

User Interface Design Improvement and Usability Evaluation for Evolution Web Application of Telkom Indonesia Using User-centered Design

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Abstract–Evolution is a web application for collecting the Evidence report. This application is used regularly every quarter of the year. The main purpose is as a repository of evidence control that can be used at any time for audit purposes. Evolution Web Application will be utilized as a research object because there are problems with the user interface design and did not meet the concept of usability. To validate the Evolution Web Application User Interface Design problem and the improvements that will be applied according to user needs. User interview is conducted using Focus Group Discussion (FGD) with Evolution web Application users. The purposes of Focus Group Discussion (FGD) are to find problems in the user interface and expectations to achieve user goals for user interface design improvement. The interview results show that the current User Interface design has significant flaws. To improve the usability of the Evolution Web Application, a method known as User-centered Design (UCD) is used for improving the User Interface design of the Evolution Web Application. The evaluation after design improvement is carried out by using a Heuristic Evaluation involving 3 experts to review the usability of the design improvement result. Heuristic Evaluation produces answers from 3 experts with a severity value not more than a severity value of 2, which indicates a severity status of 2 is a Minor usability problem or fixing should be given low priority.

Keywords: ITGC Compliance; Evolution Web Application; User-centered Design; Heuristic Evaluation; User Interface

1. INTRODUCTION

Evolution Web Application is a web application for ITGC Evidence collection in Telkom Indonesia. This web application is used regularly every quarter of the year. The main purpose is as a repository of evidence control that can be used at any time for audit purposes both internally and externally. The Evolution Web Application will be used as the object of research because this Web Application requires improvements for the User Interface Design in accordance with requests and requirements from the Evolution web application users.

To validate the Evolution Web Application User Interface Design problem and the improvements that will be applied according to user needs, Author conducted User Interview. User interview is a common technique for conducting user research that aims to obtain qualitative information from existing and potential users [1].

User interview is conducted using Focus Group Discussion (FGD) with Evolution web Application users. Focus Group Discussion is a collection of participants who have been chosen and brought together by researchers to discuss and offer their opinions on the research topic based on their own experiences [2].

At User Interview stage, the author conducted Focus Group Discussion (FGD) to discuss the problem, pain and gain point[3]. The results of a user interview and focus group discussion with Evolution web users showed that the User Interface and User Experience design on the Evolution web did not satisfy and not suitable for users. User Interface design of the Evolution Web Application is ineffective because the layout and menu makes the users difficult to use, which causes an unsatisfactory experience for the users when using Evolution Web Application.

To overcome these problems, there is a need to improve the user interface design of the application so that the application can be in accordance with the needs of the user. So, in this study the author will do the improvement to enhance the user interface design in accordance with the needs of the user [4]. The method used in this study is User Centered-Design (UCD).

User-centered Design method is based on Usability knowledge to find the user needs. The methodology is designed to collect and address the entire user experience. designed to improve the acceptance and efficiency of interactive systems, decrease errors and support and training hours, and deliver the best possible user experience [5].

After creating the improvements of the User Interface design, the author will conduct Usability Evaluation. Usability evaluation is an assessment of how usable something is. It may involve a range of techniques to look at how effective, efficient, engaging, and efficient a system is [6]. Depending on the sort of system or interface being reviewed, these elements may or may not be equally important [7].

Usability Evaluation will be carried out using Focus Group Discussion (FGD) and Heuristic Evaluation. Heuristic evaluation involves examining an interface and attempting to identify its positive and negative aspects [8]. Heuristic Evaluation is conducted with 3 experts and will review the Evolution Web Application user interface design after improvement by grade using Severity Rating to produce the accepted usability principles [9].

2. RESEARCH METHODOLOGY

The following are the modeling flow depicted in Figure 1. the stages of the method based on User-Centered Design process which are specify the context of use, specify user and organizational Requirements, produce design improvement, and evaluate design.

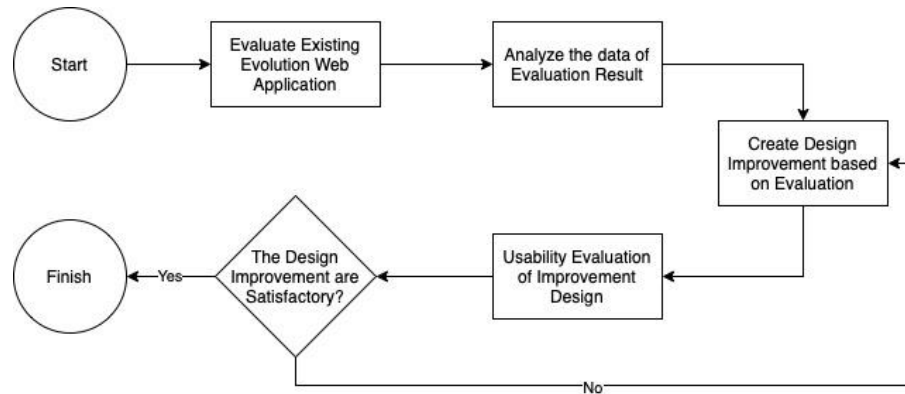


Figure 1. Plot Modelling

2.1 Research

In the following stages, the research is conducted using Focus Group Discussion (FGD) which is semi-structured user interview method that used to collect qualitative data to oversees users pain point, experiences, and expectations to equalize every perception and achieve the user goals that will be applied for the improvement of Evolution Web Application User Interface Design.

2.2 Specify Context of Use

After conducting research, the next task is to evaluate the data analysis of the research to obtained the context of use of Evolution Web Application, where the results of the analysis were collected from Focus Group Discussion (FGD) with users of Evolution Web Application. The next task is to analyze and process existing data from Focus Group Discussion (FGD), then create some conclusions such as categorizing the problem based on the problems found and conclude by user pain and gain points to obtain the users requirement for Evolution Web Application user interface design Improvement.

2.3 Specify Requirement

At this stage an analysis is carried out based on the Focus Group Discussion result to produce design recommendations. User interface design recommendations are generated from user pain and gain points, conclusion of design problem into usability concept which will categorize in the design recommendation and which will generate Hierarchical Task Analysis (HTA) to analyze the process of a task carried out by users and a conceptual model that aims to get an overview of the entire task and the response required by the user.

2.4 Wireframing

After analyzing data from Focus Group Discussion (FGD) with users of Evolution Web Application and categorizing problems according to priority level, a wireframe are made with the aim of being an initial sketch in making design improvements. Wireframes are created based on the analysis of Tasks and elements generated in the Conceptual Model.

2.5 Design Improvement

Design Improvement is made based on the results of research and based on the User-centered design method. this stage is carried out so that design improvements are made according to user needs from Evolution Web Application. After the flow of the design improvement, the results of the design will be presented with before and after improvement and presented to several potential users of Evolution Web Application for evaluation.

2.6 Usability Evaluation

Design evaluation will be carried out with usability evaluation according to user-centered design methods. In the first stage, the second focus group discussion was held with the users of evolution web application to review and gives feedback for the results of the design improvements. The second stage is carried out by heuristic evaluation involving 3 experts to review the usability of the design improvement results. Heuristic Evaluation is conducted by using the severity reference value from the evaluation to measure the success rate of Heuristic Evaluation testing.

3. RESULTS AND DISCUSSION

3.1 Evaluation

At this stage, an initial evaluation is carried out to find out the problems that exist in the Evolution Web Application. The initial evaluation was carried out using a Focus Group Discussion (FGD) to identify problems to determine the user's pain and gain points which would result in recommendations for improvement for this web application.

3.1.1 Focus Group Discussion (FGD)

The conclusions are made based on user answers at the time the first focus group discussion was conducted, statements of each user are classified into 2 aspects, which are pain points and gain points to identify the conclusion of design problem into usability concept and design recommendations that will be made. The Focus Group Discussion (FGD) results can be seen in Table 1.

Table 1. Pain Point and Gain Points

Pain Points	Gain Points
The placement of the main menu layout on the web is difficult to understand, users become difficult when initially used	The placement of the main menu layout is become to be easy to understand and easy to use when initially used
The font used is too small and inconsistent, so the text is difficult to read	Use a font that is easy to read and consistent according to the criteria and placement of the text
The color composition on the web is too much so that it makes it uncomfortable to look and use	Using color compositions that are comfortable to look at and use
The buttons and icons are not clear, so it is difficult for users to understand the use of these buttons and icons	Using buttons and icons that are clear and easy to understand
On the login page, the layout placement is not appropriate and the textfield password is not given the option to 'show password'	the layout of the placement on the login page is clearly made for easy use and a textfield is created with a description and an option to 'show password'
In the Form menu, there is no mapping for each control to each user, so it can be difficult to map the form to the user	Added Mapping feature for each control to each user, so it's easy to map the form to the user
In the evidence menu, the table layout is not easy to understand so that users find it difficult to read and understand the contents of the table	The table layout is made neater so that it is easy to understand the contents of the table
Attachment files in Evidence Closed table are downloaded manually one by one so it will be a hassle when downloading tens or hundreds of attachments from several different forms of evidence	Attached files in Evidence Closed table can be downloaded by selecting them simultaneously so that it takes less time for the user to download
The filter feature on the menu that contains a table takes up too much space on the page, so the contents of the table are not visible when the page first opened	The placement of the filter feature on the menu containing the table is made so that it doesn't take up a lot of space on the page, so that the table is clearly visible when the page first opened
There is no menu to view and download the running CSA Report	Added a menu to view and download the running CSA Report
There is no notification regarding what forms and evidence must be made, approved or submitted	Added a reminder notification feature for users to see what needs to be made, approved, or submitted

After knowing the Users Pain Points and Gain Points for evaluation during the Focus Group Discussion (FGD), the next step is to conclusion such as design recommendation for the improvement of the web application.

3.1.2 Design Recommendation

At this stage, conclusions are made on the pain and gain points that have been collected after the Focus Group Discussion (FGD) process with users from the Evolution Web Application. The collection of problems and solutions is concluded in the Design Recommendation which will be made and then design improvements will be made. The detailed results of the user interface design recommendations are as follows.

Table 2. Design Recommendation

Design Recommendation
Create the improvement for the menu of the Evolution Web Application layout into a dashboard model to make it more suitable for the usability of the web application and easy to use
Changing the currently used font, namely the “Serif” font type to the “sans serif” font type to make it easier

Design Recommendation

to read, more modern, and comfortable for users to see

Change the color composition of the background, menu, and color of each text that matches the color identity on the web that the user wants, so that the color composition is comfortable to see and the placement of the color composition is consistent

Change each button and Icon, so that the placement and composition consistent and clear. Changing every Icons on the menu and action buttons that require icons with simpler icons so that they are easy for users to see and understand.

Changed the login page layout with a comfortable background image and changed the position of the login textfield on the right side of the page, added a description above each textfield, and added a 'show password' button option in the password textfield

Added a mapping feature to the form menu, so that users don't have to worry about controlling each user when creating or editing a form

Change the layout of the table contained in the evidence menu, so that users can easily understand the contents of the table on the Evidence menu

Adding a selection feature to each form attachment file in evidence closed so that it can be downloaded simultaneously and it doesn't take much time for the user to download files

Changed the placement of the filter feature on the evidence menu, to make it easier for users to see the contents of the table listed under the filter feature when opening the evidence menu

Added the 'Report CSA' menu to the main menu for users to view and download the 'Report CSA' that is currently running

Added a 'reminder' feature on the home/dashboard menu, to warn users and be a notification of any evidence that needs to be created, approved, and submitted

The finding of problems in the Focus Group Discussion (FGD) process resulted in the design of recommendations on the Login, Dashboard, Form, Evidence pages, and adding pages to the main menu. The page added by the User during the Focus Group Discussion (FGD) is the CSA Report page, the CSA Report is used by the User to view details and download documents that are running at a certain time. Meanwhile, from the overall evaluation of the Evolution Web Application, there are improvements to the menu layout to make it easier to use which refers to Efficiency, improvements to the composition of Icons and Buttons to be more consistent in referring to Satisfaction, and improvements to the table layout and menu composition referring to Memorability.

3.1.3 Design Improvement

Design improvements are made based on research results and based on user-centered design methods. This stage is carried out so that design improvements are made according to user needs from the Evolution Web Application which will be presented in the form of a prototype.

a. Wireframes

At this stage wireframes are made with the aim of being an initial sketch in making design improvements. There are 5 main pages that will be repaired based on tasks, including the Login page, Dashboard, Form page, Evidence page, and additional CSA Report pages. The selection of layouts and elements is carried out according to user needs in the previous evaluation. Here are the Wireframes created.

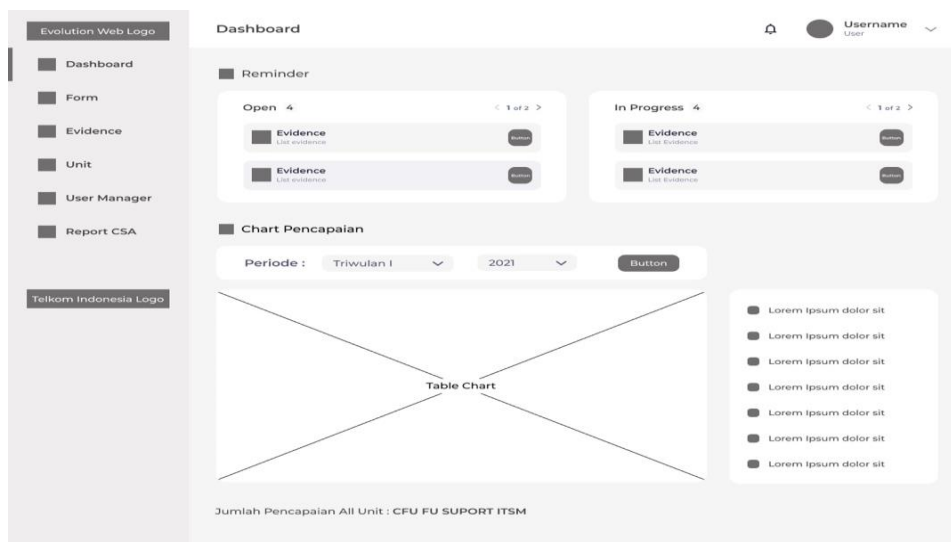


Figure 2. Wireframes

The Wireframes made based on the design recommendation. Evolution Web Application layout design improved into a dashboard model to make it more suitable for the usability of the web application and easy to use.

b. High-Fidelity Design

The next stage is to determine the design details from the results of the wireframe that has been made and continue with making the design into a layout in the form of a High-fidelity design. High-fidelity designs are created using system colors and icons that have been defined according to user requirements. The whole result of High-fidelity design then produces a prototype. The following is a comparison between one of the previous designs and the result of the design improvements in this research. The previous Dashboard page design can be seen in Figure 3.

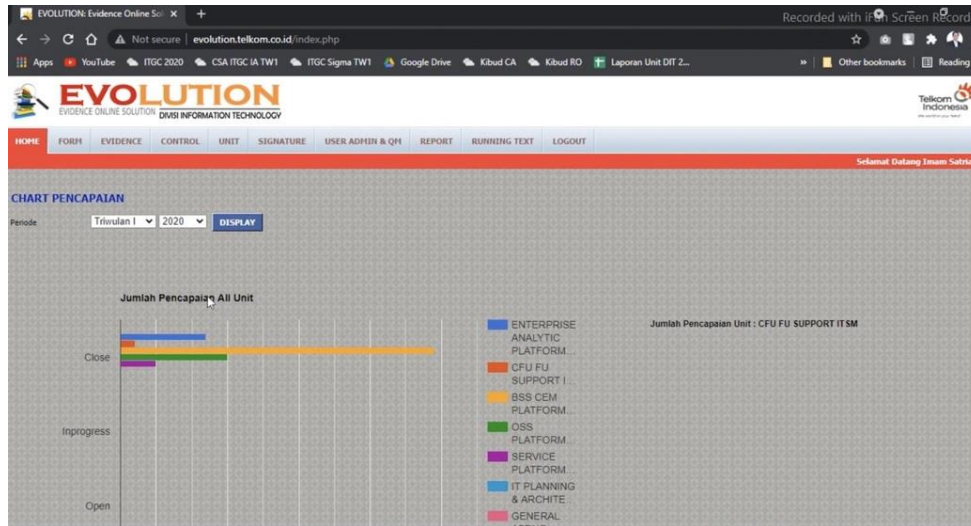


Figure 3. Previous Web Application Design

and the Dashboard page design improvement after conducting research and evaluation in this study can be seen in Figure 4.

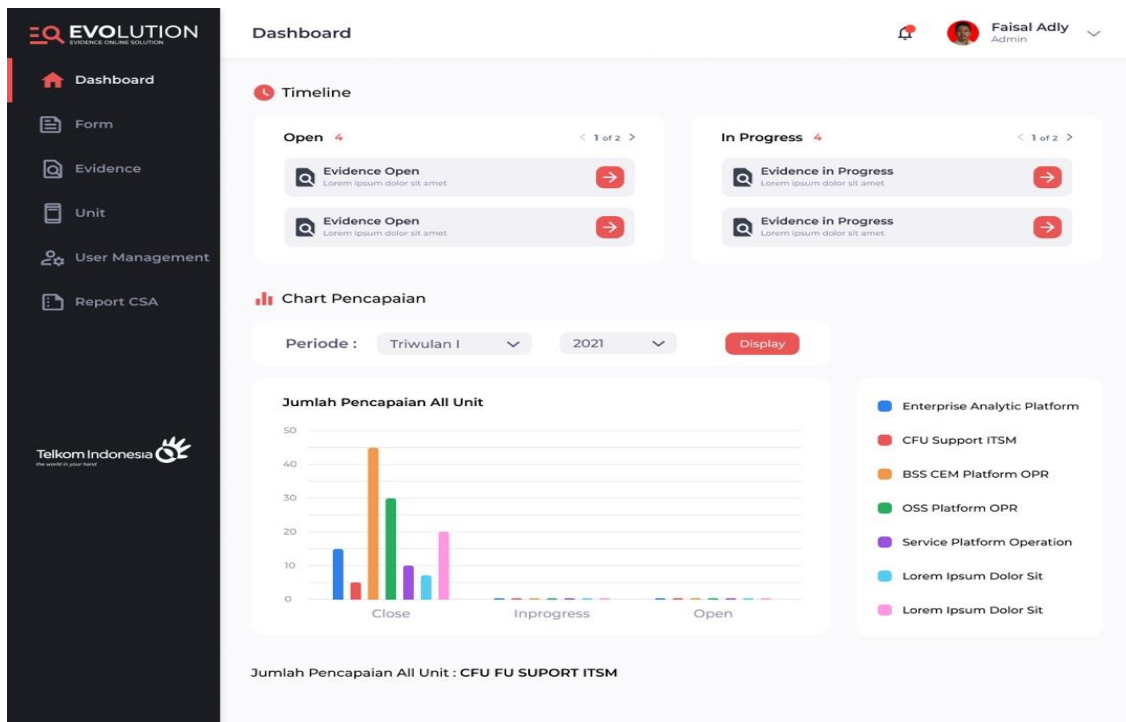


Figure 4. Dashboard page design improvement

On the dashboard page there is a sidebar that contains the main menu of this web application. There are 2 main contents on the dashboard, Reminder and Achievement Chart. Design improvement made based on discussion with user of the Evolution Web Application at the first Focus Group Discussion (FGD) stage and based on the design recommendation that has been made.

3.1.4 Usability Evaluation

At this stage an evaluation of the design improvements that have been made. Design evaluation is divided into 2 stages. In the first stage, a second Focus Group Discussion (FGD) was conducted with users from Evolution Web Application to evaluate the improvement of the design based on first Focus Group Discussion (FGD). The second stage is Heuristic Evaluation which involves 3 experts/evaluators to evaluate design improvements.

a. Second Focus Group Discussion (FGD)

Design evaluation will be carried out with usability evaluation according to user-centered design methods. In the first stage, the second focus group discussion was held with the users of evolution web application to review and gives feedback for the results of the design improvements with the topics of evaluation and feedback according to design improvement result. The second Focus Group Discussion (FGD) stage is the Usability measurement using the Usability concept according to Nielsen (1993) which is divided into 5 main dimensions (Learnability, Efficiency, Memorability, Satisfaction, and Error).

Table 3. Usability concept for evaluation with users

Usability Concept	Feedback by Users				
	User 1	User 2	User 3	User 4	User 5
Learnability (The system must be easy to learn, so that users can easily start a job with the system)	"The results of improvement s to the menu layout are very easy to understand"	"Web Application becomes easy to understand when used"	"Addition to the description of the feature, so that new users can understand its use"	"Changes in the table design makes the data in the table easier to understand"	"Placement menu designs into dashboard models makes the web easy to learn"
Efficiency (The speed at which user goals can be completed accurately and completely)	"Time to complete tasks on the Form page can be done efficiently"	"Adding a selection feature to the document you want to download is becomes very efficient"	"The addition of the Report CSA menu makes it easier for users to view the details of the CSA document"	"Improvements in placing controls in the form menu make it easier for users to view forms based on controls"	"Adding a mapping feature to the Form menu makes the tasks performed more efficient"
Memorability (The ability of the user to retain his knowledge after a certain period of time)	"Use of icons after design improvement s are easy to remember and understand"	"The layout of the table design on each menu is made different to make it easier to understand and remember"	"Design improvements to buttons or CTAs make it easier for users to remember"	"Modern design improvements make the web application very easy to understand"	"Adding information on each icon to make it easier for users to remember"
Satisfaction (Users perceptions, feelings, and opinions regarding the product)	"More modern use of color and layout composition"	"Adding illustrations/pictures can make the web even more interesting"	"The selection of appropriate colors makes the user comfortable when using it"	"The selection of a modern menu layout makes it suitable to use"	"Design improvements made is make it refreshing when using it again"

b. Heuristic Evaluation

The second evaluation is carried out by using Heuristic Evaluation involving 3 experts to review the usability of the design improvement results with Severity Rate. The results of the Heuristic Evaluation can be seen in Table 4.

Table 4. Heuristic Evaluation

No.	Principles	Statements	Evaluator 1	Evaluator 2	Evaluator 3	Evaluation Code
1	Visibility of system status	Each screen does not start with a title that describes the content of the page	0	0	0	HE01
2	Match	The system does not	0	0	0	HE02

No.	Principles	Statements	Evaluator 1	Evaluator 2	Evaluator 3	Evaluation Code
3	between system and the real world User control and freedom	speaking user's language with familiar words, phrases, and concepts System does not allow user's to go back step in a page	0	0	0	HE03
4	Consistency and standards	The page navigation does not similar to the navigation on other pages	0	2	0	HE04
5	Error Prevention	The input of incorrect data does not type in the field blocked	2	1	0	HE05
6	Recognition rather than recall	The size & color of components does not consistent (buttons for example) throughout the product	0	1	0	HE06
7	Flexibility and efficiency of use	The system does not provide effectiveness and efficiency for users	0	1	0	HE07
8	Aesthetic and minimalist design	There is content or information on each page that is irrelevant and unneeded	0	0	0	HE08
9	Help users recognize, diagnose, and recover from errors	The system does not provide error information when filling a field	2	0	0	HE09
10	Help and documentation	Does not have documentation	-	-	-	HE10

Seen in Table 3 Heuristic Evaluation with 3 experts, there are 3 problems that have a severity value of 2, including HE04 (Consistency and standards), HE05 (Error prevention), and HE09 (Help users Recognize, diagnose, and recover from errors) indicates fixing this should be given low priority or (Minor Usability Problem). There are 3 problems that have a severity value of 1, including HE05 (Error Prevention), HE06 (Recognition rather than recall), and HE07 (Flexibility and efficiency of use). indicates no need to fix unless extra time is available on the project (Cosmetic Problem Only). There are 21 answers that have a severity value of 0 which indicates don't agree that this is a usability problem at all. Total amount of problems on Heuristic Evaluation can be seen in Figure 5.

3.1.5 Analysis of Usability Evaluation Result

Based on second conducted Focus Group Discussion (FGD), Users provide feedback regarding improvements to the evaluation conducted in the first Focus Group Discussion (FGD). Feedback by users refers to the concept of usability according to Nielsen (1993) resulting in a positive response from users. There are 17 positive answers from the five users for each statement related to the usability of the concept and 3 feedback for future improvements. This can be a measure of success in the design improvements made. There are several inputs related to design improvements that have been made to become evaluations and improvements in the future. The first input by the third User on the concept of usability (Learnability) is the addition of a feature description, so that new users can understand its use. While the second input by the fifth User on the concept of usability (Memorability) is to add information on each icon to make it easier for users to remember. And the last input by second User on the concept of usability (Satisfaction) is that adding illustrations/images can make the web more attractive. The improvements that have been made can be a reference for evaluations that will be carried out in the future.

Based on the results of the evaluation of the improvements made using Heuristic Evaluation, there are 3 problems with a severity value of 2 or Minor Usability Problem. a minor problem that refers to HE04 (Consistency and standards) is the location of the problem is in the inconsistent page navigation. Things that can be recommended for improvement in the future are to provide page titles that are more in line with the contents

of the page, and determine the use of language that is not mixed between English or Indonesian. The second problem that refers to HE05 (Error Prevention) is the input of incorrect data does not type in the field blocked. What can be recommended for improvement in the future is to provide notifications to users if the input data is incorrect. The last problem that refers to HE09 (Help users recognize, diagnose, and recover from errors) is that the system does not provide error information when filling a field. Things that can be recommended for future improvements are on the Login page, if the user enters user data with the wrong input, then there is an incorrect warning or an appeal at the bottom of the Login form.

4. CONCLUSION

Based on the results of the research conducted, it is possible to produce an improved user interface design on the Evolution Web Application which is designed using the User-centered Design method that meets the needs of users in this system display. including changes to the layout of features, pages and menus that make navigation flow efficient and easy to use by users. Changes to the colors, buttons, and icons that are minimalistic and in accordance with the wishes of the user make the user comfortable when using this web application. The addition of a page on the main menu which is the CSA Report which can make it easier for users to view and download CSA documents that are running at a certain time. This shows that in this study, using the User-centered Design method resulted in a better user interface design for Evolution Web Application users. Based on the results of the second Focus Group Discussion conducted with users, Feedback by users refers to the concept of usability according to Nielsen (1993) resulting a positive response from users. There are 17 positive answers from the five users for each statement related to the usability of the concept and 3 feedback for future improvements. This can be a measure of *success* in the design improvements made and design improvement and this study with the method of Focus Group Discussion (FGD) is satisfied for the users of Evolution Web Application. The results of the Heuristic Evaluation with 3 Experts resulted in 3 answers having a severity value of 2 indicating (fixing this should be given low priority) and 3 answers having a severity value of 1 which indicates (no need to fix unless extra time is available on the project), and produces 21 answers that have a severity value of 0 (I don't agree that this is a usability problem at all) which refers to the principle of severity ratings in Heuristic Evaluation. This shows that in this study, using the Focus Group Discussion and Heuristic Evaluation methods resulted in a user interface design that is in accordance with user needs and can meet the concept of Usability.

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