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The Development of Front-end Website for Project Services Monitoring using Scrum Method

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Abstract

The project service monitoring is one of the essential aspects of a company that ensures all project activities running well. In the current digital transformation era, competition in the digital world makes several companies to used efficient system in their business process, for example the business process at PT. Gerbang Sinergi Prima (GSP). In the prior observation, the project monitoring activities in GSP still use conventional way, which often requires more time and risk like data redundancy. Hence, this study developed a Front-End website for the project service monitoring with Scrum method to emphasize the development process in a complex manner and allow user needs. Differ from the other studies, the system testing used in this study uses the black box and usability testing from four participants with system usability scale (SUS). The results of the black box test showed a perfect score in the result. In addition, the results of testing using SUS got an average score of 63.125 which means this system can be acceptable quite good by users.

Keywords: Monitoring, Project Services Website, Frontend Development, Scrum, Blackbox, System Usability Scale.

Abstrak

Pemantauan layanan merupakan salah satu aspek penting dalam sebuah perusahaan untuk memastikan semua kegiatan proyek berjalan dengan baik. Di era transformasi digital saat ini, persaingan di dunia digital juga membuat beberapa perusahaan beralih ke sistem yang lebih efisien. Salah satunya adalah PT. Gerbang Sinergi Prima. Menurut hasil temuan penelitian, kegiatan *monitoring* yang dilakukan di PT Gerbang Sinergi Prima masih dilakukan secara manual, sehingga penginputan data juga dilakukan secara manual yang seringkali membutuhkan waktu lebih lama dan cukup beresiko terjadinya redudansi data. Terkait dengan permasalahan tersebut, sistem monitoring layanan proyek dapat memberikan solusi alternatif untuk memantau kegiatan di PT. Gerbang Sinergi Prima. Dengan menggunakan metode *Scrum*, penelitian ini akan mengimplementasikan pengembangan *Frontend* pada *website project service monitoring* yang menekankan pada pengembangan produk secara kompleks, dan memungkinkan adanya perubahan yang dapat diikuti sesuai dengan permintaan pengguna. Pengujian sistem yang digunakan dalam penelitian ini menggunakan metode black box dan system usability scale. Empat partisipan berpartisipasi dalam pengujian sistem. Hasil dari pengujian tersebut menunjukkan adanya skor yang signifikan. Selanjutnya, pengujian black box menunjukkan skor sempurna pada hasil akhir. Lalu, hasil dari pengujian menggunakan SUS mendapatkan skor rata rata sebesar 63,125 yang berarti sistem ini dapat diterima dengan cukup baik oleh pengguna.

Kata Kunci: Pemantauan, *Website* layanan proyek, Pengembangan *Frontend*, *Scrum*, *Blackbox*, *System Usability Scale*.

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I. INTRODUCTION

Nowadays, the digital transformation era has been forcing various companies to transform in Indonesia [1]. According to the Indonesia Stock Exchange data, the latest listing data shows that in 2021, there were around 897 listed companies [2]. This digital transformation process also not only provides an opportunity to make changes or a complete overhaul of the existing systems but can make a new system more efficient and effective [3]. As a result, it encouraged some companies to switch to implementing more efficient operational processes in order to become the successful company, for example the PT. Gerbang Sinergi Prima (GSP). The GSP has been established since 2008 and is one of the subsidiaries of the Pension Fund of PT PLN (Persero) which is engaged in Information and Communication Technology (ICT). As a company engaged in the ICT field, GSP also has various construction service projects. The project also requires an appropriate monitoring system to monitor various progress and results on their business information.

Based on the interviews that have been conducted before, the monitoring process at PT. Gerbang Sinergi Prima is carried out with conventional way such as using Microsoft Excel. However, the manual project monitoring processes are often raised problems such as time-consuming, costly, and the manual input process often faced several errors. Therefore, it is important to implement a system that could help the GSP to monitor its projects. A system needed by the GSP can be a business project information monitoring service website. There are various methods and steps used to build a website [4].

The method used in developing this website uses the Software Development Life Cycle (SDLC) framework with an Agile development approach, which is the Scrum method as a methodology for building a website. The Scrum method is a software development method that is complex and can change according to the desires of the users [5]. This method makes a more flexible framework to control and manage software as well as iterative and incremental in the development process [6]. Hence the Scrum method is suitable for use on a large scale that allows continuous change in accordance with stakeholders, so the selection of this method can be used at GSP. Therefore, this research uses a framework from SDLC with an Agile development approach from the Scrum method in the process of developing a business process information monitoring service website.

In addition, the final step in Scrum method is testing using the Blackbox-testing. Black-Box Testing is a test of software that uses test cases from predetermined program requirements and specifications to emphasize the functionality of the software being tested [7]. Different from the previous study, in this study we also analyze deeply the System Usability Scale (SUS) method. SUS is a testing method that involves a user approach to software systems [8]. The reason for choosing the Black-Box testing and SUS methods in this study is because the Black-Box Testing method is designed to check for errors in system functionality and interface. While the selection of testing using the SUS method is to measure the level of satisfaction from users so that the product used is able to fulfill expectations and ease of using the system being tested [9]. As a result, the research of this study is expected to help and support the monitoring of business project services at GSP.

II. LITERATURE REVIEW

A. The monitoring process in PT. Gerbang Sinergi Prima

PT. Gerbang Sinergi Prima was established in 2008 and is one of the subsidiaries of the Pension Fund of PT PLN (Persero) which is engaged in ICT (Information and Communication Technology) which started its business as a Switching / Payment Gateway / Biller Aggregator in partnership with Banks and Collecting Agents across Indonesia [4]. In the journey of its business, GSP develops its business in the fields of Digital Payment, Software Development, Data Center and Fiber Optic (FO) Services as a partner for Telecommunication companies, FO Network Providers & ISPs, which includes FO network development, activation to customers, network maintenance and network recovery.

Monitoring is an activity that includes observation, examination and control aimed at approaching the process and output of a concept or system for monitoring with a specific purpose [10]. In other words, monitoring or what is called monitoring is the process of observing a concept or system that aims to ensure that the system runs as desired [19]. Monitoring also has a broad impact on performance/programs by providing information on progress, problem discovery, and opportunities for agencies [20]. In addition, monitoring also provides solutions for transparency in terms of the trustworthiness of data and accessibility for users. However, the monitoring carried out at GSP is still manually carried out, which is using excel as an audit to input data. This can cause input errors in the data and cause data redundancy. Therefore, a system is needed that can assist in carrying out monitoring activities in projects at GSP.

B. Front-end Website Development

Front-end is a component of website that allows users to interact in the application or what is known as client side [11]. The component in the front-end website includes the entire system display that can be seen by users such as images, buttons, text-colors, graphs, tables, and various attributes that support the visualization activities of the system. The front-end is also referred to as client-side because in web development, the front-end is used to display the display seen by the user or also known as the end-user [21]. Basically, front-end development is based on 3 programming languages as website builders such as Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript [22]. HTML serves as the building language of the structure of a website and is based on Document Object Model (DOM) as its representation. Meanwhile, CSS functions as a customization of the appearance of the web such as adding backgrounds, setting fonts, providing colors, and other customizations. Meanwhile, JavaScript functions to make web pages more interactive and dynamic.

In addition, to visualize the system, usually require the Unified Modeling Language (UML). UML is a visualization modeling technique used as an object-oriented design system [12]. UML is also used as a design for software systems as communication from several stakeholders such as users, developers, and testers. Representationally, UML represents the object-oriented software development process, by presenting a flat building along with connecting lines that correlate one process to another. The shape of the flat shape varies depending on the type of diagram created with different functions.

C. Scrum Method

Scrum is one of the methods in Agile Development that focuses on developing complex products and can change at any time according to client requests [5]. SCRUM is a method that is suitable for use on a medium to large scale because the performance of team members on the level of effectiveness in the success factor of a product is also influenced by the ability to be responsive in the face of changes from clients/stakeholders so that the Goals and Reviews obtained will have high quality and continuous improvement between teams also affects the focus of stakeholder needs [13]. A scrum team is built consisting of a scrum master, product owner and development team. Each team has its own role in the development of a product such as the product owner who is tasked with organizing and compiling a list of functional requirements of the system, the scrum master who is tasked with leading the running of the sprint, and the development team who is tasked with developing the product [13]. The phases of scrum consist of Product Backlog, which is the phase of determining system requirements, Sprint Backlog and Planning, which is determining the plan during the sprint phase, Daily Scrum, which is the phase of system development that is carried out iteratively and incrementally, Sprint Review, which is rechecking feedback during the sprint, and sprint retrospective, which is a discussion related to the evaluation and performance of each team during the program[13].

D. Blackbox Testing and System Usability Scale

Black-box testing is one of the software tests that focuses on the functional part of a system [7]. The tests presented in this method are in the form of test-cases that involve the structure of the interface, test errors, and errors in a test scenario against the user. Meanwhile, the System Usability Scale is a testing method that involves

a user approach to software systems [8]. SUS method collects several respondents from users and measures several aspects such as features, usability and user subjective perceptions from the system[14].

III. RESEARCH METHOD

A. Initiation Stage

In the first step, the author starts to develop the software like the author identifies the problems that arise then formulates the problem which is the main reference from the research background as the basis for creating a project service monitoring website. Initiation is carried out by looking for case studies that underlie the company in website development.

B. Software Development Methods

The software development method used in this research is the Scrum method. The reason for choosing this method is because it can be applied on a medium to large scale which requires responsiveness in dealing with changes in stakeholders/clients [5]. The stages of the Scrum method consist of Product Backlog, Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective, as shown in figure 1.

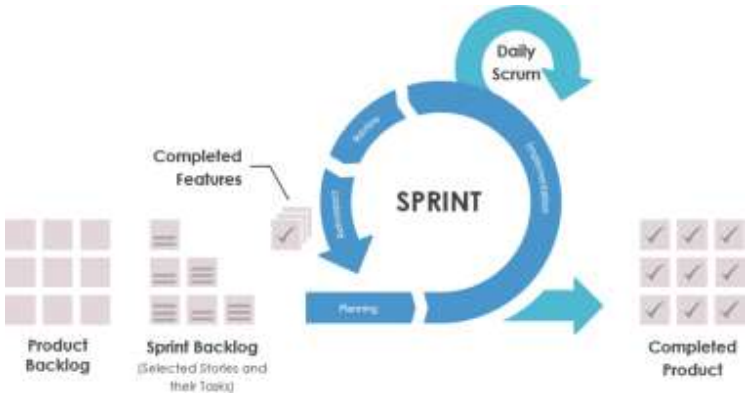


Fig. 1. Scrum Lifecycle [15]

1) *Product Backlog:* During the Product Backlog stage, the Development Team will analyze and identify the needs of the software to be created. The development team will also conduct in-depth discussions with the Product Owner to determine the specifications of the list of software requirements. This stage starts from analyzing software requirements, determining the specifications of the list of software requirements, and creating UML such as activity diagrams, use case diagrams, sequence diagrams, and class diagrams.
2) *Sprint Backlog:* The Sprint Backlog stage is the step that determines the plan during the sprint process. At this stage, the Development Team and Scrum Master will formulate the needs when the sprint runs and identify the priority of work on software development. Sprint Backlog is also referred to as part of the Product Backlog because this stage also determines the list of work activities based on the Product Backlog.
3) *Sprint Planning:* The Sprint Planning stage is the stage of preparing a work plan that will be compiled in the Sprint Backlog. This plan will include such things as iterative plans while the program is running, the resources required, as well as details of cost and time estimates while the sprint is running.

4) *Daily Scrum:* Daily Scrum is the stage where the Development Team starts working based on the Product Backlog and Sprint Backlog that have been compiled previously. At this stage, the Development Team will work on the to-do-list based on previous stages such as creating interface designs, implementing program code using Front-End Development Components, Prototyping, and testing software prototypes. This is the stage of the iterative and incremental phase until all processes have been completed.
5) *Sprint Review:* The Sprint Review stage is the stage of testing the product that has been developed. This stage is also a software testing stage to ensure that the software has been completed and has fulfilled the list of product backlogs and sprint backlogs.
6) *Sprint Retrospective:* The Sprint Retrospective stage is the final stage in the SCRUM method. At this stage, the Development Team evaluates the performance of the product that has been built along with an analysis of the work of fellow teams.

C. Testing

After completing the software development stage, the next stage is system testing. System testing in this research will use the Black-box method and SUS. Blackbox testing method uses a more functional testing approach where the system will be tested based on the scenario that has been created so that all functional requirements and test-cases can be fulfilled [7]. Meanwhile, the SUS focuses on the user's perspective [14].

D. Scrum Team Composition

Scrum Team Composition is used as an explanation of the role / job desk of each product developer and stakeholder participating in system development. This composition can be used as information in development to achieve the desired goals, as shown in Table 1.

TABLE I
SCRUM TEAM COMPOSITION

Product Owner	Employee at PT Gerbang Sinergi Prima
Scrum Master	Mr. Eko Darwiyanto S. T., M. T.
Development Team	1. Ms. Bulan Ayu Sari Muntai (Development of Mobile Application Monitoring Project Information PT. Gerbang Sinergi Prima Using Scrum Method) 2. Mr. Daffa Arya Hutomo Putra (Development of Backend Dashboard Admin for Monitoring Business Projects at PT. Gerbang Sinergi Prima Using Scrum Method) 3. Mr. Rizky Sampoerna (Development of Frontend Website Monitoring Project Services PT. Gerbang Sinergi Prima Using Scrum Method)
Project	Development of Frontend Website Monitoring Project Services PT. Gerbang Sinergi Prima Using Scrum Method
Descriptions	Development of the front-end of this website aims to assist employees in carrying out monitoring activities and facilitate employees in terms of data visualization of projects at PT Gerbang Sinergi Prima.
Sprint	4 times (1 sprint run for 21 days)

The Product Owner in this research is an employee at GSP. Product Owner is also a representation of stakeholders and customers. The Scrum Master in this study is Mr. Eko Darwiyanto as the researcher's lecturer. The Development Team in this scrum project is divided into 3 roles, they are Bulan Ayu Sari Muntai as a Mobile developer, Daffa Arya Hutomo Putra as a backend developer, and Rizky Sampoerna as a frontend web developer who is also a researcher in this project. The sprint period will take place from March 17, 2024 to June 12, 2024, and will be continued with the Testing / system testing stage which will take place from June 13, 2024 to June 16, 2024.

IV. RESULTS AND DISCUSSION

A. Functional Requirements of the System

Functional Requirements is a process that will be used to determine the features and functions that a system must have to fulfill user needs. This analysis aims to identify system requirements in software and documentation of system requirements that must be fulfilled by the system so that the system can work properly according to user expectations. Table 2 shows the list of functional requirements that must be fulfilled in the system to be developed.

TABLE II
FUNCTIONAL REQUIREMENTS

No.	Requirement System	Description
1	Register Page	Process of registering an account by entering the username, email, password, and position of the user.
2	Login Page	User authentication process to get access to the website using the account that has been registered.
3	Sidebar	The columns on the website that contain features and menus that make it easier for users to access the various features contained on the website.
4	Dashboard Page	The display of the dashboard contains various ongoing project statuses, project financial statuses, and project financial information panels presented in the form of bar charts, pie charts, and line charts.
5	Project Monitoring Form Page	The project monitoring form page that displays all project table data with table filters to search for specific data.
6	Detail Projects Page	The project details page displays the project name, current project status, and a list of the ongoing project stages and is presented in the form of a project details table.
7	Customers Data Page	The customer data page displays data in the form of a table listing customers who are currently using products/services at the company.
8	Product Services Page	The product page displays data in the form of a table listing the products that are currently available at the company.
9	User Profile Page	The user profile page that displays information about user data.
10	Notifications Page	The notification page that displays the status of the admin when there are changes or additions to the data.
11	Logout	Process of users to exit the website.

B. Unified Modelling Language (UML)

The UML represents the object-oriented software development process, by presenting a flat building with connecting lines that correlate one process to another [16]. The shape of the flat shape varies depending on the type of diagram created with different functions.

1) *Use case Diagram:* Use Case Diagram is a diagram that describes the interaction between users and the system used. Use Case diagrams are used to describe a series of system development processes and an explanation of the process flow of the functions / services provided by the system from the user's point of view and help in understanding the needs and requirements of the system. In figure 2, it can be seen that the use case of the user flow starts from registering an account first before logging in to register a user account. Then users can also access the dashboard which will be able to connect to several other website features such as job monitoring forms, customer data, services, user profiles, and notifications.

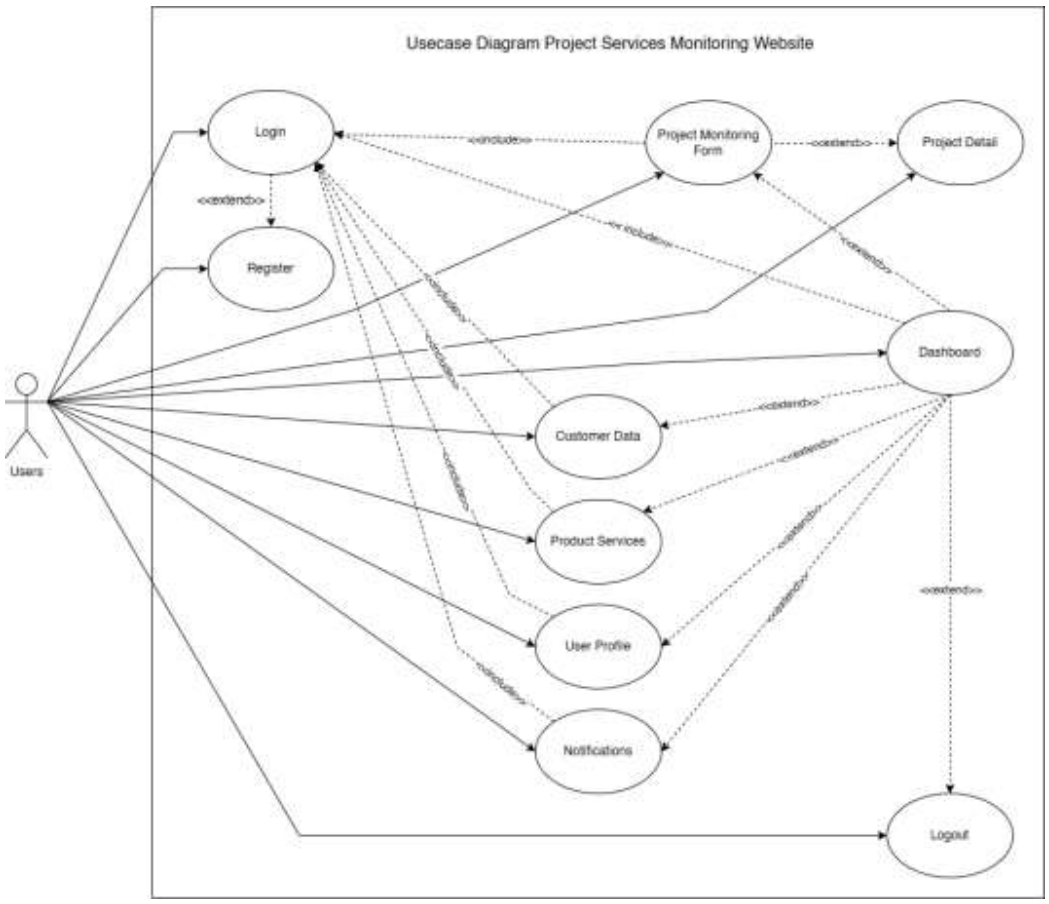
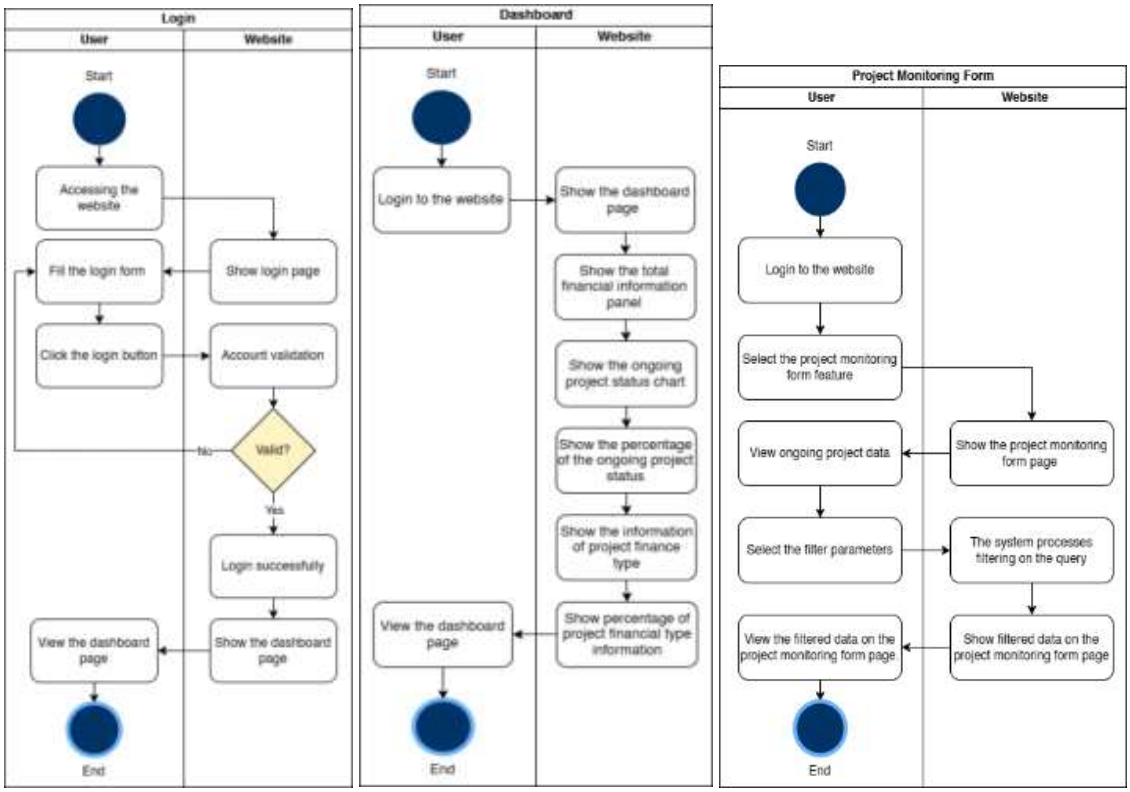


Fig. 2. Use case Diagram

2) *Activity Diagram:* Activity diagram is a diagram that shows a series of processes and steps performed in a process/system. Activity diagrams are illustrated with a sequential process by showing the flow of activities of a work process. The purpose of this activity diagram is to help model and design a system so that it can create a clear and structured understanding of how a system or process works. In Figure 3a, it is illustrated with the login activity of users who log in using the previously registered account. The login activity describes users who enter the monitoring website using their account. Then in Figure 3b, it is illustrated with the activity of view the monitoring dashboard which shows some information about the data in the company. Next, in Figure 3c, it is illustrated with user activities that views a table of all ongoing project data.



(a) (b) (c)

Fig. 3. The example of the results of activity diagrams, such as (a) activity login, (b) activity dashboard, and (c) activity project monitoring

3) Sequence Diagram: Sequence Diagram is a diagram that describes the relationship between users and the system they are using. The purpose of the Sequence Diagram is to model the interactions and flow relationships between objects in the system and users and also to model how objects in the system can interact with each other through messages that are sent and received. Sequence Diagrams are illustrated with a sequence of messages with object relationships represented by lifelines that show where the object is located. In figure 4 is one of the sequence diagrams of the project monitoring feature. The Project Monitoring Form feature has 4 lifelines, including employees, monitoring page, monitoring controller, and database. Each lifeline is represented sequentially starting from the actor, boundary, controller, and entity.

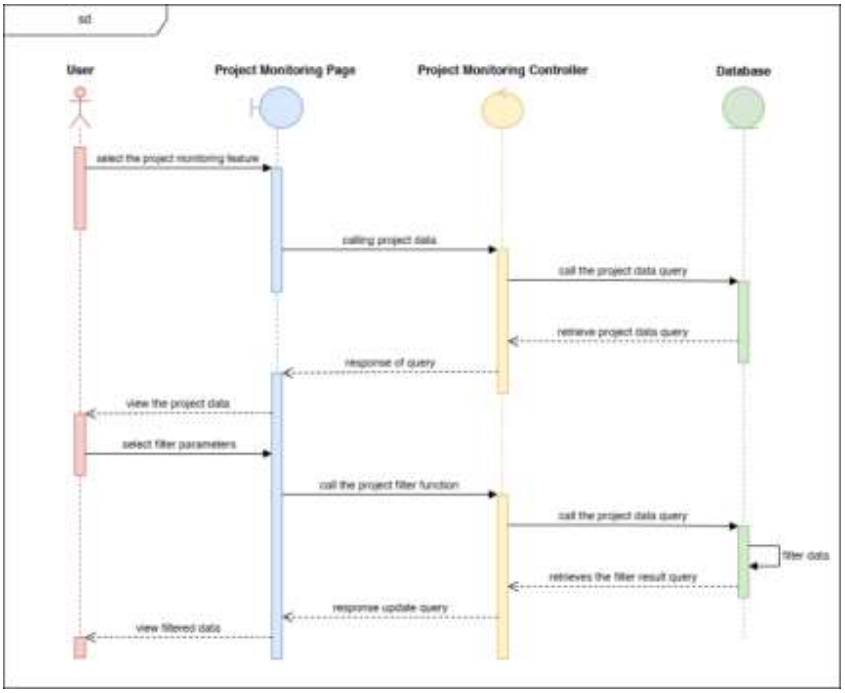


Fig. 4. Sequence Diagram Project Monitoring Page

C. Scrum Implementation

1) Product Backlog: Product Backlog is a list of requirements that contains a feature as an identification of the needs of the system to be created [23]. Product Backlog is made according to the user's needs and the estimated time of development carried out on the development team [23]. The initiation and planning of research development is during in this phase. Table 3 shows the list of product backlogs that will be executed during the development phase.

TABLE III
PRODUCT BACKLOG

No.	Backlog	Period
1	Create a register page and connect the register page to the database.	March 17, 2024 – June 12, 2024
2	Create a login page and connect the login page to the database.	
3	Create dashboard pages and deploy charts.	
4	Create a sidebar on the dashboard.	
5	Create a project monitoring form page and CRUD for the project table.	
6	Create a data filter on the project table.	
7	Create a project detail page and CRUD connection to the database.	
8	Create a customer data page and a database query connection for the customer data table.	
9	Create service product pages and query connections to the database.	
10	Create a user profile page and query users connections in the database	
11	Create a notification page and query connection to the database.	
12	Create a logout function	

2) Sprint Planning: In this phase, the development team will make a plan to sprint at the scrum phase. This sprint phase will repeat 4 times and one sprint iteration will run for 21 days. The explanation of sprint planning during the iteration sprint phase is described in table 4 below.

TABLE IV
SPRINT PLANNING ALL PHASES

Backlog	Description	Period
Sprint Phase 1		
1. Create a register page and connect the register page to the database.	1. Create a layout on the register page	March 17, 2024 – April 7, 2024
	2. Create fields to fill in username, email, and password	
	3. Create a register button and register function	
	4. Create an authenticator for register	
	5. Set up register page routing	
2. Create a login page and connect the login page to the database.	1. Create a layout on the login page	
	2. Create fields to fill in email and password	
	3. Create a login button and login function	
	4. Create an authenticator for login	
	5. Set up login page routing	
Sprint Phase 2		
1. Create dashboard pages and deploy charts.	1. Create a layout on the dashboard page	April 8, 2024 – April 29, 2024
	2. Create a total financial information panel	
	3. Create a horizontal bar chart using chart.js	
	4. Create a donut chart using chart.js	
	5. Create a line chart using chart.js	
	6. Create a pie chart using chart.js	
	7. Configure queries for each chart	
	8. Configure routes on the dashboard page	
2. Create a sidebar on the dashboard.	1. Create a layout on the sidebar	
	2. Create a button for each icon in the feature	
	3. Create a responsive sidebar	
	4. Set up routing for each feature	
3. Create a project monitoring form page and CRUD for the project table.	1. Create a layout on the project monitoring form page.	
	2. Create a project data table with CRUD function setup	
	3. Create an add data button on the project data table	
	4. Create an edit button on the project data table	
	5. Create a delete data button on the project data table.	
	6. Configure the project table in the query database	
4. Create a data filter on the project table.	1. Create table filters by product service type	
	2. Create table filters by project status	
	3. Create table filters by customers	
	4. Create table filters by account marketing	
	5. Create a table filter by project start date and end date.	
	6. Create a search bar on the table with the search function on the table	

Sprint Phase 3		
1. Create a project detail page and CRUD connection to the database.	1. Create a layout on the project details page	April 30, 2024 – May 21, 2024
	2. Create a progress bar about the project status	
	3. Create a table by project activity with CRUD function setup	
	4. Create an add data button on the project activity table	
	5. Create an edit button on the project activity table	
	6. Create a delete button on the project activity table	
	7. Create toggle buttons for each project activity	
	8. Configure the project activity data in the query projects database.	
2. Create a customer data page and a database query connection for the customer data table.	1. Create a layout on the customer data page	
	2. Create a customer data table	
	3. Configure the customer data table in the customers query	
3. Create service product pages and query connections to the database.	1. Create a layout on the service product page	
	2. Create a product data table	
	3. Configure the product data table in the products query	
Sprint Phase 4		
1. Create a user profile page and query users connections in the database	1. Create a layout on the user profile page	May 22, 2024 – June 12, 2024
	2. Create an upload section for profile photos	
	3. Create a user data information interface	
	4. Configure user data in query users database	
2. Create a notification page and query connection to the database.	1. Create a layout on the notification page	
	2. Create a table for the notification list	
	3. Configure notification data in the notifications query	
3. Create a logout function	4. Create a logout button and logout function	

3) The Result of Daily Scrum: In the Daily Scrum phase, researchers will execute the sprint planning that has been created. Within the specified period, researchers will carry out development until the specified deadline is completed. During the development process, the researcher will record and report the progress or performance and record the results of the system development.

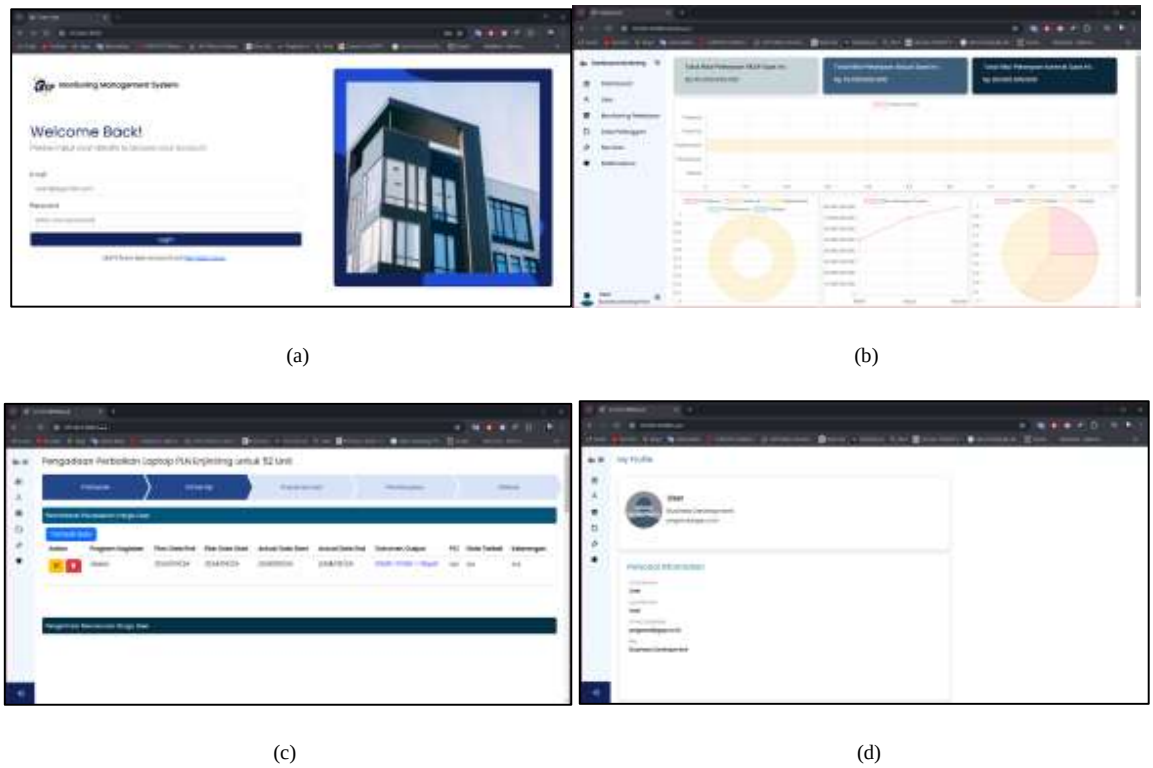
- *Sprint Phase 1:* In sprint phase 1, this sprint focused on developing authentication and create login and register pages. In this sprint phase, development was also carried out to authenticate access to the website. Figure 5a shows one of the results of phase 1, which is the login page that shows an input form containing email and password.

- *Sprint Phase 2:* In sprint phase 2, the sprint focused on connecting queries to the project table, create dashboard pages, project monitoring pages, and project table filters. In figure 5b, shows one of the results of phase 2, which is a dashboard page that shows a graph of information from projects in GSP.

- *Sprint Phase 3:* In sprint phase 3, the sprint focused on the development of the project details feature, customer data, and also service products contained in GSP. In figure 5c, the project details page shows a toggle bar and progress bar to view project activities. While the customer data and service product features show table data from the customer and product query database.

- *Sprint Phase 4:* In this research, Sprint phase 4 is the last phase for the development of the project monitoring website. In sprint phase 4, researchers will focus on developing the user profile page and notification page. In figure 5d, shows one of the features developed in phase 4, which is the user profile

page. This page displays user information such as name, email, and user role. Sprint phase 4 also developed a notification page to view project data updates.



(a) (b)

(c) (d)

Fig. 5. The Results of Daily Scrum such a (a) Login Page, (b) Dashboard Monitoring, (c) Detail Projects Page, and (d) User Profile Page

4) *Sprint Review:* Sprint Review is used to recheck the entire process of the current sprint and the progress of the work [24]. Sprint review is also used to double-check if all the backlogs have been fulfilled and completed so that the developers can run effectively for the next sprint phase.
5) *Sprint Retrospective:* In the sprint retrospective phase, the development team will discuss the evaluation and performance results after the sprint phase has been completed [25]. The purpose of the sprint retrospective is to evaluate and observe the team's performance during the sprint phase so that the development team can improve their performance in the next sprint phase.

D. The Result of Testing

1) *Blackbox Testing:* Blackbox testing is used to observe the output of the system when given a certain scenario. The main focus of this test is to ensure that the system can work in accordance with the specifications and functional requirements that have been determined. According to the Blackbox testing in table 5, it can be concluded that all features contained in the product backlog have received a score of 100% passed. This test also includes feature usage scenarios, test cases on all features and expected end results.

TABLE V
BLACKBOX TESTING

Backlog	Scenario	Test Case	Expected results	Status
Register Page	Fill out the registration form of username, email, password, and user position	Input username, email, password, and role on the form and click the register button.	Successfully register an account	100% Passed
	Fill in the username, email, password, and user position incorrectly	Input the wrong username, email, password, and role on the form and press the register button.	Failed to register an account	100% Passed
Login Page	Fill in the email and password that match the account that has been registered.	Input email and password that match the registered account.	Successfully enter the dashboard	100% Passed
	Fill in an email and password that does not match the account that has been registered / wrong account	Input the wrong email and password	Failed to log in to the dashboard	100% Passed
Dashboard Page	View the total financial information panel	Show the financial information panel on the company according to the project table query.	Successfully show the total finance panel information	100% Passed
	View a graph of the current project status using a horizontal bar chart.	Show a graph of all project statuses based on each project according to the project table query.	Successfully show a graph of all project status data based on each project according to the project table query.	100% Passed
	View a graph of the percentage of ongoing projects using a donut chart	Show a graph of all project statuses and calculate the average value of all project statuses in the project table query.	Successfully show a graph of the percentage of the total project status.	100% Passed
	View graphs of financial information using line charts	Show financial information data graph with line chart on project table query	Successfully show financial information from the project table query using a line chart.	100% Passed
	View a graph of the percentage of financial information using a pie chart.	Show a graph of financial data and calculate the average value of all financial data in the project table query.	Successfully show a percentage graph of the total financial data	100% Passed
Project Monitoring Form Page	Monitoring form icon on the sidebar	Click the monitoring icon button on the sidebar	Successfully show the project monitoring page	100% Passed
	View a table of the entire project	Show a table of the entire project data in the project table query	Successfully show the entire table of project data	100% Passed
	View the table by the selected filter	Select table filters based on product, status, customer, marketing account, date, and also search data.	Successfully show data by selected filter	100% Passed
	Add data to the project table	Fill in the data to add a project and click the add button.	Successfully show the addition of data to the table	100% Passed

Backlog	Scenario	Test Case	Expected results	Status
	Edit data to the project table	Fill in the form on the data that needs to be changed and click the save changes button.	Successfully show data updates in the project table	100% Passed
	Delete data to the project table	Click the delete data button	Successfully delete data from the project table	100% Passed
Detail Projects Page	View the list of activities in the project details	Show the list of activities in the project details	Successfully show the selected project detail activity table	100% Passed
	Add data on project detail activities	Add data for one of the activities in the project details, fill in the required data and click add data.	Successfully save data from the addition of activity data	100% Passed
	Edit data on project detail activities	Edit the data on one of the activities, then fill in the data that needs to be changed and click the save changes button.	Successfully updated the data from the project activities table.	100% Passed
	Delete data on project detail activities	Click the delete button on one of the project activities	Successfully delete data in the project activities table	100% Passed
Customers Data Page	Customer data icon on the sidebar	Click the customer data icon on the sidebar	Successfully show the customer data page	100% Passed
	View customer data table	Show the customer data table	Successfully show the customer data table in the customer data table query	100% Passed
Products Service Page	Service icon on sidebar	Click the service icon on the sidebar	Successfully show the service page	100% Passed
	View product service data table	Show the product service data table	Successfully show the service data table in the products data table query	100% Passed
User Profile Page	User profile icon on the sidebar	Click the user profile icon on the sidebar	Successfully show the user profile page	100% Passed
	View user information	Show user information	Successfully show user information such as name, email, and user role	100% Passed
Notifications Page	Notification icon on the sidebar	Click the notification icon on the sidebar	Successfully show the notification page	100% Passed
	View the notification table	View the notification data table	Successfully show the notification data table in the notification data table query	100% Passed

2) *System Usability Scale (SUS):* SUS is a test that focuses on the approach of the user to fulfill the needs of the user's expectations by asking several questions to the user in order to measure the level of satisfaction and usability of the system from the perspective of the user [17]. This test uses 5 measurement values with a scale of 1 to 5 and starts sequentially start from strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5).

Table 6 shows that there are 10 questions asked to 4 respondents and each question is given a value from a scale of 1 to 5. After getting the results of the SUS scoring on website testing, the next step is to calculate the score of SUS using the formula with the following calculations:

1) *Odd Question:* each odd numbered question, using the formula $x - 1$ where x is the score of each question [9].
2) *Even Question:* each even numbered question, using the formula $5 - x$ where x is the score of each question [9].
3) *SUS Score:* The total of x values for each respondent, multiplied by 2,5 [9]. After all the x scores on the respondents have been calculated, the next step is to find the average on each score from SUS using the following formula calculation:

$$\bar{x} = \frac{\sum x}{n} \quad (1)$$

where $\bar{x}$ is the value of average score in SUS, x is the value of score for each question, and n is the total of respondents [18].

TABLE VI
SUS QUESTIONS

No.	Questions	Scale
Q1	I think this website is easy to use	1 - 5
Q2	I need a technical guide to use this website	1 - 5
Q3	I think the various functions in this website are working well.	1 - 5
Q4	I think there are many inconsistencies in this website.	1 - 5
Q5	I think other people will quickly understand how to use this website.	1 - 5
Q6	I think this website is confusing to use.	1 - 5
Q7	I think there are no constraints in using this website.	1 - 5
Q8	I need to learn and adapt before using this website.	1 - 5
Q9	I think this website can be used smoothly in various conditions, including in the field or when working from home.	1 - 5
Q10	I think this website is less reliable when used in the field or in a work-from-home situation.	1 - 5

Table 7 shows the results of answers from 4 respondents with a predetermined scale of 1 to 5. After the answers have been collected, each score on the respondent is calculated using the SUS calculation formula. The results of the SUS calculation are explained in table 9 as the following.

TABLE VII
THE RESULT OF SUS QUESTIONS

No.	Respondents	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	Respondent 1	4	4	4	3	4	2	4	4	4	2
2	Respondent 2	3	4	3	3	3	3	3	3	2	4
3	Respondent 3	4	3	4	2	4	2	4	3	4	2
4	Respondent 4	5	2	5	2	4	3	4	2	4	2

TABLE VIII
THE RESULT OF CALCULATION USING SUS FORMULA

No.	Respondents	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	× 2, 5
1	Respondent 1	3	1	3	2	3	3	3	1	3	3	25	62,5
2	Respondent 2	2	1	2	2	2	2	2	2	1	1	17	42,5
3	Respondent 3	3	2	3	3	3	3	3	2	3	3	28	70
4	Respondent 4	4	3	4	3	3	2	3	3	3	3	31	77,5
Average Value												101	63,125

According to table 8, it can be concluded that the results of the SUS score calculation on the website obtained an average value of 63,125. This value score gets a quite good category in aspects of convenience and satisfaction as well as the usability of the system that can be acceptable to users. Furthermore, the ranking of scores on the SUS method is explained in figure 6.

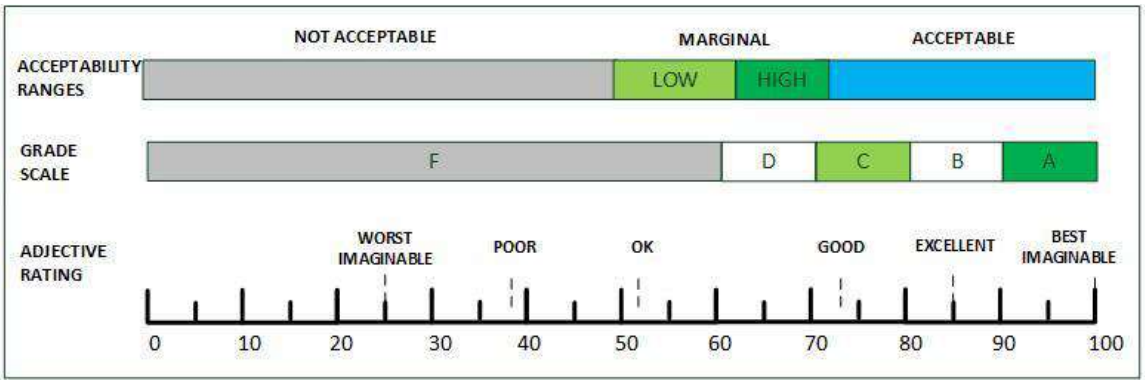


Fig. 6. Grade Rankings of SUS Scores [8]

V. CONCLUSION

It can be concluded that the development of project monitoring website at GSP using the Scrum method has been running well and has been able to meet the needs and expectations both in terms of functionality and in terms of user perspective. Tests carried out on the website also show quite good results. In blackbox testing, all scenarios and features on the website have passed the test 100%. Regarding, the SUS testing, the average value score is 63.125. This score gets a quite good category in aspects of convenience and satisfaction in using the website. However, it is also necessary to note that the tests that have been carried out in this study also still require further development to achieve a perfect score. Therefore, more in-depth testing steps are needed related to performance testing and user experience as well as feature updates that must be developed in further research on the development of this website.

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