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Design and Development of a Web-Based IT Project Management Information System at the WIT.ID Company Using the Scrum and PIECES Methods

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***Abstract*– The IT company, as a pioneer in the development of information technology, utilizes information systems in almost all of its operations, ranging from company management to marketing management. One of the operational aspects of the IT company in conducting its business is client management, in this case, project management. The IT company, WIT.ID, in Bandung, has not yet integrated its project management, resulting in difficulties in allocating programmers for projects due to a lack of data collection. This research aims to understand the project management process, the stages that can be integrated into the system, and its impact on the effectiveness of project management at WIT.ID. This study adopts two methods, namely the analysis of the piece to analyze the capability of the IT project management information system and the Scrum approach to design and build the system. The goal is to enhance the efficiency of IT project management at WIT.ID through the improvement of the information system. The development stages involve analysis, design, implementation, and system testing. The agile Scrum approach is applied to project management. System testing includes black box testing and usability testing, with a feasibility level reaching 86.4%.**

Keywords- Information System, IT Project Management, Scrum, PIECES.

I. INTRODUCTION

The era of technology is a time where every aspect of life requires technology for its implementation, ranging from education, health, security, economy, to business, which all need technology to keep moving forward and avoid falling behind in the rapidly advancing technological age. The economic and business sectors are among the primary users of technology, especially information technology, in their activities. Virtually no economic or business activity is conducted without the use of information technology[1], [2].

According to the latest data gathered by the Association of Indonesian Internet Service Providers (APJII) from 2022 to 2023, the number of internet users reached 215.63 million people, representing an increase of about 2.67% compared to the previous period of 210.03 million people[3], [4]. Zwass argues that information systems are an integrated set of components for collecting, storing, and processing data, as well as providing information, knowledge, and digital products[5].

Management in a project is crucial as it serves as a benchmark for the success of the project to meet its targets and deadlines, including project management in the IT field. With project management in the IT field, client management to the development of IT products can be well-managed to ensure they proceed according to the set targets[6], [7].

However, there are still some IT companies that have not shifted their project management activities into an integrated system, one of which is WIT.ID located in the Sukajadi District, Bandung City. One common problem faced in the IT project management process at WIT.ID is the difficulty in determining programmers to carry out a project due to the excessive assignment of projects directly to programmers without proper documentation.

To address the issues in IT project management at WIT.ID, the solution lies in the design and development of an IT project management information system that can overcome the challenges faced by the company. The construction of this IT project management information system is expected to facilitate the IT project management process at WIT.ID.

II. LITERATURE REVIEW

System

A system is defined as a set of elements or processes that interact to achieve similar goals in managing data within a specified time frame, resulting in outputs such as information, energy, or objects[1], [8], [9].

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Information

Information can be seen as something that is observable, known, transferable, and processed by humans. Information possesses physical characteristics, such as being recordable and exchangeable in various forms and media[10], [11].

Unified Modeling Language (UML)

UML (Unified Modeling Language) is defined as a visual modeling language that includes a set of diagrams and notations used to depict various aspects of software systems[12]–[14].

Scrum

Scrum is an Agile framework used to manage and control software development in a dynamic environment, emphasizing strong team collaboration and a focus on delivering high business value[15], [16].

PIECES

PIECES is an analysis method serving as the foundation to obtain specific core issues. When analyzing a system, it is typically conducted across various aspects, including performance, information, economics, control, efficiency, and service [17]–[19]

III. RESEARCH METHODS

The approach used in this research is a qualitative approach, where the qualitative approach is chosen. Qualitative research involves the use of inductive inquiry methods, collecting data in the form of words or images, and interpreting the meaning contained in that data[20]

In this study, the researcher employed one of the agile software development methods, namely Scrum. Scrum is an Agile framework used to manage and control software development in a dynamic environment, emphasizing strong team collaboration and a focus on delivering high business value[21].

Data Collection Techniques

In the conducted research, data collection methods included observation, interviews, and literature review. The observation process involved direct or indirect observation of project management processes in the research object. Interviews were conducted through question-and-answer sessions with relevant parties to obtain necessary information. Literature review was performed by searching for literature or references related to the research.

Application Development Method

The Scrum method consists of several stages, including planning, development, review, retrospective, and release. The use of the Scrum method aims to achieve flexibility in the development process, allowing for immediate evaluation and application of any changes that may occur during the application development process.

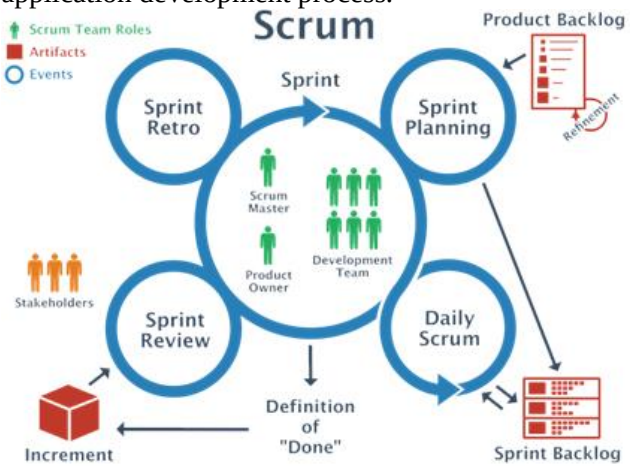

Figure 1 Stages of the Scrum Method

IV. RESULT AND DISCUSSION

In the results and discussion section, it is explained about several steps undertaken during the research process, including planning, development, and review, in the construction of a web-based IT project management information system at WIT.ID.

Planning

The planning phase involves gathering necessary information, followed by the identification of acquired information. This information serves as a reference for the planning process of the IT project management information system.

PIECES Analysis

Below are the results of the PIECES analysis conducted, focusing on analyzing performance, information, economic aspects, control, efficiency, and services within the ongoing business processes.

Table 1 Results of PIECES Analysis

No	Aspect	Result
1.	Performance	Absence of programmer management resulting in longer project completion time.
2.	Information	Third-party system has provided comprehensive information in line with the needs of IT project management.
3.	Economic	Additional costs incurred for subscribing to a third-party system to carry out IT project management.
4.	Control	Difficulty in customizing according to the specific needs of project management with the company's workflow.

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5.	Efficiency	Project management speed is considered standard.
6.	Services	Features provided by the third-party system are quite comprehensive.

Source: (Author, 2023)

Identification of Operating System

The process of identifying the operating system aims to depict the ongoing business processes in the system in the form of a BPMN (Business Process Model and Notation) diagram. The following is the ongoing business process of the operating system, which can be seen in Figure 2.

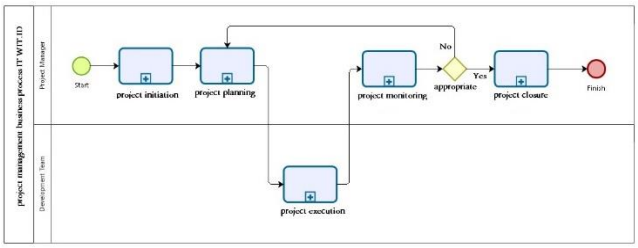

Figure 2 Ongoing System Business Process
Source: (Author, 2023)

Proposed System

The proposed system is a system created to replace the ongoing system with improvements related to business process effectiveness. The business process of the proposed system can be seen in Figure 3.

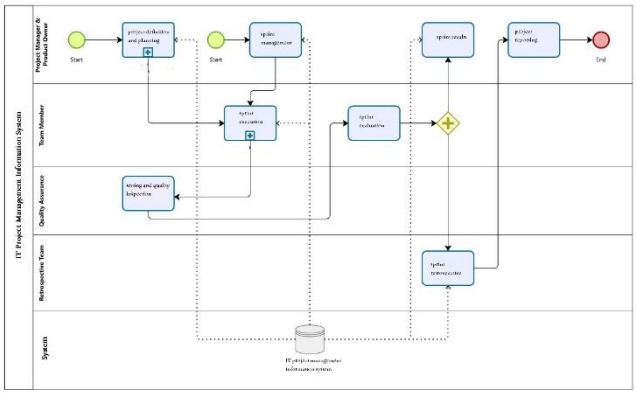

Figure 3 Proposed System Business Process
Source: (Author, 2023)

Product Backlog

The product backlog is a list of activities to be carried out in the IT project management information system development process. The following is a list of the product backlog in the development of this IT project management information system:

Table 2 Product Backlog

No	Backlog	Priority
1.	Information and data collection	Medium
2.	System and database design	High
3.	Software and hardware implementation	Medium
4.	Authentication (Login and Register)	Medium
5.	Authorization	Medium
6.	Dashboard	Low
7.	Project Menu	High
8.	Backlog Menu	High
9.	Team Member Menu	Medium
10.	Sprint Menu	High
11.	Board Menu	Low
12.	Task Menu	Medium

Sprint Planning

The sprint planning stage is carried out to determine the list of tasks from the backlog that is divided into several sprints based on the estimated time required to complete the product backlog. The following is the sprint planning that has been created based on the estimated time of work and the priority of the product backlog.

Table 3 Sprint Planning

No	Sprint	Product Backlog	Estimation (Days)
1.	Sprint 1 (1 week)	Information and data collection	7
2.	Sprint 2 (2 weeks)	System and database design	7
		Software and hardware implementation	1
		Dashboard	2
		Project Menu	4
3.	Sprint 3 (2 weeks)	Backlog Menu	4
		Team Member Menu	3
		Sprint Menu	4
		Board Menu	3
4.	Sprint 4 (2 weeks)	Task Menu	4
		Authentication (Login and Register)	4
		Authorization	4

Development

In this process, several stages are carried out, including system design using UML modeling and system implementation through source code creation.

System design using UML modeling

The system design process is conducted to illustrate the flow of the IT project management information system using UML modeling, which includes the creation of use case diagrams, activity diagrams, sequence diagrams, and entity relationship diagrams.

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(1) Use Case Diagram

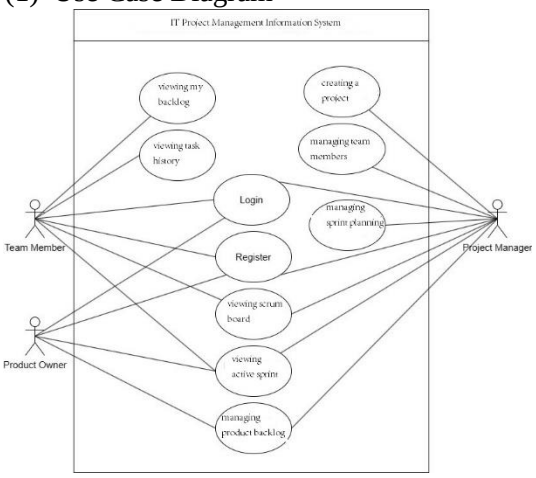

Figure 4 Usecase Diagram

(2) Acitivity diagram

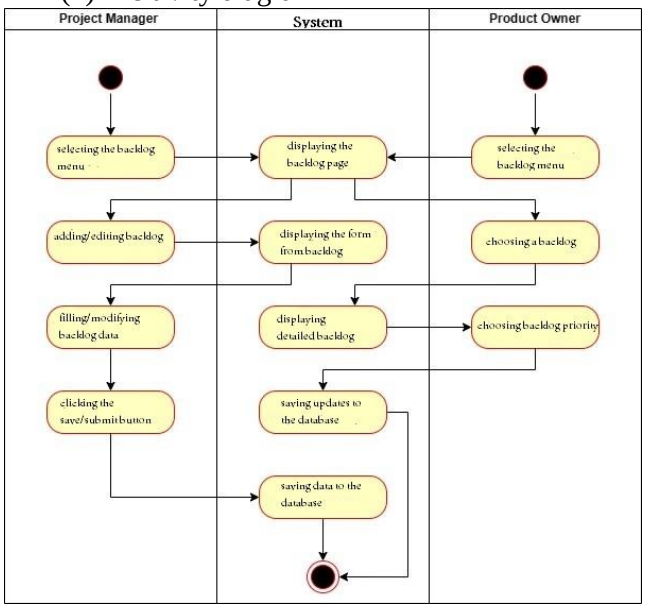

Figure 5 Activity Diagram

(3) Sequence diagram

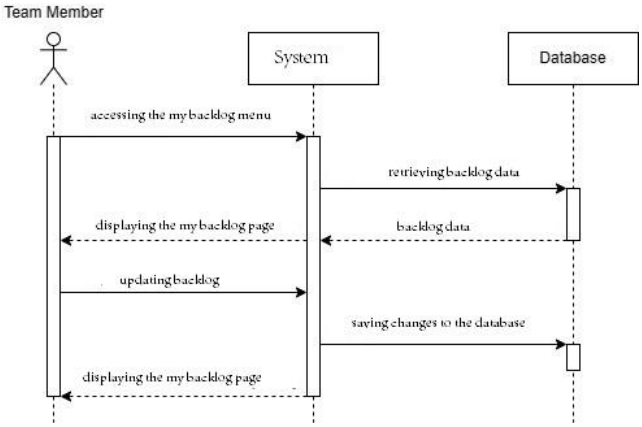

Figure 6 Sequence Diagram

(4) Class diagram

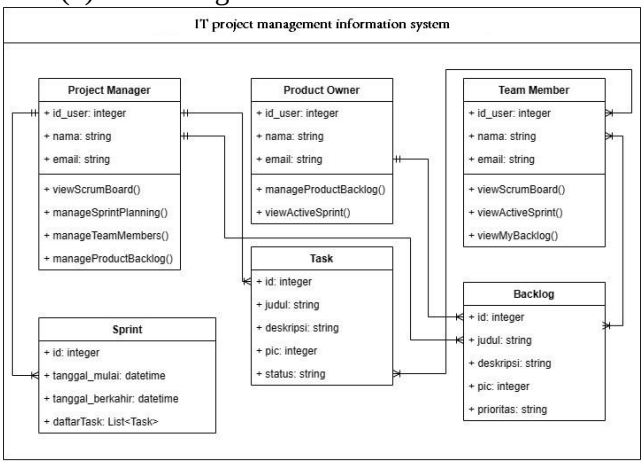

Figure 7 Class Diagram

(5) Entity relationship diagram

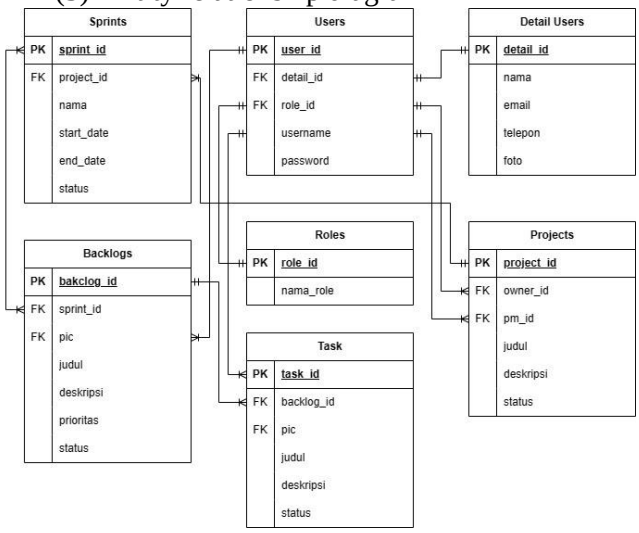

Figure 8 Entity Relationship Diagram

System Implementation

The system implementation process takes place after the design process is completed using a programming language, followed by the creation of a

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website. The following are the results of the system implementation in the form of a website interface for the IT project management information system.

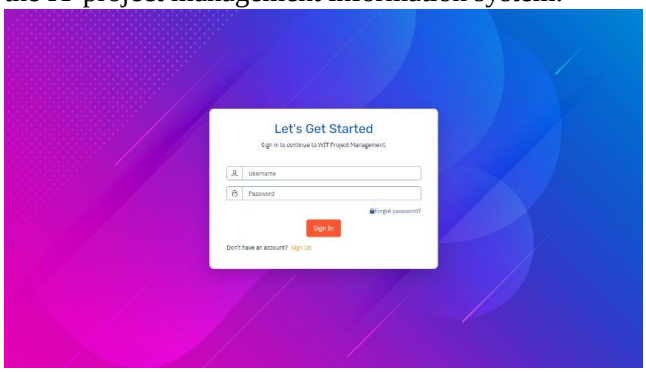

Figure 9 Login Page

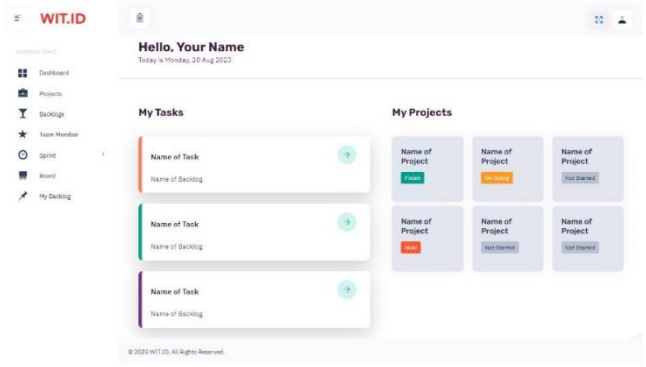

Figure 10 Dashboard Page

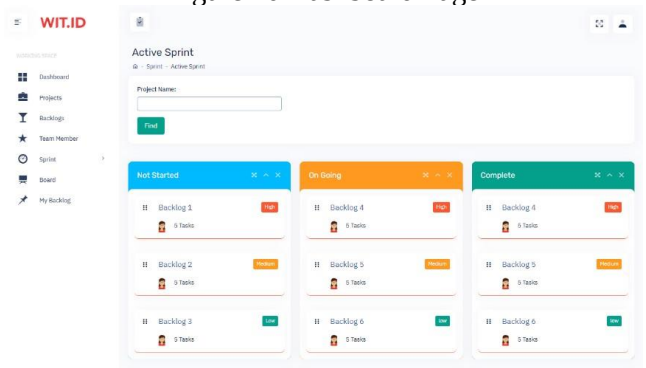

Figure 11 Active Sprint Page

Review / Evaluation

The final stage is the evaluation, where after the development process is completed, an evaluation is conducted to identify shortcomings during the development process and to test the system's performance. Testing is done by conducting usability testing on respondents who are employees of WIT.ID. The following are the results of the usability testing questionnaire.

TABLE 4 Usability Testing Questionnaire Results

No.	Respondents	Question					Total
		1	2	3	4	5	
1.	Respondents 1	4	4	4	4	4	20
2.	Respondents 2	5	4	4	5	4	22
3.	Respondents 3	5	5	4	4	4	22
4.	Respondents 4	4	5	4	4	4	21
5.	Respondents 5	5	5	5	4	4	23
Total							**108**

Percentage = (108 / 125) x 100%
Percentage = 86.4%

Based on the calculation results of the feasibility percentage, which is then compared to the usability testing assessment standards, a feasibility percentage of 86.4% is obtained with a qualification of very feasible.

V. CONCLUSION AND SUGGESTION

Conclusion

Based on the conducted research, the following conclusions can be drawn:

The IT project management stages at WIT.ID begins with project initiation, project planning, analysis and identification, execution, and project closure.

Implementable stages to enhance the effectiveness of the IT project management process at WIT.ID includes the selection of a project manager, product owner, and team members during the project initiation phase.

Based on the test results of the developed IT project management information system through usability testing, a feasibility score of 86.4% was obtained, categorizing it as suitable for use.

Recommendations

To further improve the research results and enhance the performance of the developed IT project management information system, the following recommendations can be considered by the researcher or the company involved:

Further development of the IT project management information system, including integration with third-party systems such as version control systems, different software development methods, and the development of additional features needed in the IT project management process.

The use of hosting to place the IT project management information system, allowing access from anywhere and at any time, thus enhancing the mobility and efficiency of the IT project management system.

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