UI/UX Analysis of Project Management Information System (PMIS) Website Using User-Centered Design Method

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Abstract: In Industry 4.0, a lot of data has been digitized and is no longer stored manually. In helping to record all the projects that were worked on initially stored in outstanding Project Management applications such as Trello. However, the Trello application has limitations and compatibility with business processes, including employees not writing down projects that have been done because they are not in accordance with procedures, causing many projects to go unrecorded. So because of these limitations a Project Management Information System (PMIS) website is needed which makes it easy to record all projects so that there is no more unrecorded data. Furthermore, there are problems in conducting an analysis that can make it easier for users and how to design a User Interface and User Experience on the PMIS website using the User Centered Design (UCD) method, which in the manufacturing process will continue to make changes according to needs. The results of the User Interface design that has been made will be tested for User Experience using the Single Ease Questionnaire (SEQ) method as a measure of the success of the User Interface that has been made. Based on the results of the User Experience test using the Single Ease Questionnaire method for 5 respondents, an average value of 6.3 was obtained, which means that it can be concluded that the User Interface that has been created has a level of convenience that is in accordance with the User Experience.

Keywords: User Centered Design, User Experience, User Interface, Single Ease Questionnaire, dan Website

INTRODUCTION

PT. LAPI ITB is one of the business units owned by the Bandung Institute of Technology. Established in 2004, has been providing professional services to the Government of Indonesia, Indonesian National and Regional Owned Enterprises as well as National & International Private Companies. Supported by ITB in resources such as International and National Experts, Laboratory Facilities, and national & international networks. Play an important role in the application of research from science, technology, and art.

The Project Management Information System (PMIS) is a Project Management Information System that starts from the process of identifying opportunities, procuring projects to managing project implementation. Project Management has principles that serve as basic guidelines for strategy, decision-making, and problem-solving (Stackpole, 2013).

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PT. LAPI ITB as a business entity that manages projects still manages projects manually. Manual project management has limitations and drawbacks such as managing the project management process which is still separate so that it requires more time to complete tasks, document printing costs, requires more time to collect data or information for decision making, and limitations in collaboration or cooperation. Initially, all worked-on projects are stored in outstanding Project Management applications such as Trello. However, the Trello application has drawbacks such as limitations and compatibility with business processes, among others, employees do not record projects that have been carried out because they are not following procedures so many projects are not recorded. Previously, they had created a Project Management Information System (PMIS) website based on the Forum Group Discussion (FGD) that had been carried out by previous employees, but it had not fully met the needs of employees, so it needed to be redesigned. Based on these problems, it is necessary to re-design the UI/UX.
User Interface (UI) is the science of the graphical layout of a website or application. The User Interface (UI) designs all visual elements, how users interact with website pages, and what is displayed on website pages (Muhyidin et al., 2020). Apart from the User Interface (UI), User Experience (UX) is also needed to find out how the website works according to user needs.

According to Borrys Hasian, there are several definitions of UX or User Experience. By the nature of their work, UX designers are people who create useful products and visualize user flows into tried and tested and beautiful product designs (Muhyidin et al., 2020).

In UI and UX design, a method or approach is needed to design a design so that it has a structured approach as an overview of the process or steps when designing. User-Centered Design (UCD) is a design philosophy in which the system development process, goals, and characteristics in the system environment focus on the user as the center based on user experience or experience (Subhiyakto et al., 2021).

In previous research there was a design that applied the User Centered Design method by (Defriani et al., 2022) to meet user needs, in research (Hartawan, 2022) it was explained that making this wireframe design was able to provide a good layout and further research explained that this can give a good impression to website users by (Multazam et al., 2020).From the three previous studies, it was concluded that the User Centered Design (UCD) method is good for websites and can meet user needs. Furthermore, previous research using the Single Ease Questionnaire by (Dewi et al., 2023) and by (Krishnavarty et al., 2022)produced categories that were easy to use and acceptable to users. The difference between previous research and current research is that in the analysis of the problems carried out, there is a need for a redesign.

Based on the problems that have been described, an analysis of the Project Management Information System (PMIS) website is needed to make it easier for users to use the website so that it is more efficient, saves time, and meets user needs. So the author will conduct research with the title UI/UX Analysis of PMIS Website Using User-Centered Design Method.

LITERATURE REVIEW
User Centered Design
User-Centered Design (UCD) is a design process that is based on user needs. The User-Centered Design approach is optimized for end-users and emphasizes how the needs or desires of end-users regarding product use are planned according to the behavior of product use so that the products developed are useful and easy for users to use (Utomo, 2019). The User-Centered Design method is used to find out what users need when developing applications. This design process prioritizes user needs. The system developed by User Centered Design is optimized according to user needs to create environmentally friendly applications and applications according to user needs, and users do not need to change application usage (Aldi & Wahyuddin, 2022). There are steps for carrying out User Centered Design (UCD) according to ISO 9241-210, 2010 which has 5 User Centered Design (UCD) processes.
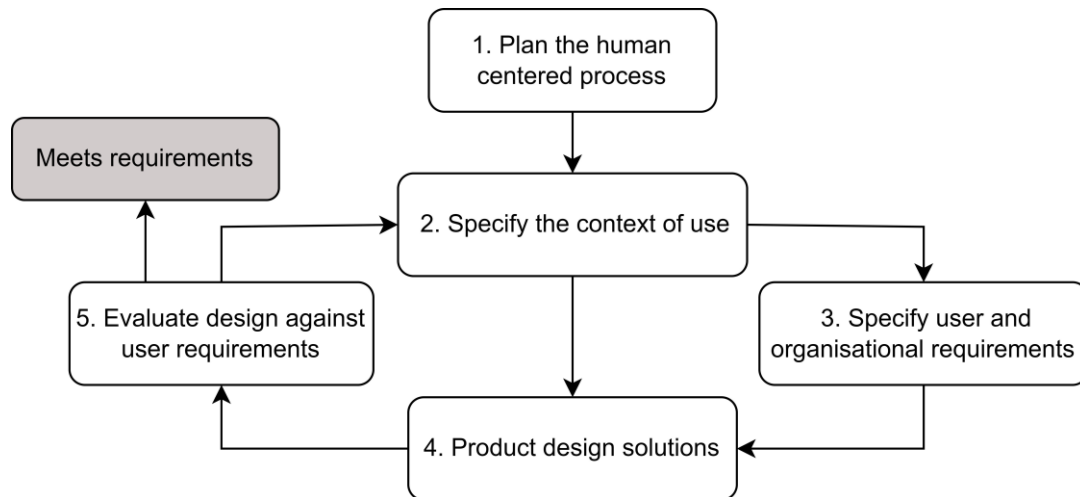
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Fig. 1 User Centered Design (ISO 9241-210:2010)

(User Centred Design for EASYREACH, 2011)

Single Ease Question

The Single Ease Questionnaire (SEQ) is a test that is taken after completing all the given tasks and scenarios. Participants were given a task and a seven-point scale to rate how easy and difficult it was for participants to complete the task. The Single Ease Questionnaire (SEQ) survey was completed by respondents after the prototype was made. The first step in using SEQ is to create a questionnaire that is divided into the given tasks. The questionnaire consists of items rated on a 7-point Likert scale. The Likert scale has two tails which are shown from left to right, namely very heavy (Likert score 1) and very light (Likert score 7) (Reksi Prayoga et al., 2022).

Table 1 Rating Scale Single Ease Questionnaire (SEQ)

Respon	Value
1	Very difficult
2	Difficult
3	Quite difficult
4	Neutral
5	Quite easy
6	Easy
7	Very easy

(Anggara et al., 2021)

The Single Ease Questionnaire (SEQ) consists of one question with a Likert scale of 1 to 7 from very difficult, difficult, not easy, moderate, not difficult, easy, and very easy. With the Single Ease Questionnaire, you can compare usability across tasks and see the relative weight that users give to the problems encountered in a task. User Experience should use the Single Ease Questionnaire comparatively to find areas of improvement that will have the greatest impact on users. Typically, the Single Ease Questionnaire is used in conjunction with task completion rate and task time to provide more insight and context into these metrics. When users are asked how and why a task was easy or difficult to complete, they can better read the results and understand the reasons behind the results.

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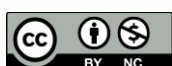
METHOD

The research method is carried out to explain the stages in solving the problem that will be discussed. The following is a frame of mind that has been made and contained in the picture.
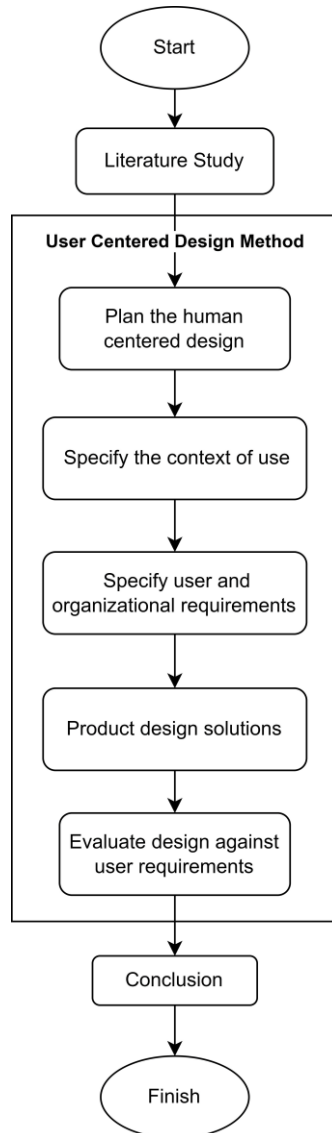

Fig. 2 Research Methodology

Literature Study

In the literature study stage, the aim is to obtain a theoretical basis as a reference or reference in developing collection applications and working methods to solve the problems that are the subject of this thesis. A literature study is carried out by looking at the contents of magazines, work references on research objects, and the method of designing the tool system used in books and journals. The literature study conducted focuses on material that discusses the following:

1. PMIS book seventh

2. ISO 9001:2015 Project Management Procedures concerning international standards for Quality Management System Certification, also known as Quality Management System Certification

3. ISO 45001:2018 Project Management Procedures concerning occupational safety and environmental management

4. User Centered Design

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Plan the human centered design

Plan the human-centered design is to identify the people who use the system. It describes what and under what conditions they use the system (Rahman et al., 2020). At plan the human-centered design stage, observations, interviews, and Forum Group Discussion (FGD) will be carried out to find out all needs related to research.

Specify the context of use

Specify the context of use to identify the people who are users (Mahfudh & Saputra, 2022). The specify the context of use stage will describe the target user and use of the Project Management Information System (PMIS) website by identifying the user persona from the results of the interviews that have been conducted. Creating a user persona, it will represent the goals, needs, and characteristics of different users so that it will produce a user experience that matches what the user needs.

Specify user and organizational requirements

Specify User and Organizational Requirements to identify what users need from the application (Supardianto & Tampubolon, 2020). In the specify user and organizational requirements stage, identification of user needs and user flow will be carried out to carry out the needs analysis stage in the form of data types and data sources used.

Product design solutions

Product design solutions is the solution design stage. Where researchers develop a design as a solution of the system being analyzed(Megasari et al., 2021). At the product design solutions stage, designs are made using the User Centered Design (UCD) method, by producing design solutions and evaluating designs against user needs. In the design solution, the interface design is based on the results of the needs analysis which can be explained in Figure 4.
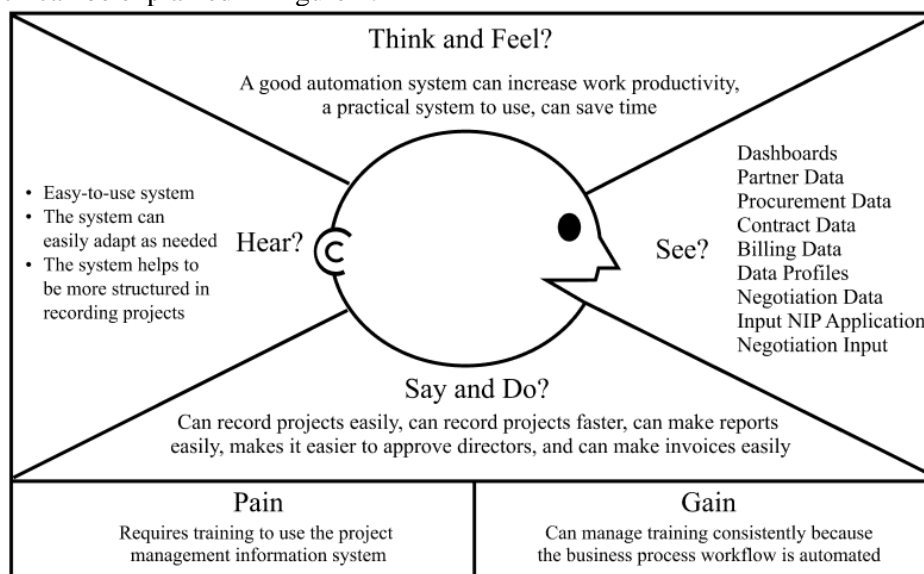

Fig. 3 Empathy Map

Evaluate design against user requirements

Evaluate design against user requirements will evaluate designs that have been tried in the previous stage. Where the design must meet the requirements required by the user. This stage is used to see whether the goals of the user and the organization are achieved (Putri & Pakereng, 2021). In the evaluate design against user requirements stage, a Single Ease Questionnaire (SEQ) will be carried out by 5 employees of PT. LAPI ITB will give value to each task from the results of the interface design and prototype that has been made. Evaluation using the Single Ease Questionnaire (SEQ) aims to find out whether the design that has been made meets the needs of the user or not.

Conclusion

At the conclusion stage, this is the stage of analysis and discussion of the results of all methods that have previously been carried out.

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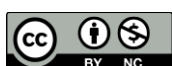
RESULT

Plan the human centered design

The plan the human-centered design stage is the first stage in User-Centered Design (UCD). At this stage, it will contain all the requirements needed for this research by conducting observations, interviews, and Focus Group Discussions (FGD).

1. Observation

The observation stage carried out is to make direct observations to collect information. The things that are observed are by making direct observations and obtaining information through the Forum Group Discussion (FGD) which has been carried out by employees of PT. LAPI ITB. By making direct observations, the questions and answers needed for the Project Management Information System (PMIS) website are obtained.

Based on the observations that have been obtained, the Project Management Information System website requires more structured data collection starting from Partner Data, Procurement Data, Contract Data, and Billing Data. Every data that is input by employees of PT. LAPI ITB using the Project Management Information System website does not need to manually collect data which causes data not to be inputted. Where the dashboard display on the Project Management Information System website contains Graphs of Information on Net Profit Acquisition, Information on the Acquisition of Contracts from Total Contracts, Information on Obtaining Revenue, List of Projects to be Invoiced, List of Projects that are being Invoiced, and List of Invoices past the time of easy disbursement employees PT LAPI ITB when entering the website to see the project and the development of project information every month and year.

2. Interview

At this stage, the interview was conducted in May by 5 employees of PT. LAPI ITB consists of 1 director of operations representing the directors, 2 operations departments (1 Project Manager and 1 Project Administration person), 1 user monitoring (MK3L), and one person from finance. Operationally five employees of PT. LAPI ITB who conducted the interviews has represented functionally for the Project Management Information System website.

Based on interviews with 5 respondents, the following is one of the results of the interview, that is, when logging in, there are conveniences that are sufficiently understood so that the login security is guaranteed to be safe, then the dashboard display is sufficient to present the necessary data and is quite easy to access the required menu features. In the appearance of the menu you are looking for, the main view is easily available, then the menu display you are looking for is available quite complete in the main view. Tracking on contract data is in accordance with the timeline but the view on the button does not contain the data that was previously filled in. All features have not provided all of their tasks because the link in the financial section for billing data does not yet exist and the display that has been made is quite attractive.

3. Focus Group Discussion (FGD)

At the Forum Group Discussion (FGD) stage, a discussion was held via a Zoom meeting to find out the results of the design evaluation that had been made. The Forum Group Discussion (FGD) was held twice, the first on 13 February 2023 and the second on 3 March 2023.

Specify the context of use

In the specify the context of use stage, identification of the user person will be carried out from the results of the interviews that were conducted in the first stage, namely plan the human-centered design.

The user persona used describes the target user for the Project Management Information System (PMIS) website. This includes the user's profile, problems, wishes, and conditions, which are then used to fulfill the user's needs using the website. Some of the information received is username, roles & tasks, about, frustrations, and goals.

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Table 2 User Persona Project Administration

Name	Andri Mulyana
Profession	Project Administrator
Age	25 years old
Address	Coblong, Bandung
About	Andri Mulyana is an employee of PT. LAPI ITB working as Project Administration. Where a Project Administration when doing work will cooperate with the Project Manager.
Frustation	The menu layout still needs to be improved
Goals	So that users can use PMIS easily and quickly

Specify user and organizational requirements

In the specify user and organizational requirements stage, an analysis will be carried out on the type of data and data sources that will be used in this research by identifying user needs and user flow.

1. Identification of User Needs

After the plan the human centered design stage, observations, interviews, and Forum Group Discussions (FGD) are carried out, which will be used to identify user needs. From the information that has been obtained, the next step that must be taken is to classify the user's needs and after that provide the solutions needed by the user to solve the problems experienced by the user which will then be made a design from the results of the solutions that have been found.

Project Administration (PA) / Project Manager (PM) generates requirements Input Partner Data, Input NIP Request, Input Status Profile, Input Negotiation Data, Print SP3 Letter, and Project Overview, Input Contract Data, View Contract Data, Automatic PO and SO buttons for PO and SO numbers, View No. PO and SO, Input Event Minutes, View Minutes, Input Reports, View Reports, Tracking, Input SP3 and Summary Letters, Upload SP3 and Summary Letter Files, View Upload SP3 Letter Files and Overview, Added comments on the Contract Data feature. Directors generate requirements Directors' Approval of Data Rekanan to Data Pengadaan. MK3L generates requirements Make a Move from Data Pengadaan to Data Negosiasi, Make a Move on the Data Negosiasi, Editing Data Pengadaan, Check the unilateral signature on the Data Negosiasi. And Finance generates requirements Create New Invoice, Edit Data Penagihan, Check the billing submission form, Print Payment Application Letters, Invoices, and Receipts, and Adding comments on the Data Penagihan feature.

2. User Flow

The User Flow used will explain how each user flows using the Project Management Information System (PMIS) website so that users can understand how to use the Project Management Information System (PMIS) website. The following is the user flow consisting of directors users, operations department users (Project Manager and Project Administration), user monitoring (MK3L), and financial users.

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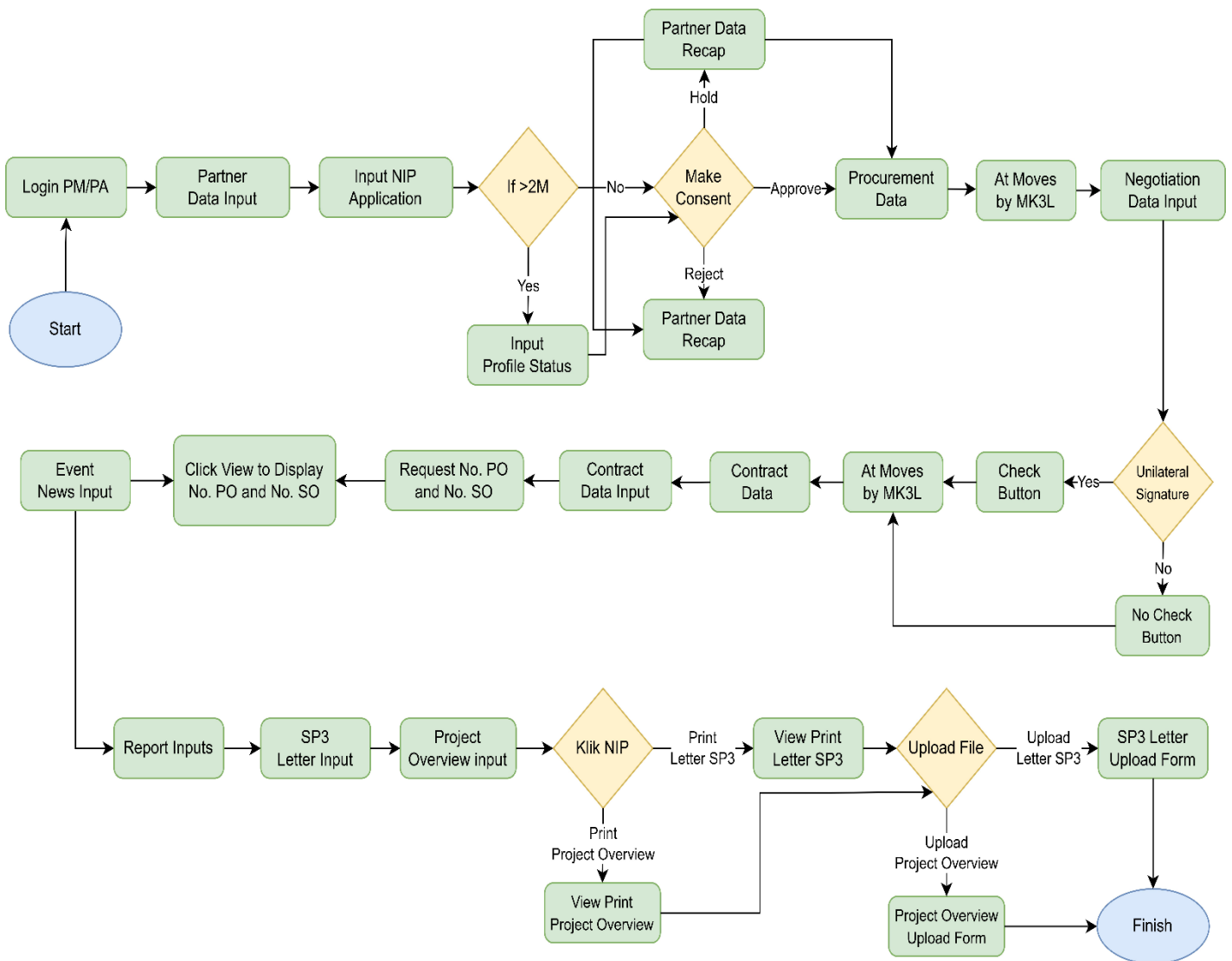Department of Operations (Project Manager / Project Administration)

Fig. 4 User Flow Login Project Manager / Project Administration

Product design solutions
In the specify user and organizational requirements stage, it will produce design solutions for user needs by making wireframes, UI Style Guides, and prototypes. The User Interface is made according to user needs on the Project Management Information System (PMIS) website, where all designs are made using Figma. Below are the stages of product design solutions.

Wireframes
    The created wireframe will contain a rough description of the user interface design that has been made. Below are some of the wireframe results that have been made, namely:

Dashboard
    The operations department dashboard page is the main page after the user logs in. The operations department dashboard navbar contains admin, data, recap, and operations department profile. Then on the main page, it reads the title of the main page, namely the dashboard which contains input, data, button show chart/button hide chart, Information Graphic Information on Net Profit Acquisition, Graph Information on Acquisition of Contracts from Total Contracts, Graph of Information on Revenue

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Acquisition, Tables of Project Data to be in Invoices, Project Data Tables that are being invoiced, Invoice Data Tables that are past the disbursement time, partner data buttons, procurement data buttons, contract data buttons, and billing data buttons. In contrast to the admin and director dashboards on the operations department dashboard, partner data buttons, procurement data buttons, contract data buttons, and billing data buttons are located at the bottom after the Project Data Table to be invoiced, Project Data Table is invoiced, Invoice Data Table past the defrosting time. In contrast to the admin, directors, and MK3L dashboards on the operations department dashboard, the partner data button, procurement data button, contract data button, and billing data button are located at the top after the navbar and reads the title of the main page, namely the dashboard.

Partner Data

The operations department partner data page displays a table containing some of the data needed, namely no. partners, dates, job names, employers, grades, team names, PM & PA names, opportunity stages, notes, and actions that contain NIP and more checklists that contain views, comments, and fill in the profile status if the project value is more than 2 Billion. On the partner data page, the operations department also has a data profile button and a partner data input button. The operations department partner data page displays a table containing some of the data needed, namely no. partners, dates, job names, employers, grades, team names, PM & PA names, opportunity stages, notes, and actions that contain NIP and more checklists that contain views, comments, and fill in the profile status if the project value is more than 2 Billion. On the partner data page, the operations department also has a data profile button and a partner data input button.

UI Style Guide

The UI Style Guide stage is a stage that is carried out to make it easier to design an interface consisting of typography, color palette, icons and components. The UI Style Guide is made according to the user's design needs.

Typography

Typography is used to create user-readable text. The typography used on the Project Management Information System (PMIS) website can be differentiated into several font types and sizes. The following is an image containing typography.

Color Palette

The color palette used is a color selection that is tailored to user needs and is the identity of PT. LAPI ITB. The set of colors that will be used to design the user interface consists of backgrounds, text, icons, and other components. The color that is mostly used on the Project Management Information System (PMIS) website is blue with code #458AC9.

Icons

Icons are the appearance of an image or object that represents the function of the object itself. The icons used on the Project Management Information System (PMIS) website are tailored to user needs. The following are the link icons used when creating the Project Management Information System (PMIS) website, namely Vuesax + UIX Icons Set (+6150 free Iicon) (Community) – Figma.

Components
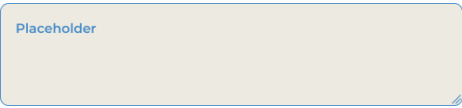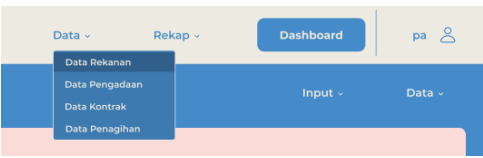
Components used for displaying the user interface will often be used for website creation. The components made are tailored to the needs of the Project Management Information System (PMIS) website to make it easier for users to understand when using them.

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Table 3 Components

No.	Components	Name	Functions
1.		Logo	Used to represent identity on a website
2.		Input Field	Used to input text
3.		Check Box	Used to find out the choices of several options or to find out whether the Surat SP3 and Ikhtisar Proyek have been filled in
4.		Text Area	Used to be able to input more than one line of text
5.		Search Bar	Used to search for words or data you want to search for by entering the required keywords
6.		Navigation Bar	Used as the main menu that directs the user to the desired page
7.		Button	Used to run a specific command
8.		Dropdown	Used to display multiple data choices so that the user can select one of the existing data lists

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Prototypes

Prototype is the stage of implementing the actual website design that has been made. The prototype created has a function to respond to commands that will be given by the user. The prototype made is adjusted based on the user flow made in the user specification and organizational requirements. The following is the result of the prototype based on one of the user logins as follows:

Operations Department (Project Manager/Project Administration)

In the view of the directors, if you want to feel the user experience on the prototype directly and how to use it, you can scan the barcode with Figure 14 below:

Fig. 5 Operations Department Prototype Barcode

Operations Department Dashboard

On the dashboard display of the operations department, there is a show chart button which when clicked will display a Net Profit Gain Information Graph, a Contract Acquisition Information Graph of Total Contracts, a Revenue Gain Information Graph, Project Data Tables to be invoiced, Project Data Tables that are being invoiced, Invoice data table that passes the disbursement time, partner data buttons, procurement data buttons, contract data buttons, and billing data buttons. However, if you click the hide chart button, it will not display the graphs and tables previously mentioned.

Evaluate design against user requirements

In the evaluate design against user requirements stage, an evaluation stage of the results of the design that has been made will be carried out. The evaluation made will be carried out by users who use the Project Management Information System (PMIS) website. The trial stage for evaluation using the Single Ease Questionnaire (SEQ) aims to determine the measurement of the level of success of a design that has been made. To carry out an evaluation using the Single Ease Questionnaire (SEQ) will be carried out by 5 employee respondents of PT. LAPI ITB where the 5 people have operationally represented each process so that it can be fulfilled functionally. The following is a table of testing tasks carried out by respondents.

Table 4 Testing Tasks

No.	Task	Description of Tasks
1.	Login	Log in with an account that has been registered
2.	Dashboard	Click on the dashboard button and see if the dashboard that has been created is informative and meets your needs
3.	Button	Clicking one of the buttons then analyzing whether the pressed button takes the action that the user wants
4.	Edit Profile	Edit your profile to change your username and profile photo then click edit
5.	Search	Perform a search for the required data

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No.	Task	Description of Tasks
6.	Comments	Make comments on the comments feature
7.	View	View data views that have previously been filled in
8.	Tracking	Clicking the tracking button and viewing the tracking on the contract data that contains the timeline
9.	Check Box	Click on a unilateral signature if you have done a unilateral signature, a check box will display
10.	Filling in the Form	Filling in the form as needed and pressing the submit button

DISCUSSIONS

In terms of, among other things, the target users of the Project Management Information System website are employees of PT. LAPI ITB, then a survey will be carried out on users of the Project Management Information System website, which has the scope of research only on the Project Management Information System website, and discussion of research only on design analysis and making prototypes of the Project Management Information System website using the User Centered Design Method.

By using the User-Centered Design Method, the results of the analysis are obtained following user needs according to the Specify user and organizational requirements in identifying user needs. After analyzing using the User Centered Design Method, then at the Evaluate design against user requirements stage an evaluation is carried out using the Single Ease Question (SEQ).

The Single Ease Question will be carried out by 5 respondents by carrying out the 10 tasks given, then the user will carry out the Single Ease Question assessment which will start from number 1 to 7. The results of testing the 10 tasks carried out by 5 respondents then obtained an average value of 6.3, which means that the results of testing the tasks that have been carried out mean that the Project Management Information System (PMIS) website is easy to use. The results obtained, when compared with research (Dewi et al., 2023)and (Krishnavarty et al., 2022), have the same results, namely they can be categorized as easy to use.

CONCLUSION

Based on the results of the analysis that has been carried out with 5 respondents employees of PT. LAPI ITB, where when inputting data for all projects undertaken by PT. LAPI ITB which was originally still stored in Project Management applications that were circulating like Trello. Because it is still done manually and causes some data to be unrecorded, PT. LAPI ITB requires a Project Management Information System (PMIS) website. By using the User Centered Design (UCD) method for the Project Management Information System (PMIS) website, the website design results are obtained according to what employees need PT. LAPI ITB. This can be proven by the results of the Single Ease Question (SEQ) test which yielded an average score of 6.3 by 5 respondents from PT. LAPI ITB. Where the results of the test values produce results that are easy to use by employees of PT. LAPI ITB.

As for the suggestions obtained and considered to be used as a reference for improvement and improvement in further research, namely the user interface will continue to develop according to what is needed by employees of PT. LAPI ITB so that the information needed can be obtained easily and the scope of the test respondents is added again to produce even more valid test results.

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