

Scrum as a Platform to Manage Students in Projects of Technological Development and Scientific Initiation: A Study Case Realized at UNIT/SE

Larissa Freitas Santana^{1*}, Luiz Felipe Cirqueira dos Santos¹, Thiciane Suely Couto Silva¹, Victor Brito Villar¹, Fabio Gomes Rocha², Vitor Gonçalves³

¹ *Tiradentes University (Unit), BRAZIL*

² *Computer Department – Federal University of Sergipe (UFS) and Tiradentes University (Unit), BRAZIL*

³ *Escola Superior de Educação Instituto Politécnico de Bragança, PORTUGAL*

***Corresponding Author:** lariissasantana_n@hotmail.com

Citation: Santana, L.F., Santos, L.F.C., Silva, T.S.C., Villar, B.V. and Rocha, F.G. (2017) Scrum as a Platform to Manage Students in Projects of Technological Development and Scientific Initiation: A Study Case Realized at UNIT/SE. *Journal of Information Systems Engineering & Management*, 2(2), 7. doi: [10.20897/jisem.201707](https://doi.org/10.20897/jisem.201707)

Published: March 30, 2017

ABSTRACT

This paper deals with the Scrum methodology as an alternative to pedagogical practices and managing of the software projects, presenting an investigation with the students of scientific initiation of an university from the Brazil's northeast. It was seeking to analyze the accomplishment of the students with the Scrum practices, as well the perception of the learning of the methodology, showing the positive aspects and the negative ones through this experience. As a conclusion, the Scrum methodology is indicated to manage projects even when the team has limited or none experience promoting the learning, adding value and satisfaction to the student.

Keywords: scrum, agile, education

INTRODUCTION

Scrum is a framework to manage agile projects, its is gaining spotlight in the software market for providing a better flexibility and versatility to the development team. It was designed by Jeff Sutherland, John Scumniotales and Jeff McKena in 1993 incorporating concepts shown by Takeuchi and Nonaka in 1986 on the article “The new new product development game” published in Harvard Business Review (Prikladnicki, Willi & Milani, 2014) and as yours idealizers “[...] it uses an interactive and incremental approach to refine the predictability and damage control” (Schwaber and Sutherland, 2013).

To the application of the framework, it’s required three important functions: the Product Owner (PO), the professional with the knowledge of the product to be developed; the Scrum Team, that refers to the development team and it is, in general, featured for being a self-organized and multifunctional team; and the Scrum Master (SM) that is the person responsible for to grant the applicability of the Scrum in a correct way and remove possibles obstacles that would affect the Scrum Team. The functioning is based in constant development and interaction cycles known as Sprints, with prefixed time, ordinarily divided in two or four weeks, called Timebox, [Figure 1, presents the Timebox]. The list of system’s requirements is called Backlog of the Product, and it is normally defined by the Product Owner. To start a sprint, the team makes a backlog session where it will be defined the requirements to be developed on the next cycle based on the backlog of the product. At the end of the cycle, the team must have already part of the product and show it to the client (Rocha, Sabino & Acipreste, 2015).

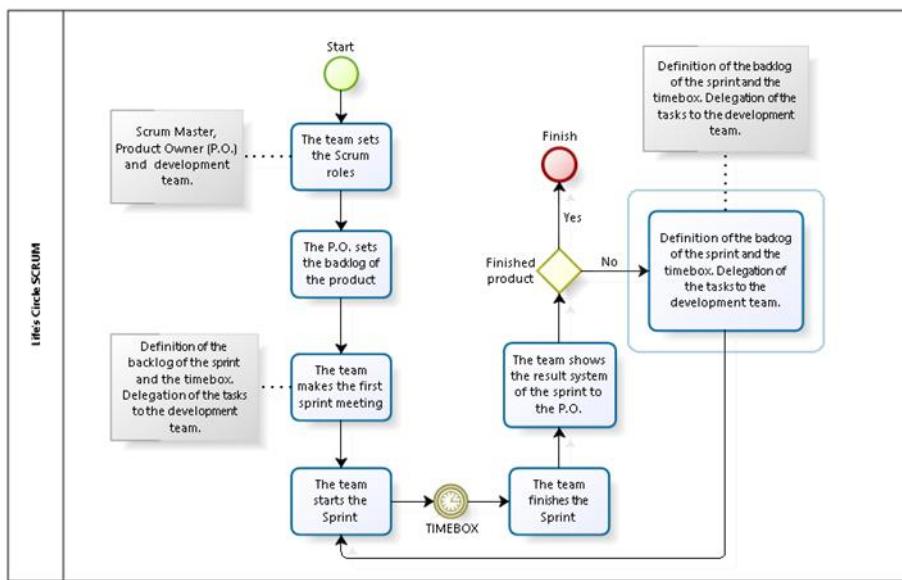


Figure 1. Represents the Timebox of the team, showing the steps to be followed for the application of the Scrum.

This paper presents a study about the case of Scrum's use in the management of the project of technological development of a system to the process' automation related to Scientific Initialization of the Tiradentes University (Unit), located on the state of Sergipe, Brazil. The team involved on this process is composed by students of the courses of Computer Science and Information Systems of Unit with students of the second and third year of graduation, presenting as a disadvantage caused by the lack of experience and without a fixed workplace. By that, this article objectifies to analyze if the utilization of the Scrum has had making the process easier to the development, allowing a bigger integration of the team.

CASE STUDY

This study case has the objective of analyze the integration of the team and the quality results of the requirements delivered, with the utilization of Scrum by students of a private university, in projects of technological development. The objective was established based on GQM model (Wohlin et al., 2012).

- Analyze the application of Scrum;
- for the purpose of evaluate and monitorate
- with respect to their relation between the integration of the team and the speed of development;
- from the point of view of the team
- in the context of scholarship students on the Project of Technological Development and the client.

The questions that this paper seeks to answer is:

Q1. Did the utilization of the Scrum's framework by the team help on the agile development of the product?

Q2. It is possible to confirm that the integration among the students contributes for a better product development?

Description of the Local and the Study Case

The Project was fulfilled at Tiradentes University (UNIT), located on Murilo Dantas avenue, 300, Farolândia Farola, Aracaju – Sergipe Brasil. The responsibles for the study case the members of the Group Interdisciplinary in Information Technology and Communication (GPITIC) in partnership with the Coordination and Directorship of Research, with the objective of creation of a system to automate and manage the process related to Scientific Initialization. The research coordination is responsible to evaluate, register and keep up with the projects of scientific initialization and technological development of all the academic areas. Every year the coordination publish two notices, one each semester, and all the process is made manually and managed using spreadsheets.

Preparation

To the realization of the study case, it was proposed a Project of automation for scientific initialization of Tiradentes University, thereunto it was proposed six subprojects where it was approved and protocoled on the first semester's notice, from that, which the themes was: Enviroment Usability, data base and techniques of agile



Figure 2. Four students responsible for the three initial subprojects. They are doing the backlog of the product, with the exhibition of the requirements collected and validated.

programation. Those sub projects were integrated, however, with distinct tasks on research and development. The team is composed by nine students, where two of them are from feminine sex and the seven others masculine, the youngest one is eighteen years old and the oldest is twenty-five years old. The students are coursing the third and seventh semester of graduation, four of the is coursing Computer Science and the others are coursing Information Systems at the university.

To each Project of the research, it was possible to designate the maximum of two students, in this way, were selected four students on the first stage and the rest after the second semestre and on. Beyond the development of the product, the students also conducted a scientific research about the theme of your own subproject. The students were divided in that way: One played the paper of the Scrum Master (SM), having the responsibility of to manage the team, another one was the Product Owner (PO), in charge of the product, and the others composed the development team. Besides the participation of the students and the professor advisor, the Project had also an indirect participation of the research coordinator and four more professor that were selected by the research coordination to be interviewed about the process of scientific initialization.

Initially, it was selected a manner of managing the projects of technological development, that was Scrum framework. Although the students had already a previous knowledge about the framework because of the classes of Software Engineering present on the graduation course, it was conducted a short course to reinforce the knowledges about Scrum. After the short courses, it was realized a meeting to define the tools that would be used and a deadline of thirty days as the Sprint timebox.

Due to the fact of the team is not able to do daily meetings, it was accomplished meetings every fifteen days to discuss about the project's progress and possibles difficulties found. Furthermore, after the first meeting, it was noticed the necessity of daily communication and, to do so, it was used some tools so the members of the team could be reporting what they were doing and, consequently improve the communication and production. It occurred because of the fact that the students didn't have matching schedules in most of the time.

After the first six months were added three new sub projects, those were consisted in: Software Testing, Agile Software Engineering and Mobile Development. Hence, five new students were added to the team to the system development. One of the new students replaced a student that could not keep going with the subproject that he was responsible.

To make possible the initialization of the Project, the student that was playing the Product Owner (PO) carried out the first contact with the client (Research Coordinator and professors) in order to interview him for the survey of the requirements and after that, the approval.

Execution of the Case of Study

After the process of collecting and approving the requirements, the PO scheduled a meeting with all the members of the team in order to explain the whole Project and, therefore, be able to start the divisions of the tasks to be accomplished. From the first meeting realized with all the members of the team, the tasks were designated [Figure 2, Sprint meeting], the deadline was stipulated and the questions about the Project were answered.

To the explanation of the tasks we used the Kanban board [Figure 3, Kanban board], so the students could have a better view of the whole process needed to development of the final product..

Since the team did not have a fixed place to display the Kanban board and to facilitate the meetings so wouldn't be needed to mount the board every time, the team decided that would be used a online and free platform called Scrumme [Figure 4 shows the Scrumme platform], which were counted all the listed requirements divided as



Figure 3. Students interacting with the Kanban board. They are selecting the tasks to be realized and observing all of the tasks that should be developed.

A screenshot of the Scrumme project management platform. At the top, there's a header with the URL 'www.scrumme.com.br/web/dashboards.aspx?p=c05fc4bc450a4fb3-a0d5-b383263a50b' and a message 'Além dos seus projetos, gerencie as finanças da sua empresa com nosso produto! GRÁTIS!' Below the header, the interface is divided into several sections: 'Project sprints' (showing two sprints with 100% and 64% completion), 'Project team' (listing team members like Bruno Reis, Fabio Gomes Rocha, Larissa, Thiciane, and Thomas Augusto), 'Project information' (with a description of the project as a tool for managing the Pós-Graduação de Inovação Científica, owner Fabio Gomes Rocha, start date 3/20/2015, and estimated end date 3/1/2016), and 'Meetings' (listing scheduled meetings for 4/2/2015 and 3/30/2015).

Figure 4. The platform Scrumme, where are exhibited the realized sprints, the percentage of the conclusion, the members that are associated to the Project as well a short description about the Project submitted.

A screenshot of the Trello project management platform. The top navigation bar shows 'Quadrados | Trello' and the URL 'https://trello.com'. Below the bar, there are sections for 'Meus Quadrados' (My Boards) and 'Welcome Board'. Under 'Meus Quadrados', there are several boards represented by colored cards: 'SARA - Sprint 1 2015.2' (blue), 'SARA - SPRINT 3 2015.2' (dark blue), 'SARA - SPRINT 4 2015.2' (purple), 'SARA - SPRINT 5 2015.2' (grey), 'SARA - Sprint 6 2016.1' (orange), 'SARA - Sprint 7 2016.1' (green), 'SARA - Sprint 8 2016.1' (teal), and 'SARA - Sprint 9 2016.1' (red). Each board card has its name and a small description below it. At the bottom of the screen, there's a toolbar with various icons and a status bar showing system information like battery level and signal strength.

Figure 5. Shows the platform Trello, on it is the number of the Sprint realized.

it's development process. Besides give the team the na online vision of the kanban board, it was possible to realize chats through the platform, which the team member could solve doubts and the SM and PO could verify how the project's progress was going. Furthermore, it was used Google Docs to make daily meetings, since during the first moment it was noticed the necessity of communication even if it was in an online way.

With the addition of new projects and therefore new students, the team, together with the professor advisor, decided to use also the online and free platform Trello (**Figure 5** shows the Trello platform), which is also available to Android and iOS systems.

The tasks were selected based on importance criteria, so they were defined by the research coordinator during the interview. In each new Sprint, the members of the team should have to give a short feedback of their concluded

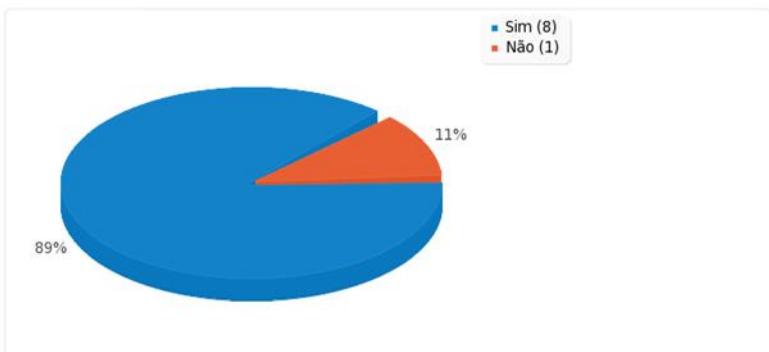


Figure 6. 89% of the team members agreed that with the using of the online platform occurred a better interaction among themselves. According to the displayed results, it is believed that the utilization helped in a positive way this interaction.

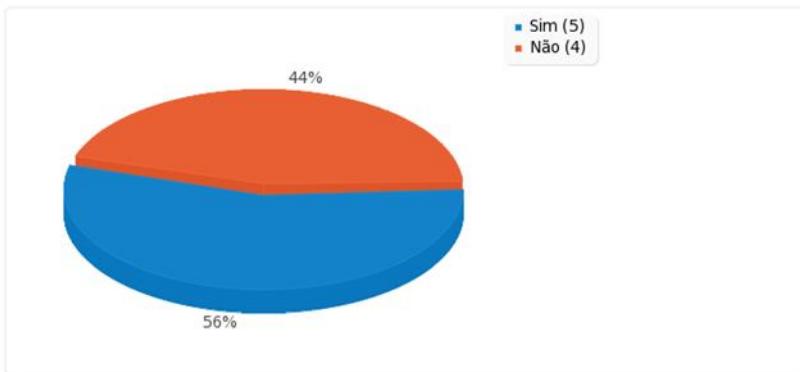


Figure 7. 44% of the team members answered no to the question about the doubts that arised during the Sprint period, if they were solved without harming the deadline.

tasks and the PO, together with the SM, would verify and evaluate it so the new tasks could be started, in case of a task wasn't fitting what was established before, it would be redone and given on the next Sprint.

Currently, it was realized eleven sprints, although the first two sprints are not in Trello, but Scrumme. The first Sprint was about the building of the documentation, the second Sprint was virtually lost, because it was a Sprint for adaptation, since the students did not share their doubts. So on the biweekly meeting we realized that the tasks were different from their objectives, through the third Sprint and on we noticed a better engagement, quality, development and consequently a shorter delivery time.

The Project was foreseen to be delivered in two years, although on the tenth month of the project's execution the product was presented and approved by the Research Committee, it is formed by the new and older direction and coordination of research, the committee of ethics and by the secretary. With the delivery of the product it was realized an interview with some professors and the coordination of research, in order to know their opinion about the product, also it was realized a questionnaire with the students that participated of the Project, it had the objective of analyse the methods that were used for the production.

ANALYSIS OF THE RESULTS AND DISCUSSIONS

Observing the team working, it was noticed that the adaptation to Scrum, in spite of being fast, it took at least two sprints. Also, it was observed that each one have a different progress rhythm, agreeing with (Cohn, 2009), so this phase allowed the adaptation of the team members that did not have experience, get in the rhythm of the rest of the team, so the first Sprint didn't produced results enough and the communication was totally inefficient. From the second Sprint and on, the team had a better communication, however there are a few delivery fails but the productivity starts to increase. After the third Sprint the team begins to have a better interaction, and after being questioned if the online platform helped with the interaction of the team, 89% of them answered yes (Figure 6).

The interaction related to the doubts took a while to be developed in a satisfactory way, this way, the communication happened only on the Sprint meeting during the first four months. Hence, the team after being questioned if the doubts that arised during the long time of development of the Project were solved without harming the deadline, 44% answered no, a high number (Figure 7, about the doubts).

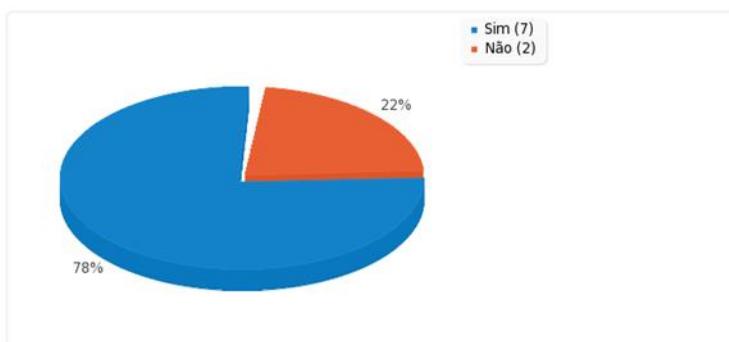


Figure 8. 22% of the team members did not agree that the Scrum training to the new members occurred in an appropriate way

After the first semester were added three new projects and with it new students were included on the team, this way occurred the adaptation process of them to the Scrum framework. (**Figure 8** shows the question), however, the result obtained shows that 22% of the team members thinks that this process of adaptation did not occurred in an appropriate way.

The Scrum enabled a mutual learning, which one of the challenges of modern education is to enable a critic space of the using of Technologies. So, questioning if the use of kanban helped on the understanding of the tasks to be done, 100% answered yes, besides, 100% of the team members answered that Scrum helped the team with the delivery of the product at the deadline and with the integration of the team, streamlining the development process, also they affirmed that the constantly feedback of the client and the team helped on the development process.

So the answer to the question “Does the utilization of the Scrum framework by the team really helped on the agile development of the product?” We can affirm that not only helped with the development of the product, it also enabled a better learning for the team that did not have any experience, and they also succeeded in conclude the development of the product with the approval of the client. Related to the question if the interaction of the students contributed to a better development of the product, it is possible to answer yes, however it took a while to make the interaction happen in a satisfactory way, so it is concluded that shorter sprints is better to the learning, comparing a period of thirty days proposed initially.

CONCLUSION

With the analysis realized on the case of study, it is noticed that the choose of the Project was a key point to the success of the team, because of the little or none changing of the requirements during the process of development, however, the first Sprint was totally lost, but the learning of the team in relation to the requirements. Another problem was the adaptation of the new members, as the team was consisted of students, the initial capacitation was essential to the success in relation of the Scrum’s utilization, although after being added new projects and consequently aggregated new members on the team, the training did not occur, so it is noticed the necessity of constantly capacitation of the new members.

As a positive point, the integration of the team and the increasing of the communication with the sprints resulted in deliveries with higher quality and faster, with a positive feedback of the client. Not only that, the team approved the utilization of the tools to help the manage of the tasks because of the fact of they did not have a fixed place to work, so the tool had been essential for the communication. Ultimately, the members of the council of research composed of 12 people, some of them coordinators of research of UNIT/SE and UNIT/AL, ex-coordinator of research and the current coordinator of máster and doctorate’s degree of education of UNIT/SE, 4 evaluators and 5 professors approved the product.

REFERENCES

- Basili, V. and Weiss, D. (1984). A Methodology for Collecting Valid Software Engineering Data. *IEEE Transactions on Software Engineering*, 10(3), pp. 728-738.
- Cohn, M. (2009). *Succeeding with Agile: Software Development using Scrum*. Addison-Wesley.
- Prikladnicki, R., Willi, R. and Milani, F. (2014). *Métodos ágeis para desenvolvimento de software*. Bookman, Porto Alegre.

- Rocha, F.G., Sabino, R.F. and Acipreste, R.H.L. (2015). A Metodologia Scrum como Mobilizadora da Prática Pedagógica: Um Olhar Sobre a Engenharia de Software. In: *CBSOFT 2015, Brazilian Conference on Software: Theory and Practice*. Belo Horizonte - MG, Brazil.
- Rodriguez, G., Soria, A. and Campo, M. (2013). Virtual Scrum: A teaching aid to introduce undergraduate software engineering students to scrum. *Computer Applications in Engineering Education*, 23(1), pp. 147-156.
- Rosa, G. D. A., Massukado, L. M., Stumpf, E. R. T. (2015). Análise de um Time de Trabalho à Luz do Framework Scrum: O Caso de Uma Organização Pública Federal de Educação Profissional e Tecnológica.
- Santos, V., Goldman, A., De Souza, C.R.B. (2015). Fostering effective inter-team knowledge sharing in agile software development. *Empirical Software Engineering*, 20(4), pp. 1006-1051.
- Schwaber, K., Sutherland, J. (2013). The Scrum Guide: The Definitive Guide to Scrum – The Rules of the game. Scrumguides.
- Soderback, J., Hrastinski, S., Oberg, L.M. (2015). Using Distributed Scrum for Supporting Online Collaborative Learning: A Qualitative Descriptive Study of Students Perceptions.
- Sutherland, J. (2016). *Scrum a arte de fazer o trabalho na metade do tempo*. Leya, São Paulo.
- Van, S.R. and Berghout, E. (1999). *The Goal/Question /Metric Method: A practical guide for quality improvement of software development*. McGraw-Hill.
- Wohlin, C., Runeson, P., Höst, M., Ohlsson, M.C., Regnér, B. and Wesslén, A. (2012). *Experimentation in software engineering*. Springer.