

# The SDLC Analysis for Implementation Document Management System at IPR Center of Universitas Jenderal Soedirman

Muhammad Syaiful Aliim<sup>1\*</sup>, Retno Supriyanti<sup>2</sup>, Hari Siswanto<sup>3</sup>

<sup>1-3</sup> Department of Electrical Engineering, Faculty of Engineering,  
Universitas Jenderal Soedirman,  
Purwokerto, Indonesia 53122  
muhammad.syaiful.aliim@unsoed.ac.id; retno\_supriyanti@unsoed.ac.id;  
hari.siswanto@unsoed.ac.id

\*Correspondence: muhammad.syaiful.aliim@unsoed.ac.id

**Abstract** – *The Document Management System (DMS), the Center for the Development of Intellectual Property Rights, is a web-based document management information system developed by the Center for Intellectual Property Development at Universitas Jenderal Soedirman. This system is used to archive documents digitally. However, because it did not work as intended by the user, the DMS Intellectual Property Rights Center did redesign both appearance and database relations. After the redesign process is complete, the SIMD Intellectual Property Rights Centre's development results from the redesign need to be implemented in a production environment. For the implementation process to run well, it is necessary to analyze the factors that affect the deployment process with the implementation process in the widely used System Development Life Cycle (SDLC) model. By mapping these factors with the characteristics, advantages, and disadvantages of each SDLC implementation process, the V-shaped model's deployment process is more effective and efficient in its execution in a production environment. The results show that the results of this redesign procedure can solve the problems that have occurred so far.*

**Keywords:** *System Information; SDLC; V-Shaped Model*

## I. INTRODUCTION

The Intellectual Property Rights Centre Management Information System went through a redesign process due to changes in appearance and table relationships in the database (Syaiful Aliim et al., 2020). This change certainly needs to be implemented as soon as possible because the Information System didn't meet user requirements for

historical document purposes after finished the first software development.

Implementing information systems certainly requires careful preparation because the existing system is still running and in use. Planning and preparation of both the application and the database are required. SIMD does not archive documents based on document history. Old documents are not stored when the user updates the changed documents. Changes that occur in documents are not well managed, making it difficult for users to archive. Before starting implementation, it is necessary to analyze the proper implementation process. In Software Development Life Cycle, where the application development process always runs continuously if the application implementation process experiences problems, the development process need to continue.

An information system is a set of organizational procedures that exist when implemented will provide information to make decisions or control information. A Decision Support System is a computer-based information system that uses a decision model and a unique database to help the managerial end users in the decision-making process (Laudon 1944- author, 2014). The development of information systems is now high-speed and rapid; few are using information systems to help ease work. One form of the information system that is easy to develop is web-based; web-based information systems are used to display information and be used for dialogue with data to provide information to make a decision. Many studies use Management Information Systems in solving problems that exist today. Gensby (Gensby et al., 2012) conducted a review of the effectiveness of management information systems-based work. Prilutskay (Prilutskay et al., 2017) state that

a coordinated structure forms a firm's structural capacity. The assessment's coherence criteria suggested estimating the structural potential and determining the direction of increasing the company's efficiency. Luchian (Luchian et al., 2017) conducted a study on the concept of total quality management in health systems providing essential strategic vector evidence. Struebig (Struebig et al., 2018) combines several spatial models of information systems to uncover the causes of human-tiger conflict in Sumatra. Zeisler (Zeisler & Hyams, 2014) reviewed concepts related to transitional management for adolescents and young adults with IBD. Valls (Valls et al., 2012) conducted a study to determine SFM requirements in the Mediterranean region and took Spain as a case study, especially in forest management. Semiarty (Semiarty & Fanany, 2017) presents three hospitals' experiences balancing the conflicting demands of a national healthcare system and traditional leadership models in local communities in an information system. Obeidat (Obeidat & Maqableh, 2015) says the critical factors of Information System Implementation are technical concerns in projects and product quality, highly focusing on project management concepts and effective regulations.

By referring to some of the literature reviews, it appears that management information systems are vital in the management of an organization. The process of redesigning the SIMD Intellectual Property Rights Center has been carried out and entered the implementation stage. SIMD Intellectual Property Rights Center cannot go through the trial phase without going through the implementation stage. With the redesign of the SIMD Intellectual Property Rights Center, there is a difference between the existing SIMD and the redesigned SIMD; of course, it is necessary to prepare an implementation process to ensure the SIMD is running and does not disturb users. Changes in the SIMD Intellectual Property Rights Center are in the appearance of the application and the relations in the database. Then also, other factors such as the development and production environments have different computer systems. It is also necessary to ensure a backup plan if the implementation process does not run as it should; the old SIMD must be reactivated.

## II. METHODS

Choosing the right implementation method will increase SIMD's success rate working together during the development or redesign process. The selection of the implementation model is adjusted to the conditions on the device that will be implemented as a result of the redesign. Table I explains the factors that must be considered in implementing SIMD Intellectual Property Rights Center, Jenderal Soedirman University.

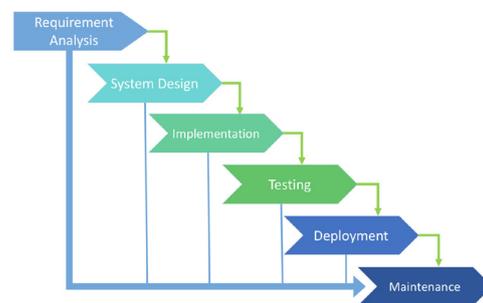
**Table I.** Considered Factors

Factor	Description
Difference table relations in the database	There are differences in the table relations in the database between the existing SIMD application and the redesign; it is necessary to have a table transition process. Adjustments in the transition process must be adjusted to the table in the table, the column in the column to ensure data integrity is maintained
SIMD display differences	SIMD redesign makes changes to the appearance to support user requirements for historical loading. With the difference in appearance, the user must be given the latest user guide to operate the SIMD without any difficulties.
The difference between the development and production environment	During the redesign process, the Intellectual Property Rights Center SIMD process was carried out on a different device.

A literacy study of commonly used SDLC models is needed to find the right implementation method, such as waterfall, iterative, spiral, V-shape, and agile. Each model has a different implementation process, according to the SDLC used in the software development process.

### 2.1. Waterfall

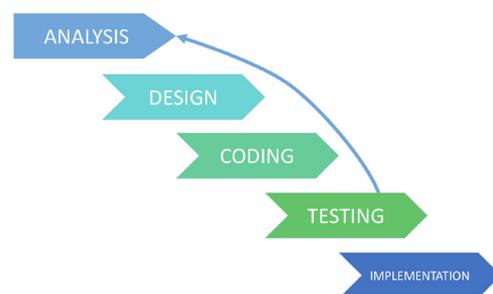
In the Waterfall model, the implementation process is carried out after the system design process has been completed. The waterfall model is used for a rapid development process. If the requirements of the user are unambiguous, then this model is the right choice. Figure 1 described the waterfall model.



**Figure 1.** Waterfall model

### 2.2. Iterative

In the Iterative model, the implementation process is carried out after going through testing. The iterative model has the advantage of being suitable for large projects. Figure 2 shows the Iterative model.



**Figure 2.** Iterative model

### 2.3. Spiral

In the spiral model, the implementation process is repeated until the application is running well. Each iteration will correct errors in the previous iteration. This model has a weakness, which requires considerable resources. Figure 3 shows a spiral model.

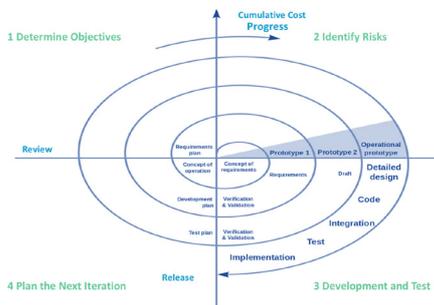


Figure 3. Spiral model

### 2.4. V-Shaped

In the V-shaped model, the implementation process is done after all processes on the V-shaped are completed. In this model, all processes in SDLC carry out a validation and verification process. To ensure that the development process has been achieved and is following the requirements. Figure 4 shows a V-shape model.

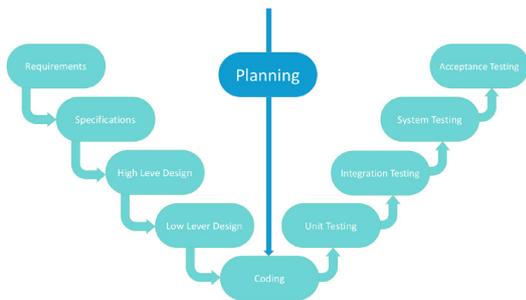


Figure 4. V-shaped model

### 2.5 Agile

In the Agile model, the user can see the development results at the end of the development cycle. The implementation process will be carried out if the user feels like following the desired results. Kuhlmaan(Kuhrmann et al., 2017) says in practice, the Agile model usually combines with another model to improve flexibility because the Agile model provides flexibility. Saeedi(Saeedi & Visvizi, 2021) says the Agile manifesto was first proposed as an alternative to existing software development methods, such as waterfall, spiral, and V-shaped models.

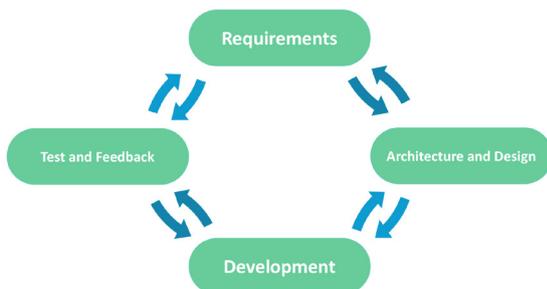


Figure 5. Agile model

## III. RESULTS AND DISCUSSION

To choose from the five implementation processes of the SDLC model, it is necessary to analyze conditions and conditions before the implementation process is carried out. The current state of the Intellectual Property Rights SIMD application is installed on a computer located at the IPR Research Centre of the General Soedirman University LPPM. The SIMD Intellectual Property Rights Center application currently installed in the production environment runs on the XAMPP application version 3.1.9 and uses CodeIgniter version 3.1.11 using the MySQL database and runs on PHP version 7. The development environment runs on the XAMPP application version 3.2.4 and uses CodeIgniter version 3.1.11 using the same database MySQL and PHP version 7. To show the process flow of data through process redesign we use a DFD diagram or Data Flow Diagram. The Data Flow Diagram from this process is described in Figure 6.

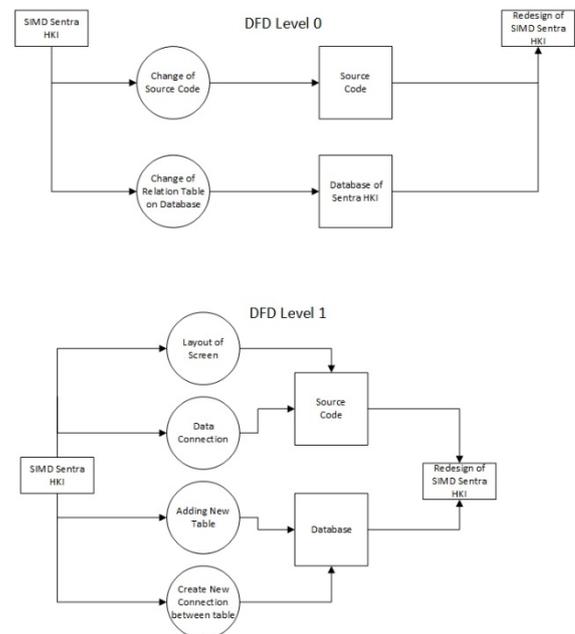


Figure 6. Data flow diagram redesign process

The difference between the SIMD Intellectual Property Rights Centre before and according to the redesign process is the difference in appearance, which means there is a difference in the source code. The differences in appearance from before the redesign and after the redesign are shown in Figures 7 and 8.

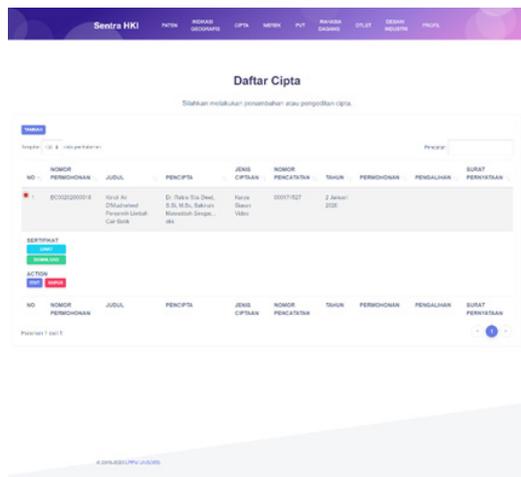


Figure 7. Appearance SIMD before the redesign

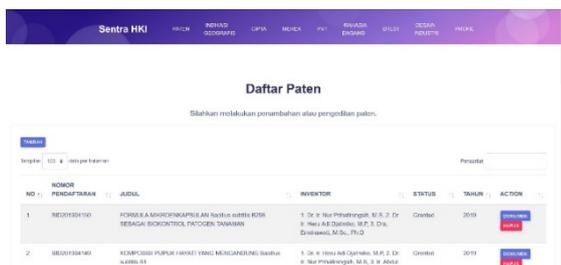


Figure 8. The appearance of SIMD after the redesign

The difference in the table relation was used in SIMD Intellectual Property Rights Centre after the redesign process. The differences from the existing structure and after the redesign are shown in Figures 9 and 10.



Figure 9. ERD diagram SIMD existing

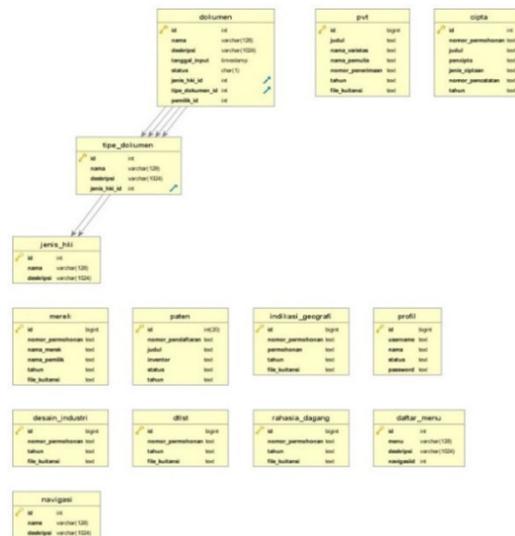


Figure 10. ERD diagram SIMD after the redesign process

This difference needs to be related to the advantages and disadvantages of the implementation process of each model. Table II, III, and IV shows the results of the differences we got after testing the five methods.

Table II. Source Code

SDLC Methods	Analysis
Waterfall	The difference in source code in SDLC needs to be maintained because it only runs once per cycle.
Iterative	The difference in source code in the iterative SDLC requires additional sources where SIMD Intellectual Property Rights Centre will continue to go through an iterative process.
Spiral	The difference in source code in each cycle can be facilitated by dividing the work into smaller ones, so repairs will be quick to do if changes to the source code occur.
V-shape	The difference in source on the V-shaped SDLC will be monitored because every change will go through a validation and verification process. However, repeated changes to the source code will increase the source in the implementation process.
Agile	Source code differences in SDLC Agile will go through repeated iterations with direct validation of the user so that the implementation process will be focused according to the user's intention

Table III. Database Table Relationship

SDLC Methods	Analysis
Waterfall	The difference in table relation requires that the implementation process runs smoothly because the SDLC process runs once in one cycle.
Iterative	The difference in table relations will increase the implementation process's resources because the implementation process can only be done after the testing process is carried out.
Spiral	The same thing happened to the difference in table relations by dividing the work into smaller ones using the iterative SDLC model.
V-shape	The same thing with the relationship development process table; It will be better because changes to the relationship will go through a validation and verification process.

Agile	Changes in table relations in SDLC Agile are also the same through repeated iterations and are checked directly by the user so that the implementation process runs well.
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**Table IV.** Implementation Environment

SDLC Methods	Analysis
Waterfall	Different environments require validation in the SDLC waterfall implementation process because, in one cycle, it only occurs once.
Iterative	The different environments in the SDLC iteration will increase the resources needed when implementing the SIMD Intellectual Property Rights Center.
Spiral	The different environments do not affect the iterative SDLC implementation process by dividing the cycles into smaller cycles.
V-shape	Environmental changes in SDLC V-shape will go through a validation and verification process so that the implementation process runs according to the user's wishes.
Agile	The different environments are not affected because the user is directly involved in ensuring the implementation process's success. The user will continue to monitor the progress of the implementation process so that the cycle is complete.

## IV. CONCLUSION

Based on the performance comparison of the five SDLC methods discussed in the sections above, it can be concluded that the V-Shape model is much safer in the implementation process because it undergoes a validation and verification process before the implementation process is carried out. Considering the advantages and disadvantages of SDLC, the implementation process of the SIMD Intellectual Property Rights Centre must go through a check and recheck process so that the results of the implementation will run according to the wishes of the user.

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