

Implementation of Scrum Framework for Crowdfunding Application Development in Pari City Village

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Abstract— Funds can be utilized for various purposes, including both physical and non-physical endeavors such as infrastructure, scholarships, and social activities. Limited budgets and multifaceted needs often necessitate fundraising efforts, typically undertaken by non-profit organizations. However, fundraising initiatives frequently encounter several challenges, including the time and resources required for information dissemination, inaccuracies in disseminating information, restricted funding methods, low public trust, and suboptimal fundraising calculations. To address these obstacles, a mobile-based software application for fundraising has been developed using the Scrum framework, enabling its completion within 35 days. This application facilitates the efficient dissemination of information, implement notification systems, and provide real-time community access to funding opportunities. Additionally, it enhances the collection and calculation processes in real-time. A System Usability Scale test has demonstrated a usability level of 82.1% for this mobile application.

Keywords— *Fundraising; Scrum; Website Apps;*

I. INTRODUCTION

Funds refer to the financial resources allocated for specific purposes. They are a set of independent accounts designed to carry out particular activities and objectives based on the agreement with the funding source. Funds can be utilized for various physical and non-physical endeavors, such as infrastructure, scholarships, and social initiatives. However, the limited budget and the abundance of needs often necessitate fundraising efforts. Fundraising involves the process of seeking and collecting voluntary financial contributions from individuals, businesses, foundations, charities, or government institutions. Typically, fundraising is conducted by non-profit organizations. Unfortunately, fundraising often faces several challenges, including the time and resources required to disseminate information, low accuracy in information dissemination, limited funding options, low public trust, and suboptimal fundraising calculations. These obstacles are prevalent in both rural and urban areas.

The fundraising process can be viewed as a social exchange, where donors provide funds in exchange for a sense of belonging, social status, or personal values, including altruism and philanthropy.

Developing a mobile-based software application could be a viable solution to address the fundraising challenges mentioned. Mobile applications offer several benefits, as they can be tailored to users' specific contexts, such as their location and time. This contextual relevance can enhance the effectiveness of fundraising efforts. Furthermore, mobile devices offer greater reach and accessibility compared to traditional fundraising methods, potentially increasing the pool of potential donors.

This mobile application aims to facilitate and enhance the fundraising process. It is designed to inform and track the progress of fundraising events, accommodating both cash and non-cash contributions. Additionally, the application provides access to the history of funders, enabling better understanding and management of the fundraising activities. This mobile application is also notable for being one of the first to be developed using emulator technology. Furthermore, the application's availability on the Google Play Store, which has the largest user base compared to other platforms, ensures widespread accessibility and reach for potential donors.

The fundraising application is developed by adopting the Scrum framework, which iteratively and sequentially manages the product development process. Scrum is an agile framework that emphasizes software development. It is designed for a development team that addresses problems through time-boxed, action-oriented approaches. It can be concluded that the strategy of using the Scrum framework to develop the product is flexible and holistic, as the team shares a common objective and departs from traditional, sequential product development methods.

The Scrum framework is particularly well-suited for financial system development, which often involves complex requirements and close collaboration between the development team and the customer.



Using the Scrum framework to develop a mobile application requires additional processes during the implementation phase, such as prioritizing tasks. This is necessary because Scrum does not encompass the entire product development cycle and has a hybrid aspect. When developing fundraising applications that adopt Scrum, crucial elements must be in place, including a dedicated and collaborative team, a team with specific skills, a detailed plan, daily evaluations, optimal coordination between teams during "sprints," and thorough examinations. By leveraging Scrum, the development of mobile applications can be achieved successfully.

II. RELATED WORK

A software development company has undertaken a significant effort to combine the Capability Maturity Model Integration method with the agile approach in order to boost their overall business performance. This innovative study utilizes a novel technique to meticulously map the latest version of CMMI 1.3 to the popular Scrum agile framework. The researchers have thoroughly analyzed, refined, and successfully implemented this integrated CMMI-Scrum approach within the same software development company. The findings of this study reveal that this combined methodology can achieve an impressive 37% satisfaction rate and 17% partial satisfaction rate for CMMI-specific practices. This represents a substantial 19.4% increase in satisfaction and a 6.2% boost in partial satisfaction compared to other related studies that did not leverage the most up-to-date version of CMMI. The successful integration of CMMI and Scrum has demonstrated the immense potential to enhance software development processes and drive significant improvements in overall business outcomes for the organization.

The study examined the application of agile methods in 40 companies located in Malaysia and Norway. It found that the Scrum agile framework was widely utilized, with daily scrum meetings conducted through teleconference and web camera technology. The teams also adopted synchronized 4-week sprints and held weekly scrum-of-scrum meetings to foster collaboration and alignment across the distributed project. The researchers further identified several key agile practices that supported the management of these distributed projects, such as frequent in-person visits between team members, informal meetings, and annual team-building events. These practices helped to maintain strong communication, coordination, and camaraderie among the geographically dispersed team members.

A study was conducted to investigate the application of an agile hybrid model that combined the Scrum and Feature-Driven Development methodologies in a project. Scrum and FDD are two distinct project management approaches, each with its own advantages and disadvantages. Scrum emphasizes strict management of the project schedule, while FDD prioritizes the quality of the project or individual tasks. The findings from a bank domain project involving large-scale data transactions indicate that this hybrid approach achieved a 10% improvement in quality and customer satisfaction. Additionally, the Scrum method has been successfully utilized in the educational domain, specifically in the distribution of online learning communities for higher education. These online learning communities have demonstrated several positive effects for students, such as enhanced learning, increased engagement, improved retention, and a reduced risk

of isolation and dropout. Furthermore, the distributed Scrum approach has been explored to support the establishment of online learning communities, drawing insights from student perspectives, including the effects and potential solutions. Interviews with students revealed a high level of satisfaction with the distributed Scrum project, as well as a greater degree of flexibility, interaction, communication, and collaboration throughout the online implementation.

The successful application of the Scrum methodology has also been observed in other domains, such as the development of software for medical purposes. The strict regulatory requirements in the medical industry pose considerable challenges, and the agile approach of Scrum has emerged as a viable solution. The combination of Extreme Programming and Scrum methods has been found to enable efficient software development for medical applications while also ensuring a high level of suitability and validity. This hybrid approach has helped to address the unique concerns and requirements of the medical industry, allowing for faster and easier development of medical software.

Furthermore, the integration of Model Driven Engineering and the Scrum agile framework has been explored in the context of web information system development. This new pre-prototype-based methodology, which combines the practices of MDE and Scrum, enables rapid feedback from clients and accelerates the design and validation of the system. The application of this combined approach has demonstrated its effectiveness in producing efficient and validated web information systems.

The use of agile methods, such as Extreme Programming and Scrum, can address the challenges faced in software development for the medical industry. These strict regulatory requirements related to health and safety necessitate a more efficient and suitable approach. The combination of XP and Scrum methods has been found to enable the efficient development of medical software while ensuring a high level of suitability and validity, allowing for faster and easier implementation of medical software applications.

The study explored a novel pre-prototype-based methodology that integrates the practices of Model Driven Engineering and the Scrum agile framework to develop web information systems. This combined approach aimed to facilitate rapid client feedback and accelerate the design and validation of the system. The findings indicate that the integration of MDE and Scrum-based methods enables the efficient development of information systems, allowing for quicker design and validation of the pre-prototype model, which in turn can lead to faster delivery of the final product to the client.

Researchers used the Scrum method to build learning websites for specific subjects. This agile approach made the development process more effective and efficient. The project team included education experts on Scrum teams and university administrators, which led to optimal results for the automated system and functional products.

III. METHODOLOGY

This study applies the Scrum framework, a well-established and widely adopted software development methodology. The researchers thoroughly prepared and maximized their understanding of the Scrum framework, which enabled its effective application in this software

development project. The key principle underlying the Scrum approach is acknowledging that customers' requirements are often subject to change, and unpredictable challenges may arise where a purely predictive or rigidly planned approach is no longer suitable. In such cases, active and continuous customer participation in the Scrum implementation process is crucial, particularly for coordinating, consulting, and communicating their evolving needs and priorities. The Scrum framework involves three main collaborative roles - the Product Owner, Development Team, and Scrum Master - who work together within the Scrum Team to produce incremental product enhancements triggered by each sprint cycle. The Scrum framework scheme applied in this study is shown in the following figure:

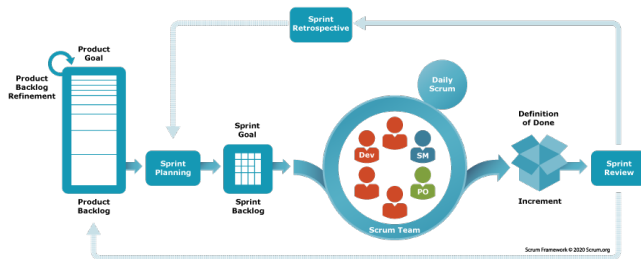


Figure 1. Scrum Framework

IV. RESULT AND DISCUSSION

A. Result

This study utilized the Unified Modeling Language, a set of tools for abstracting and establishing software systems, to design the development of a fundraising mobile application. The UML was employed to abstract, visualize, build, and document the system, which was implemented using a specific programming language. The UML diagrams described in this study include Use Case Diagrams, which represent the system's functionalities as units that exchange messages between units or actors, and Class Diagrams, which depict the structure of the system by showcasing its classes, attributes, operations, and the relationships between objects.

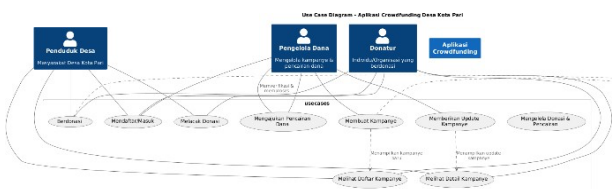


Figure 2. Use Case Diagram

This diagram depicts the general use cases of a crowdfunding application tailored to the context of Kota Pari Village.

Explanation:

- Actors:

- Residents: Can register/log in, view campaigns, donate, and track donations.
- Fund Managers: Manage campaigns, submit fund withdrawal requests, manage donations & withdrawals.
- Donors: Can register/log in, view campaigns, donate, and track donations.
- Use Cases: Include the main flows such as creating a campaign, viewing a list of campaigns, making donations, etc.
- Relationships: Indicate the interactions between the actors and use cases.

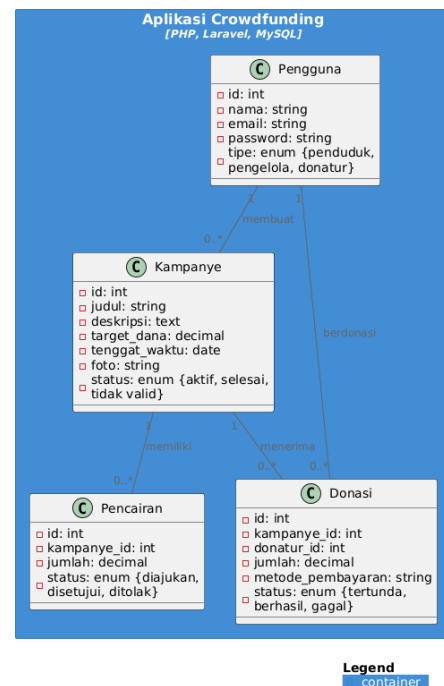


Figure 3 Class Diagram

This study developed two user interfaces, a front-end and a back-end. Both were created for a mobile platform using Android Studio, an integrated development environment for Android app development that is based on IntelliJ IDEA. The front-end interface was designed to be user-friendly and intuitive, providing a seamless experience for end-users. The back-end interface, on the other hand, was developed to facilitate the management and administration of the application's underlying data and functionality. The interfaces were constructed with an open-source MySQL database management system, which enabled efficient data storage and retrieval. The generated user interface is depicted in Figure 4.

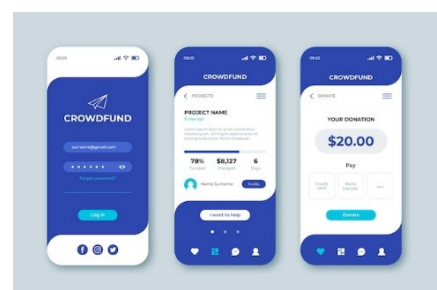


Figure 4. Application Interface

B. Result

The product backlog serves to identify and prioritize the tasks that must be completed during the sprint. In this case, a planning meeting is held involving the Product Owner, Scrum Master, and Development Team. During this meeting, they discuss the media that facilitate community funding, the processing of fund contribution data, the preparation of fundraising financial statements, and the prioritization of funding for humanitarian social needs. The discussion not only addresses problems but also explores solutions, such as mobile application development. The necessary instruments to solve the problem are also determined in this planning meeting. The management of the product backlog is the sole responsibility of the Product Owner, who indirectly defines the project's vision and purpose. By utilizing the Scrum Framework, the fundraising application can be completed within 35 days, as detailed in Table 2.

ID	Product Backlog Item	Priorization	Estimate (Day)
1	Problem Identification and Analysis		1
2	Description of Solution		1
3	Identification of Needs		1
4	System Design and Prototyping (UML Design, UI / UX Design)		3
8	Testing (Software Testing using Black Box and White Box Testing)		1
9	Testing (Usability Testing)		1
5	Database Design and Creation (Database Design and Creation with My SQL)		5
7	System-wide integration (Integration of mobile application systems using databases, and integration between administrator menus)		4
6	Coding in creating applications (Building a mobile application with the Java programming language in accordance with the existing design and prototype)		13
10	Application improvements and refinements (After going through the process of integration and testing, then the web application is repaired and refined to avoid bugs / errors and to suit the needs of the product owner)		3
11	Release (After the application has been integrated, tested, then repaired / refined based on the needs of the product owner and the product has been documented in according to the initial agreement, then the mobile application can be released)		2
Total			35

The Sprint Planning stage is a critical phase in a mobile application development project, where the tasks to be

undertaken by the project teams, including the product owner, scrum master, and development team, are formulated. The development team is responsible for various aspects such as system analysis, UI/UX design, coding/programming, and software testing. This stage is characterized by the involvement of a development team typically consisting of three members, although the specific number may vary. The Sprint Planning stage is a recurring event conducted prior to each sprint.

CONCLUSION

Based on the findings of the completed study, it can be concluded that the process of developing fundraising mobile applications using the Scrum framework can be expedited, with all work completed in only 35 working days. Since all Scrum teams are involved in the completion process, the data can be well integrated, and issues during application development are resolved more quickly. The mobile application product facilitates the dissemination of fundraising information, provides residents with a real-time notification system, and enables easy donation for users. Furthermore, the collection and calculation of funds can be discovered quickly and in real-time, and the usability testing results using the System Usability Scale yielded a score of 82.1%..

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