



An Approach to Integrate Innovation Initiatives into Agile Software Development Process

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Abstract : Software Development is a thought provoking, challenging and an exciting process. However even such an inspiring process feels monotonous for teams which are continually working on it. A few ways this reflects in the team is through, the team members seeking other systems to work on, taking up self-study/focusing on equipping themselves with alternative technologies, which might not always align with the Organizational/product vision. Failing to address these, could lead to attrition, lack of motivation which eventually leads to reduced productivity.

A major increase in focus on Innovation can be observed in Organizations everywhere. This can be majorly attributed to the highly innovative products brought out by the Competitors, which are rapidly altering the product landscape. Organizations bring out many innovative initiatives to promote and harness the Innovative spirit through its hierarchies. However, major observations regarding these initiatives are that they fail to achieve everyone's participation and they are not continuous.

This article puts forth a proposal, which addresses the issues raised by continuous Software development activities and Innovative initiatives occurring within the Organization. The proposal aims to address the motivational and productivity issues caused by continuous software development activities by integrating new processes that target innovation into the current development process. This also addresses the continuity and participation issues identified during execution of Innovation initiatives. The proposal aims to be as lean as possible so that existing processes can embrace it seamlessly, while intrinsically focusing on building a culture of trust within the team.

IndexTerms - Innovation Strategy, Scrum framework, Software development methodology, Innovation Management, Product Innovation.

I.INTRODUCTION

Agile software development refers to software development methodologies centered around the idea of iterative development, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams. The ultimate value in Agile development is that it enables teams to deliver value faster, with greater quality and predictability, and greater aptitude to respond to change [1]. Some of the Agile Adoption Statistics: a) 71% of companies are adopting Agile, b) 60% of the companies experience growth in profits after adopting an Agile approach and, c) The Agile failure rate is 8% [2]. Scrum is one of the most widely used agile methodology in the IT industry. The 15th state of Agile Report states that Scrum remains the most popular agile approach, with 66% of the participants identifying it as the most closely followed, with a further 15% following Scrum deviations including Scrumban and Scrum/XP [3]. Findings this year indicate significant growth in Agile adoption within software development teams, increasing from 37% in 2020 to 86% in 2021 [4]. Growth in non-IT lines of business also rose significantly, doubling in adoption since last year's report. The major hurdles for a broader adoption, as per the survey are Inconsistencies in processes and practices (46%), Cultural clashes (43%) and, General organizational resistance to change (46%) [4].

Innovation is important for every business and IT which is becoming an integral part of almost every business is no exemption to it. IT is a crucial part of every organization as it makes them more productive and efficient. Innovation: a) grows the business, b) helps in staying ahead of the competition and, c) helps in taking advantage of new technologies. Top challenge companies face in corporate innovation is in fostering an internal culture of experimentation and innovation (57%) [5]. The most deployed corporate innovation programs include corporate innovation teams (78.9%); innovation centers of excellence (61.4%); and technology education (54.4%). This shows that companies are first focusing internally on building the right teams, getting governance and processes in place, and educating current and new employees on emerging technologies before spending resources on rolling out external programs or investing in the startup scene [5]. 60% of the respondents believe internal employees to be the most important partners to deliver people-powered innovation. (Source: PWC) [6]. In a survey conducted by PA Consulting, 66.67% of the respondents consider innovation as an important criterion in the success of an organization [6]. These are some of the figures that highlight the need of Innovation in Organizations. One-quarter of private company innovators say a chief impediment to innovation is their lack of a disciplined in-house process for driving and executing innovation [7].

It is needless to say that Innovation is a necessity for Organizations and the above statistics state that the processes that are in place are not enough and there's a huge scope for improvement. Moreover, Organizations also are facing many issues when it comes to adoption of Agile development methodologies, that needs to be addressed to ensure delivery value faster, with high quality along with being able to embrace the change.

II. SCRUM MODEL AND EXISTING WORKS

2.1 Conventional Scrum Model

The focus of the Scrum Teams is to work upon a previously agreed backlog chosen from the product backlog, which is usually done before the sprint starts. During the sprint, the team works collectively together and aims to finish the backlog by the end of the sprint. The Scrum Master assists the team to ensure a smooth execution, by resolving any impediments observed during the sprint. Product Owner provides additional inputs to help the team understand the requirements together. At the end of the sprint, the Product Owner verifies the developed user stories by checking them against the acceptance criteria set against each product backlog item. The entire focus of the sprint model for software development is to complete the sprint product backlog.

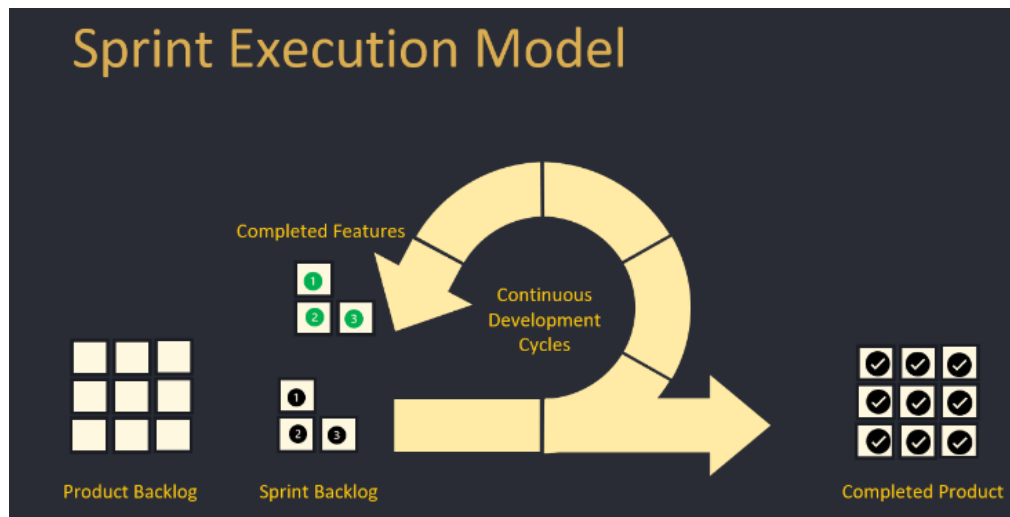


Fig. 1. Conventional Sprint Execution Model

2.2 Existing Works

Dobrigkeit, Franziska; de Paula, Danielly [8], aimed to integrate Design Thinking, Lean Startup, and agile practices into one software development process – INNODEV model. Moses Ma and Langdon Morris [9], define the “Innovation Sprint” as the process which fuses the Design thinking approach that was developed at Stanford university’s d School with the time-boxed, iterative workflow process as Agile software developers have defined it. Maruthi Rohit Ayyagari [10], proposed iScrum: Effective Innovation Steering using Scrum Method to adopt and modify the Scrum software development methodology to overcome research problems. Brent Barton [11] proposed an All-Out Organizational Scrum as an Innovation Value Chain. Google’s design sprint is the framework to map out challenges, explore solutions, pick the best ones, create a prototype, and test it [12]. Hackathons have become increasingly popular in recent years as a modern tool for innovation. 3M’s unique 15% Culture encourages employees to set aside a portion of their work time to proactively cultivate and pursue innovative ideas that excite them [13].

III. PROPOSED MODEL

This research paper aims to address the reduced productivity of teams, providing an opportunity to the teams to positively impact the product backlog and create a platform for teams to be the active participants in driving Organizational Innovation.

Abbreviations and Acronyms

PRISM - Product and Research Oriented Innovation Sprint Model.

Product and Research Oriented Innovation Sprint Model (PRISM) is a sprint model not just aiming to complete the sprint backlog, but also aims to harness and cultivate the innovative spirit within its team members, by bringing in minimal and highly effective activities as part of sprint execution. In addition to the sprint backlog being completed at the end of the sprint, PRISM also provides the platform that enables Innovation within the team thereby resulting in identifying innovative product proposals as part of the sprint execution. Moreover, PRISM also paves the way for the team members to fulfill their sprint responsibilities and address the challenges in highly creative manner, consistently.

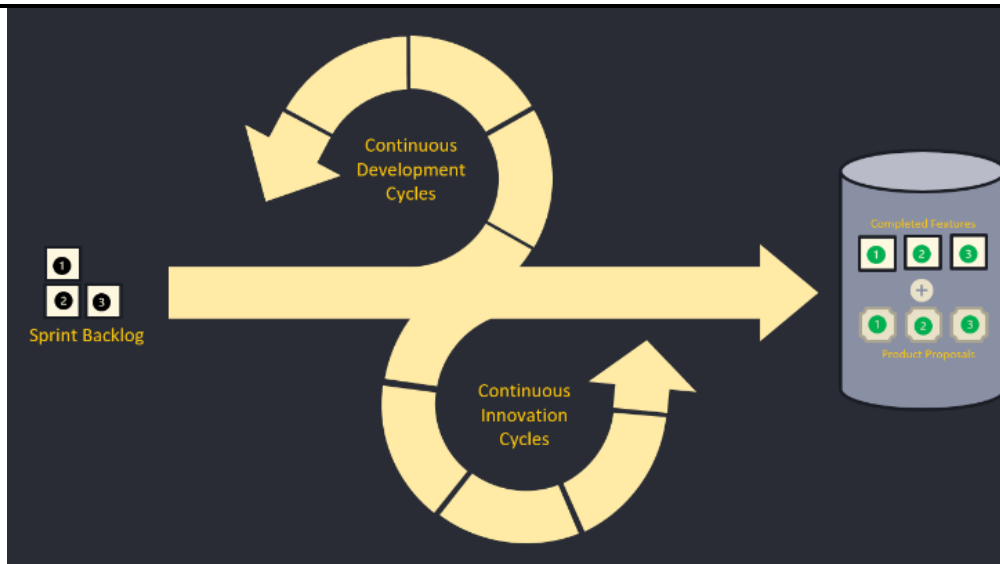


Fig. 2 shows the PRISM execution model

2.1 What does PRISM facilitate?

Traditionally, a Top-Down approach is followed, where the requirements are gathered by Product management and traversed down to Teams for Implementation. With the PRISM process in place, the doors for a Bottom-Up approach are opened, where the Teams brainstorm and propose innovative Product Proposals to the Product Management, who reviews and evaluates the proposals keeping customers in mind and support the Teams in Productizing it.



Fig. 3 shows the workflows in PRISM model

PRISM brings the scrum teams closer to product management, resulting in them being much closer to the customers. PRISM provides teams with platforms for having a high engagement with the product management and a means for engaging in highly meaningful dialogue. They empower the teams to see the big picture, whose scope is way beyond their sprint backlog. This eventually results in high level of understanding the teams of the product they are working on, and this along with their knowledge of the product that they are associated with will lead to surprisingly innovative solutions that can be brought out of the scrum teams. The teams can themselves get creative in solving challenges while addressing the product challenges which they encounter during their sprint execution, while working on the product backlog.

PRISM focuses on learning, application of learning and growing together of individuals, collectively, as a team. Teams are provided not just the opportunity to evolve, but also given the freedom in choosing the direction that they wish to evolve in, parallely helping the organization by providing high valued and highly creative and innovative solutions that the organization can capitalize on.

3.2 Structures in PRISM: Innovation Governance Community

For each Product offered by the company, which is listed under the company's product portfolio a committee is to be formed which includes the following personnel: a. Product Managers, b. Product Owners, c. Domain Experts, d. Solution Architects, and e. Sales/Vendor Analysts.

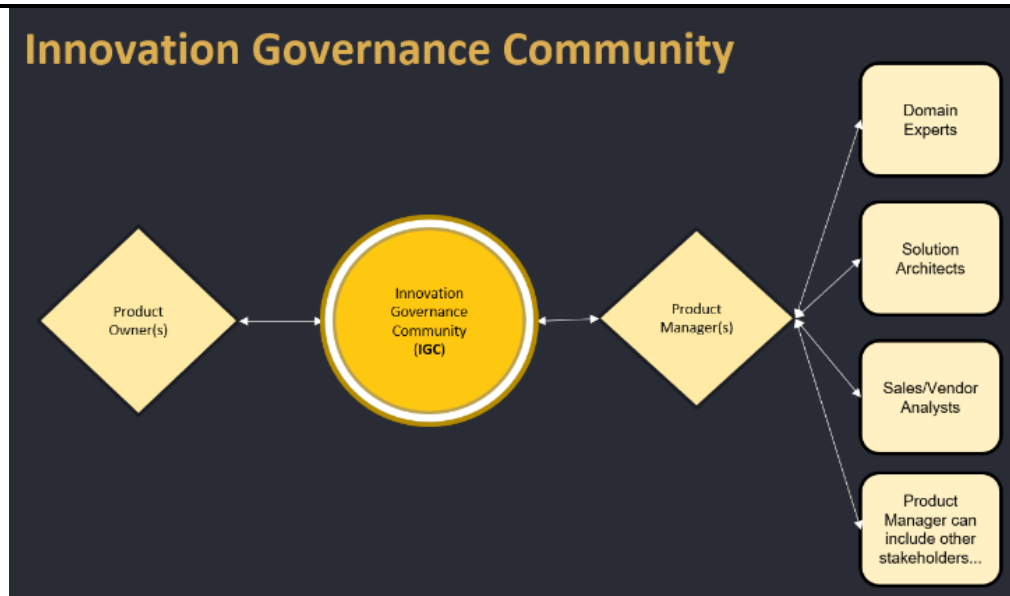


Fig. 4. Structure of Innovation Governance Committee

Product managers will be heading the Innovation Governing Committee and they have the authority to include other stakeholders as deemed necessary, in order to review and aptly gauge the innovative product proposals brought forward by the Product owners from the Scrum Teams, after attaching appropriate business use cases to them. It is the Innovation Governance Community that decides the future of a product proposal brought forward by the team. They can either send it back to the team for further refinements and improvisations or scrap it or add it to the product backlog after prioritizing it.

It is the Innovation Governance committee that is the destination of all the innovative product proposals that are received from the scrum teams, and it is from here that the proposals take a more formal shape provided they are identified to be of high customer and thereby business value. Innovation Governance Committee meets periodically at regular frequency in order to discuss the various product proposals that are identified out of Scrum Teams brainstorming sessions and brought forward in front of the committee by the Scrum team’s Product Owners.

3.3 Activities Involved in Rolling-out PRISM

In addition to the conventional activities, the following are the new activities involved in rolling out the PRISM: 1. Identify the Innovation focus area for the Scrum Team, 2. Training sessions on Innovation focus area to the team, (Optional and to be organized by the Scrum master), 3. Scheduling the brain storming sessions, 4. Propose ideas resulted out of brainstorming to the Product Owner, 5. Proposal refinement by the Product Owner – Attach with a business use case, 6. Product owner to present the proposals to Innovation Governance committee, 7. Proposals are reviewed by the Innovation Governance committee after receiving the feedback from multiple stakeholders within the committee, 8. Next steps taken on the proposal, either to be sent back to team for further enhancements or they will be prioritized and added to product backlog.

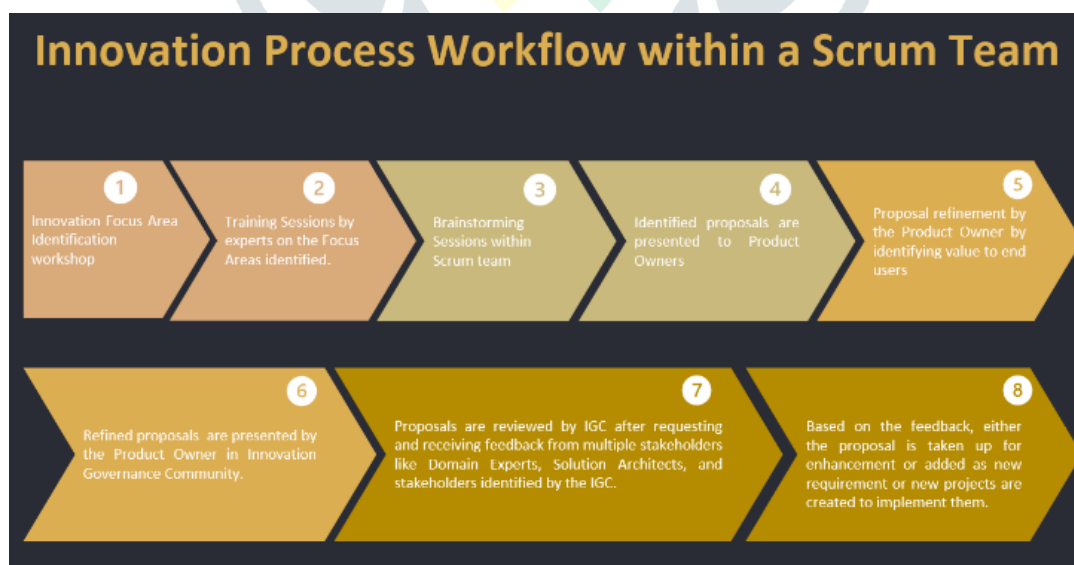


Fig. 5. shows the tasks involved in PRISM sprint

3.4 Members and their involvement in various stages of Innovation Process activities within the Sprint

All the members of the Scrum Team are actively involved in the Innovation Process Workflow, thus ensuring inclusiveness, which is one of the major aims of this model. The below figure clearly depicts the various stages of Innovation Process Workflow and the members of Scrum Team involved to carry it to the next process stage.

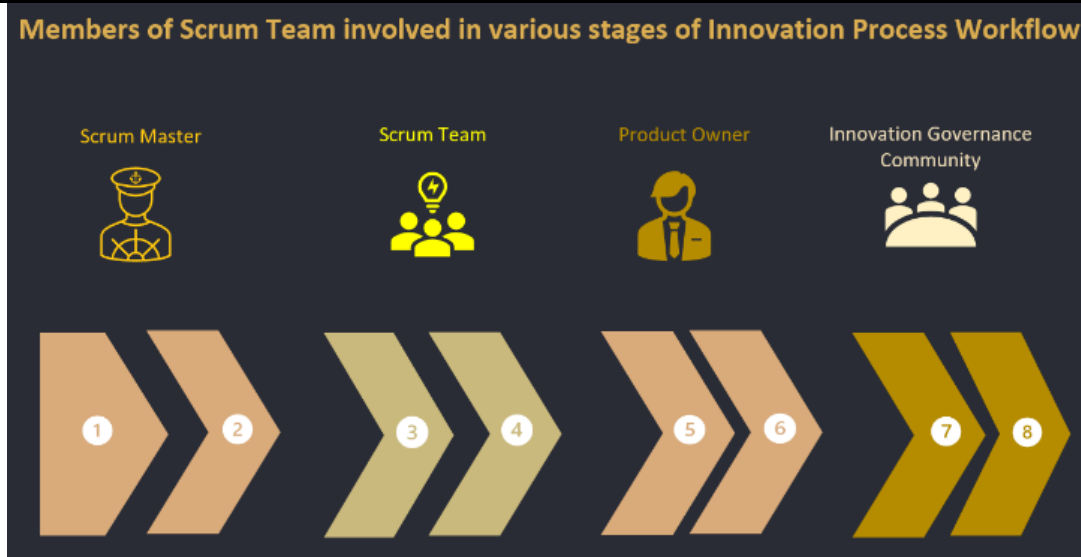


Fig. 6. shows the Scrum Team members involvement in additional activities during a PRISM Sprint model

3.5 Proposal Workflow within PRISM

Scrum Teams participate in Brain-storming sessions and come up with Product proposals in the identified Innovation focus area.

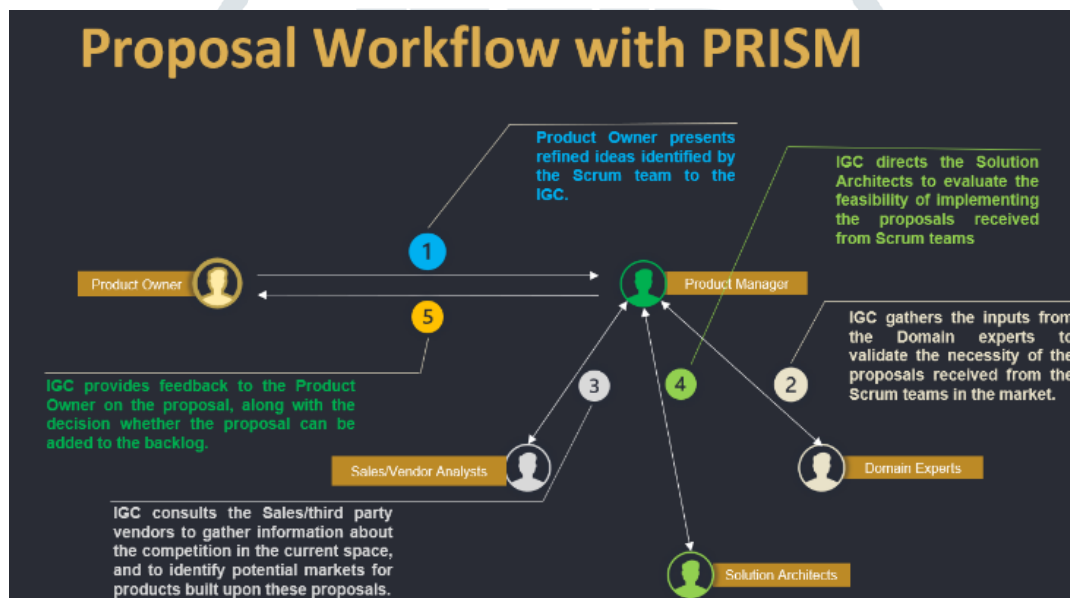


Fig. 7 shows the proposal workflow in PRISM

The product proposal is presented by the Product Owner of the Scrum team who have brain-stormed to come up with the proposal to the Innovation Governance Committee. Once the proposal is presented, the Product Manager(s) heading the said committee will gather the inputs from multiple stakeholders like: a) Domain/Subject matter Experts, who validate the necessity of the proposals in the current market situation and the likelihood of its relevance in the future, b) Sales/vendor Analysts, who provide the information about the competition in the current market and also identify the potential markets for products built based on these proposals, c) Solution Architects, who evaluate the feasibility of implementing the proposed proposals. Product Managers also will include other necessary stakeholders to get better review the proposal and bring it into a reality as early as possible. Product managers also will bring in the customer perspective while evaluating the proposal to complete the all-round review of the said proposal, proposed by the Scrum Team.

3.6 How PRISM works:

As conveyed above, PRISM facilitates a bottom-up approach, where the Scrum Teams propose Innovative product Proposals to the Product Management.

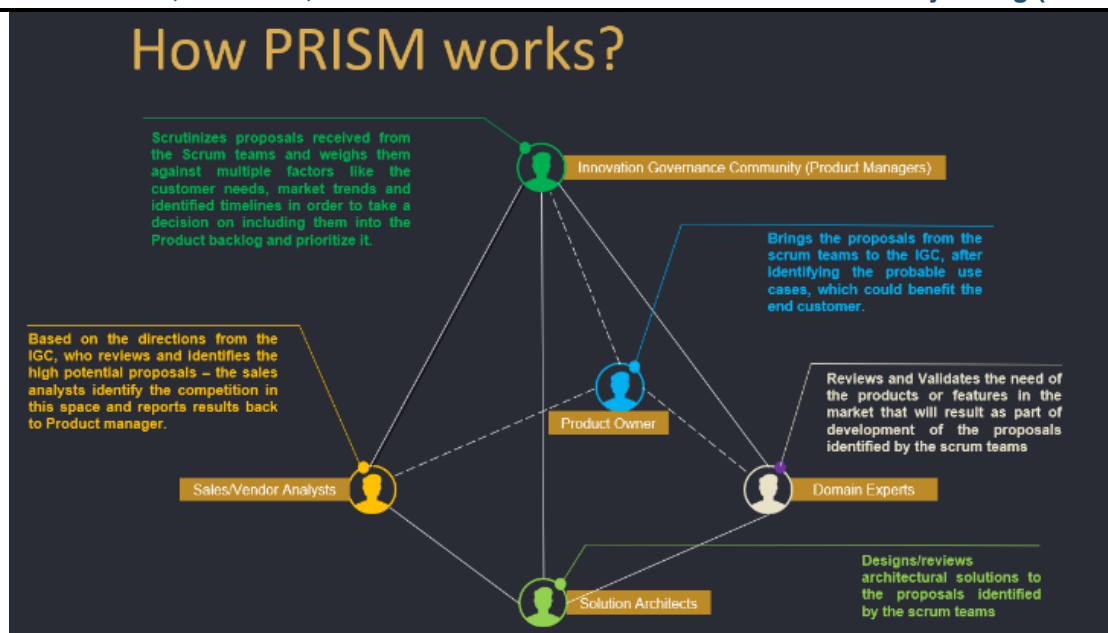


Fig. 8 shows the working model in PRISM

And in this process, the team first shares the innovative proposals with the Product Owner, who takes the proposals forward by presenting it to the innovation Governance Committee, headed by Product Managers. Product managers involve multiple stakeholders like the Domain/Subject Matter experts, Solution Architects, Sales/vendor Analysts and other necessary stakeholders and attach a customer standpoint opinion to review and gauge the relevance of the proposal, for the current and future business scope and its alignment with the goals and vision of the Organization. After a thorough review process, the Innovation Governance committee takes a decision on the future of the proposal which can range from the either sending it back to the team for improvements or adding it to the product backlog or creating a new scrum team for developing the prototype for the said proposal.

3.7 Innovation Focus Area Identification for Scrum Team

The below figure details the exercise that needs to be taken up by the Scrum Team to identify the direction it needs to proceed in, and fix the area to propose innovative product proposals in.

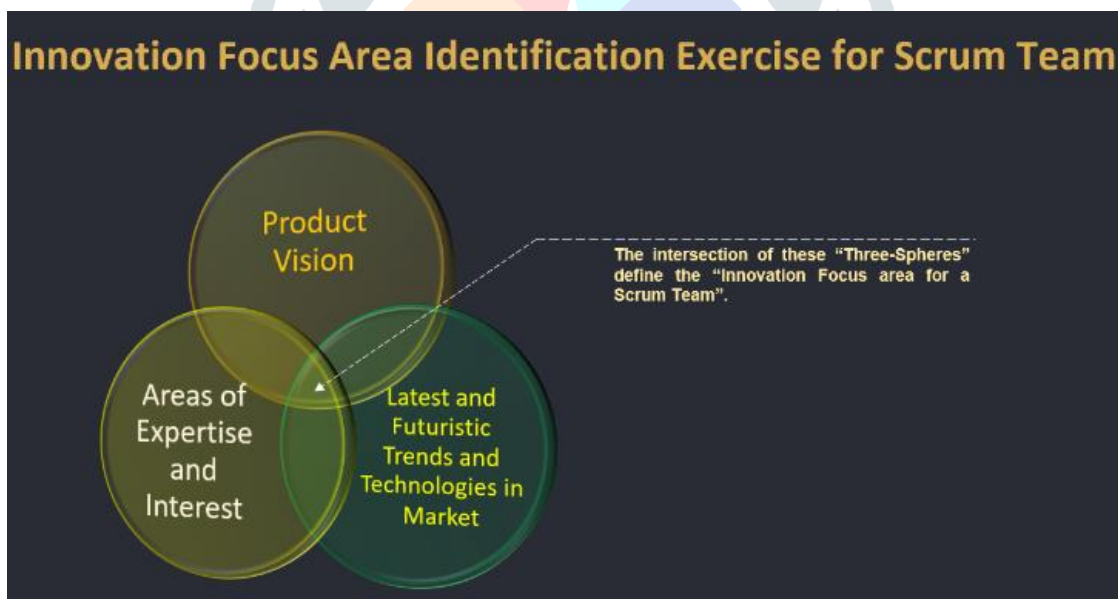


Fig. 9. shows the Innovation Focus Area Identification exercise for a Scrum Team

Keeping in mind the Product vision, the scrum team has to introspect to gauge and identify the Team’s Area of Expertise and Interest and fuse it with the latest and futuristic trends and technologies in the market to finalize the area of innovation focus for a Scrum team.

3.8 Innovation Activities within the Sprint

Brain-storming sessions are conducted within the team to identify the Innovative product proposals and presenting them to the Product owners are the two activities that occur consistently across Sprints to ensure the continuous flow of process to result in Innovative proposals coming up from a Scrum Team.

In accordance with the flow of activities identified above, the below diagram shows the activities leading to identifying Innovation proposals in a Scrum Team across the sprint is as follows:

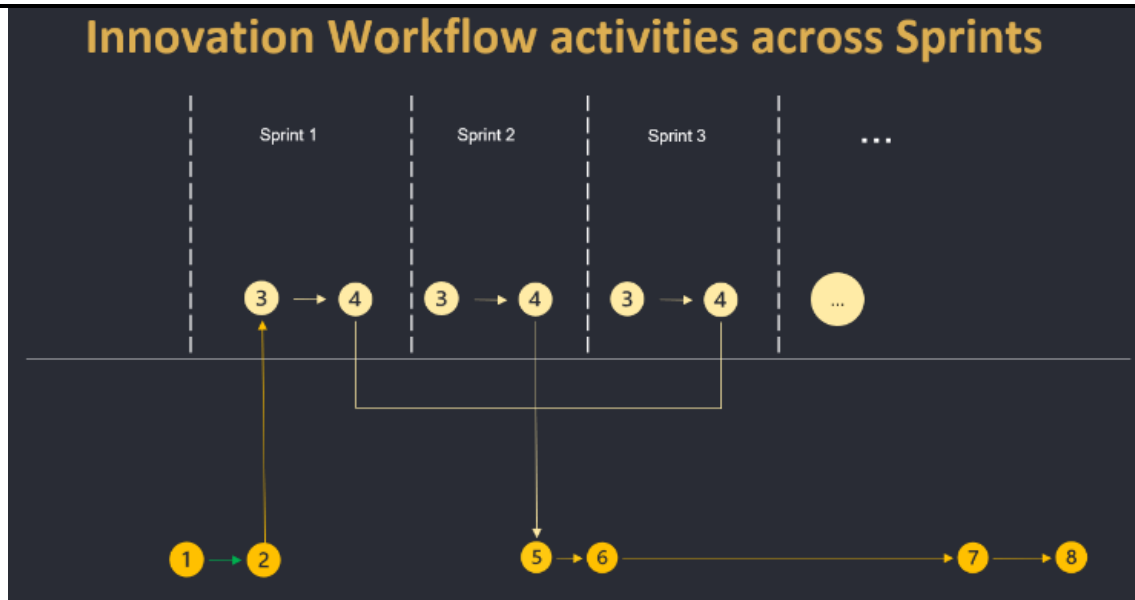


Fig. 10. shows the PRISM activities additionally taken up during Sprint Execution.

3.9. Redefined Responsibilities of Scrum Roles

This section elaborates the proper statistical/econometric/financial models which are being used to forward the study from data towards inferences. The detail of methodology is given as follows:

3.9.1 Scrum Master

1. Conduct workshops for identifying the areas of area of focus for the Scrum team – the focus area defines the scope of exploration for producing novel and innovative product proposals.
2. Aims for building diverse competencies within the scrum team by identifying the training requirements to enable the team to explore new grounds for product innovation proposals.
3. Conduct innovation sprints, Hackathons, if necessary, within the team and parallelly making sure that the current project priorities do not take a backseat.
4. Ensures unhindered completion of Sprint backlog by the end of the Sprint.

3.9.2 Product Owner

1. Refines and enhances the proposals identified by the scrum team, by identifying the potential use cases for the end customer.
2. Contributes to reviewing the proposals from other teams presented in the Innovation Governance Community.
3. Presents the Team's proposals and represents the Scrum Team in the Innovation Governance Community and brings back feedback and results to the Team.

3.9.3. Development Team

1. Identify the areas of Innovation Focus, inclusively.
2. Actively Participate in Team Brainstorming Sessions for producing innovative product Proposals.
3. Present Proposals to Product Owner and have healthy active discussions to give the best shape to the proposals.

IV. CONCLUSION AND FUTURE WORK

Though existing works mentioned in Section II of this paper focus on Innovation and agile methodologies, it is to be noted that they are all either: a) aim for innovation using agile methodologies or b) innovatively re-define the existing methodologies for building better/faster solutions. However, an approach which aims to integrate a process for innovation with software development methodologies followed in a development team, to deliver the intended software solutions along with innovative solutions hasn't been explored before, which is what this research essentially focuses on.

Additionally, the impact of such integration must be evaluated on the deliverables of the sprint (including the innovative proposals) and on various sprint activities. It is also of high interest to consider multiple scenarios where sprints must deliver high valued deliveries, and its impact on the Innovation activities. Moreover, it is also of high importance to understand the motivational aspects of the team, by integrating such activities into the scrum.

REFERENCES

- [1] K. Trapani, "What is Agile/Scrum," cPrime, May 22, 2018. <https://www.cprime.com/resources/what-is-agile-what-is-scrum/>.
- [2] A. Djurovic, "20+ Astonishing Agile Adoption Statistics for 2020 (Updated)," goremotely, Aug. 21, 2020. <https://goremotely.net/blog/agile-adoption/>.
- [3] "15th State of Agile Report Shows Notable Rise in Agile Adoption Across the Enterprise," www.businesswire.com, Jul. 13, 2021. <https://www.businesswire.com/news/home/20210713005631/en/15th-State-of-Agile-Report-Shows-Notable-Rise-in-Agile-Adoption-Across-the-Enterprise> (accessed Apr. 29, 2022).
- [4] "15th Annual State of Agile Report | Digital.ai," digital.ai. <https://digital.ai/resource-center/analyst-reports/state-of-agile-report>.
- [5] jeremiah_owyang, "Report: The Corporate Innovation Imperative," Jeremiah Owyang. <http://web-strategist.com/blog/2017/02/21/report-the-corporate-innovation-imperative/>.
- [6] "Latest 2020 Update: Innovation Statistics & Facts," ALCOR FUND. <https://alcorfund.com/insight/latest-innovation-statistics-and-facts-2020/>.
- [7] "Pwc gyb innovation imperative keeping your company relevant," 2012. [Online]. Available: <https://www.pwc.com/gx/en/consulting-services/innovation/assets/pwc-gyb-innovation-imperative-keeping-your-company-relevant.pdf>.

- [8] F. Dobrigkeit and D. de Paula, "The best of three worlds - The creation of InnoDev a software development approach that integrates Design Thinking, Scrum and Lean Startup," DS 87-8 Proceedings of the 21st International Conference on Engineering Design (ICED 17) Vol 8: Human Behaviour in Design, Vancouver, Canada, 21-25.08.2017, pp. 319–328, 2017. Accessed: Apr. 29, 2022. [Online]. Available: <https://www.designsociety.org/publication/39850/The+best+of+three+worlds+-+The+creation+of+InnoDev+a+software+development+approach+that+integrates+Design+Thinking%2C+Scrum+and+Lean+Startup>.
- [9] M. Ma and L. Morris, "The Agile Innovation Sprint," International Management Review, vol. 13, no. 1, 2017, Accessed: Apr. 29, 2022. [Online]. Available: <http://americanscholarspress.us/journals/IMR/pdf/IMR-1-2017.%20pdf/IMR-v13n1art8.pdf>.
- [10] M. R. Ayyagari, "iScrum: Effective Innovation Steering using Scrum Methodology," International Journal of Computer Applications, vol. 178, no. 10, pp. 8–13, May 2019, Accessed: Apr. 29, 2022. [Online]. Available: <https://www.ijcaonline.org/archives/volume178/number10/30565-2019918812>.
- [11] B. Barton, "All-Out Organizational Scrum as an Innovation Value Chain," IEEE Xplore, Jan. 01, 2009. <https://ieeexplore.ieee.org/document/4755763> (accessed Apr. 29, 2022).
- [12] "What is Design Sprints?," The Interaction Design Foundation. <https://www.interaction-design.org/literature/topics/design-sprints>.
- [13] 3M, "3M's 15% Culture | Cultivate & Pursue Your Innovative Ideas | 3M United Kingdom," 3m.co.uk, 2019. https://www.3m.co.uk/3M/en_GB/careers/culture/15-percent-culture/.

