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Comparison of Agile Software Project Management Methods

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Abstract— In this paper, we focus on the first stage of the thesis, which is analyses agile methods of software development and their adaptation to corporate environments with emphasis on observable features. This step helps us design a model based on observational and analysis data obtained in this paper.

***Keywords*— Agile methods, Scrum methodology, SAFe framework, DAD framework and Big Data.**

I. INTRODUCTION

During the design or development of software applications, some steps must be passed in order to obtain the required product at the required speed, decorated and specified, and performs the desired requirements [7].

From this point of view, there are several methodologies or frameworks in the field of software engineering that are working under until the required application is implemented [6], and one of the most important methodologies in the field of software engineering is the agile methodology. Which is known for its flexibility in responding to changing requirements and the speed of delivery of the product to the required party [7], [12]. Also known as the style of working as a team and managing itself.

However, even the agile approach has many different methodologies or frameworks in the way of working, but they have the same goal, which is to deliver the required application in the required time [6].

II. AIM OF THE RESEARCH

In software engineering or software development, projects have become largely dependent on the Agile methodology. Some studies show that 73% of the development process is based mainly on Agile methodology [4], and the process of selecting the framework is carried out according to the project to be implemented, it is possible, after reviewing the project requirements [7], that the agile team will choose the appropriate business framework for the requirements. Some consider that scram is one of the most common methods of work, and in some studies it is considered that SAFe is one of the most used methods in software development [5], especially companies or large institutions.

In this article, the most important agile approach that large organizations rely on will be addressed, and here is what is meant by large organizations that rely on big data or that have a wide geographical scope in their work [13].

The most important of these frameworks are Scram methodology, SAFe framework and DAD framework [4], [5]. All of these methodologies are dealt with in the case of a large work team and it is geographically distributed so that the team can work with the same high efficiency in the case of a small team and its geographical scope is limited [16], [18].
Also how to deal with the big data that will be dealt with the development team and with the client.

III. DATA COLLECTION

The first step that we must do is to study a different group of researchers that works under agile methods and try to understand them in a way that we can build the desired model of this study.

First, we will search of studies and understand the multiple agile methods through research on the existing studies in several scientific fields, and this will help us understand the models in the way they work and how to adapt in a particular environment. Because there are a large number of institutions that work with agile methods and these institutions or companies all have laws and different styles of work [12]. This thing will generate a kind of knowledge of a number of forms on it, and knowledge of the features in it, and through introductory books so that the life cycle of each model is understand.

- During the last period, research was carried out in several digital scientific journals by collecting the largest possible number of research papers on the topic through:

IEEE electronic library, Springer, ACM digital library, and Google Scholar.

- The research method was based on certain keywords:

Agile project management, Scrum methodology, SAFe framework, DAD framework, advantage and disadvantage of SAFe, and DAD frameworks, and the lifecycle of methods.

- These studies and various articles have been sorted for ease of study and understanding.
- The research process was carried out based on the most widely used and known agile methods, which were known through these studies and some books as well.
- This study focuses on three different methodologies:

Scrum methodology, Scaled Agile Framework (SAFe). Disciplined Agile Delivery (DAD).

IV. QUESTIONS

The questions formed by reading the articles are:

1. What are the features that distinguish all of these most widely used methodologies?

2. Could these features also be effective in managing big data?

3. How is it possible to collect these methodologies and design a model through the advantages obtained?

4. How possible to be highly effective in the areas of big data, artificial intelligence and data mining?

V. LIFECYCLE OF METHODOLOGY

A simple explanation of the way some of the main frameworks work helps us understand the features of each individual framework and helps us in the comparison process, for easy access to the main points in designing a model based on the advantages obtained.

A. Scrum methodology

Agile Scrum is one of the frameworks according to the agile methodology, and is characterized by flexibility as it allows the customer to change requirements during implementation, and start developing a Minimum Viable Product (MVP) [14].

It is based on union where team members work as one and the ability to self-motivate.

Scrum depends on dividing the work stages into small tasks and short periods called (Sprints) [10], the duration of which ranges from one to three weeks. As shows in Figure 1.

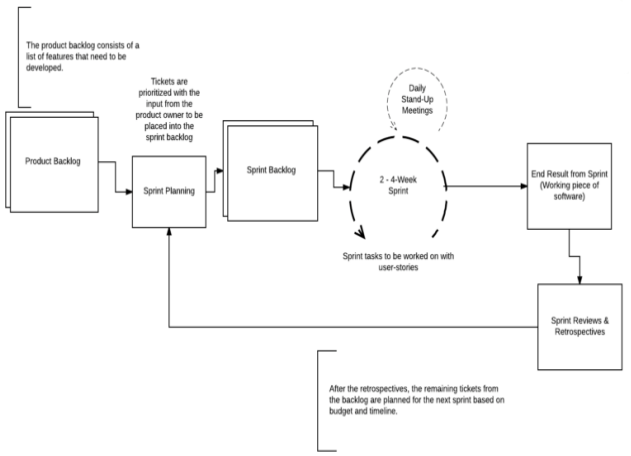

Fig. 1. The life cycle of Scrum methodology

In Scrum, many people have important roles in implementing the needs and requirements by creating a plan to achieve the goal [14].

1. Product Owner: The person responsible for developing and defining the features of the product and its innovative ideas that are required to be available.

2. Scrum Master: He is responsible for leading the team, holding meetings, maintaining the progress of the production process, and implementing steps with accuracy, skill and high efficiency.

3. Team Members: It consists of (Developer, Tester, Writer), and any other person who contributes to the implementation. Team members may rotate tasks, for example, the developer does the testing, and the tester completes the writing task, because the task of the team is to finish the work in the required time and in the right way.

B. Scaled Agile Framework (SAFe)

The Scaled Agile Framework (SAFe) is the most popular, most complex and comprehensive Agile framework today [16]. The primary goal of SAFe is to facilitate the creation and growth of a Lean organization because it recognizes that many different types of companies are, in part, software companies that need to consistently deliver value in the shortest sustainable period [8].

SAFe identifies five core competencies for a Lean organization. Each competency is a set of relevant knowledge, skills, and behaviors [19], which together enable organizations to excel:

1. Lean Leadership: Describes how leaders lead and sustain organizational change through learning, teaching, and applying the SAFe Lean-Agile mindset.

2. Team Spirit and Technology: Describes the skills, principles, and practices needed to create high-performance agile teams.

3. DevOps and Release on Demand: Describes how DevOps implementation and a continuous delivery pipeline provides organizations with the ability to issue product increments at any time necessary to meet demand.

4. Lean Business and Systems Engineering Solutions: Describes how to apply Lean-Agile principles and practices to the specification, development, deployment, and evolution of large and complex software applications.

5. Lean Portfolio Management: Balances strategy and execution through the application of lean and systems thinking approaches in strategy financing, investment finance, agile portfolio operations, and governance.

SAFe provides three organization levels as follows [16] [21]:

1. Team Level: SAFe is based on Agile teams, each of which is responsible for defining, building, and testing stories from their backlog. Teams employ Scrum or Kanban methods, augmented by quality practices, to deliver value in a series of synchronized, fixed-length iterations.
2. Program Level: SAFe teams are organized into a virtual program structure called the “Agile Release Train” (ART). Each ART is a long-lived, self-30 organizing team of 5 to 12 Agile teams along with other stakeholders that plan, commit, execute, inspect adapt, and deliver solutions together.
3. Portfolio Level: The portfolio level organizes and funds a set of value streams. The portfolio provides solution development funding via Lean-Agile budgeting and provides necessary governance and value stream coordination. As shows in the figure 2 [16].

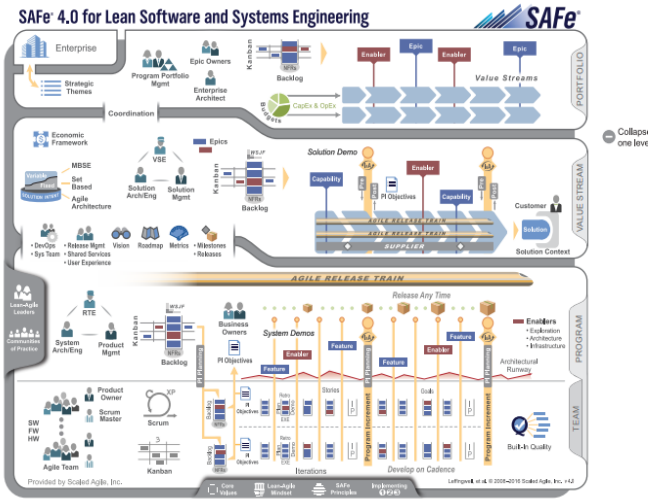

Fig. 2. The architecture of SAFe

C. *Disciplined Agile Delivery (DAD)*

When we are thinking about agile, it is thought of, on the basis that it is a specific model that helps us carry out specific work in a certain way and within a certain framework to help us deliver the product quickly to the desired place [1]. However, here we are talking about something that is not a specific framework, but rather we are talking about a set of the tool kit. Here it is possible to think about how it will be an environment for work because, in the end, we need a certain structure to work under it. It gives you the basic building blocks, there are large blocks that help us create a large structure, and there are small building blocks that help us get things done on a regular basis.

In general, it is a life cycle to accomplish some task; it can give us multiple options for the life cycle [9], [20]. This lifecycle is like the outer layer that you can choose according to your requirements and change it according to your requirements in the same product field, in Figure 3 we can present the life cycle of DAD in general [20].

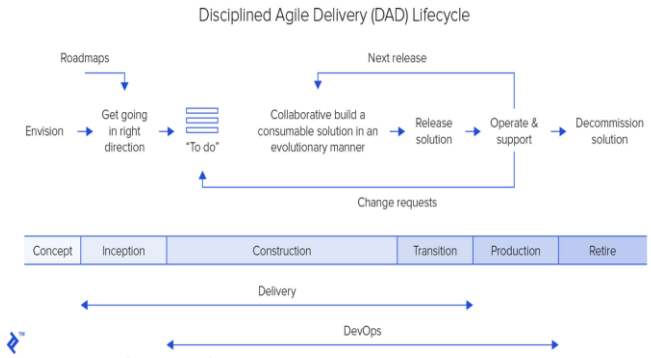

Fig. 3. The life cycle of DAD in general

- *Main roles:*

Principles and main components DAD has many more roles than scrum and is divide into two categories of team roles. People who work with the project on an ongoing basis fill primary roles [20]. Secondary roles are usually offered on a temporary basis to assist the team with expansion or other issues. DAD has these additional roles because it handles the entire solution delivery lifecycle and because it learns about the different types of temporary and needed supporting roles that exist in the real world [9], [20].

VI. COMPARISON

The results obtained from the process of studying and understanding the way each method works individually:

Within the framework of the agile approach, here was obtained the following comparison that shows the advantages of each of the methodology on the monopoly from different points of view:

A. *Scrum methodology:*

1. The participation of all stakeholders benefiting from the product development process gives a better view of stakeholders and helps ensure that everyone's expectations are effectively manage [14], [10].
2. Transparency is available in the construction or development of the product at all stages of development [10].
3. By dividing the processes to be implement to build a product, it is easy and quick to discover flaws in the construction process.
4. By involving stakeholders and breaking down the construction process into small parts, this helps reduce the cost of the process [3].

B. *Scaled Agile Framework (SAFe):*

1. It contains the most specific effective roles in the development process that help in appropriate communication and more work productivity [16].
2. Speed in the time of product access to the labour market.
3. Ease of moving the organization in the work methodology from the traditional methodology to the SAFe methodology in the case of it works in an agile way [8].
4. There is good communication between the team members [19].

C. *Disciplined Agile Delivery (DAD):*

1. It has flexibility and adaptability according to the size of the organization and business requirements [10].
2. The main job is to deliver the required application faster.
3. It pays attention in detail to all aspects of the institution and does not have any bias towards a particular party [8].
4. Gives good guidance on the processes that best fit the project, architecture, and development processes [8], [24].
5. There is good communication between the team members.
6. The complexity of the work on it is considered medium, that is, the possibility of adapting the work quickly [24].

VII. Conclusion

Through this comparison, we can extract the common factors, including [8], [12]:

1. All methodologies focus on the main objective of delivering the required product to the workplace as quickly as possible.
2. The client's involvement in one way or another in the development process means that the client has a major role in the development process.
3. The team leader has a great deal of responsibility in the communication between the client and the developers.

Through the study, we touched on a little topic that is also considers important, which is DevOps [21], and how it can influence the design of the model. It considers a new approach that has a vision and a way of working very close to the generational methodology, and therefore we can benefit from it in one way or another.

Through the study and comparison, methodologies and the result obtained that I mentioned earlier, the initial image of the model was formed [4], or in other words, the main elements that should be in it[16], [20]:

1. The customer who has the responsibility to explain the requirements and understand whether the requirements have been fulfilled is what is required.
2. The team manager whose main task is to coordinate with the client and the development team, which could be one of the team members.
3. The development team, which has the most difficult task, is to build the desired product, and this team consists of designers, operators, code writers, testing team, and other people who have an active role in building the desired product.

After this stage, the stage of designing the model will begin on the basis obtained, and this model will be simulate in one of the projects that have Big Data to know the extent of its effectiveness and the possibility of modifying the model to reach the desired result of this thesis.

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