schedule or to execute jobs. In the near future, resolute help of management is also needed, as it will play an essential role in the scrum. A group of 4 to 9 people in every scrutiny are needed for best concert. Effective and authenticated scrum master and the team can support to create the process perfect and to get the fruitful results. As a future improvement, the problems associated with the traditional models can be reduced by accepting the scrum, majorly to get the work of Scrum by giving project examples that show exclusive results using Scrum. Various differences can be sorted out by the active team [25]. Scrum existed as the most perfect method of agile, and has many benefits over other practices. Scrum has its activities time-boxed (called sprints), so the tasks are well done within the time duration. If we need to make big changes, we simply go with a new sprint with updates.

Scrum helps to reduce errors and saves time with respect to the working products in the long time. Scrum takes the benefits from the XP to become more structured so that the direction of the improvement can be obtained. Scrum framework has a feature that we can obtain the changes in each sprint. Scrum workflow also includes an operational test of the transportable project. It is available after sprint for better improvement and time saving [26].

In the present framework, retrospection (rethinking) is not followed religiously, and rethinking after every sprint helps to form the scrum simple and rapid by analyzing what happened wrong and what happened right.

The diagram below shows that how the scrum activities are taken place. The activities come under scrum are effective and iterative. These are very clear and involve variety of people.

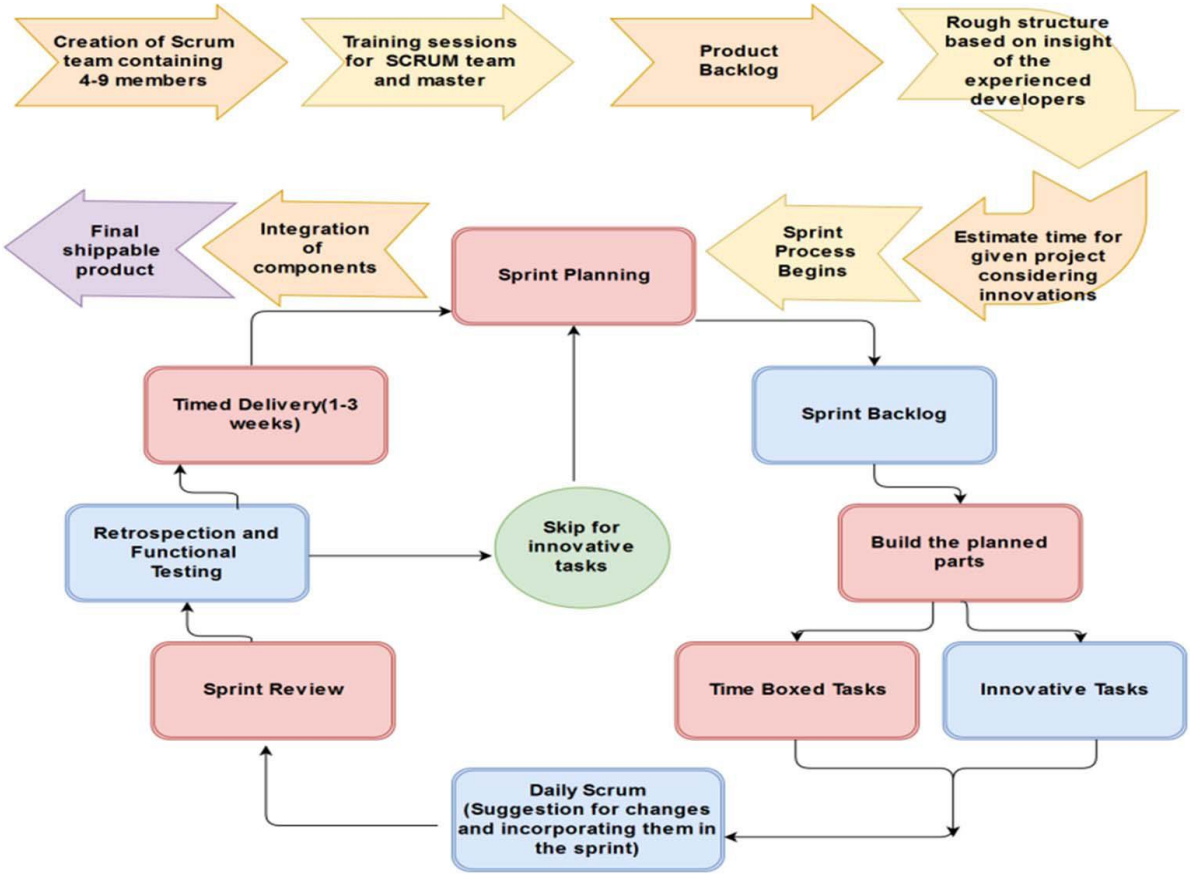


Figure 5 Proposed Scrum Model

5. Conclusion

Usually to develop a software product we use the SDLC frameworks include waterfall, V-model, spiral model, agile model and etc. Every model has its own pros and cons, the decision on which model is suited for which product is taken by the organization. If the projects are large, business as well as the customer requirements are frequently changing and there is insufficient time to develop the software product it is better to choose Agile based practices where as the waterfall model is good for the small products with clear customer requirements and sufficient to develop the products. In the other case if the products very large with changing requirements and need proper validation in every step developer as well as test engineer use the V-Model. But, now a days every software product or project is having the tight schedule with high customer expectations, to deal with these kind of projects with customer satisfaction the better way is the Agile methodology. Most of the software industries treat and acknowledged agile practices are the best to develop an effective and qualified software product. Agile provides effective coordination among the team; Includes customers or product owners to get the feedback; Have the ability to meet customer requirements; Quick adaptability of frequently changing business and customer requirements; Provides satisfaction, discipline and confidence among the team; Proper planning guidelines by the Master; Deliver the products in terms of small and frequent releases.

In our paper we have noted that one of the various techniques of agile methodology that is scrum and have seen that the working flow of scrum and how can we achieve an effective software product in a rapid development. The scrum model which we have been proposed aims to achieve an effective software product with customer satisfaction. Here the key concepts of scrum are pillars, roles, events, values and artifacts describe the effective nature of the scrum.

We ensure that Scrum helps organizations in their work transformation by commencing duties and accountability; By generating dare and admiration; By enhancing cooperation and self-sustaining among the team, this has led to the core beliefs of the work, the standards of deployable project characteristics or attributes , and user fulfillment.

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