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A proposed Cutomized Scrum Framework for Sudanese Software Companies

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Abstract

Scrum is recognized as one of the most promising and successful agile process models in the software industry. Wide recognition is based on his contribution to increased productivity, better collaboration, quick response to changing market needs and faster delivery of quality products. Although Scrum works better for small projects, practitioners face some challenges in implementing it in Sudanese software companies. Experts have tried to improve Scrum in ways that eliminate these shortcomings and limitations, but no company has been able to solve all the problems. The purpose of this study is to provide a customized Scrum framework for small and medium-sized software companies in Sudan with the aim of improving team productivity and documentation. . The study used asynchronous online focus group data collection as a very useful technique to obtain feedback from small and highly experienced groups in the field of agile software development. The resulting customized Scrum framework requires the adaptation and development of classic Scrum techniques and responsibility for solving problems while maintaining the integrity and simplicity of the methodology.

1. Introduction

Agile software has been developing in the software development community for a decade. It now replaces traditional software [1]. Agile software has been recognized for following rules, such as detailed documentation of software operations, interaction between people and tools and processes, cooperation with the customer according to formal agreements, and compliance with plan changes [2]. Scrum is a subset of the agile development method born in the 1990s to implement complex projects [3]. It is an agile project management framework for software projects that delivers new programming skills every two to four weeks using iterative and incremental practices. Adopting a pure Scrum process has many benefits for organizations such as higher productivity, shorter time to market, higher job satisfaction, lower error rates, faster adaptation to rapidly changing business needs, and more [4]. The meaning of pure Scrum is that the body is free from an extended and dressed up version of the Scrum model. . Despite of all the benefits, some still find it a challenge in implementing pure Scrum especially in software companies in Sudan that could not adapt to regulated environment.

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2. Background and related work

2.1. Background

As can be seen in Figure 1, Scrum is based on an iterative and incremental process [5] to improve predictability, reduce errors and manage risks during software development. Scrum [6] has three main roles that include Product Owner, Scrum Master and Team Member or Scrum Team. Thus, product owners are only responsible for maintaining a list of all features/requirements [7] collected by the end user, team and stakeholders, and a high-priority product list [5] set by the product owner, where the product owner is only. An authentic person. Modify or update product features after each iteration.
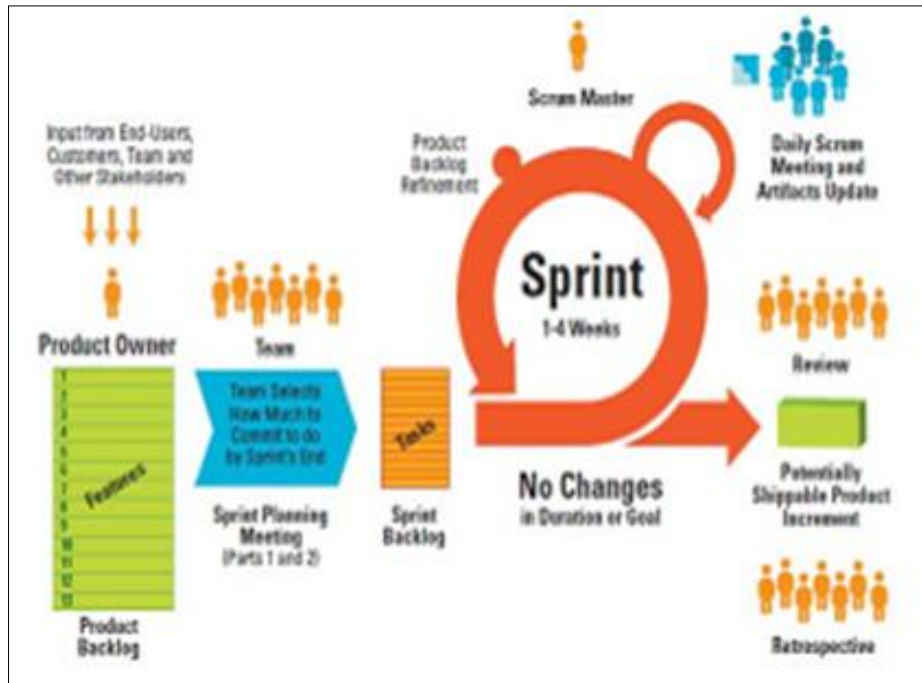

Figure 1 Scrum Framework Process Overview

Scrum teams usually consist of 7+/-2 people, which means there are either 5 or 9 people working on the project. Here, the team organizes cross-functional activities that include designer, coder, tester, etc. At the end of each day, organizing a daily meeting [7], they discuss what they did today and what they will do tomorrow to develop the project. The Scrum Master treats the team as a servant to protect them from external or internal disruptions, for example if the Product Owner is interested in adding a new feature in the middle of a sprint, the Scrum Master protects them by waiting for the flow. repetition must be completed [6] The Scrum Master is very responsible to ensure that the Product Owner and the Scrum Team follow all the principles of the Agile methodology of training.

2.2. Related Works

As previously indicated, academics have been modifying Scrum in various ways to address the difficulties encountered while using it for projects of various sizes and complexity. It has been noted that all of these attempts have focused on one or two specific problem areas at a time. Yet, neither a framework nor a single solution exist that can address all significant problem areas simultaneously. Table 1 displayed the efforts made by numerous researchers to alter the Scrum framework in order to address some associated issues.

Table 1 Scrum Framework Customization Activities

Task	Activities
Scaling Agile Scrum Software Development: Providing Agility and Quality to Platform Development by Reducing Time to Market [8]	Despite producing superior results for big, scattered initiatives, small projects do not always yield the best results.
Requirements Engineering in Scrum Framework [9]	How to overcome problems that develop during the RE stages when used in Scrum is not covered in the paper.
ScrumLint: Identifying Violations of Agile Practices Using Development Artifacts [10]	The tool is used in a controlled setting with few performance measuring metrics and parameters.
Enhancements in scum framework using extreme Programming practices [11]	The suggested paradigm isn't examined and approved in actual, practical contexts.
An experience in blending the Traditional and Agile methodologies to assist in a small software development project [12]	The time needed for planning and testing was extended by the hybrid method. Additionally, don't offer any support for applying with diverse teams.
A Synchronous Agile Framework Proposal Combining Scrum and TDD [13]	For the claimed Benefits to be verified, the suggested model must be tested in practice. The team's structure and composition are not discussed. Additionally, testing methods and tools are not mentioned.
A Hybrid Agile model using Scrum and Feature Driven Development [14]	Only one controlled environment is used to validate the model SCR-FDD; hence, large-scale deployment is needed to explain the potential.
Enhancing Scrum Framework: A Case at a Multinational Manufacturing Company in Malaysia [15]	The work is still in development, and the enhanced Scrum framework technique has not yet been evaluated.
Issues and Challenges in Scrum Implementation [16]	The mentioned problems and difficulties weren't methodically and scientifically investigated.
Just in Time Demos in the Scrum Framework [17]	JIT Demos will take up more of the product owner's time than compressing all of their feedback for all of the demos during the sprint review time box.
Scaling Agile Scrum Software Development: Providing Agility and Quality to Platform Development by Reducing Time to Market [8]	Despite producing superior results for big, scattered initiatives, small projects do not always yield the best results.
Requirements Engineering in Scrum Framework [9]	How to overcome problems that develop during the RE stages when used in Scrum is not covered in the paper.

3. The customization process for scrum framework

In this section, the customization process for the current state of Scrum framework will be explained in details, which is including qualitative data collection and analysis, after distributing the scientific and detailed questionnaire. Finally, the resulted customized Scrum framework for Sudanese software companies will be constructed.

3.1. Qualitative Data Collection and Analyze

The qualitative data for this study was gathered through the use of asynchronous online focus groups. The goal of the focus group is to gain a deeper understanding of the selected topic and to solicit feedback from the respondents [18]. According to the source [19], this describes how using the focus group's findings to evaluate the pre-designed issues might aid in improving comprehension of a certain subject. The focus group must go through four stages in order to be treated as academic research [20]. The same steps were employed in this study, and they are as follows:

3.1.1. Problem Identification Phase

A focus group's primary goal should be distinctly articulated and identified. The ultimate objective is the heart of the rule that will be followed in that particular focus group. In the questionnaire that already submitted as online form, all prepared questions were brief, direct, understandable, and delivered in a casual style. In line with this, the information gathered must be pertinent to attaining the focus group's goal [20].

The current objective of this research group is to evaluate the application of pure Scrum in software companies in Sudan. The questions relative to the evaluation and assessment were designed to cover Scrum framework and its activities.

3.1.2. Planning Phase

The planning phase considers the group size, equipment to be used, tools and people to be invited [20]. For this focus group evaluating the implementation of Pure Scrum in software companies in Sudan, the evaluators were Scrum framework specialists and their roles were Analysts, Developers Product Owners, Scrum Masters and Visual/UX Designer.

3.1.3. Implementation Phase

The qualitative evaluation data for this study was gathered using an asynchronous online evaluation form. There have been responses from 52 of the evaluators. Many evaluators were actually invited to conduct the evaluation; however, many did not respond. 52 people responded overall after 2 months, which is within the acceptable range. Consequently, the procedure of beginning the estimates of difficulties and challenges as well as the commitment to using the framework.

3.1.4. Reporting and Analyzing Phase

The major goal of this step is to organize data into mathematical categories and then use SPSS to perform various statistical operations to provide a precise and understandable conclusion. Pre-analysis data screening was the initial phase in the data analysis process, which was done to make sure the data collected was accurate. Prior to data analysis, the pre-analysis data screening determined the response rate and addressed the outliers.

Reporting

For the reporting part, the following figures showed the come out from responders and feedback that have already collected and analyzed after doing many statistical operations. Fig. 2 reflects the deep of understanding of standard Scrum framework to know the degree of the impact for the feedback from those 52 responders.
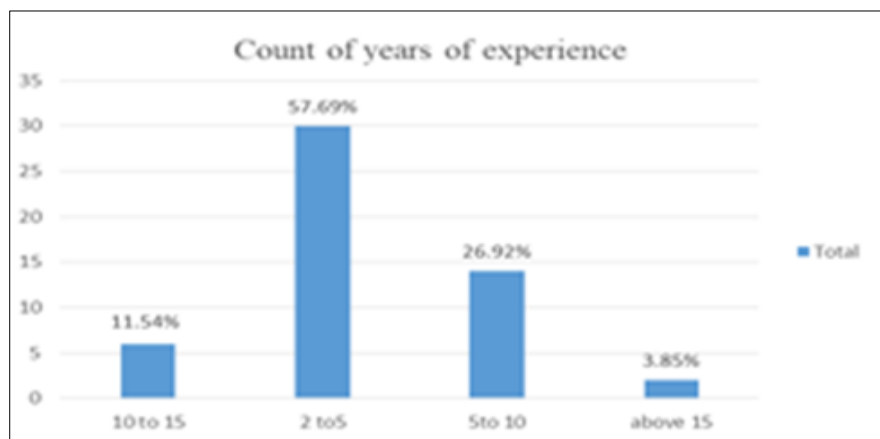

Figure 2 Experience of Using Scrum Framework

As it is clear, the sprint duration for the Scrum framework means how long it needs to take time to release the next increment for the system under process. Fig. 3 shows the feedback from the responders about their opinion to add or reduce the sprint duration.
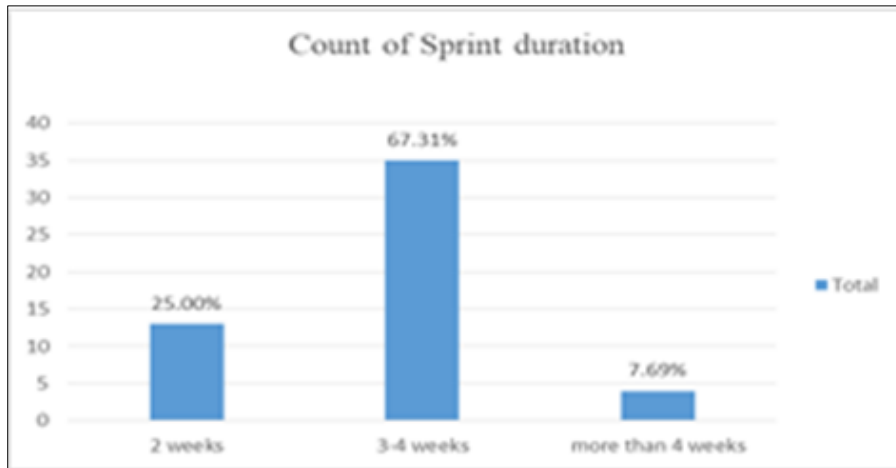
Figure 3 Suggested Sprint Duration for the Customized Framework

Fig. 4 shows that the highest percentage of the sample members answered that the product owner is responsible for sprints documentation (59.62%). That is untrue. The sprint documentation process is not the responsibility of the Scrum master. Which indicates that there is no specific person doing the documentation process. Even the scrum framework did not specify a specific person for the authentication process in the sprint.
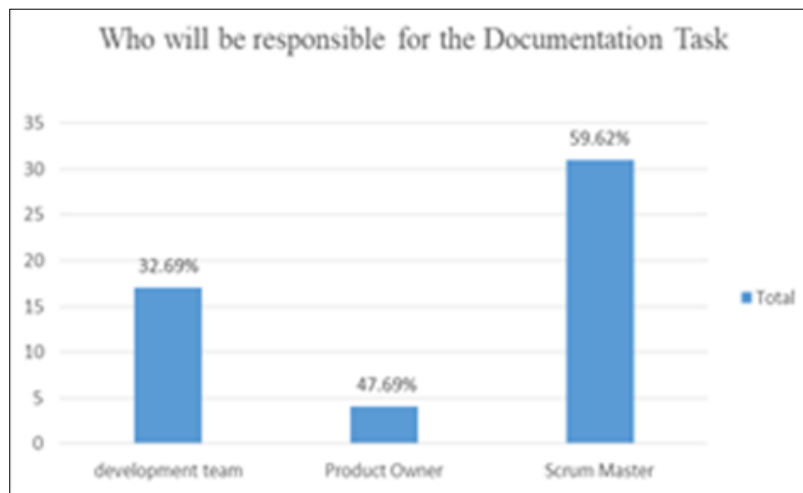

Figure 4 Documentation Responsibility

Fig. 5 shows the highest percentage of the sample members answered that they Receive changes in requirements through Phone calls or Emails (71.15%). Which is considered an unprofessional method and leads to several problems such as improperly updated product backlog and traceability concerns later and documentation problems.
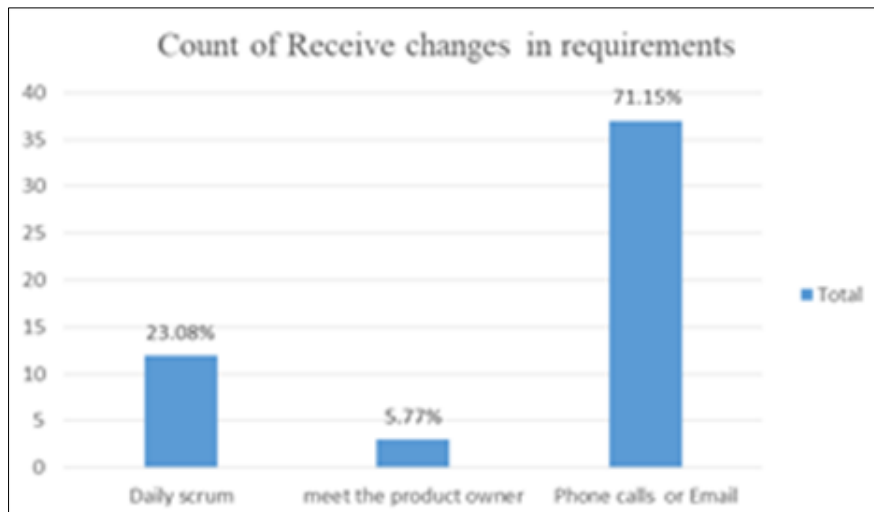
Figure 5 Receiving Changes in Requirements

Analysis

The main objective of this research is to study applicability of Scrum in software companies in Sudan and to propose a framework for Scrum customization.

The data has collected to determine how to receive requests for change in requirements from the customer. Most of Participants answered that they receive changes in requirements through "phone calls and emails" that may lead to improperly updated product backlog and traceability concerns later and documentation problems. In addition, there are wide feedback variations when the question is about who is responsible for the documentation, which indicates that there is no specific person doing the documentation process.

The second part in the questionnaire has focused on the respondent's perceptions about the product owner. Positive attitudes about the product owner had an impact. The outcomes showed that the product's owner does a good job completing the tasks interestedly.

The third research section has evaluated the sprint in terms of the sprint planning meeting held, sprints results, and items that are included in the sprint. As the results, participant's feedback revealed that the sprint planning meeting, outcomes, and sprint items were completed in the anticipated manner.

To find out if everyone on the team has more than adequate training and experience for the type of work they need to undertake, data from questionnaire was gathered, and showed that participants did not consider that the team had sufficient scrum training and expertise, which can lead to misuse and well understanding the framework and affect the product. In addition, the vast majority of the respondents agreed that the team should receive a Scrum or Agile training and certification.

The most important part in the questionnaire revealed that the majority of respondents disagreed with the daily scrum meeting to take place in the early morning. This, as an opinion, is based on the Sudanese environment, which there are a very bad traffic and transportation problems. The sprint itself has reviewed and assessed in terms of the sprint outcomes. The responses provided by the participants demonstrated that they were satisfied with the standard Scrum.

4. The resulted customized framework

Many suggestions are made to tailor the scrum framework for Sudanese software companies based on the analysis presented above. As can be seen in Fig. 6, the tailored Scrum framework aims to provide small to medium-sized businesses with high-quality software. The suggested framework aims to apply Scrum in a typical manner. Moreover, a technical writer is needed to create appropriate documentation. Also, to provide the training, the Scrum master role is tailored.

This research has supplied the foundation required for Scrum to be used in Sudanese software firms in this tailored framework. It identifies many stages, certain actions that must be taken, the people who will play what roles, and the protocols that must be adhered to. Apart for Scrum training, the customized framework includes all of the fundamental components of regular Scrum, including Product Backlog creation, Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective. The primary responsibilities of the Scrum Master, Product Owner, and Team remain the same, with the addition of the Technical Writer as a new member of the Scrum Team.
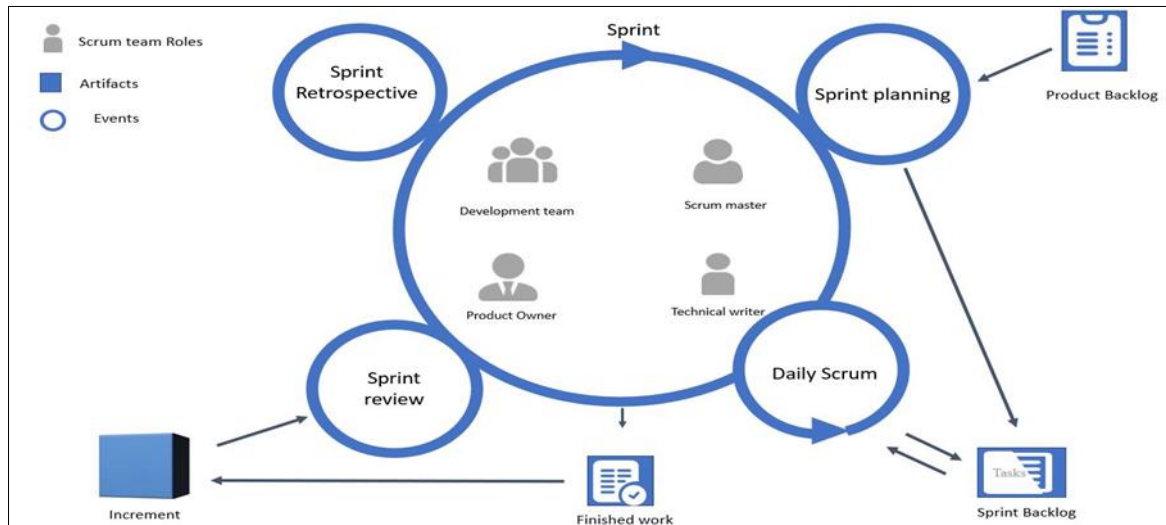

Figure 6 Customized Scrum Framework for Sudanese Software Companies

4.1. Guidelines for Customized Framework

4.1.1. Team Formation

Taking into account the project's nature (scale and complexity), constraints (time and cost), available tools and technology, as well as human resources, a team with the necessary skill set will be formed. In this situation, a team member will take on the new role of technical writer. The Scrum guidelines shall be followed for determining the team size.

4.1.2. Scrum Training

After assembling the team, the next stage is to conduct Scrum training sessions. If at all possible, enlist the help of an outside resource person to do the Scrum training. If not, only train the Scrum Master; the other team members can learn Scrum from him later. Same strict time restrictions apply to the training exercise as they do to all other Scrum events. Training sessions could go for four hours a day for two to three days.

4.1.3. Role of Technical Writer

It is possible to overcome the challenge of inadequate documentation by highlighting the technical writer as a crucial component of the Scrum team. From project planning to the Sprint retrospective and even after the product has been deployed to maintenance, he takes part in every step of the process. Technical writers, for instance, will participate in sprint planning to identify stories and tasks that require additional documentation. In order to ensure team participation on the deliverables they will create during the iteration, the technical writer will remain in contact with the developers during the sprint.

4.1.4. Role of Scrum Master

The Scrum Master will carry out the same duties as in traditional Scrum, in addition to informing the team about Scrum.

4.1.5. Documentation

Despite the fact that documentation is sometimes viewed as an unnecessary burden in agile projects, it is nevertheless crucial if it can be done well, particularly if the documenters are close by and the work is of the highest caliber. According to Cockburn & Highsmith [21], cooperation among documenters and in-person interactions largely replace document

creation and delivery. As a result, to fill in the gaps caused by incomplete documentation, researchers typically engage in intensive conversation. Nonetheless, it's crucial to strike a balance here between documentation and communication. Instead of being completely abandoned, the conventional Scrum documentation processes will be upgraded. The first step in producing enough and effective documentation is deciding what and when to document for the following reasons:

- There is minimal to no prospect of discussion;
- It obviously affects the project's immediate purpose.
- The document can be transformed into executable specifications, such as requirements, architecture, and design specifications, in the form of tests that the client demands.

4.1.6. Standup Meeting in the Late Morning

Due to the current circumstances in Sudan, such as traffic and transportation, it is recommended that this meeting be held in the late morning as opposed to the standard Daily Scrum, which is held in the early morning. The meeting will follow the same standard Scrum procedures in terms of timing and location.

4.1.7. Scrum or Agile Training And Certification

The Professional Scrum Developer certification will validate and certify that the team member knowing and understanding the role of Development Team Member in Scrum. The Professional Agile Leadership certification validates and certifies an understanding about how leaders can best support their teams in an agile environment. Every team member should possess Scrum certificate due to the above advantages.

5. Conclusion

The work that is being presented in this research examines the application status of Scrum in Sudanese software companies. Data were collected from teams working in Sudanese software companies that use the scrum framework via questionnaire. To acquire a thorough understanding of the execution of the scrum framework, a focus group questionnaire was used. 52 team members from Sudanese companies constituted the study's sample.

The proposed framework is anticipated to enhance team performance and result in high-quality product. The framework maintains the simplicity of the original Scrum while adhering to its principles and goals. The training of the Scrum team will aid in enhancing team performance. The team can get more comfortable at a time that is convenient for each team member by holding a late-morning stand-up meeting. It is possible to create consistent, high-quality documentation by adding the position of technical writer. It would assist in allaying worries about traceability. Additionally, the problem of insufficient documentation will be fixed.

Future works

In this section, and after what has been reviewed with the regard to the Customized Scrum Framework, this presents a set of recommendations and to the future work. Future studies can explore more into other Scrum problem areas. Thus, the customized framework that has been suggested can be improved by using it for various software enterprises in Sudan. Extending the proposed Scrum framework to be applied to large size companies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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