

Planning a project applying the Scrum framework

La planeación de un proyecto aplicando el marco de trabajo Scrum

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Abstract

Currently, Scrum is one of the most recognized and used methodologies in agile project management. The main objective of this article is to analyze the planning phase in an agile project, integrating the life cycle of the Scrum framework and the Deming cycle that allows to identify, define and specify the processes and techniques to be managed during said phase. An applied research is proposed, under a case study according to the nature of the disciplinary area. On the other hand, in addition to this, the opportunity to apply this framework in daily life has been identified. Contributing, mainly as a contribution to the line of knowledge generation in the scientific field of applied research of agile methodologies in life projects. In the same way, a path is left in the scientific study to integrate continuous improvement in the implementation of the Scrum framework.

Scrum, Planning, Product Backlog

Resumen

En la actualidad, Scrum es una de las metodologías más reconocidas y utilizadas en la gestión ágil de proyectos. El presente artículo tiene como objetivo principal analizar la fase de planeación en un proyecto ágil integrando el ciclo de vida del marco de trabajo Scrum y el ciclo Deming que permita identificar, definir y concretar los procesos y técnicas a manejar durante dicha fase. Se plantea una investigación aplicada, bajo un caso de estudio de acuerdo con la naturaleza propia del área disciplinar. Por otro lado, además de ello, se ha identificado la oportunidad de aplicar este marco de trabajo en la vida cotidiana. Contribuyendo, principalmente como un aporte a la línea de generación de conocimiento en el campo científico de la investigación aplicada de metodologías ágiles en proyectos de vida. De igual manera, se deja un camino en el estudio científico para integrar la mejora continua en la implementación del marco de trabajo Scrum.

Scrum, Planeación, Product Backlog

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Introduction

Agile methodologies are adaptive methodologies, which arise to carry out software development projects, adapting it to changes as an opportunity to improve the system and increase customer satisfaction, considering change management as an inherent aspect of the software development process itself and, thus, allowing a better adaptation to the environment, maximising investment and reducing costs, either to vary part of its functionality, add a new one, or for example, adapt the system to a new application domain (Navarro, *et al.*, 2018). In addition to this, there have been multiple studies on how to apply the Scrum framework in everyday life. The general objective of this study is to carry out an analysis of the Planning phase by applying the Scrum methodology and correspondence with the Deming cycle to manage an agile project, in such a way that the efficiency and effectiveness of the process is optimised and its quality is increased.

Development

Gradually, over time, programmers noticed that traditional methods of software manufacturing were less efficient than expected. So they began to look for more effective frameworks for what they did every day. No one wanted to waste time, or money (Majchrzak, Pietrzekiewicz, & Scislak, 2018).

Scrum is an agile development model characterised by (Navarro Cadavid, Fernández Martínez, & Morales Vélez, 2013):

- Adopting an incremental development strategy, rather than complete product planning and execution.
- Basing the quality of the result more on the tacit knowledge of people in self-organised teams than on the quality of the processes used.
- Overlapping of the different phases of development, instead of carrying them out one after the other.

Scrum is an agile project management methodology, founded on the principles of a learning organisation. The principles of a learning organisation are systems thinking, personal mastery, mental models, shared vision and team learning (Harrison & Thackeray, 2020).

Scrum is grounded in the empirical theories of process control or empiricism. Empiricism asserts that knowledge comes from experience and from making decisions based on what is known. It also uses an iterative and incremental approach to refine foresight and risk control (Noriega Martínez, 2017).

The Scrum process identifies the project lifecycle divided into three phases: Pre-game, in some other texts as Planning, Game "Development" or Development and Post-game or Completion (Chimarro Chipantiza, Mazón Olivo, & Cartuche Calva, 2015). Figure 1 shows the Scrum life cycle.

Figure 1 Life cycle of the Scrum process

Source: Taken from (Chimarro Chipantiza, Mazón Olivo, & Cartuche Calva, 2015).

On the other hand, Scrum is also based on continuous improvement processes, which can be summarised from the Deming cycle or PDCA (Plan-Do-Check-Act) cycle:

- Plan: what to do, how to do it?
- Execute (Do): do what has been planned.
- Check: was it possible to do what was planned?
- Act: how do we improve for the next cycle?

W. Edwards Deming's PDCA cycle states that each of the company's activities must follow a cycle that is repeated uninterruptedly, which is why it is known as the "spiral of continuous improvement".

The steps in the cycle are as follows (González Gaya & Domingo Navas, 2013):

- Plan. Before starting an improvement action, it is necessary to carry out a diagnosis of the current situation to ensure that the methods used are documented and standardised. Based on the data collected to identify and define the problems, a plan of actions to be undertaken during a fixed period of time is made. This plan should include the quality improvement techniques to be analysed later.
- Execute. This consists of implementing the proposed plan.

- Check. The data recorded during the execution phase are evaluated to check for deviations from the planned schedule.
- Act. Depending on the results obtained during the verification phase, the appropriate measures are taken. If the plan is working as planned, changes are instituted, if new standards are set, the affected personnel are informed, the necessary training is provided to those who require it, and the change is implemented. If the plan has not been successful, the cycle is repeated.

The Deming/Shewhart/PDCA cycle and Scrum are iterative methods that focus on Continuous Improvement. The objective of the present study is to perform and apply a correspondence analysis of the Pre-Game Phase of the Scrum life cycle and the Plan Phase of the PDCA cycle applied to a project. Table 1 shows the correspondence analysis of the Pre-Game Phase of Scrum and the Plan action of the Deming Cycle (PDCA).

Scrum Lifecycle	Planning in the PDCA cycle (What and How?)
Business Vision	Business Vision
Product Backlog List	Product Backlog List - User Stories - Prioritise User Stories - Estimate User Stories
Software Architecture	A purpose-built software tool for agile project management using the Scrum framework (Jira Software)

Table 1 Correspondence of the Pre-Game Phase of Scrum with Planning of the Deming Cycle (PDCA)
 Source: Own Source

Methodology

Based on the previous section, the present study is conducted as an applied research. The case study is divided into the following steps:

1. Drafting the project statement.
2. Create the Product Backlog (Product Stack).
 - a. Define User Stories
 - b. Estimate User Stories
 - c. Prioritise User Stories

Results

As an added value, a case study coined from the Scrum for Life stream is credited. The life project is A Wedding.

The business vision states in a concrete and specific way the main requirement or benefit that the project brings. Table 2 shows the project vision statement of the case study.

Project vision
To plan a Wedding including the religious ceremony and social reception making it an unforgettable day for the couple.

Table 2 Definition of the project vision
 Source: Own Source

Next, the Product Backlog is created, which defines the general requirements aligned to the vision of the project. The Product Backlog is a dynamic and publicly visible list for all those involved in the project. In it, an up-to-date list of requirements is maintained.

The entries in the Product Stack are written in the form of User Stories. These are a tool that streamlines requirements management, reducing the amount of formal documents and time needed. They are part of the functionality capture formula defined in 2001 by Ron Jeffries of the Three C's:

- Card: each User Story is reduced until it is easy to memorise and synthesise on a card or post-it.
- Conversation: the Team and Product Owner add acceptance criteria to each Story shortly before implementation.
- Confirmation: the Product Owner confirms that the Team has understood and correctly captured its requirements by reviewing the acceptance criteria.

In this sense, Table 3 below details the User Stories defined for the case study including, firstly, their id, title and description.

ID US#	User Story Title	Description of the User Story
01	Choose a date	as a fiancée I would like to find an ideal date for the celebration of my marriage, which should suit our needs.
02	Define a budget	as a fiancée I would like to define the maximum budget in order to have a correct distribution of the investment within the established economic limit.
03	Choose the place and time	as a fiancée I would like to specify the place and time of the religious ceremony and the social reception in order to correctly define the other aspects to be organised.
04	Analyse the option of hiring a Wedding Planner	as the fiancée I wish to analyse the economic feasibility of hiring a wedding planner to be responsible for managing all the details of the wedding and to avoid any kind of inconvenience in the event.
05	Choose the main suppliers: invitations, banquet, photographer and others.	as siblings I wish to consult and define the providers of the services required to obtain a quality service and cost according to the budget.
06	Prepare the documentation for the formalities	as mothers of the bride and groom I wish to collect the required documentation from the bride and groom to carry out the marriage legally and religiously.
07	Drawing up a guest list	as the fiancée I wish to specify the guest list according to the budget in order to share this important event with the people closest to the bride and groom.
08	Find the wedding dress and groom's suit.	as a fiancée I wish to choose my wedding dress and that my fiancé chooses his suit accordingly to look as we wish on the wedding day.
09	Defining the colour palette and decorations for the wedding	as a fiancée I wish to choose the colour palette, as well as the decorations for the wedding so that I feel satisfied and can enjoy my wedding as I imagine it to be.
10	Wedding trip	as a fiancé I wish to organise a wedding trip to share with my wife the first weeks of our union and enjoy a beautiful, comfortable destination, according to our common interests.

Table 3 Product Backlog of the project establishing User Story

Source: Own Source

Once the Product Backlog with the User Stories has been defined, the next step is to estimate the effort for each of them. The technique used for the estimation is known as Planning Poker.

This technique is one of the most effective and well known agile estimation techniques. Planning Poker is played with a pack of cards numbered according to the Fibonacci series, which is composed of a logical series where each number is the sum of the two previous ones: 1, 1, 2, 3, 5, 8, ... The lower the number, the less effort a User Story requires, and the higher the value, the greater the effort. The Poker deck also has two additional cards:

- A cup of coffee, which means "I'm done! Let's take a break".
- A question mark, which can mean "I'm not sure how much effort it takes" or "I didn't quite understand the requirements".

The Planning Poker technique is applied to define the value of the effort for each User Story in the Product Backlog. Table 3 shows the summary of applying the Planning Poker Technique for the estimation of User Stories in the case study.

ID US#	User Story Title	Planificación del póquer
01	Choose date	First round Fiancée card chosen: 3 Promised card chosen: 1 Father of the bride card chosen: 1 Mother of the bride card chosen: 2 Father of groom card chosen: 1 Mother of groom card chosen: 1 Best man card chosen: 2 Godmother of the Mass chosen letter: 3 argues the fiancée, godmother of the bride and fiancé. Second round Fiancée card chosen: 1 Fiancé chosen letter: 1 Father of the bride card chosen: 1 Mother of the bride card chosen: 1 Father of groom card chosen: 1 Mother of groom card chosen: 1 Best man card chosen: 1 Godmother of the Mass card chosen: 1 Estimated value: 1

Table 4 Use of the Planning Poker Technique to estimate the User Stories of the case study

Source: Own Source

Estimated value

The next step is to prioritise the Product Backlog, using the basket or bucket estimation technique. This technique is a derivation of the Delphi technique and consists of giving all the cards to each member of the team. Baskets or buckets are then placed where the inside cannot be seen. Each basket will have values relative to the difficulty: 1, 2, 3, 4, 5, 8, 13, 20, 30, 50, 100, 200. The User Stories, which each member has in their hands, should be placed inside the baskets that they consider to represent their difficulty. The contents of each basket are then revealed, and if the baskets reveal too much disparity, discussion follows, ending with consensus on each task. Table 5 shows the use of the basket estimation technique to prioritise the User Stories in the case study.

ID US#	Baskets				
01	1	2	3	4	5
	0	0	1	1	6*
* The priority of this User Story is 5 by majority and subsequent consensus..					

Table 5 Use of the Basket Estimation Technique to estimate the User Stories in the case study
Source: Own Source

In this way, at the end, an estimated and prioritised Product Backlog is obtained, as shown in Table 6.

ID	User Story Title	Effort	Priority
01	Choose a date	1	5
02	Define a budget	5	5
03	Choose the place and time	8	4
04	Analyse the option of hiring a Wedding Planner.	1	1
05	Choose the main suppliers: invitations, banquet, photographer and others.	5	4
06	Prepare the documentation for the formalities	8	5
07	Draw up a guest list	13	4
08	Find the wedding dress and the groom's suit.	13	3
09	Defining the colour palette and decoration for the wedding	5	4
10	Wedding trip	8	3

Table 6 Estimated and prioritised product backlog of the case study
Source: Own Source

Finally, as an essential part of User Stories, their acceptance criteria must be established. Acceptance criteria are additional descriptions, examples of use, rules to be followed or any information that helps to understand the functionality of the User Story. The general format for writing assignment criteria includes: "given [scenario] when [behaviour] then [result]". Table 7 shows the specific acceptance criteria for the User Stories in the case study.

ID	Acceptance Criteria (Acceptance Testing) of the User Story
01	Given a tentative date for the religious celebration and the social reception of the wedding in agreement of the bride and groom when I have confirmed the availability of that date and time by all the main participants of the event (bride, groom, parents and godparents) then it is established that the date for the event is confirmed.
02	Given an estimated financial budget for the event when the scope of the event is established then the definition of a budget is concluded.
03	Given the date of the event when the place and time for the religious ceremony and social reception is confirmed by agreement of the bride and groom then the place and time for the wedding is established.
04	Given a budget when the possibility of hiring a person to be in charge of the details of the wedding is analysed. If solvency allows it and it is decided by mutual agreement of the bride and groom then this service is added to the wedding organisation.
05	Given the definition of a budget when you define the places where you will get the services you will need based on the services offered, quality, price and availability then you end up choosing the main suppliers for the wedding.
06	Given a date when the documentation required to conduct the marriage legally and religiously is compiled, then you have completed the preparation of the paperwork for the formalities.
07	Given a date when the guest list is specified when a list of the number of guests is obtained in agreement with the bride and groom and according to the established number of guests then the number of attendees at the event is known.
08	Given the definition of a budget when the wedding dress is chosen with all the characteristics required by the bride, then the bride and groom's attire is determined.
09	Given the venue and the budget when you choose the colour palette and decoration for the wedding in agreement with the bride and groom then you have completed this Task.
10	Given a budget when you decide on a destination for the wedding trip and all the organisation of the wedding trip then you have a planned wedding trip.

Table 7 Acceptance criteria for the User Stories in the case study
Source: Own Source

Conclusions

Agile methodologies gained popularity because of their flexibility and the reduction in documentation at the beginning of the project. However, that does not mean that the Planning stage is less important when managing an agile project. This study allowed contrasting the fundamentals of the Scrum lifecycle and the Deming cycle to make the planning work (Planning) efficient at the beginning of an agile project.

Through the case study, it was possible to apply the fundamentals of the Scrum framework, identifying two products to be created during the planning phase: the project vision and the Product Backlog.

By using our own specific techniques and elements in the implementation of the two mentioned products, we contribute to optimise the implementation of Scrum and, in the same way, ensure the quality of the products.

Furthermore, as an added value, the proposed research line of study and application of projects under the Scrum for Life approach remains as an added value.

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