

SCRUM Model for Agile Methodology

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Abstract- Software now rules the world and its development is integral to all the IT companies. Software development is very complex process and requires multidimensional growth. Having a single model like waterfall or prototype for development is not enough for the product requirements and thus agile development is most useful for customized product development. With adaptive nature and early delivery and flexible life cycle, Agile is best suited for quick and effective development of software. The researchers also suggest that agile adaptation gives maturity to the organization and helps in the CMM levels achievement. There are various frameworks for agile but some can be more complex or overwhelming to agile beginner and so amongst all, scrum provides an easy method to implement agile. Scrum is currently the top most technique used in development not only for software but even in the fields of finance, research etc. If we are able to address the few backlogs it has, Scrum can undoubtedly become the most sought after method to be chosen for development with no hassles.

Keywords- SCRUM; SCRUM model; Agile; Scaling Agile through SCRUM

I. INTRODUCTION

Agile has a different approach and outlook for each project from the traditional methods of waterfall and prototype and thus helps to address to the needs of contemporary projects and is in sync with the current level of development. Agile is a methodology where continuous iterations and testing take place during the entire Software Development Life Cycle (SDLC) of a product. Among the other different agile methods, like Crystal Methodologies, Dynamic Software Development Method (DSDM), Feature Driven Development (FDD) and others, scrum is the most commonly used method for software product development [1]. Scrum is basically an agile, lightweight framework that provides steps to manage and control the software and product development process. Scrum is the combination of the Iterative model and the Incremental model because the builds are successive and incremental in terms of the features to develop object oriented

software. Scrum was designed to increase speed of development, align individual and organizations' mottos, define a culture focusing on performance, support shareholder value creation, to have good communication of performance at all levels, and improve individual development and quality of life. Scrum has gained its popularity in recent few years and has proven to be quite useful but not a method to use always [2]. Our goal is to make scrum

more powerful and self-sufficient such that there is no need of mixing up of different methods and scrum itself provides all possible software development without any pitfalls. With current situation analysis and deductions we put forward an enhanced model of scrum that can help improve the scrum process making it more strong and efficient.

II. METHODOLOGY

Scrum offers a customised way of working on different projects that have a variety of requirements and having advantages like flexible requirement selection for sprints and no specific procedures to follow. Being widely used scrum still holds back on some essentials that can give an edge to other methods.

In this project, we research and analyse the essentials of scrum to know how it is relevant and its enhancement for development of a wide variety of projects and its scalability possibilities.

A. Workflow of Scrum

Workflow of scrum consists of close collaboration of scrum team and Master with Product owner over continuous iterations of the evolving software. The scrum process involves a scrum Master, the Product Owner and the scrum Team. The scrum Masters' main role is to eliminate impediments. The team of scrum is a cross functional one which comprises of developers, testers and other experts of various fields required in development which leads to a

versatile and innovative end product that meets the satisfaction of the customer.

A sprint is the smallest block of scrum which has a small team that works on assigned task. It lasts for 1 to 3 weeks. The task for a sprint is decided by a sprint backlog. Sprint backlog is a documentation of all the requirements for current sprint to be worked on. The product backlog is a roster of requirements which are determined by the product owner and are called user stories. It is broken up into sprint backlogs followed by sprint planning which includes methods to get a sprint done. At the end of each day a daily scrum takes place aimed at progress of the task assigned for the day [3]. The aim of each sprint is to deliver a potentially shippable product. At the end of the each sprint there is sprint review that takes place with the product owner to demonstrate the shippable product increment.



Fig. 1. Basic Scrum Model

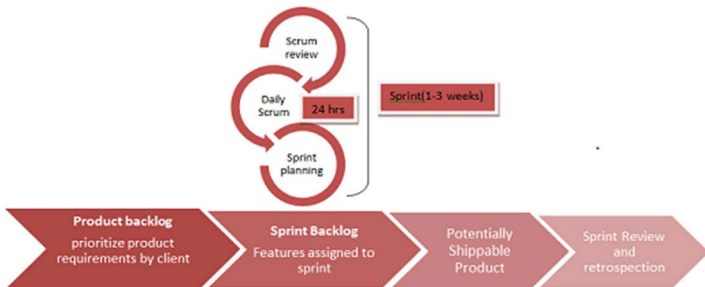


Fig. 2. Scrum cycles

Sprint goals cannot be changed during a sprint but with each increment the product owner can add new features to the project which were not specified earlier [4]. Optimisation of release plan and process takes place with the help of retrospection of each iteration and inspecting each release.

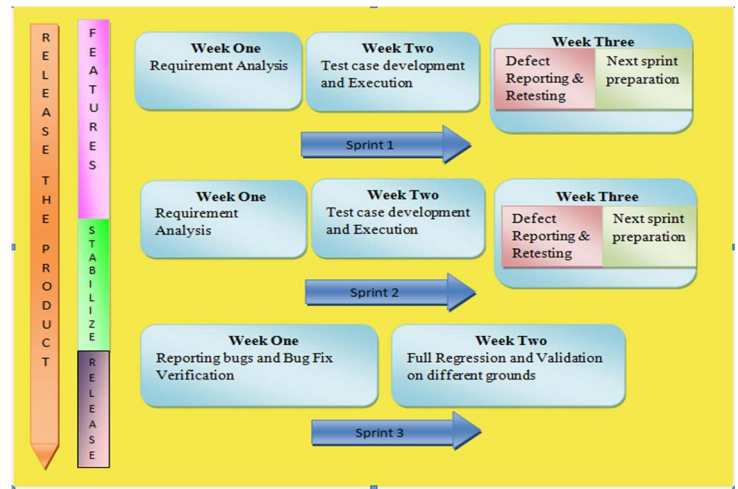


Fig. 3. Explanation of Sprint cycle in scrum

Sprint burndown and product burndown and release burndown charts are used to indicate progress and keep a check on burnout. They start from maximum points and with time move towards zero.

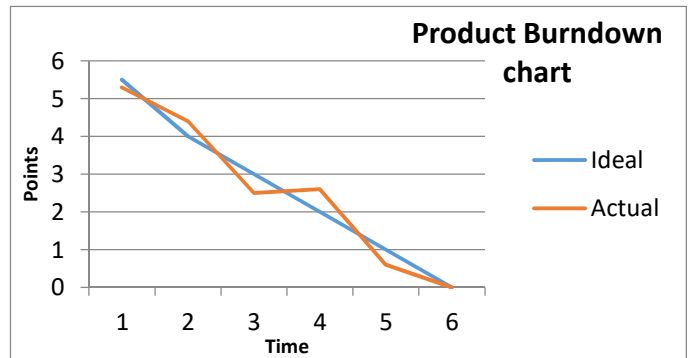


Fig. 4. Product burndown chart

A series of sprints for project planning which are time boxed are used to deliver the final shippable product and being tested has all the requirements of the product owner.

B. Advantages over other Methods

Scrum focuses on productivity through communication and planning that provide freedom to teams for discovering ways to engineer solutions. It also provides a more efficient process in case a fundamental shift is required. Also, scrum is best suited for teams that can concentrate entirely on the development of the project or a product in hand [5]. Some of the other advantages include lowering of cost due to constant communication and increase in quality by ensuring that all teams are aware of problems and changes.

Comparison table below shows the advantages over other agile methods [6].

TABLE I. COMPARISON OF SCRUM WITH OTHER METHODOLOGIES

| SCRUM | OTHERS |
|--|--|
| More prescriptive, formal meeting structures, well defined roles and iterations | Kanban Less prescriptive, no formal meetings, indefinite roles and iterations |
| Productivity is given topmost priority leading to customer satisfaction and is more flexible | XP Less flexible and production is not given much priority |
| Effective communication among team members, less complexity involved | FDD Less communication, more complex procedures involved |
| Better communication amongst team members | DSDM Less communication amongst team members |
| Procedures followed are easy and complex | ASD Complexity in procedural structure |
| User requirements strictly define development and planning, better traceability | Crystal Less considerate about user requirements, difficult to trace the work done |

C. Scalability

Though each agile methodology has different implementation techniques that are suitable for certain specific scenarios, scrum seems to have an upper hand while talking about scalability scrum can be easily used in large projects by using its scalability characteristic. Scrum of Scrums (SoS) is a ceremony used in the scrum methodology to overcome the barrier of effective communication and flow of information between the members of numerous large teams working in parallel on complex projects [7]. The factors like type of application, project duration and team size decide the number of levels in the SoS technique. In organisations that have various scrum teams working simultaneously, the SoS meetings can be scaled up to higher level with a scrum of Scrum of Scrums meeting wherein one participant of each daily scrum is sent to SoS meeting on second project level. With coming up of LeSS and LeSS huge it has been quite proven that scalability in Scrum is not at all an issue [8].

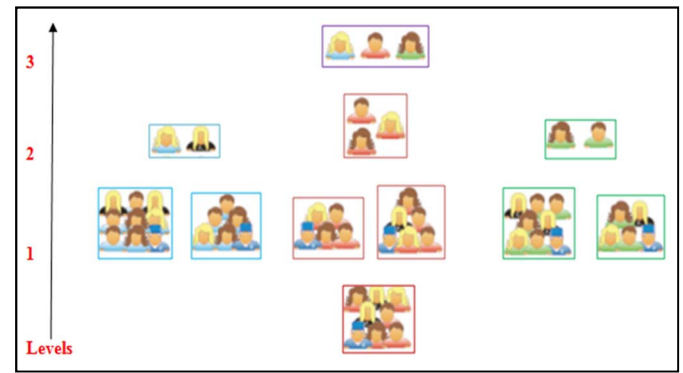


Fig. 5. Scrums of Scrums (SoS)

Rather scrum is chosen over other methods for scaling up. LeSS is not a system with embedded scrum but it is scrum itself. The LeSS principles are simple to implement and close to scrum. With principles like more with LeSS, we can reduce the overhead of employing more roles, more processes etc. while scaling up and keeping everything to the minimum for simpler execution. Thus, the motto of LeSS is to descale organizational complexity and reducing unnecessary complex solutions providing less roles, less management and less organizational structures, less communication and more efficiency [9].

LeSS can work effectively with distributed teams also. Scrum teams are divided and with a large number of teams working together on a project so that the coding is done and is stored into a central saving place, like SourceSafe where the code written and stored is validated and analysed. For each individual sprint of scrum, there should be a saving depository and a common place to share all the parts completed and each part will be delivered in small portions so that it can be coordinated with other parts of the projects. In a typical LeSS Huge organization, there is a 'centralize' support, mainly because of the massive volumes of work. At the end of each month, the scrums will enter into the final testing phase and all the finished parts of project will be integrated with each other [10].

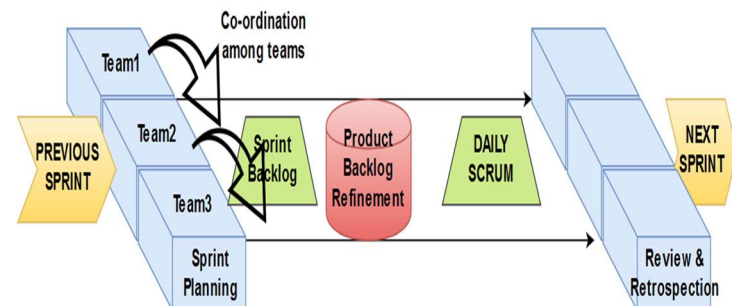


Fig. 6. LeSS framework representation

D. Current Situation

Scrum has become the face of agile and the terms are often used interchangeably. The reason for the popularity of scrum is that it allows the product owner to start a project without extensive pre-planning and because it is also there have been significant improvements in the number of people using Scrum as a development technique from the 2013 report. Around 82% of the respondents among 5000 participants are using Scrum and 11% are piloting Scrum.

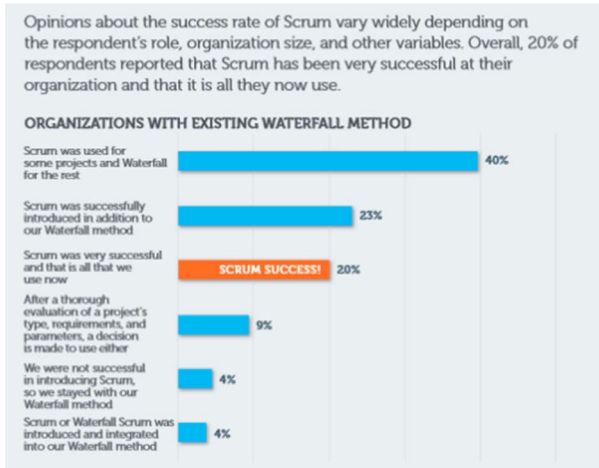


Fig. 7. Survey for organizations using waterfall method

Since the main reason of practicing Scrum is customer satisfaction, 49% feel that this highest priority task along with other priorities of budget and time are delivered through scrum's incremental shippable products whereas 71% believe that using it causes tension with other parts of organisation not using scrum. While half of the respondents' organisation recommended certification only 7% require it. The size of the organisation also influences the success of scrum projects.

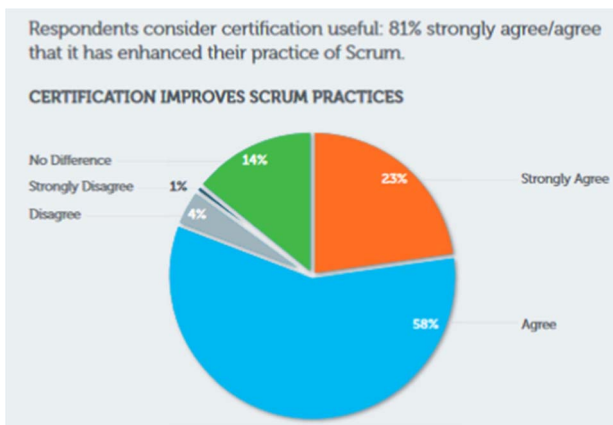


Fig. 8. Statistics of participants for certification

While 83% believe holding sprint planning prior to the print and 81% hold daily scrum meetings. Apart from IT technical industries, other industries too are gaining a lot from usage of scrum in their processes.

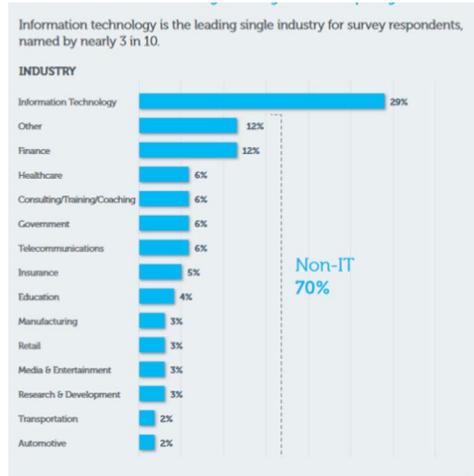


Fig. 9. Survey for IT and Non-IT sector participants

While 93% agree that involvement of PMO can lead to successful scrum projects, Active involvement of PMO is still far off possibility [11].

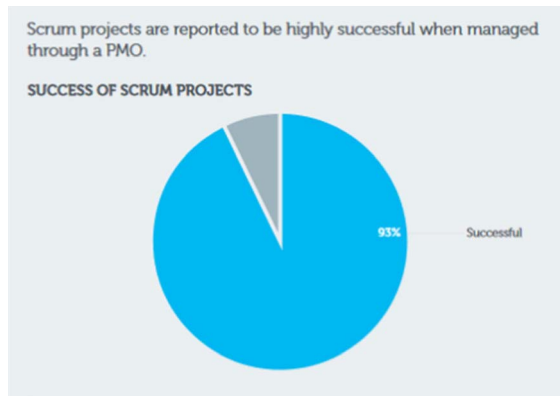


Fig. 10. Statistics for Scrum projects' supporters

III. RESULT AND DISSCUSSION

A. Future Enhancements

Future of scrum is quite bright as 95% of respondents are planning to continue using it and other new fields are finding scrum very useful in either execution or management of tasks to have fairly effective results. In near future, there is also a need of active support of management as it plays a very important role in the scrum process. Improvements like team comprising of 4 to 9 members in each scrum is essential for better performance as bigger teams take longer time for each

sprint and all other sizes of teams have a lower success rate. Also, automation of agile systems is very important and the need of the hour as it is one of the reasons for choosing traditional waterfall over scrum as the analysis of scrum is a tedious task and extremely difficult to be done by hand. Skilled and certified scrum masters and the team can further help to make the process much more efficient as presently the team is given only a basic training in the scrum which doesn't prove to be that promising and fruitful as a well-trained scrum team. A shift from the traditional method of each expert working separately to modern scrum where all the experts come together to form a team is not a much-appreciated idea because it requires a shift of mind set. Also in an organisation, since there can be a difference of working between those who are using scrum and other who are not, it often leads to a conflict. As a future enhancement, this situation can be improved by allowing all the parts of an organisation to practice scrum and most importantly understand scrum's working by providing project examples that showed high end results using scrum. Conflicts can be resolved through active management team [12].

Being the most practiced method of agile, scrum has a lot of advantages over other but still cannot completely replace some like XP or Kanban in some specific areas of development. Since Kanban is more adaptive than scrum as scrum has its tasks time-boxed, this can be improved by time boxing only certain tasks which require traditional coding and

processing and giving freedom of time to other tasks which require innovation and creativity.

In XP, emphasis is given to a functional finished product after each iteration while a sprint's shippable product goes to nowhere, XP also gives flexibility of accommodating changes during an iteration but scrum doesn't provide with the same during a sprint. If major changes need to be made we have to start over with another new sprint, so XP also helps to avoid over engineering. Since the products are working and functional, it helps avoid errors and saves time and energy in the long run. Scrum can include these positives of XP by being more structured so as to get a view or direction of progress. Scrum structure can also be changed so that it becomes capable of accommodating changes within each sprint. Scrum workflow can also include functional testing of the shippable product obtained after a sprint to improve performance and save time [13].

Since in the current scenario, retrospection is not followed religiously, following retrospection after each sprint can actually help to make scrum easier and faster by analysing what went wrong and what went well thereby helping the development of further iterations.

B. Proposed Scrum Model

According to the above mentioned detailed study and analysis, it was observed that a few changes in the scrum cycle can help eliminate the current disadvantages of the scrum model. With the above stated observations and deductions given below is a proposed scrum model.

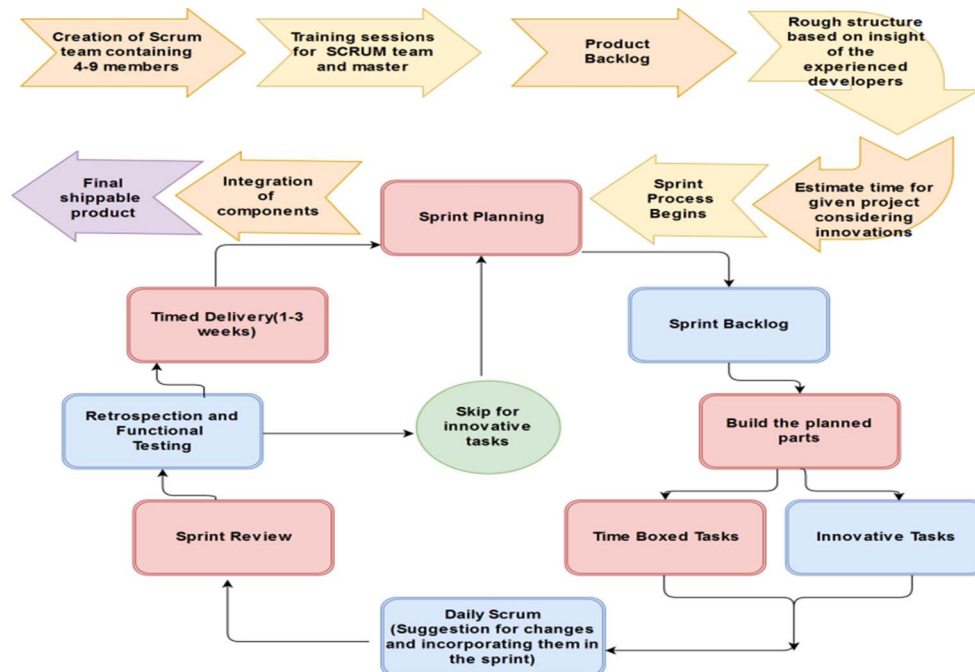


Fig. 11. Proposed Scrum Model

IV.CONCLUSION

Scrum has the ability to cater to the needs of thousands of projects and can very well be scaled to large amounts. It is the small aspects of its implementation that are having significant issues like lack of automation in workflow and testing, better management support and unavailability of experienced team workers.

The proposed scrum model aims to make scrum a more comprehensive approach over other agile methodologies. With separate treatment to the traditional and innovative tasks, the overall scrum cycle can prove to be complete in sense of functionality and can accommodate changes within each iteration. Improvement in scrum is essential to the its current users and all these steps can further improve the reign of scrum. It can not only be a software development methodology but also as a process that can fit into any field being customised for it and can without any pitfall give effective and long lasting results.

V. REFERENCES

- [1] Cobb, Charles G., *The project manager's guide to mastering Agile: Principles and practices for an adaptive approach*. USA: John Wiley & Sons, 2015.
- [2] Schwaber. K., and Mike Beedle, *Agile Software Development with Scrum*. USA: 2002
- [3] Rubin, Kenneth S., *Essential Scrum: A practical guide to the most popular Agile process*. USA: Addison-Wesley, 2012.
- [4] Schwaber K., *Agile project management with Scrum*. USA: Microsoftpress, 2004.
- [5] Kniberg, Henrik, and Mattias Skarin, *Kanban and Scrum-making the most of both*. USA: C4 Media, 2010.
- [6] Jim Bowes(2015, July 21). Kanban vs Scrum vs Xp an agile comparison [Online].Available: "Kanban vs Scrum vs xp" <https://manifesto.co.uk/kanban-vs-Scrum-vs-xp-an-agile-comparison/>
- [7] Sutherland, Jeff. "Future of scrum: Parallel pipelining of sprints in complex projects," in the Proceedings of the Agile Development Conference, IEEE Computer Society, 2005.
- [8] AlMutairi, Abeer M., and M. Rizwan Jameel Qureshi. "The Proposal of Scaling the Roles in Scrum of Scrums for Distributed Large Projects," *International Journal of Information Technology and Computer Science (IJITCS)* 7.8, 2015.
- [9] Diebold, Philipp, Constanza Lampasona, and Davide Taibi. "Moonlighting Scrum: An agile method for distributed teams with part-time developers working during non-overlapping hours," in Eighth International Conference on Software Engineering and Advances, IARIA 2013.
- [10] J. Sutherland, A. Viktorov, J. Blount and N. Puntikov, "Distributed Scrum: Agile Project Management with Outsourced Development Teams," in 40th Annual Hawaii International Conference on, Waikoloa, HI, 2007, pp. 274a-274a.doi: 10.1109/HICSS.2007.180
- [11] Harvey Wheaton, "2015 State of Scrum Report", Scrum Alliance, Westminster, USA, 2015.
- [12] Ahmed, A., et al. "Agile software development: Impact on productivity and quality," in Management of Innovation and Technology (ICMIT), IEEE International Conference, 2010, pp. 287-291.
- [13] Mike Cohn (2014, April). Scrum Xp better together [Online].Available:<https://www.Scrumalliance.org/community/spotlight/mike-cohn/april-2014/Scrum-xp-better-together>