IMPROVING ASSET MANAGEMENT SYSTEM ON FACULTY OF INDUSTRIAL ENGINEERING USING SCRUM METHOD

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***Abstract* — This research addresses the challenges faced by Telkom University's Faculty of Industrial Engineering (FRI) in managing extensive equipment across multiple buildings due to the reliance on manual methods and fragmented data storage. The study aims to develop an improved Management Information System (MIS) to centralize asset data, streamline workflows, and standardize processes, thereby enhancing asset management efficiency. Utilizing a fishbone diagram, the root causes of existing issues, including shortcomings in people, information, and equipment management, were identified. Relevant literature on asset management and information systems was reviewed to construct a conceptual framework for the proposed solution. The implementation of the improved MIS is expected to facilitate easy access to asset information, automate workflows, and enable comprehensive asset lifecycle tracking, leading to optimized maintenance schedules, reduced equipment downtime, and cost savings. The research concludes that the proposed MIS will significantly benefit all stakeholders within FRI by providing a robust, efficient, and centralized system for managing assets, thereby addressing the complex management needs of a university environment.**

Keyword— Management Information System, Maintenance, Asset Management

I. INRODUCTION

The Faculty of Industrial Engineering (FRI) at Telkom University faces significant challenges in managing its extensive assets across multiple buildings due to the reliance on manual methods and fragmented data storage. This situation has led to inefficiencies in monitoring maintenance activities and making informed decisions. The need for an improved Management Information System (MIS) is evident to centralize and streamline asset management processes within the faculty. By analyzing current practices and utilizing tools like the fishbone diagram, key issues such as poor coordination, incomplete asset information, and lack of an integrated system were identified as root causes of the existing problems. The proposed MIS aims to address these challenges by providing a centralized platform that enhances collaboration, automates workflows, and standardizes processes. This system will facilitate better asset lifecycle management, optimize maintenance schedules, reduce downtime, and ultimately result in cost savings. The objectives of this study are to develop an improved asset management information system tailored to the needs of FRI and to describe the business processes necessary for its successful implementation. The outcomes of this project are expected to significantly improve the efficiency of asset management at the Faculty of Industrial Engineering.

II. LITERATURE REVIEW

A. Management Information System

Management Information Systems (MIS) function as a unified and strategically designed network of information subsystems. These integrated components will be able to transform raw data into valuable information through a multiple of methods. This empowers managers, by adjusting information delivery to their individual styles and characteristics, to optimize productivity within the framework of established quality standards[1]

B. Maintenance Information System

Maintenance Information System is often an information system carried out by the company. By a definition, It is a system consisting of components in the form of mobile asset maintenance information that used to fulfil the objectives to be achieved.[1]

C. Asset Management

Asset management covers a comprehensive lifecycle encompassing planning, design, organization, utilization, maintenance, and disposal, all while ensuring meticulous asset oversight. This systematic and structured approach spans the asset's entire lifespan. Asset management strives to optimize asset utilization, maximizing benefits in service delivery and financial returns. Effective asset management minimizes costs, maximizes asset availability, and optimizes asset utilization.[2]

D. Computerised Maintenance Management System

Computerized Maintenance Management Systems (CMMS) are critical tools in modern asset management, designed to coordinate activities related to the availability, productivity, and maintainability of complex systems. These systems have evolved significantly over the past few decades, transitioning from simple mainframe-based maintenance planners to sophisticated, multi-user platforms capable of managing extensive maintenance functions. The primary benefits of CMMS include improved resource control, better cost management, efficient scheduling of maintenance activities, and enhanced integration with other business systems. Crucially, CMMS can significantly reduce the frequency of equipment breakdowns by facilitating a proactive and structured approach to maintenance. However, despite these advantages, many CMMS implementations face challenges such as inadequate decision support capabilities and issues with user-friendliness. Modern CMMS need to overcome these limitations by providing robust data analysis and decision-making tools to support effective maintenance strategies, ensuring that organizations can maximize the reliability and performance of their assets.[3]

E. Unified Modelling Language

Unified Modeling Language (UML) is a visual language used to describe, design, and document object-oriented software systems. One of its functions is the ability to map out the system's behaviour, from initial triggers to the resulting changes in its state.[4]

III. METHOD

The problem-solving systematic design aims to explain the completion process. There are seven stages consisting of preliminary stage, data collecting stage, system design stage, testing stage, validation stage, analysis: evaluation stage, and closing stage.

A. Preliminary stage

the research begins by identifying the problem related to the research subject. Once the problem is identified, a preliminary study is conducted to explore the theories and methods that will be employed through journals, books, related research, and other relevant sources related to Management Information System (MIS) and maintenance. This study also aims to enhance the understanding of the research subject and support the writing of the background section. Following the preliminary phase, the problem formulation can be carried out by formulating theories and implementing methods to address the identified problem. Subsequently, the research objective is determined, which involves finding solutions to the formulated problem using the predetermined methods.

B. Data Collecting Stage

Data Collecting Phase is carried out to assist the process of creating the final project, beginning with the identification of data needs to define the necessary data. Following that, data gathering strategies are applied depending on the kind of data. There are two kinds of data, namely primary and secondary data. Primary data is collected by literature studies and field studies. Literature studies is a study through research papers, article journals, and previous theses that has a relation to maintenance classification, Management Information System (MIS). Field studies are carried out by interviews with stakeholders involved, including faculty staff, administrators, vice dean 2, and direct observation. On the contrary, secondary data consists of data collection of existing system process, namely existing business process of asset management in the Faculty of Industrial Engineering Telkom University and data collection of existing assets of the Faculty of Industrial Engineering Telkom University.

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D. System Designing Stage

This stage describes the Scrum methodology's system development phases as it starts with identifying requirements, which includes identifying stakeholders and business processes. The problem analyst then develops a product backlog to support system development by specifying system modules and functionalities. Following the completion of the product backlog, the Scrum team conducts sprint planning to determine the most important features from the product backlog for the next sprint. Following sprint planning, the sprint backlog is created, which is a collection of tasks to be completed during the sprint iteration. The developers begin working on the application, beginning with design, coding, system integration, and testing, and ending with an inspection to assess the sprint's progress.

The sprint review stage is intended to examine and modify the product in development. Following that, the Scrum team engages in discussions during the Scrum retrospective stage to identify process flaws and propose improvements for future iterations. If the iteration is not completed after the sprint retrospective stage, the process is repeated from the sprint backlog and continues iteratively until the final iteration. The process then moves on to the results and system testing stage.

E. Testing Stage

Testing stage testing which is one of problem-solving system design processes that testing on system functionality. The method used for testing is black box testing. Black box testing is an essential methodology in system testing that focuses on evaluating the functionality of software applications without delving into the internal code structure. This testing approach is particularly valuable for assessing user interfaces and ensuring that the system meets specified requirements and performance standards

F. Validation Stage

Validation Stage is a crucial step in ensuring that a system meets the specific requirements of its users. This process involves external testing to evaluate the system's functionality and adherence to user needs. In this case, the validation method that will be used is user acceptance testing (UAT). UAT involved active participation from actual users or stakeholders involved in the asset office management process at the Faculty of Industrial Engineering (FRI) of Telkom University. These participants engaged directly with the developed management information system for FRI's assets. Furthermore, they completed a comprehensive questionnaire that assessed the system's alignment with user needs and its overall functionality

G. Analysis and Evaluation Stage

Analysis and Evaluation stage is conducted after testing the developed system. This aims to ensure the quality and suitability of the solution in the developed system. In this final assignment, there are several aspects that need to be analyzed, including the existing conditions and proposed conditions, as well as the functionality of the system. The advantages and disadvantages of the system as well as the relevance of the industrial engineering perspective and the development plan for the system.

H. Closing Stage

Closing Stage is a summary of the development and suggestions for the next project will be made.

IV. RESULT AND DISCUSSION

A. User Requirements Identification

From user requirements identification, it determines the system's features. The goal is to create a system that effectively addresses user requirements and enhances usability. The features are detailed in Table IV.1

Table IV. 1 Features of The System

No	Features
1	Dashboard
2	Asset Categories
3	Asset Subcategories
4	Building
5	Floor
6	Room
7	Asset
8	vendor
9	Maintenance
10	Proposal Maintenance
11	Report Maintenance
12	User

After being able to determine the features, then you can create a use case diagram to illustrate the interaction between users. In the development of this system, it will be accessible to 3 users, namely, Vice Dean 2, Head and Staff Finance and Human Resources. The image below is a use case diagram for the 3 users.

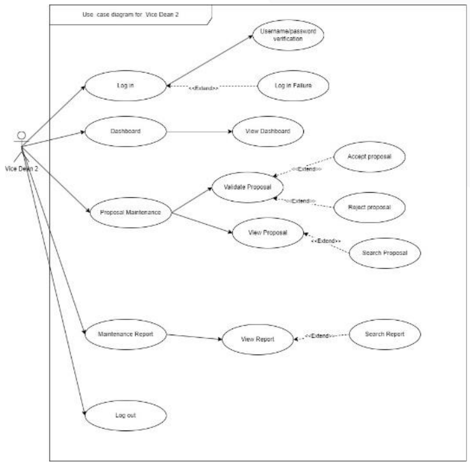

Figure IV. 1 Use Case Diagram Vice Dean 2

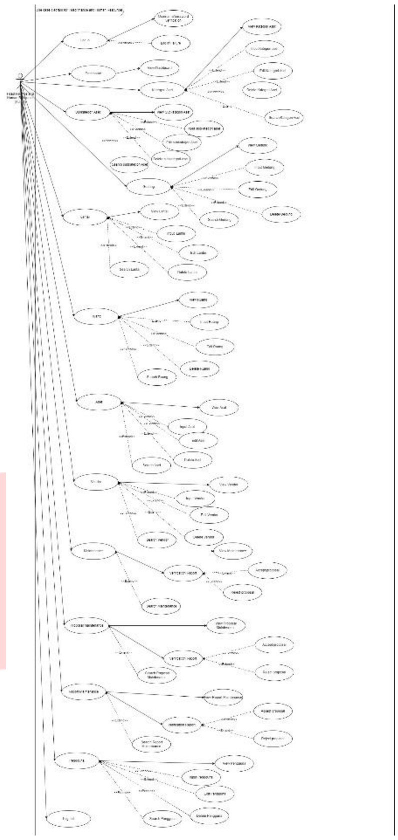

Figure IV. 2 Use Case Diagram Head Finance and Human Resources

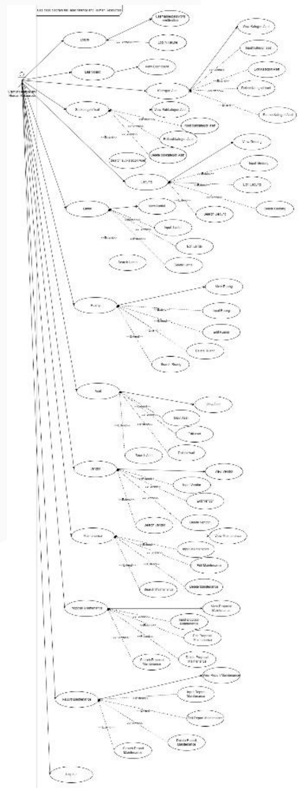

Figure IV. 3 Use Case Diagram Staff Finance and Human Resources

Next, we will create a database design using a class diagram

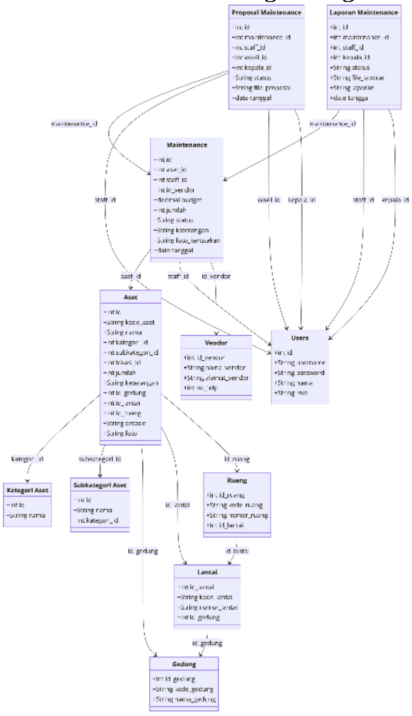

Figure IV. 4 Class Diagram

B. System Development

The system design stage with the scrum method starts with product backlog, sprint planning, sprint backlog, sprint execution, sprint review, and retrospective sprint.

1. Product Backlog

Table IV. 2 Product Backlog

Priority	Features
1	Dashboard
2	Asset Categories
3	Asset Subcategories
4	Building
5	Floor
6	Room
7	Asset
8	vendor
9	Maintenance
10	Proposal Maintenance
11	Report Maintenance
12	User

2. Sprint Planning

Table IV. 3 Sprint Planning

Estimated work	Features	Sprint
12 Days	Dashboard	Sprint 1
	Asset Categories	
	Asset Subcategories	
	Building	
24 Days	Floor	Sprint 2
	Room	
	Asset	
	vendor	
26 Days	Maintenance	Sprint 3
	Proposal Maintenance	
	Report Maintenance	
	User	

4. Sprint Backlog

Table IV. 4 Sprint Backlog

Estimated work (days)	Features	Task
3	Dashboard	Coding
3	Asset Categories	Coding
3	Asset Subcategories	Coding
3	Building	Coding
6	Floor	Coding
6	Room	Coding
6	Asset	Coding
6	vendor	Coding
8	Maintenance	Coding
8	Proposal Maintenance	Coding
8	Report Maintenance	Coding
2	User	Coding

5. Sprint Execution

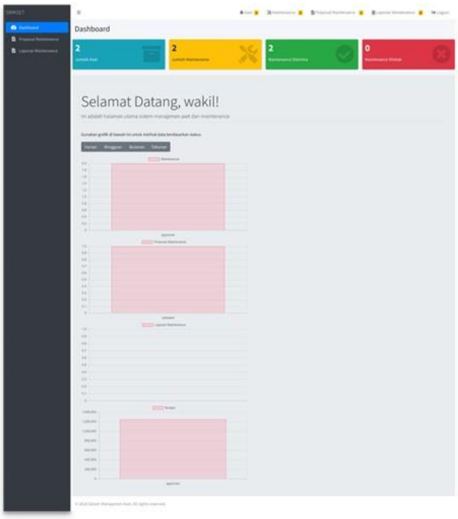

Figure IV. 5 Dashboard

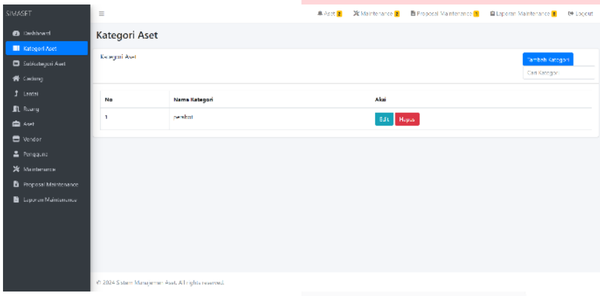

Figure IV. 6 Asset Categories

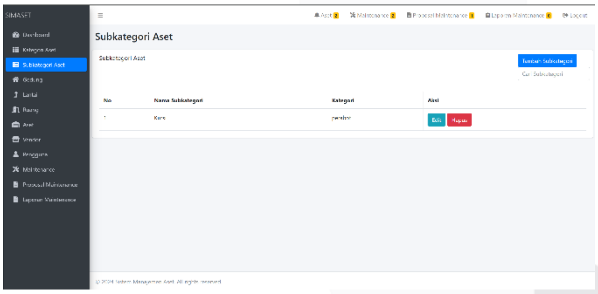

Figure IV. 7 Asset Subcategories

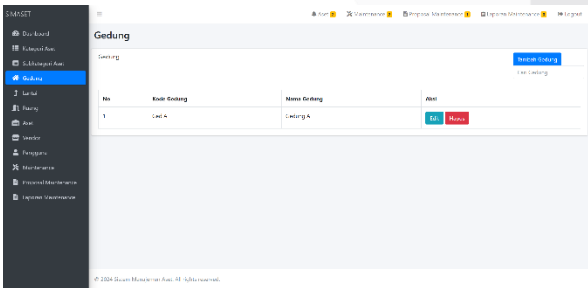

Figure IV. 8 Buildings

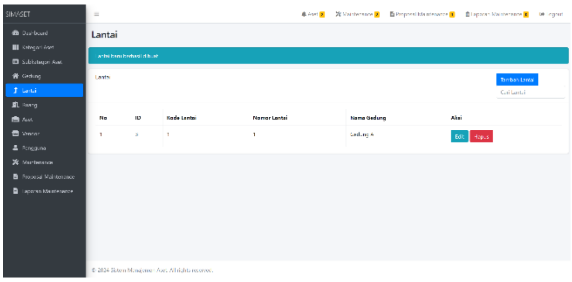

Figure IV. 9 Floor

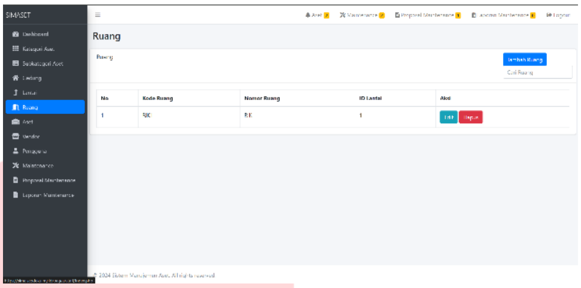

Figure IV. 10 Room

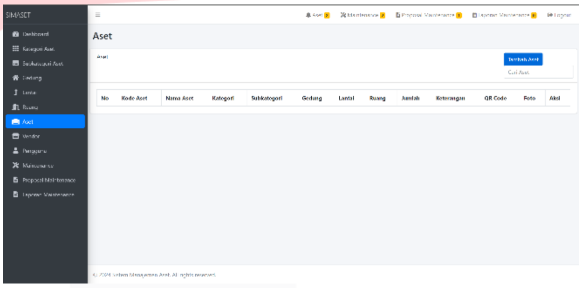

Figure IV. 11 Asset

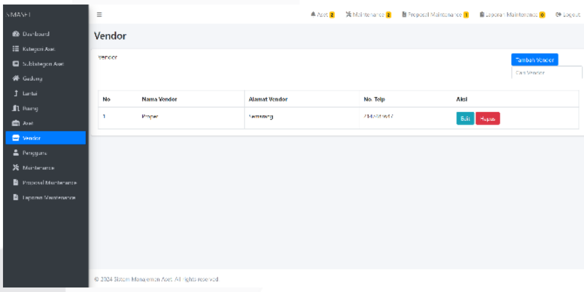

Figure IV. 12 Vendor

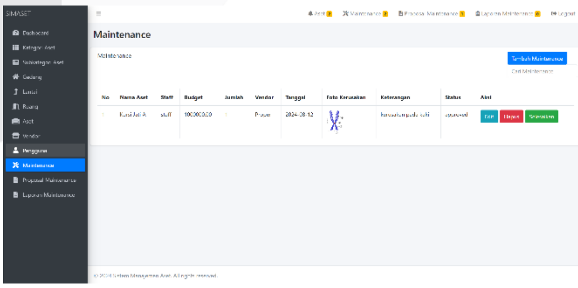

Figure IV. 13 Maintenance

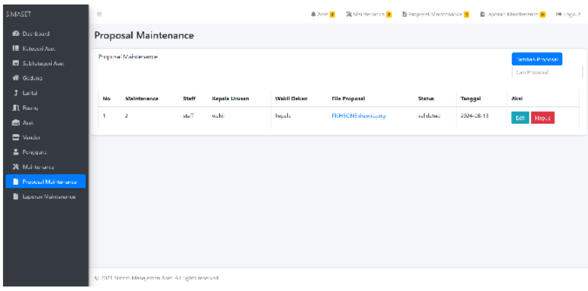

Figure IV. 14 proposal Maintenance

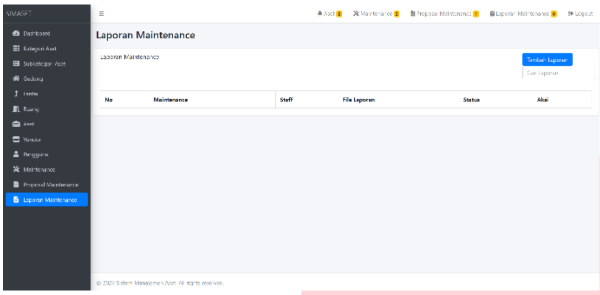

Figure IV. 15 Report Maintenance

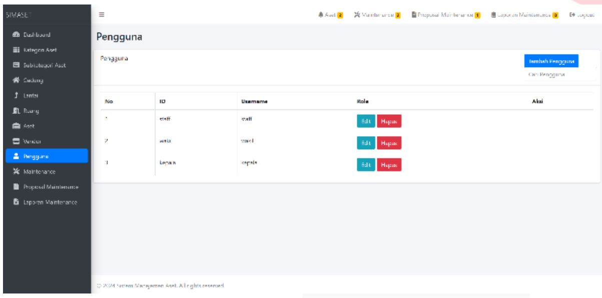

Figure IV. 16 User

V. CONCLUSION

The Improvement of an Asset Management Information System specifically developed for the Faculty of Industrial Engineering (FRI) at Telkom University. The main goal is to streamline and enhance the management of office assets within the faculty. Key stakeholders, including the Vice Dean 2, Finance & Human Resources staff, and the Head of Finance & Human Resources, are anticipated to gain significant advantages from the system's implementation.

The outcome of the Asset Management Information System is a comprehensive solution that encompasses multiple functions. It was designed to improve the efficiency of asset management within the faculty, covering aspects such as asset tracking, procurement, maintenance, and reporting.

REFERENCES

[1] W.K. Chen. *Linear Networks and Systems*. Belmont, CA: Wadsworth, 1993, pp. 123-35.