



## Digitalization of Correspondence Information Systems Using Scrum Model

Yunita Ardilla<sup>1</sup>, Ahmad Khairul Hakim<sup>1</sup>

<sup>1</sup>Da'wa Management Study Program, UIN Sunan Ampel Surabaya

\*Corresponding Author: Yunita Ardilla



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### Abstract

Rapidly developing technology has an important role in organizational development which can support various human activities or performance, namely the performance of employees in an environment whose faculty activities cannot be separated from correspondence activities that are not yet fully optimized and computerized. Conventional mail services make services less than optimal and ineffective. Therefore, an information system is needed that is useful for making employee performance more effective in correspondence activities in the form of a correspondence information system in order to speed up performance and improve services to stakeholders. The development method used by researchers is the scrum method, while the research data collection method includes interviews, observation and documentation with descriptive analysis. The results of this research, a web-based correspondence information system design was produced to streamline employee performance, so as to optimize service and speed up performance.

## Introduction

Along with the development of the era, the progress and development of technology greatly influences all aspects of human life. Especially the development of information and communication technology, which has a very important role in life, both personally and in organizations (Utama, 2020). In an organization or agency, both private and government, education or other fields, it is certainly familiar with the process of correspondence and disposition which is an inseparable part of its daily activities. Currently, many are still found in an institution, agency or company that makes various mistakes in the process of managing letters or important data that exist (Muslihah & Iswara, 2021; Amalia & Anty, 2023; Dewi et al., 2023). Such as finding data or letters that are scattered or damaged, so that it can cause great losses for the organization. In an institution, whether private or government, in carrying out its activities, it is inseparable from correspondence activities (Sarasvananda et al., 2022; Musdah et al., 2022). For that reason, in a company or agency, correspondence activities must receive more attention, because the contents of the letter in the institution or agency will be a means of achieving the goals of the agency or company concerned, so there needs to be good letter management (Widiawati & Andilla, 2021; Simangunsong et al., 2024).

Correspondence problems that often occur in educational institutions, in this case in the study program at the Faculty of Da'wah and Communication UIN Sunan Ampel Surabaya, there are several forms of correspondence services that still use conventional systems, so that the service that is expected to be done quickly is not realized. So far, the process is that students must come to campus and have to wait for officers from the study program if at that time the officer on duty is not in his room, then the student must come back the next day to get the desired correspondence service (Gani, 2022). Of course this is very inefficient considering

that there are quite a few students who live far from the campus area. Utilizing information technology by using a correspondence application can be one of the right solutions for organizations or agencies that have obstacles when using manual correspondence processes, such as frequent letters being lost, difficulty finding letters, slow processes and so on. By using a correspondence application, all of these problems can be minimized.

Therefore, as a large organization under the auspices of the Ministry of Religion by implementing the tagline "Smart Work", it is necessary to design a study program correspondence information system in the Faculty of Da'wah and Communication UIN Sunan Ampel Surabaya in order to accelerate performance and service to stakeholders, especially to students. So the author conducted a study entitled "Scrum Model in the Development of a Web-Based Correspondence Information System for the Faculty of Da'wah and Communication UIN Sunan Ampel Surabaya". The Scrum model was chosen as a framework in the development of the information system because it is considered capable of saving resources in software development both in terms of material and non-material. The Scrum model allows the developer team to adapt to changes in software needs efficiently and effectively (Mukti et al., 2022; Mishra & Mishra, 2011; Visser et al., 2016).

The use of the Scrum model in application development has been implemented in various sectors, such as Viany's research which focuses on developing mobile-based learning applications using the Scrum model (Tjhin et al., 2020; Utami Tjhin et al., 2020; Riantini et al., 2019). Other studies have also tested the effectiveness of using the scrum model compared to the waterfall model. (Prasetya et al., 2021), it is produced that the scrum model is able to provide final application results that are in accordance with user desires. However, there is still very little research on the use of the scrum model that focuses on the implementation of a web-based correspondence information system, so in this study a correspondence information system was built with the scrum model framework. It is hoped that with this information system it will be able to provide good performance for educational officers in more careful, fast and effective work.

## Methods

The The method used in this study is applied research, meaning that this study emphasizes on solving solutions to existing problems in the agency by being directed to create innovation and development of science and technology, especially in the field of developing correspondence information systems. This study focuses on solving concrete problems to produce knowledge that can be applied practically in real-world situations. The information system development method used is the scrum method, because Scrum allows changes in each iteration or sprint, so that the development team can quickly adapt to changes in user needs or priorities. This is very useful in the development of information systems where changes in demand often occur. In addition, through incremental development and continuous improvement, the Scrum team can identify and fix problems or bugs earlier in the development process. This helps improve the quality of the final product. Figure 1 shows the research stages that begin with identifying the problem, determining the objectives and limitations of the problem. Then continued with a literature study related to software development with the scrum model, then implementing software development followed by system testing with the black box testing method (Supriyono, 2020).

The system development method used in this study is the scrum model method. This method is an approach or framework in software development that is flexible, adaptive, and based on collaboration between members of the development team (Schwaber & Sutherland, 2020). The main stages in the system development phase consist of 3 main phases as shown in Figure 2, namely, the pregame phase, the game phase, and the postgame phase (Schwaber & Sutherland, 2020; Hidalgo, 2019).

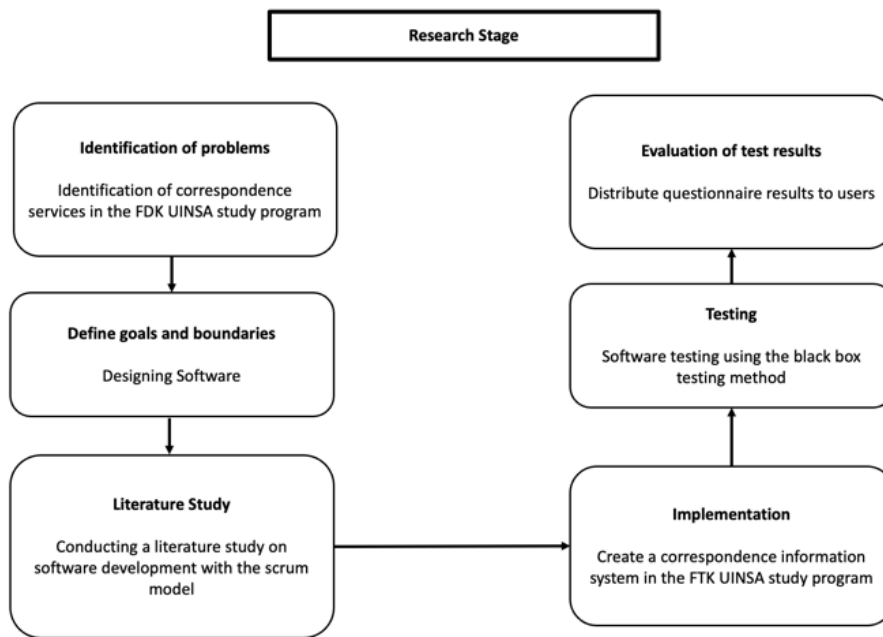


Figure 1. Research Stage

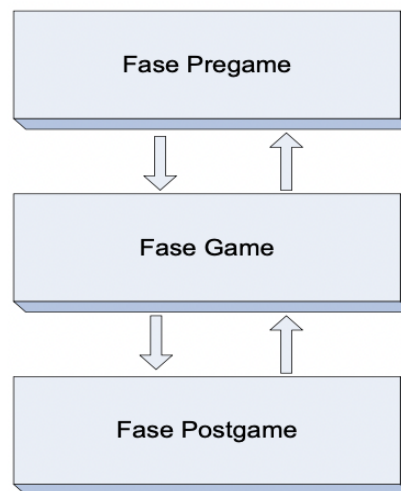


Figure 2. Software Development Phases

The pregame phase in the Scrum model refers to the initial preparation or preparation phase before starting software development using the Scrum method. This phase is usually carried out before the first Sprint begins and has several steps that must be carried out before the development team begins to actively work (Garzaniti et al., 2019). In this phase there are four things that are done, namely defining the product vision and strategy where the product owner and key stakeholders work together to establish a clear product vision and long-term strategic goals. Then do backlog preparation, namely creating and compiling product backlog priorities, namely a list of features, functions, and improvements desired for the software. Backlog items are arranged in the form of user stories or product requirements (Sharma & Kumar, 2023; Sedano et al., 2019). The third step in this phase is to form a scrum team, then initial planning is carried out or carrying out initial planning in software development, namely estimating the priorities of the backlog items that have been compiled and making the first Sprint plan that must be worked on.

The Game phase is the core of the Scrum development process where work is done in iterative and incremental Sprints. The main activities in the game phase are called Sprint cycles which include Sprint planning activities (making plans for work to be done in the upcoming Sprint,

setting Sprint Goals, and selecting backlog items to be worked on), daily scrum (daily meetings to align team work and identify obstacles in the software development process), development work (software development process that includes coding, testing and system integration), Sprint review (presenting work results to stakeholders and receiving input), and Sprint Restrospective (conducting internal team meetings to evaluate the work process during the Sprint and identify improvements that can be made in the next Sprint (Rubin, 2012). The Postgame phase includes all activities carried out after the software work is considered complete, the main activities in this phase include integrating all the work results from various Sprints into a final product that is ready to be released. Overall the scrum model process can be seen in Figure 3 below.

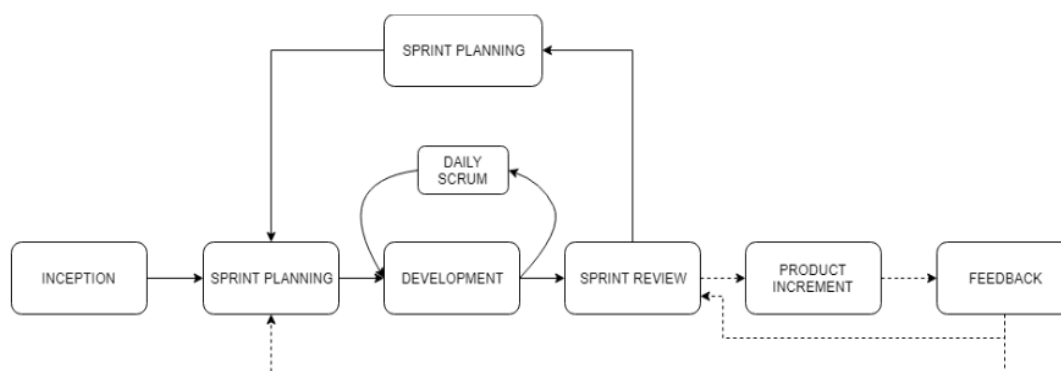


Figure 3. Scrum Model Stages (Rubin, 2012)

The testing process in software development uses the black box testing method. Testing is done by running the system and seeing the output, whether it is in accordance with expectations or not. Testing is done on the main business process of the software.

### Results and Discussion

This chapter contains the research results obtained in the design and development of software using the scrum model method..

#### Pregame Phase

Define In this phase, the first step taken is to align the perception between the product owner and the main stakeholders in defining the vision and strategy of the software product to be developed. Then, make a product backlog containing the features or modules to be developed, the results of the product backlog can be seen in Table 1.

From the agreed product backlog, user stories are then formed for each product backlog, which is the initial step in the inception process. There are several columns in the user story (Ramos et al., 2016): a) Actor is the person who carries out the story; b) Objective is the goal of the story being created; c) Pre-Condition is the situation before the story is implemented; d) Main flow is the stage in the story that will be carried out by the actor to achieve the objective; e) Alternative flow is if the actor has not fulfilled the pre-condition then it will follow the previous flow; f) Post condition is the condition after the objective has been completed.

Table 1. Product Backlog List

No	Product Backlog List
1	Login User
2	User Management
3	Submission of a letter of dispensation for tuition payments
4	Submission of cover letter for cross-study program courses

No	Product Backlog List
5	Certificate of completion of course
6	Submission of letter for programming courses
7	Submission of a letter of correction of a value that has been locked
8	Validation of letter proposal
9	User Registration
10	LogOut

Next is the formation of a scrum team consisting of a product owner, scrum master, and a software development team consisting of back end developers, designers, and front end developers. After compiling user stories, the scrum team and compiling a product backlog, the next step is to do initial planning by compiling backlog items that will be processed into the Sprint. In the product backlog item there are 10 points written by the product owner and discussed with the development team. In making a product backlog item there are 3 items, namely Name, Importance and Estimated Time. Importance is an assessment given by the product owner which contains numbers from 1 to 10, the higher the value, the more important the feature/module is for the product owner. The estimated time column is an estimate of the features being built. The results of the initial planning stage can be seen in Table 2.

Table 2. Initial Planning.

Name	Importance	Estimated Processing Time
<i>Login User</i>	5	3 days
User Management	4	3 days
Submission of a letter of dispensation for tuition payments	9	5 days
Submission of cover letter for cross-study program courses	3	5 days
Submission of letter for programming courses	6	5 days
Submission of a letter of correction of a value that has been locked	8	5 days
Certificate of completion of course	7	5 days
LogOut	5	2 days
Validation of letter proposal	11	7 days
User Registration	10	3 days

### Game Phase

The main activities in the game phase include Sprint planning activities. Sprint planning is done by defining the work to be carried out in the Sprint, where this stage is carried out collaboratively with the entire scrum team (Ependi, 2018). In Sprint planning, product backlog priority planning is also carried out to agree on the 1st, 2nd and 3rd Sprints. In this software development, it is divided into 3 main Sprints which can be seen in Table 3. The software development process is carried out based on the Sprint sequence that has been agreed upon between the product owner and stakeholders. In this game phase process, a daily scrum is also carried out, where this activity is carried out by holding daily meetings to align the team's work and identify obstacles in the Sprint work process. In the daily scrum activity, several tasks are carried out, including: defining the work done by the development team, defining the work to be done by the development team. defining and finding solutions to problems or obstacles faced by the development team.

Table 3. Task Sprint 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>

Task Product Backlog	Task	Task Owner
<b>Sprint 1st</b>		
Feature of Login User	Interface design	Designer

<b>Task Product Backlog</b>	<b>Task</b>	<b>Task Owner</b>
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
Feature of LogOut	Interface design	Designer
	Database design	Back end dev
	Back end work	Back end dev
	Front end work	Front end dev
	Testing	Development team
Feature of User Registration	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
<b>Sprint 2nd</b>		
Feature of Submission of a letter of dispensation for tuition payments	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
Feature of Validation of letter proposal	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
Feature of Submission of a letter of correction of a value that has been locked	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
<b>Sprint 3rd</b>		
Feature of Submission of cover letter for cross-study program courses	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
Feature of Submission of letter for programming courses	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
Feature of Certificate of completion of course	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>
	Front end work	<i>Front end dev</i>
	Testing	Development team
Feature of Management User	Interface design	Designer
	Database design	<i>Back end dev</i>
	Back end work	<i>Back end dev</i>

Task Product Backlog	Task	Task Owner
	Front end work	<i>Front end dev</i>
	Testing	Development team

The next activity is the Sprint review at this stage the scrum team checks, discusses the increments that have been made when implementing the Sprint. Sprint review is done at the end of each Sprint which is useful for receiving feedback on what has been developed by the development team. In this process the product owner also follows this stage to assess the extent to which the system has been created and developed (Sutherland, 2010).

Then the last activity in this phase is the Sprint Retrospective. At this stage the development team together with the Scrum Master checks all tasks that have been carried out during the implementation process from Sprint 1 to Sprint 3 (Ramos et al., 2016)(Sharma et al., 2012). Along with making a plan to improve the next Sprint. Allocate 1 – 3 hours to discuss or close the Sprint Retrospective (Demirel & Das, 2018). The Scrum Master will review the Sprint Backlog and summarize the Sprint that has just been implemented. Each stakeholder is given time to speak to express their opinions about the Sprint that has passed including what can be improved, and what can be done differently.

### Postgame Phase

This phase is the final phase in software development, namely integrating all work results in all Sprints.

### Use Case Diagram

Use case diagrams are used to help model the main functions that will be performed by the system and their relationship to the actors involved. In this correspondence information system, the following is a use case diagram that is built as in Figure 4.

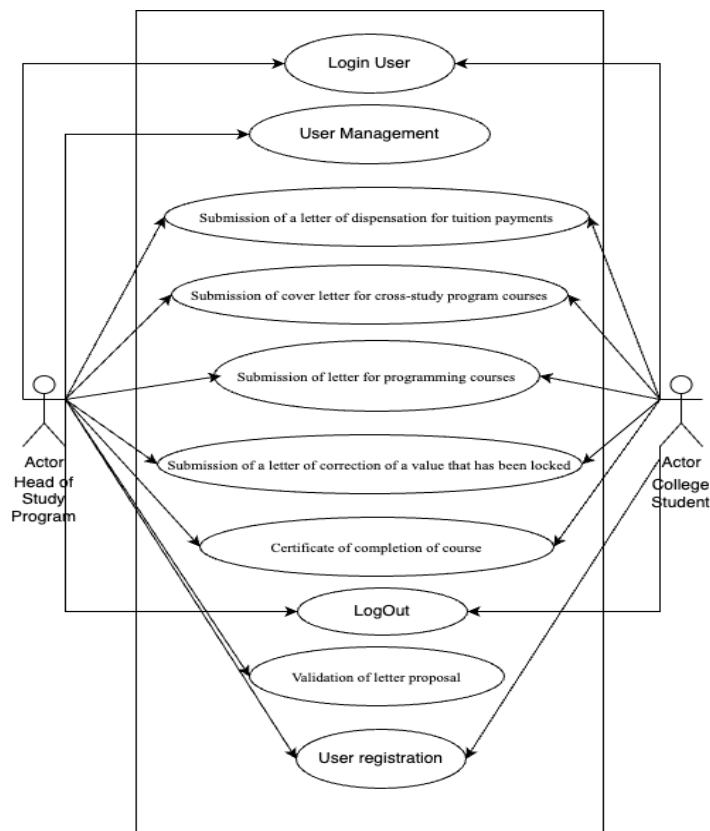


Figure 4. Use Case Diagram

## Database Design

The database design built in software development can be seen in Figure 5 below:

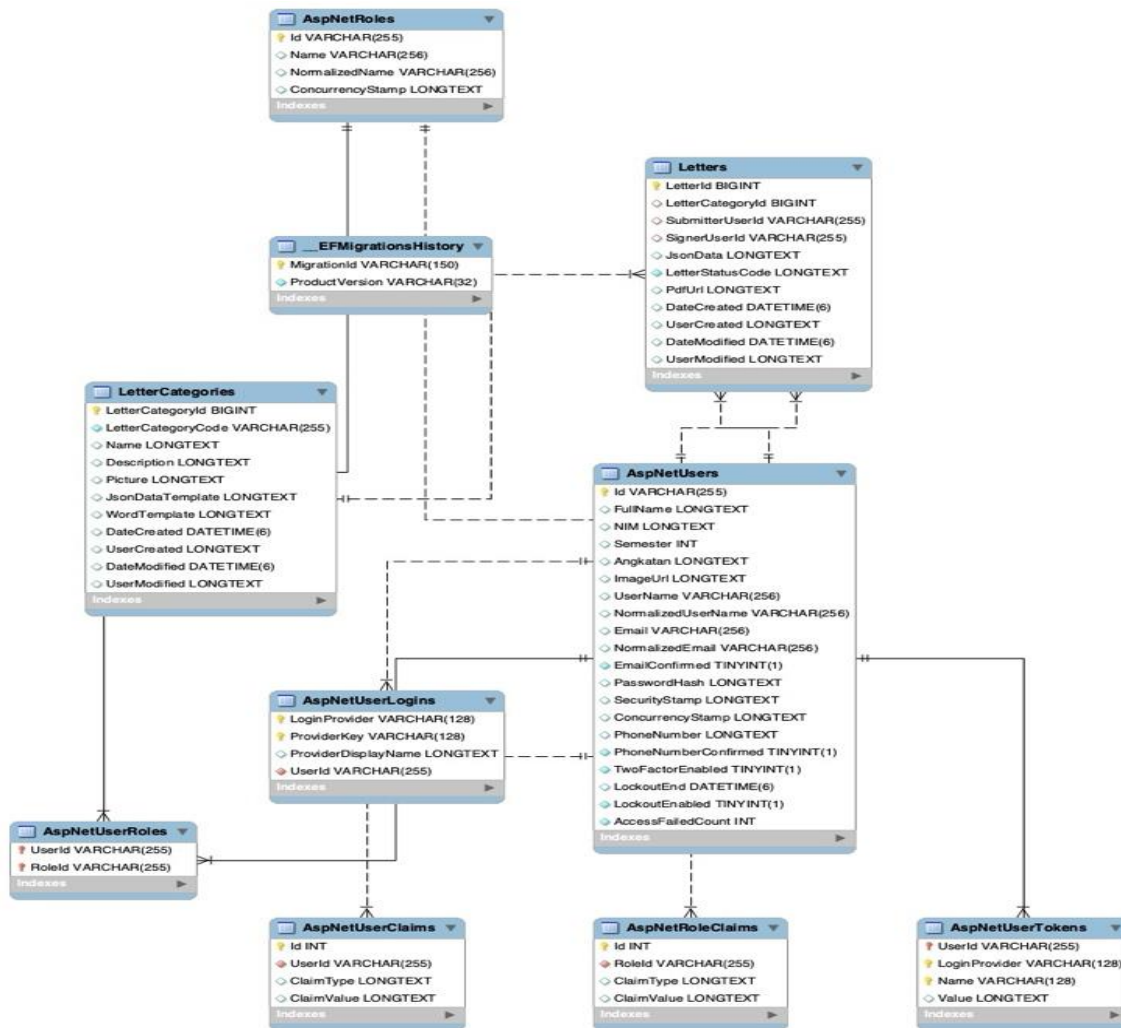


Figure 5. Database Design

In the system testing process, this study uses the blackbox testing type. Testing is done by running the system and viewing its output. (Ningrum et al., 2019), whether it is as expected or not (Febriyanti et al., 2021). The tests carried out are only related to the main business processes presented in Table 4 below:

Table 4. Feature Testing Results with Black Box Testing Method

Feature	Test Case	Expectation	Result
Login User	Enter the correct name and password	Go to the appropriate page	Valid
	Entering the wrong name and password	Return to login page with warning	Valid
User Management	Select the name of the registered student	Displays a list of validated and unvalidated system users.	Valid
Submission of a letter of	Select the tuition fee payment dispensation request letter feature then fill in the Name, NIM, Study Program,	Go to the appropriate page	Valid

Feature	Test Case	Expectation	Result
dispensation for tuition payments	Address, Reason, and Ability correctly.		
Submission of cover letter for cross-study program courses	Select the cross-study program cover letter feature then fill in the Name, NIM, Semester, Course Code, Course correctly	Go to the appropriate page	Valid
Certificate of completion of course	Select the certificate of completion of the course feature then fill in the Name, Student ID, Semester, Course correctly	Go to the appropriate page	Valid
Submission of a letter of correction of a value that has been locked	Select the Request for Grade Improvement feature by filling in the Lecturer's Name, Lecturer's NIP, Lecturer's Position, Course, Class correctly.	Go to the appropriate page	Valid
User Registration	Select the registration feature by filling in the NIM, Full Name, Email, Password and confirm password then press the register button.	Go to the appropriate page	Valid
LogOut	Press the logout button	Exit from the system	Valid

## Conclusion

The results of the research on the implementation of Scrum for the development of a website-based correspondence application can be concluded that the application can be completed within 43 days or 3 Sprints using the Scrum software development method more effectively by producing a Minimum Viable Product, as evidenced by the results of black box testing which obtained overall results that can be concluded if all features can run well.

The results of this study provide in-depth insights into how the implementation of the Scrum model affects the development of a correspondence information system. It was found that the iterative and collaborative approach in Scrum facilitates frequent changes in requirements in the correspondence context. The development team can quickly adjust priorities and features based on feedback from users and stakeholders. Flexibility in Sprint planning also allows for strategic adjustments throughout the project.

From a managerial perspective, by building this system, the study program does not have to create letters related to the study program manually and is able to help the study program's performance to improve quality services to students.

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