

## DEVELOPING REGISTRATION MODULE IN HEALTH INFORMATION SYSTEMS USING THE DESIGN THINKING METHOD

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### Abstract

In applications, usability is an essential factor that shows the user experience whether the application is easy to use and fits its function or not. For this reason, this study aims to determine the usability of the registration module on the Khanza Hospital Management Information System (SIMRS) used by RSUD Banyuasin employees and to find out the difficulties faced, needs, and desires of RSUD Banyuasin employees as users of SIMRS Khanza. This research is helpful for the agency as a subject of application evaluation and helps discover what opportunities can be applied to overcome user difficulties. The approach used is Design Thinking. Meanwhile, the usability measurement uses the System Usability Scale (SUS) involving five respondents. The initial results of measuring the usability of SIMRS Khanza obtained were 26 with a poor rating. In addition, the interview results show that users have difficulty learning the application, the features and fields are too many, and there is a redundancy of patient data. Based on these findings, the researcher recommends a solution design with a High Fidelity Prototype (Hi-fi) with a final value of SUS 87. With the implementation of this research recommendation, it is hoped that it can help the performance of RSUD Banyuasin with an application design that is easy to understand and supports the creation of accurate and consistent data.

Keywords: Information System, Design Thinking, SUS, Prototype

### Abstrak

Dalam aplikasi, ketergunaan merupakan faktor esensial yang menunjukkan pengalaman pengguna apakah aplikasi mudah digunakan dan sesuai fungsinya atau tidak. Untuk itu, penelitian ini bertujuan untuk mengetahui tingkat ketergunaan modul registrasi pada Sistem Informasi Manajemen Rumah Sakit (SIMRS) Khanza yang digunakan oleh pegawai RSUD Banyuasin dan mengetahui kesulitan yang dihadapi, kebutuhan, serta keinginan pegawai RSUD Banyuasin sebagai pengguna SIMRS Khanza. Penelitian ini bermanfaat bagi pihak instansi sebagai subjek evaluasi terkait aplikasi serta membantu dalam menemukan peluang apa yang dapat diterapkan untuk mengatasi kesulitan pengguna. Pendekatan yang digunakan yaitu Design Thinking. Sedangkan, pengukuran ketergunaan menggunakan System Usability Scale (SUS) dengan melibatkan lima responden. Hasil awal pengukuran ketergunaan SIMRS Khanza yang didapat yaitu 26 dengan rating poor. Selain itu, hasil wawancara menunjukkan bahwa pengguna kesulitan mempelajari aplikasi, fitur dan kolom peggisian terlalu banyak, dan terjadi redudansi data pasien. Hasil penelitian ini berupa rancangan solusi High Fidelity Prototype (Hi-fi) dengan nilai akhir pengujian SUS 87. Dengan diterapkannya rekomendasi penelitian ini, diharapkan dapat membantu kinerja pegawai RSUD Banyuasin dengan desain aplikasi yang mudah dipahami dan mendukung pembuatan data yang akurat dan konsisten.

Kata kunci: Sistem Informasi, Design Thinking, SUS, Prototype

### INTRODUCTION

One of the applications of technology in the health sector is a computerized service system. This system allows information to be managed accurately and reliably so that clinics, health centres, hospitals, and various other health institutions have great opportunities to improve service quality. Various

hospitals in Indonesia use a computer-based medical record information system to support hospital operational programs. One is the Regional General Hospital located in Banyuasin Regency or the RSUD Banyuasin.

RSUD Banyuasin must hold medical records. Recording of medical records must be made as complete as possible from the beginning until the



medical record process is complete (Hilmansyah, 2021). RSUD Banyuasin uses a health management information system called the Khanza Health Information System (SIMRS Khanza). The SIMRS Khanza application is Open Source and free so that various healthcare institutions can enjoy it.

Sourced from the results of interviews with users of the SIMRS Khanza application at RSUD Banyuasin, the application of SIMRS Khanza is deemed not optimal because there are several problems, namely the amount of time needed to learn SIMRS Khanza through manuals, too many fields to fill in and redundancy of patient data. Users who are used to interacting with a system will be different from novice users in interacting with the system (Astawa, Darmawiguna, & Sugihartini, 2019). Hence, users need a system that is easy to learn because, based on the results of interviews, they have no experience using similar applications and only have little time to learn. In addition, users need a system that can prevent redundancy when updating patient data because users must create accurate and consistent data by the hospital's minimum service standards (Putra, Dangnga, & Majid, 2020). Constraints at the medical record management stage at the registration section at the RSUD Banyuasin can cause the patient waiting time to increase. If that happens, the quality of hospital services will decrease because the waiting time is not by the Minimum Service Standards contained in the regulations of the Ministry of Health (Apriyantini, 2018).

Previous research conducted by Muhammad Azmi et al. entitled Evaluation of the User Experience of the Food Ordering Mobile Application with the Design Thinking Method (Case Study: GrabFood) resulted in four solutions to the user experience problem of the GrabFood application version 5.27.0, including speeding up the splash screen loading time, performing design improvements in the category section, make design improvements in the recommendations section, and make minor improvements to the address selection section. The solution is then poured into a prototype form in the Adobe XD application (Azmi, Kharisma, & Akbar, 2019).

Another study by Suzianti and Arrafah aimed to redesign the dental clinic's user interface so that the ERP system could work optimally. The conclusion is that design thinking has succeeded in redesigning the UI on the ERP system according to what is personalized. The needs of each user to help with their work are validated by clinical personnel as users (Suzianti & Arrafah, 2019).

Another study by Razi et al. entitled the application of the design thinking method to a UI/UX design model for handling losses and finding reports of scattered goods. The Kembaliin application is a technology-based media design model specifically designed according to the target user to solve the problem of lost and found items scattered in public places. However, to succeed, the application of Kembaliin alone can only be achieved by supporting public participation in holding honesty and respectful culture to help each other in society (Razi, Mutiaz, & Setiawan, 2018).

Based on the problems above, this study aims to evaluate the usability of the registration module because usability is an essential factor that shows the user experience of whether the application is easy to use and according to its function (Suzianti & Arrafah, 2019). In addition, this research aims to discover the difficulties faced, needs, and desires of RSUD Banyuasin employees as users of SIMRS Khanza. Design thinking is used as a framework in this research. There are five major stages in design thinking as proposed by the Hasso-Plattner Institute of Design at Stanford University, USA (Pratama, Rahayu, Setiyadi, Azhar, & Ashshiddiq, 2022). The solutions will then be used to design the prototype SIMRS Khanza as a reference for the agency in developing the system to help the performance of RSUD Banyuasin with an application design that is easy to understand and supports the creation of accurate and consistent data.

## RESEARCH METHODS

### Types of research

This research uses a qualitative descriptive approach to research the application of the SIMRS Khanza.

### Time and Place of Research

The research time for distributing the initial questionnaire was October 17, 2021. Interviews were conducted on October 18, 2021, the idea-collection session was held on February 02, 2022, and the testing questionnaires were distributed on Mei 08, 2022. Data retrieval is done via the zoom application.

### Research Target / Subject

The research target is five people. The target criteria for this research are males or females aged 25-45 years as an employee of the Banyuasin Hospital and a user of SIMRS Khanza.

## Data Collection Techniques

The technique used for data collection in this research include:

### 1. Questionnaire

The technique of collecting data by submitting a statement to the respondent is the definition of a questionnaire. The technique used in this study is the System Usability Scale. The questionnaire is an online questionnaire with statements in the questionnaire measured by a Likert scale (Karnawan, 2021).

### 2. Interview

Conducted interviews with employees of the Banyuasin Hospital with questions and answers via Zoom Meetings. The selected interview participants are users of SIMRS Khanza who are quite experienced in using SIMRS Khanza and based on time availability. The questions posed to the interviewees were based on the researcher's need to find out the experience of the interviewees in operating the SIMRS Khanza application and the obstacles faced. The researchers tried to allow the interview participants to present the desired solution to their problems.

### 3. Literatur Study

A literature study is relevant data collected from books, scientific articles, news, and other reliable sources to obtain a theoretical foundation related to the research topic.

### 4. Documentation

Documents that are analyzed and collected, whether written documents, pictures or electronically, are documentation data collection techniques. Documents used by researchers in the form of internal sheets, namely Standard Operating Procedures (SOP).

## Design Thinking Method

An approach or research framework that is useful for concise and creative problem-solving with a primary focus on users is known as Design Thinking. This approach can provide great value for concept exploration. By going through this phase of design thinking, it is hoped that it can be useful in solving problems and manifesting a solution product or application by understanding the needs and desires of users first. The choice is to use this method because the design process can be done by including Empathy from the user's side. Using user understanding of design thinking can help to question the problem, its assumptions, and implications (Darrin & Devereux, 2017). There are five stages in Design thinking, namely:

### 1. Empathize

The first stage is Empathy. This stage seeks to understand the experience better and for whom one

is designing. The understanding in question is in the context of the product being designed. At this stage, the researcher conducted interviews. Then, the researcher processed the interview results into an empathy map and user persona. The empathy map recognizes and understands users' needs, desires, goals, behaviours, and feelings (Pileggi, 2021). Meanwhile, the creation of user personas aims to provide insight into the needs, wants, and goals of target segments to help make decisions about system features, services, or products.

### 2. Define

Define which is useful for "defining" the user's point of view, which will be discussed with alternative concept designs. In other words, this second stage aims to analyze the knowledge produced through the first stage as the basis for determining the problem statement to be the primary attention in the research. In this study, Point of View is used as a problem statement by utilizing, interpreting, and weighing all findings to allow researchers to create ideas in a goal-oriented way. There are three important POV elements: user, need, and insight (Lewrick, Link, & Leifer, 2018).

### 3. Ideate

Ideate is intended as a step toward solving problems by exploring alternative solutions as widely as possible (Ferdi, Putra, Ajie, Safitri, & Jakarta, 2021). In this stage, the ideas generated will be used as a reference in the formation of a new design prototype that will be formed. The collection of ideas at this stage is done by holding a brainstorming session. This session aims to generate many ideas by using the thinking of a group of people who are involved with each other, listen, provide input and build other potential and useful ideas (Bonnardel & Didier, 2020). After the ideas are collected, then the ideas are selected and grouped into the Now-Wow-How Matrix consisting of three different perspectives. The last is the How perspective, a collection of difficult ideas to apply today (Dirman, Prayudi, & Ramadhani, 2021). Now contains various ideas that can be implemented in a short period. Then, Wow contains an instrument of ideas that can be implemented, and these ideas are innovative.

### 4. Prototype

In its implementation, the initial design that is realized will be tested for end users to obtain appropriate feedback or criticism to improve the design. The process carried out by the researcher is first making a wireframe based on the ideas contained in the NWH matrix. Then processed into a mockup by applying visual elements. The finished mockup is then integrated to form various interactions called a high-fidelity prototype (hi-fi).



At this stage, ideas will be transformed into physical forms for users to experience and interact with the process (Rusanty, Tolle, & Fanani, 2019).

#### 5. Test

Testing is carried out to get user responses or appropriate feedback from the prototypes that have been made to find out whether the solutions have overcome existing problems and explore user needs more deeply. Usability measurement at the testing stage uses the System Usability Scale (SUS) technique.

#### System Usability Scale (SUS)

SUS (System Usability Scale) is one of the tools most frequently used to assess a system or product's usability. System Usability Scale is used to measure usability because it has several advantages, including a) can be calculated, and the output is a score of 0-100, so it is easier to understand, b) does not cost in its use, c) with a relative sample size minor is still proven to be valid and reliable (Beny, Yani, & Ningrum, 2019). The list of sus statements is in table 1.

The test results are calculated by following the following rules: For each statement with an odd number, the respondent's answer scale is reduced by 1. Each piece of information with an even number is reduced by 5, and the respondent's answer scale is reduced. The results of the scale value are 0 to 4 (four being the most positive response). Summing up the scale of respondents' answers and multiplying by 2.5. Determine the average answer of all respondents (Rasmila, 2018).

Table 1. SUS Testing Instrument

	Instrument	Skala
1.	I think that I would like to use this system frequently	1-5
2.	I found the system unnecessarily complex	1-5
3.	I thought the system was easy to use	1-5
4.	I think that I would need the support of a technical person to be able to use this system.	1-5
5.	I found the various functions in this system were well integrated	1-5
6.	I thought there was too much inconsistency in this system	1-5
7.	I would imagine that most people would learn to use this system very quickly	1-5
8.	I found the system very cumbersome to use	1-5

	Instrument	Skala
9.	I felt very confident using the system	1-5
10.	I needed to learn a lot of things before I could get going with this system	1-5

## RESULTS AND DISCUSSION

### Evaluation

Questionnaire distribution using Google Forms. Evaluation at this stage uses a questionnaire method based on the System Usability Scale (SUS) method. Based on the SUS method, the questionnaire consists of 10 statements (Kesuma, 2021). Then, the results of the questionnaire the respondent has filled out will be calculated as the final score using the formula determined in the System Usability Scale (SUS) method, carried out on a spreadsheet. Table 2 is the final score calculated using the SUS formula.

Table 2. Final Score SUS

	SUM Final Score	MEAN Final Score
Total	130	26

The calculation produces a score which is then interpreted using an adjective rating.

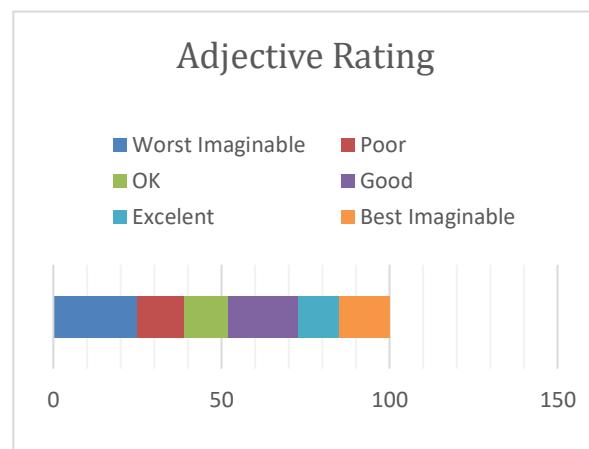


Figure 1. Adjective Rating SUS Score

Based on the indicators above, the evaluation results later get a value of 26, and the usability of the interface design is classified as poor.

After distributing questionnaires to five employees of RSUD Banyuasin who use SIMRS Khanza, then to find out more specifically what are the difficulties and needs of users, an investigation is carried out on the system with a design thinking approach.

**Empathize**

The first step is to make an interview instrument. Table 3 asks questions when conducting individual interviews via the Zoom application.

Table 3. Interview Questions

Interview Question	
1.	Briefly describe your daily work routine.
a	Working environment conditions
b	Frequency of using gadgets
c	Special needs
d	Work equipment
2.	What is the mechanism for managing medical records in RSUD Banyuasin?
3.	What obstacles are faced from the beginning to the end of the medical record management process?
4.	What do you feel and do when you experience these problems?
5.	In your opinion, what is the ideal medical record system according to your needs and expectations?

The next process is making an empathy map using four quadrants: says, thinks, does, and feels. Two empathy maps are made as representatives. Then the results that have been made can be described in Tables 4 dan 5.

Table 4. Empathy Map's Joni

Empathy Map Aspect		Result
1	Says	<ul style="list-style-type: none"> <li>Patients sometimes forget to bring identification</li> <li>Many fields are not needed in the registration section</li> <li>It takes extra focus to read text that is too small</li> <li>Some of the medical record processes are still being recorded on paper</li> </ul>
2.	Thinks	<ul style="list-style-type: none"> <li>Users want Display Features set according to the needs of the profession</li> <li>The design can be made more user friendly</li> </ul>
3.	Feels	<ul style="list-style-type: none"> <li>Upset because performance is hampered</li> <li>Worried about slowing down the process</li> </ul>
4.	Does	<ul style="list-style-type: none"> <li>Ask the IT officer</li> <li>Use paper-based forms</li> </ul>

Table 5. Empathy Map's Yesi

Empathy Map Aspect	Result
1 Says	<ul style="list-style-type: none"> <li>Too many features to learn.</li> <li>Hard to understand how to use simrs khanza.</li> <li>There is data redundancy.</li> <li>Not all units are integrated with simrs khanza</li> </ul>
2. Thinks	<ul style="list-style-type: none"> <li>Users want to reduce data redundancy</li> <li>Users want to be able to learn the system easily</li> </ul>
3. Feels	<ul style="list-style-type: none"> <li>Worried that the medical record process will be hampered</li> </ul>
4. Does	<ul style="list-style-type: none"> <li>Ask the IT officer.</li> <li>Watch tutorials about the application on youtube</li> </ul>

After making the empathy map, the researcher created a user persona as a fictional character of the target user whose data came from the empathy map. The first user persona is Adelio. He studied at the engineering faculty. Adelio is currently 40 years old and married. According to Adelio, the problems faced by SIMRS Khanza are difficulties in recording medical record information. Because of these problems, Adelio wants to maximize using the SIMRS Khanza application in recording medical record data. All officers with access rights to the application can access all modules to reduce patient data privacy. Then, the officers are expected only to be able to open the application module according to the job description.

The second fictional character is Adelia, who is cheerful and hardworking. The problem that Adelia faces is that it takes much time to learn how to operate SIMRS Khanza and there is data redundancy when registering, and the display of features is too much and does not focus only on the task that staff should do. According to Adelia, the ideal hospital management system is that it can be learned easily and can reduce the occurrence of redundancy of patient data. It looks simple and attractive but still provides features and information as needed.

**Define**

The next process is defined. This stage aims to focus on the problems the researcher will follow up on. The following is the Define result which is presented using the Point of View table.

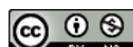


Table 6. Point of View

User	Need	Insight
Adelia	Easy-to-learn system	Users have no experience using similar applications and only have little time to learn.
	A system that can prevent redundancy when updating patient data	Users must create consistent data.

### Ideate

After determining the focus of the problem, the next step is to ideate. At this stage, brainstorming is carried out using Zoom to conduct online discussions and Figma to record the brainstorming results. This stage is carried out with the same respondents as the previous stage. Before brainstorming, the questions to be asked are made first using data from the define stage. Questions were created using the How Might We format. The questions asked are in table 7.

Table 7. How Might We Question

Point of View (POV)	How Might We
Adelia needs an easy-to-learn system because she had no experience using similar applications and only had little time to study.	- How might we support users in registering online efficiently?
	- How might we help new users understand the use of this application easily?

Adelia needs a system that can prevent redundancy when updating patient data because it has to create consistent data.	- How might we make sure that the data entered is correct?
	- How might a user use an application without making an accidental mistake, such as accidentally pressing a key?

Brainstorming participants are given 5 minutes for each question answer. Then, the question's answers are presented, discussed, and grouped into the now-wow-how Matrix.

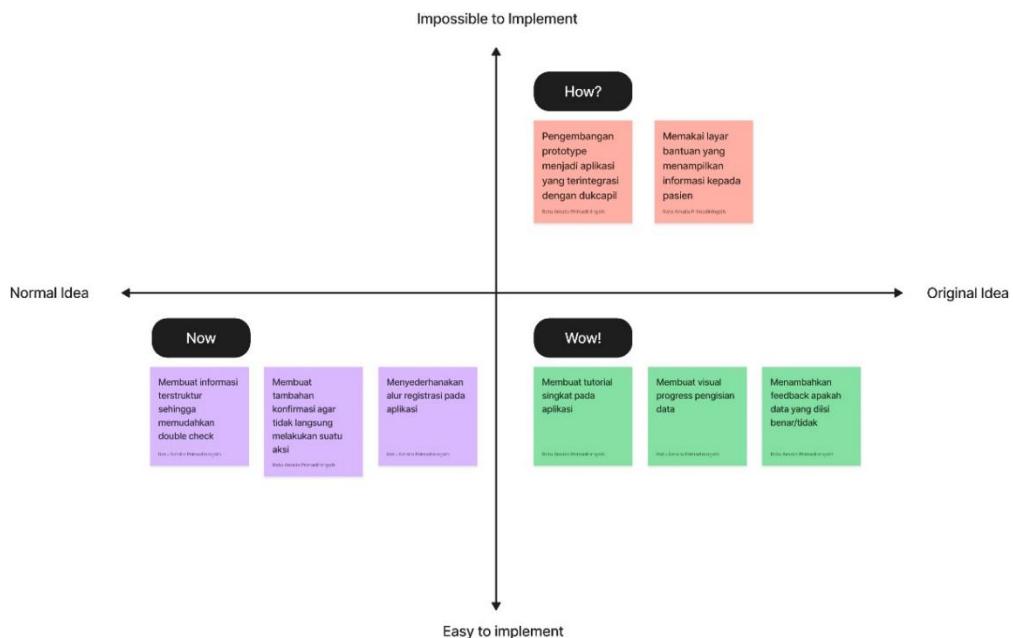


Figure 2. Result Now-Wow-How Matrix

The result of the discussion for the Now section is to create structured information to make it easier to double-check, simplify the registration flow, and make additional user confirmations that do not

immediately take action. The How matrix section contains ideas that are impossible to implement now, namely the development of prototypes into applications integrated with Dukcapil. The second

idea is to use a help screen that displays patient information. Then in the Wow section, the idea is to make a short tutorial on the application, visualize the progress of data entry, and add feedback on whether the data entered is correct or incorrect.

### Prototype

At this prototype stage, the researcher will apply the ideas collected in the NWH matrix by making designs that can interact directly with the user. The design is made with a high degree of resemblance to the original method.

#### a. User Flow

When designing a prototype, it is necessary to draw a flow first to make it easier for the designer to know what pages and information are needed in designing the application (Rusanty et al., 2019). The first user flow is the user flow in registering new patients. The first step is that the user opens the application, then the user selects a new patient task in the sidebar. The first stage registration page will appear when the user has pressed the new patient button. After the user fills in, the user presses the following button, which the system will then verify whether all the data has been filled in or some are empty. If there is empty data, the progress bar will change colour, and in the empty column, there is a red notification, and the user can continue to the next stage page. The system will repeat the process until the user reaches the fourth stage. If the user has completed the fourth stage and the verification is successful, a notification will appear that the data has been saved.

The subsequent user flow shows the user flow in registering old patients. The initial step taken by the user is to open the application and select the old patient registration task in the sidebar menu. Then the user is directed to the old patient registration page. After the user fills in the fields on the page, the user must press the save button, which the system will verify. If the verification fails, it will return to the previous page, and if successful, it will display a notification that the data has been saved, and the user can check the data on the table data page.

#### b. Wireframe

After determining the flow as an illustration of the design, the next step is to create a wireframe as a simple initial design framework without using visual elements such as colour to determine the layout of the information (Kenny, Regan, Hearne, & O'Meara, 2021). Figure 3 is an example of a wireframe page that has been created.

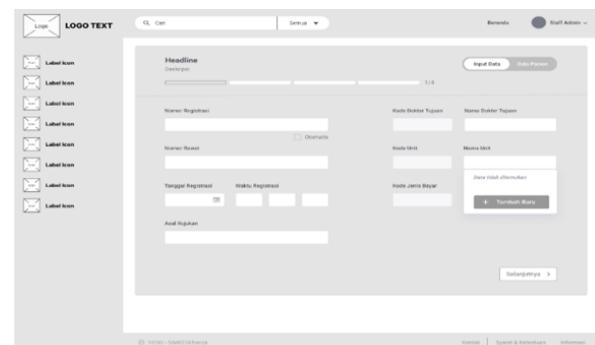


Figure 3. Example of Wireframe

#### c. Mockup

After making the wireframe, a mockup design displays a more detailed visual design and is closer to the original design than the wireframe. Figure 4 is an example of a wireframe page that has been created.

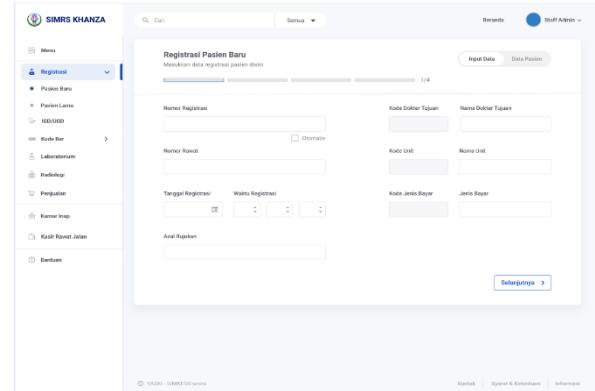


Figure 4. Example of Mockup

In the mockup design, the design created has been equipped with colors, icons, and other information. It is known that color determines how a user interacts with an application and influences user behavior and awareness. In general, the preferred colors in medical institutions are blue and green. However, in a study by lugwen et al., the most suitable colors for interactive websites are royal blue, slate blue, and dark blue (Rusanty et al., 2019). Therefore, the primary color used in the application design is blue. The color is then adjusted by performing a contrast test, and the appropriate primary color is obtained, namely blue, with code #164CCA. The following is the result of testing the color contrast code #164CCA (Figure 5).

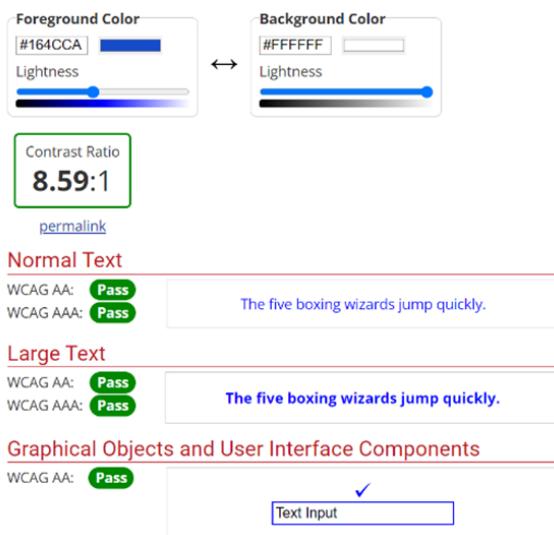


Figure 5. Color Contrast Test

The next visual element is the determination of the icon. Icons play an important role in human-computer interaction because graphic symbols can represent objects in the real world. According to research by zhangfan et al., users who use applications with complex tasks perform better when the icons used are simple and commonly encountered in their daily lives (Shen, Zhang, Li, & Liang, 2020). Therefore, the selection of icons in this application design is based on the selection of simple shapes and adapts to objects often encountered by participants.

After determining the icon, next are typefaces. The typeface used in the design of this application is Roboto sans-serif. The size used for heading 1 is 20 pt, and heading 2 is 14 pt. While the button is 16 pt and the body text is 14 pt. Reading speed reaches a stable period between medium and bold but decreases when it reaches extra bold (Bigelow, 2019). Therefore, the thickness of the letters used in this design is regular, medium, and bold unless the text on the logo label uses extra bold thickness.

#### d. High Fidelity Prototype

The finished mockup is then integrated to form various interactions called a high-fidelity prototype (hi-fi). The following is a hi-fi result created using Figma software.

##### 1. Tooltips Page

One of the problems faced by respondents when they first used SIMRS Khanza was confusion in understanding the flow contained in the application. Users need to see the video tutorials and manuals prepared to know how to use this application. However, the problem is that users only have a little time to learn this application. For this reason, the author makes a short tutorial design or tooltips that

can be seen at this point when using the application for the first time. Hopefully, these tooltips will make it easier for users to understand how to use the application without the need to open other files and spend much time. The tooltips page is in figure 6.

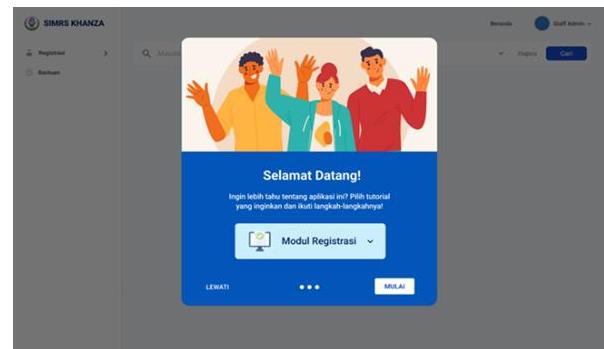


Figure 6. Tooltips Page

##### 2. Home Page

On the home page and other pages, applications that previously did not have a sidebar, there is a top bar that combines the three sections. Figure 7 is an image of the previous home page.

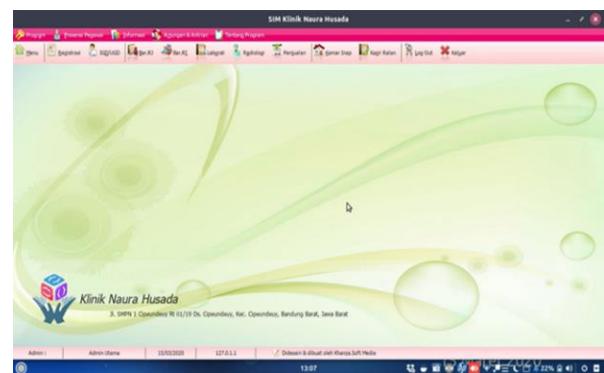


Figure 7. Previous Home Page

The application's new design home page can be seen when the user has completed a short tutorial or when he first opens the application. The design of the created application separates the two topbar sections contained in the previous application by moving the first section into the footer section and creating a sidebar for the menu set in the second section so that it is organized. In the new design, the top bar is filled with the home button and the user's name, in which there is access to log out to avoid the wrong button pressing. Right below the top bar is a search column directly adjacent to the category selection so that users can immediately filter according to their search needs when searching. Figure 8 is a draft of the new design that has been made.

Figure 8. Home Page Recommendation

### 3. Registration Page

The previous design did not separate registration page displays between new and old patients. To make it easier for users to understand this application, the authors separate the new patient registration page and the registration of old patients or patients who have already registered. Moreover, in the application's new design, there is a progress bar to clarify the filling steps that the user must do (Silver, 2018). After completing the form in step one, the user can continue filling it out by pressing the next button. The new registration page is in Figure 9.

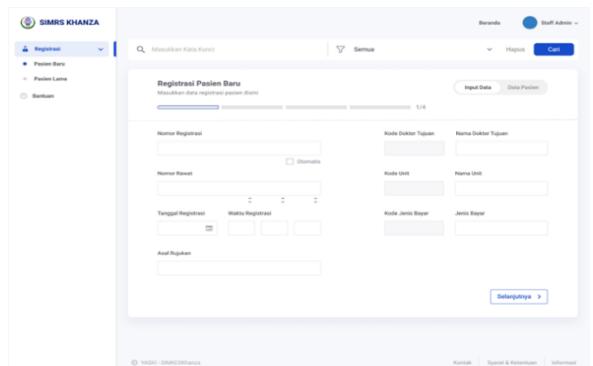


Figure 9. Registration Page Recommendation

In the second phase of the new patient registration page in Figure 10, There is an adjustment to the form composition that the user must fill out. The forms are arranged according to the *Kartu Tanda Penduduk* (KTP) labels. The preparation based on the KTP is expected to make it easier for users to re-check. Where in the previous application, the forms were not arranged sequentially. After going through stage one and proceeding to the stage two page, the previous button will appear, which can be used to return to the previous stage if the user wants to correct or re-correct that stage. The button is located on the registration page for stages two to four.

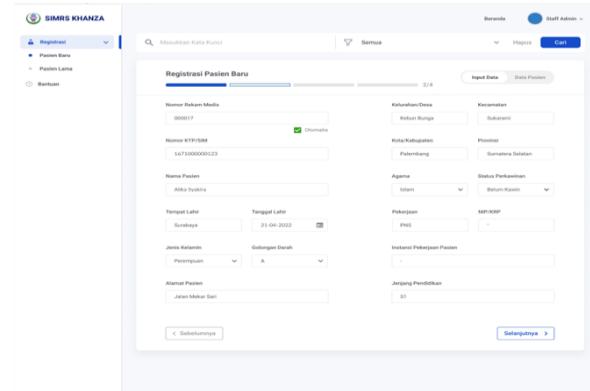


Figure 10. Registration Page Phase two

#### 4. Error Description

In the previous application, an error description in the form of a pop-up will appear when pressing the save button without changing the colour of the empty form. Figure 11 is a description of the error in the previous application.

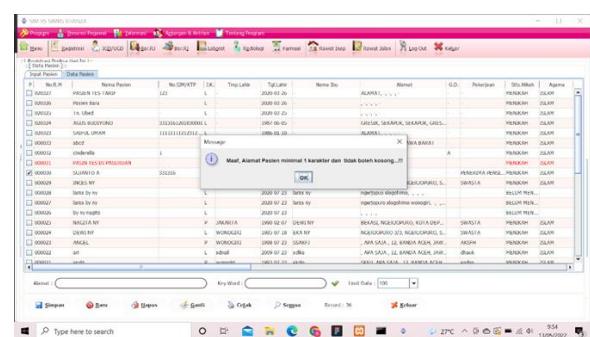


Figure 11. Previous Error Description

The result of the redesign is that if the data on the form is not filled in, the user can continue filling in, but there is an error statement on the form whose form is not complete, and the colour change in the progress bar becomes red. Figure 12 is a page with an error description on the form.

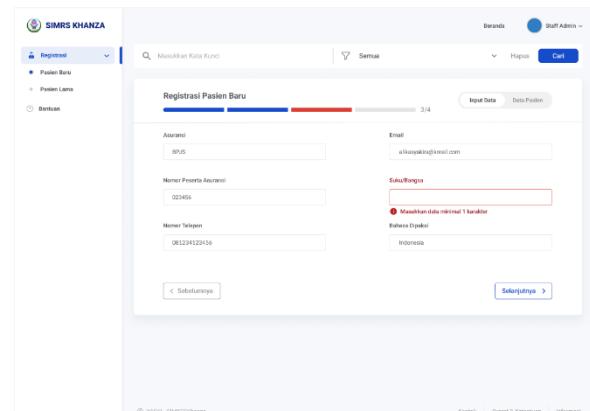


Figure 12. Error Description Recommendation

## 5. Pop-Up Data Addition Form

Previously, the user had to press the attachment icon to add or select the data used. Meanwhile, the attachment icon functions as a symbol to attach files other than text messages, such as ppt documents, pdf, images, and others. Therefore, the user can directly type in the data in the new design, and the system immediately brings up the search results dropdown. If the data does not exist, it will display the words data not found along with a button to add new data.

Figure 13 is a Pop-up data addition form. If the add new button is pressed, a pop-up form for adding data will appear that can be used when the user needs additional data such as unit, doctor, referral origin, and others. Users can also check what data has been added to the section by pressing the patient data button, and then all the data that has been added will appear. If the user has finished filling in the pop-up, press saves, and if successful, it will display a notification that the data has been saved. If it fails, it will return to the previous page, and an error notification will appear.

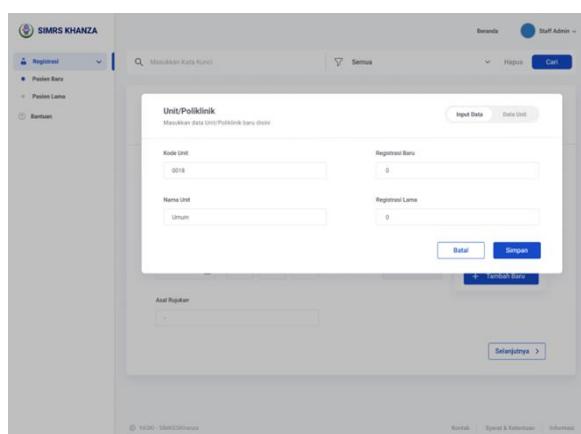


Figure 13. Pop-up Recommendation

## 6. Notifications and Toast Message

In the previous application, there was no notification that system had saved the data. Moreover, based on the third stage that has been carried out, it is necessary to add application feedback on whether the data entered is correct so that the user becomes confident with the action taken. Adding a toast message is helpful to notify the user that the data entered has been saved (Megalingam et al., 2019). At the same time, adding a notification on the patient data button is helpful to indicate that users can view previously stored data on the page. Notifications and toast messages are in Figure 14.

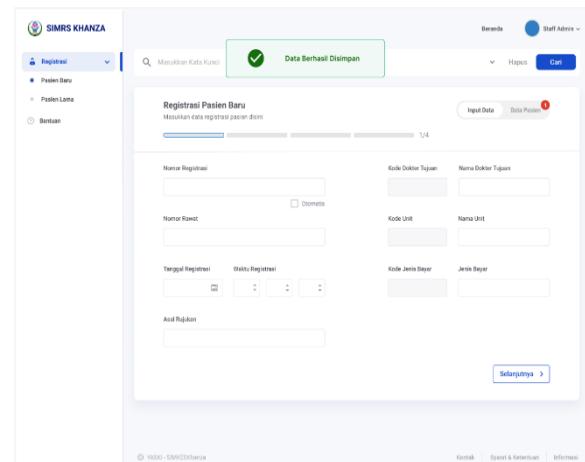


Figure 14. Notification and Toast Message

## 7. Patient Data Page

Figure 15 is the patient data table page in the previous application. To bring up the patient data table, the user must press the call button or the green check icon at the bottom of the application. Then, the actions the user can perform on each table row are divided into two, the first is at the bottom of the page, and the second can be seen when the user right-clicks on the cursor and selects the desired action.

The changes contained in the new design are layout adjustments by levelling the distance between table columns, placing page selection options into a dropdown located at the top of the table, eliminating the exit button, arranging table data sequences according to changes on the data input page, placing all actions on buttons. The action located on the right side of the table changes the placement of the print, limit, and period buttons to be at the top of the table.

Registrasi Awal	Nomor Registrasi	Tanggal Registrasi	Waktu Registrasi	Dokter Tujuan	Nomor Rekam Medis	Print	Limit	Period	Call
0010	2022/04/21/00009	21-04-2022	10:33:30	dr. Bambang Prige	000017	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0009	2022/04/21/00049	21-04-2022	03:11:30	dr. Dwi Cahya	000018	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0008	2022/04/21/00048	21-04-2022	03:02:30	dr. Dewi Sarika	000019	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0007	2022/04/21/00047	21-04-2022	09:23:30	dr. Estra	000020	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0006	2022/04/21/00046	21-04-2022	09:23:30	dr. Eka Setiawan	000021	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0005	2022/04/21/00045	21-04-2022	09:03:30	dr. Farida Ardila	000022	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0004	2022/04/21/00044	21-04-2022	08:50:30	dr. Fajri Abduh	000023	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0003	2022/04/21/00043	21-04-2022	08:50:30	dr. Gisela Amrina	000024	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0002	2022/04/21/00042	21-04-2022	08:33:30	dr. Glang Pratama	000025	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>
0001	2022/04/21/00041	21-04-2022	08:20:30	dr. Hermin Aksa	000026	<a href="#">Edit</a>	<a href="#">Delete</a>	<a href="#">Print</a>	<a href="#">Call</a>

Figure 15. Patient Data Page

## 8. Print Page

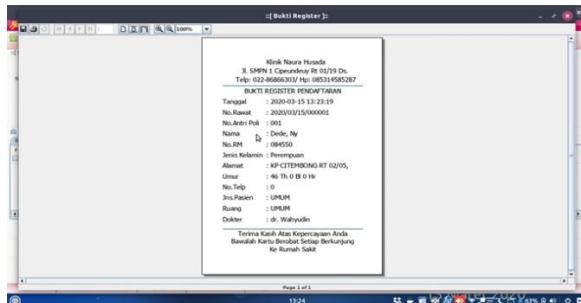


Figure 16. Previous Print Page

Changes to the printed page are in the layout adjustment by placing all actions that can be performed on the right side of the screen and focusing on the left as the display of the page to be printed. Figure 16 is a view of the previous application, and Figure 17 is a new recommended design.



Figure 17. Print Page Recommendation

## Test

The final stage of the design thinking method is testing. The testing phase is carried out by requiring users to test prototypes witnessed by the author via zoom. Access to the prototype link is given when participants have entered the zoom meeting. After the trial, participants are given a google form link containing the system usability scale (SUS) questionnaire questions. The results of the feedback provided by the user when conducting the test can be seen in Figure 18.

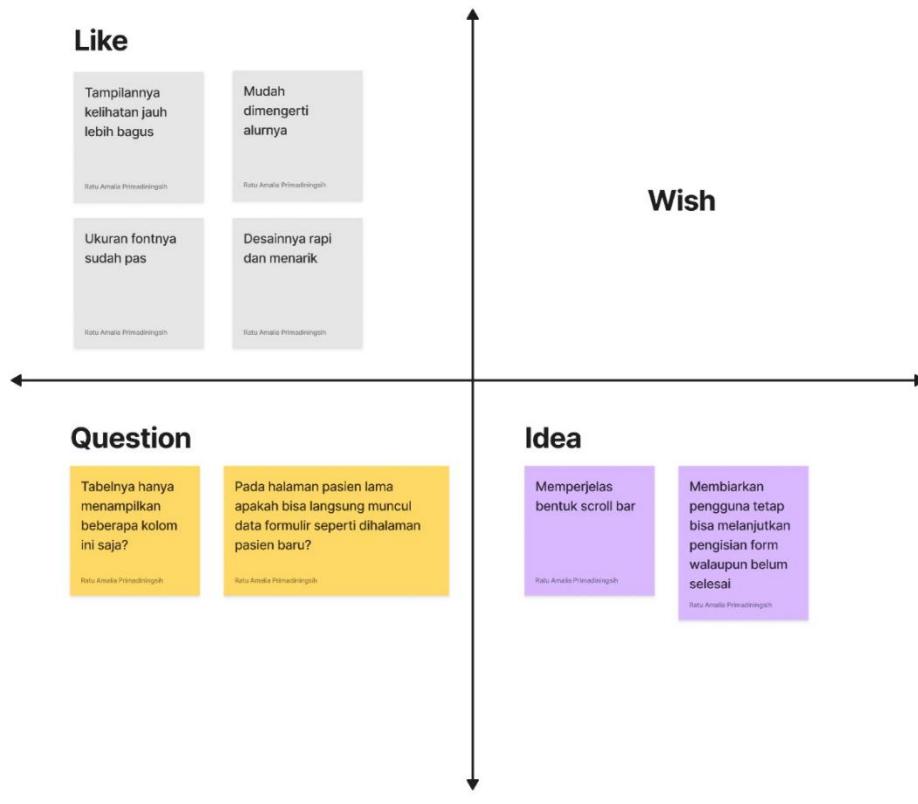


Figure 18. Feedback Capture Grid

In the like section, the test participants stated that "the display looks much better," "easy to understand the flow," "the font size is right," and "the design is neat and attractive." then, in the

question section, the test participants asked the question, "the table only displays these few columns?", "on the old patient page, can the form data appear directly on the new patient page?". Then

in the wish section, test participants did not give criticism or say something that had to be changed. Moreover, in the idea section, the concept that came up during the test was to clarify the shape of the scroll bar and let the user continue to fill in the form to the next stage even though there were still unfilled fields.

After testing, the researcher made changes by trying the ideas in the feedback capture grid. The application of the idea is then re-tested by the user. Then the author asks the user to fill out the SUS questionnaire, and the following table is the final result of the questionnaire calculation.

Table 7. Final Score SUS

	SUM Final Score	MEAN Final Score
Total	435	87

Based on the adjective rating indicator, evaluation results get a value of 87, and then the usability of the interface design is classified as excellent. It can be concluded that the user can accept the results of the redesign (Ependi, Putra, & Panjaitan, 2019). The difference between this study and other studies, such as those that have been carried out by Razi et al., is the focus of the research, namely the user experience of the SIMRS Khanza registration module and several techniques used in each process of the design thinking method, such as in the define stage, the researcher uses the point of view technique, the ideate stage uses brainstorming. Test results are presented using the now-wow-how Matrix. However, this study has limitations. Namely, the limited scope includes one company, and the research only reached the prototype stage.

## CONCLUSIONS AND SUGGESTIONS

### Conclusion

The measurement of the usability level of the SIMRS Khanza application using the System Usability Scale (SUS) shows a final score of 26. Furthermore, the results of the Adjective Rating show a "Poor" rating. These results indicate that it is necessary to improve the application's usability. Therefore, the researcher conducted interviews with users as a basis for making a redesign in the form of a high-fidelity prototype (hi-fi) for the SIMRS Khanza application using the Figma tool. The interface design recommendations have been tested using the SUS method with a score of 87, which received an "Excellent" rating. Based on these results, it means that users can well receive the design. The developer can consider the results of the design recommendations to improve the application's quality to help the performance of

RSUD Banyuasin with an application design that is easy to understand and supports the creation of accurate and consistent data, which is expected to improve the quality of hospital services.

### Suggestion

In this study, the recommendations generated are in the form of hi-fi so that the next researcher can conduct further research up to the stage of making the program. Then, the next researcher can still make design improvements on other aspects to achieve the best imaginable rating.

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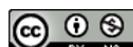
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