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Methodology for the Agile Development of Software Based on a Guide for the Body of Knowledge of SCRUM (SBOK™ Guide)

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Abstract

The management and agile development of software requires the definition and selection of an adequate methodology that is adaptable, iterative, flexible and effective, as is the SCRUM methodology, which is designed to offer significant value quickly throughout the project development. This paper performs a characteristic analysis of the principles, aspects and processes proposed by the SBOK™ Guide, which interact with each other to achieve a mechanism that allows the correct and successful implementation of the SCRUM methodology. In addition, the components of the SCRUM framework will be addressed by adapting the activities, roles and tools with respect to the planning of the necessary efforts to complete each of the tasks raised throughout the management and development of the software project, no matter its complexity.

Keywords: SCRUM Methodology, software development, agile development, SBOK.

INTRODUCTION

In recent years, organizations have been forced to opt for the uses of methodologies that allow perform a quick and practical management of projects related to software. This type of projects tends to change constantly and it is necessary to carry out processes of improvements and modifications in order to make continuous deliveries of value to the client [1].

Opting for an agile development framework allows for an incremental iterative process that does not require exhaustive planning or that requires strict compliance to achieve a deliverable or product. This model seeks to manage customer expectations while maintaining continuous interaction and collaborative work between this and the work team, in such a way that the solution can be scaled and evolve according to the need of the project, meaning, that the activities of the phases can overlap in favor of having a reduction of the time to market, greater productivity and risk reduction [2].

This methodology handles an informal communication style and is designed for projects that are being developed in complex environments, of which there are no well-defined requirements, but where results are required soon [3]. The agile management of projects with SCRUM is based on carrying out an incremental development of the requirements, taking into account a prioritization of them according to the value assigned by the client. Likewise, this methodology is applicable where empirical control of the project is required which means, once each iteration is completed, a result is obtained and showed to the client, so that it can be evaluated, decisions can be made related to any change, and the team can synchronize daily and make the necessary adaptations, so there is always a collaborative alignment between the client and the development team.

Therefore, to address the development of this article, reference will be made to the SBOK Guide, which defines a series of guidelines for successfully implementing one of the most popular agile methodologies currently, such as SCRUM, which can be applied to projects of any size and complexity under the use of its principles, aspects and processes.

MATERIALS AND METHODS

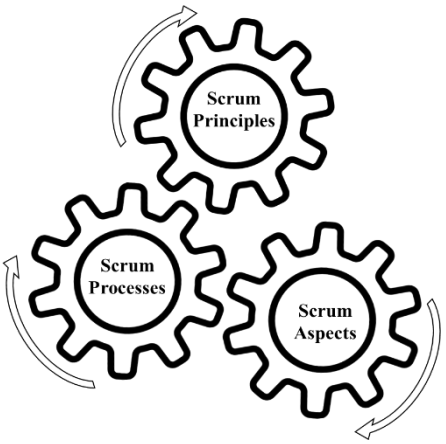

Figure 1: SBOK ™ Guide Framework

The changes and the increasing technological complexity related to the management and development of software projects, has prompted the methodologies to be subject to modifications and adaptations in accordance with the needs and challenges that the current market requires, as they are: obtaining constant results, collaborative work and the immediate response to the change without the need to follow a plan without accuracy[2,4].

This is why, as can be seen in Fig. 1, the SBOK™ guide proposes three areas that must be addressed and managed throughout a SCRUM project.

Principles of SCRUM

The six principles of SCRUM cannot be modified and must be applied as described in the SBOK ™ [5] guide in order to guarantee a correct application of the SCRUM framework; these principles are defined below:

1. **Control of the empirical process**: Since the SCRUM is not based on following an initial planning, this principle has its focus on three main ideas, such as transparency, inspection and adaptation; where each of these plays an important role throughout the project, since what is sought with this principle is that the information flow in a transparent manner, there is a SCRUM board in which the progress of the team regarding the tasks, inspection, feedback and approval of deliverables and finally the execution of retrospective meetings that allow rethinking and carrying out the necessary changes in case of detecting deviations in the project.
2. **Self-organization**: It is an essential principle that prefers a style of servant leadership oriented to obtaining results and in which the work team is committed, work motivated and manage an innovative work environment.
3. **Collaboration**: It is a team effort in which there is constant customer participation aimed at minimizing change requests, increasing efficiency, mitigating risks and practicing continuous improvement.
4. **Prioritization based on value**: The owner of the product is responsible for indicating the priority that will be given to each of the requirements in order for the SCRUM team to deliver maximum value in the shortest possible time.
5. **Assignment of a block of time**: It establishes a quantity of time for each process and activity in order to perform an efficient development and at a high speed that guarantees a correct block of time both for a sprint and for meetings (daily, sprint planning, sprint review and sprint retrospective).
6. **Iterative development**: Makes constant deliveries of value according to the prioritized list, which allows the client to evaluate the progress of the project and in the same way makes corrections that are integrated into the project in a flexible way.

Aspects of SCRUM

Fig. 2 shows the five SCRUM aspects that must be managed throughout the project and the function that each one of them fulfills:

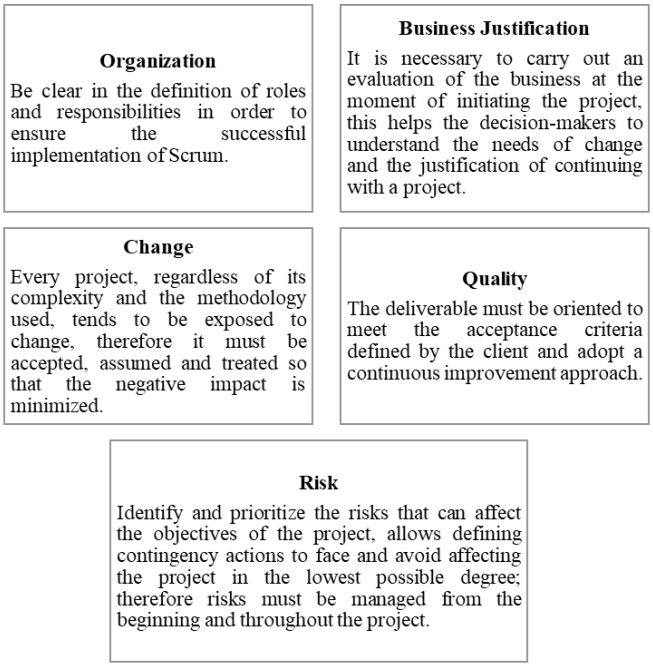

Figure 2: SCRUM Aspects

SCRUM processes

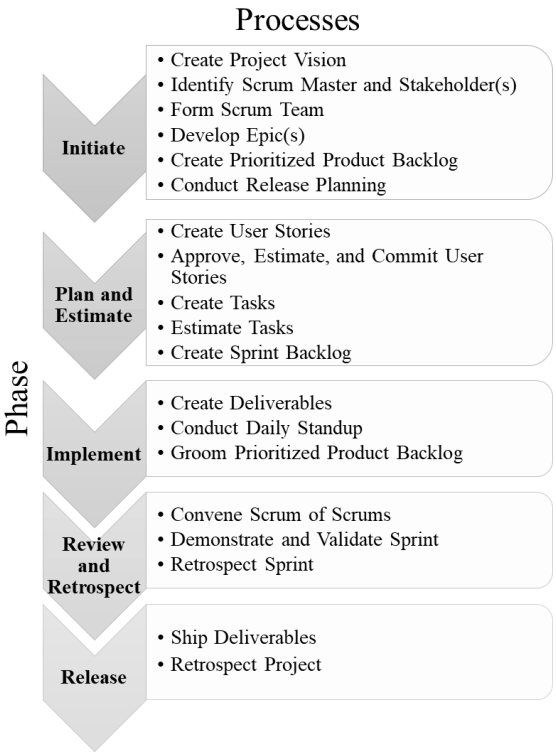

Figure 3: SCRUM processes grouped by phases

There are nineteen SCRUM processes[4,6], which address a series of activities that include inputs, tools and outputs for the implementation of the specific flow of a SCRUM project [7]; these processes are grouped into five phases as shown in the Fig. 3.

Start

- Creation of the project vision: With this vision what is sought is to have a focus for the project and identify the owner of the product.
- Identification of the SCRUM Master and the partner(s): In this process, specific selection criteria are used to identify these two roles.
- Training of SCRUM teams: The selection of team members is the responsibility of the product owner and in turn has the cooperation of the SCRUM Master.
- Development of epic(s): For the identification of epics it is important to take into account the vision of the project and hold meetings of user groups to discuss the appropriate epics.
- Creation of the prioritized list of pending products: In this process it is necessary to refine, create the epics and then prioritize them in order to obtain an organized list of pending products.
- Carry out the launch planning: The main team of SCRUM develops a schedule of launch planning taking into account the user stories in the prioritized list, in addition the duration of the sprint is determined.

Planning and estimation

- Creation of user stories: in this process the stories are defined by the owner of the product with the purpose of covering and understanding all the requirements of the client; in addition, the acceptance criteria of the user stories are defined.
- Approval, estimation and assignment of user stories: the user stories are approved by the owner of the product, and then the SCRUM Master and the SCRUM team perform the effort estimation to carry out the development of the functionalities described in each user story.
- Creation of tasks: Based on the approved, estimated and assigned user histories, they are divided into specific tasks and grouped in a list of tasks.
- Task estimation: The SCRUM team in the task planning meetings is responsible for estimating the effort necessary to carry out each task on the list.
- Creation of sprint pending list: This pending list is created by the SCRUM main team at the sprint planning meeting.

Implementation

- Creation of deliverables: according to the prioritized list of pending sprints, the SCRUM team is responsible for working on the tasks to create the sprint deliverables.
- Hold a daily standing meeting: this meeting is held in a fixed block of time, there SCRUM team members update each other regarding their progress and impediments they may be facing.
- Maintenance of the prioritized list of pending products: This process refers to the list so it must be updated continuously.

Review and retrospective

- Convene the SCRUM of SCRUMs: When several SCRUM teams participate, this type of calls can be given, in order to track the respective progress, impediments, and dependencies between other teams.
- Sprint demonstration and validation: during a sprint review meeting, the SCRUM team demonstrates the sprint deliverable to the product owner and relevant partners for the purpose of ensuring product owner approval and acceptance of the deliverables created in the sprint.
- Sprint Retrospective: The SCRUM Master and the SCRUM team meet to analyze and study the lessons learned throughout the Sprint.

Launching

- Sent of deliverables: Deliverables that are accepted are passed to the relevant partners.
- Project retrospective: In this process, the partners and members of the SCRUM main team meet to do a retrospective of the project in order to identify and document the lessons learned.

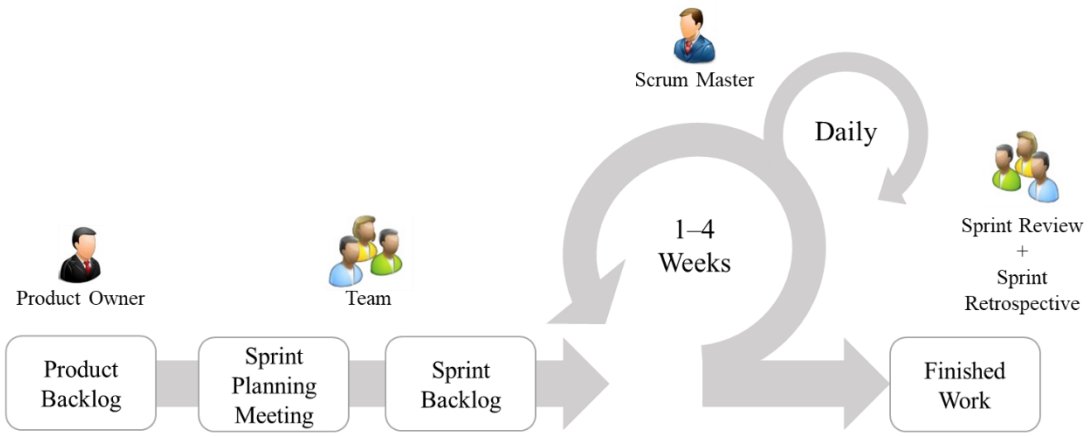

Figure 4: SCRUM Framework

DEVELOPMENT AND DISCUSSION

Taking as reference the guide for the body of knowledge of SCRUM (SBOK™ Guide), the SCRUM framework [8,9] is defined in which the activities and roles are related as shown in Fig. 4. It can be seen the different activities that should be executed throughout the project in an iterative and incremental way, such as sprint planning, sprint, SCRUM daily meeting, sprint review, sprint retrospective and the refinement of the list of requirements and changes in the project, in addition to the responsibilities and intervention points made by each of the roles (Product Owner, SCRUM Master and SCRUM Team).

In the same way [10], for this proposed adaptation, a distribution of the roles involved in a project homologated to the SCRUM roles framework was defined (see Fig. 5).

Product owner: Person responsible for representing the client and transferring the vision of the project to the team.

SCRUM master: Person who leads the team, is a facilitator who guides and teaches SCRUM practices to all participants in the project.

Team: Group of people with the necessary technical knowledge and responsible for understanding the requirements specified by the owner of the product and carrying out the user stories.

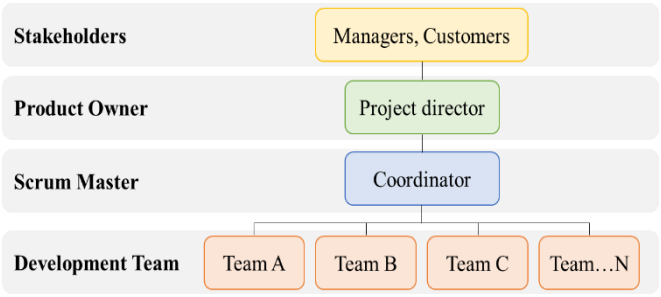

Figure 5: Task and effort planning

Finally, the definition of a possible structure of a work package was defined as shown in Table 1, which defines the SCRUM Master as the package leader and details some objectives, tasks and deliverables for certain specific work associated with a project process under the framework of work, which can be modified and adapted according to the need and the phase that is being developed. [11]

Table 1: Work Package Model

Work package number	WP2	Type of activity	Comunications
Work package title	Project communication and quality tests		
Leader of the package	Scrum Master		
No. of participants	2		
Participants	Scrum Master - Quality engineer		
Start month	1	End month	20
Objetives			
- Define the means and methodology of communication. - Manage communications. - Prepare and perform system audits.			
Description of work			
T2-01: Design the communication plan. T2-02: Execute the communications plan. T2-03: Monitoring and control of the communications plan. T2-04: Execute audits			
Deliverables			
E2-01: Document with communications plan. E2-02: Audit reports.			

CONCLUSIONS

Defining a methodology to carry out the development of a project can avoid serious problems for an organization, both with the client and with the members of the work team; therefore, this paper covered one of the most agile development methodologies, popular in the market such as SCRUM, a project execution framework geared towards an incremental approach in which effective collaboration exists between team members and the client; In addition, a descriptive analysis of the principles, aspects and processes proposed by the SBOK™ Guide was carried out, to subsequently define a SCRUM framework in which the main roles were defined together with the planning of efforts in short work cycles and the structuring of a work package associated with a series of tasks and deliverables in order to offer results of significant value in a short period of time.

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