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## Application of Design Thinking Method in Designing the User Interface Prototype for the Website of the Informatics Engineering Study Program at Dian Nuswantoro University

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#### Abstract

In today's era, with the rapid development of technology such as the internet, human work can be significantly aided. This advancement positively impacts the education sector in terms of teaching, learning, and information dissemination. This development increases the use of websites, making the user interface an essential aspect of user comfort. The website of the Informatics Engineering study program at Dian Nuswantoro University has some deficiencies in its user interface. Therefore, the researcher has designed a user interface prototype to facilitate user interaction with the website, using the design thinking method. The designed user interface prototype is expected to address existing problems, meet user needs, and enhance campus services.

#### Introduction

Technological advancements in today's era are progressing rapidly. The internet, for instance, has reached even remote areas. This rapid technological progress has helped many people complete their tasks more efficiently. The impact of this development can be felt across various sectors, including agriculture, healthcare, education, and many others, all benefiting positively. The education sector, in particular, has reaped the benefits of technological advancements, especially since the onset of the Covid-19 pandemic, which necessitated a shift from face-to-face to online learning (Li, 2022; Stoian et al., 2022; Singh et al., 2021; Bartusevičienė et al., 2021; Turnbull et al., 2021). UI (User Interface) refers to the display that directly interacts with users. The purpose of a user interface is to act as a bridge between the user and the system, allowing electronic devices such as computers, tablets, smartphones, and other gadgets to be operated effectively (Zen et al., 2022; Haleem et al., 2022; Marinagi et al., 2013).

The role of the user interface is crucial because an attractive and engaging interface enhances user comfort while accessing the system (Wiwesa, 2021). Relating this to the education sector, as discussed earlier, an appealing user interface can significantly improve the teaching and learning experience (Maslov et al., 2021; Kukulska-Hulme. 2007; Huang et al., 2022). Dian Nuswantoro University has effectively utilized technology in its operations. The teaching and learning processes are web-based, enabling students to access them anytime and anywhere. However, the user interface of the Informatics Engineering study program's website still has room for improvement to ensure greater comfort for its users. The aim of this research is to design a User Interface model by innovating the Informatics Engineering study program's

website using the Design Thinking method. The Design Thinking method is considered capable of addressing existing issues, making it easier for users to utilize the developed prototype, and providing an experience that meets user expectations.

#### Methods

This research employs the design thinking method, which is defined as a user-centered approach prioritizing innovation, intended for designers who integrate human needs, technology, and business requirements (Razi et al., 2018). The design thinking approach consists of five stages: Empathize, Define, Ideate, Prototype, and Test, explained as follows:

Empathize: This stage is the core of the design process, focusing on understanding users (Arisa et al., 2023). The goal is to uncover users' problems through interviews, observations, or questionnaires to identify their issues and needs (Bangsa & Hermawan, 2021).

Define: This stage follows the empathy stage, aiming to formulate the actual problem based on information gathered during the empathize stage (Ikhsandi et al., 2022).

Ideate: This stage involves generating as many creative ideas as possible to find solutions for a digital product that will be developed as a prototype (Surachman et al., 2022).

Prototype: This stage involves designing or building a prototype model from the ideas generated in the Ideate stage to test and receive early feedback from users. There are two types of prototyping: low fidelity and high fidelity. A low fidelity prototype is an incomplete system design with low accuracy, using only black, white, or gray colors. A high fidelity prototype is a system design close to the final system, with added details such as images, icons, colors, etc (Sulistyono et al., 2023).

Test: This stage tests the design solutions previously created (Haryuda et al., 2021). It involves testing the prototype to collect feedback, understand the solution's effectiveness, and make necessary improvements.

Thus, conducting research using the Design Thinking method consists of the stages of Empathize, Define, Ideate, Prototype, and Test, each producing various outputs such as prototypes or test results. Further explanation on using Design Thinking for this activity will be discussed in the results and discussion section.

#### **Results and Discussion**

#### **Empathize**

In this stage, the aim is to understand users' problems, needs, and desires through various methods such as interviews, observations, and questionnaires. Interviews were conducted with respondents within the Informatics Engineering study program at UDINUS. Below are some of the questions asked during the interviews:

Table 1. List of Questions

No	List of Questions						
1.	Is information about the study program important? Please provide your reasons.						
2.	How do you access information about the study program?						
3.	Is it currently difficult to access information about the study program?						
4.	What do you think if the Informatics Engineering study program provides access to						
	information about the study program?						
5.	Will creating an information website for the Informatics Engineering study program						
	help both students and lecturers find information?						
6.	What information do you think is necessary for the Informatics Engineering study						
	program?						

7.	Is information related to MBKM (Merdeka Belajar Kampus Merdeka) necessary if a system related to Informatics Engineering is implemented? If so, please provide your reasons.
8.	What features do you expect to be available on the Informatics Engineering study program website?
9.	What kind of website design would you like if the Informatics Engineering study program creates a website?

This stage aims to identify whether respondents encounter issues with the Informatics Engineering study program's website and to find solutions to align the prototype design with user needs.

#### **Define**

The second stage, Define, involves pinpointing the core problems based on the data collected previously. From the data obtained, five respondents aged 20-22, who are accustomed to using technology, especially accessing websites, were surveyed. The data revealed that users were dissatisfied with the Informatics Engineering study program website, indicating a need to research and improve the system and components of the website. Based on the problems identified, the following list of needs was formulated from the data collected during the Empathize stage:

Table 2. Needs

No	Needs					
1.	An attractive user interface design					
2.	A chat feature with admin to communicate with the study program when there are					
	issues					
3.	An informative profile feature about the study program					
4.	Informative news and event features					
5.	Academic and career reference features					
6	Alumni stories feature for the Informatics Engineering study program					
7	Features related to the Merdeka Belajar Kampus Merdeka (MBKM) program					

The needs listed above suggest that the researcher has identified user problems and is ready to provide solutions, such as adding necessary features to the Informatics Engineering study program website.

#### **Ideate**

The previous stage identified issues with the Informatics Engineering study program website. The Ideate stage aims to generate solutions for these problems. The researcher proposes improving the interface design, addressing user complaints about font choices, uncomfortable color schemes, and unengaging copywriting. Solutions include enhancing the website's features, such as adding a chat feature with the admin for users facing issues, providing an informative study program profile, creating an informative news and events feature, and adding academic features like curriculum details and career references for Informatics Engineering graduates.

Before developing the website prototype, the researcher created wireframes, which are basic structures of a webpage including components like banners, headers, content, footers, links, forms, etc (Putra et al., 2023). Below are the wireframe designs based on the proposed solutions:

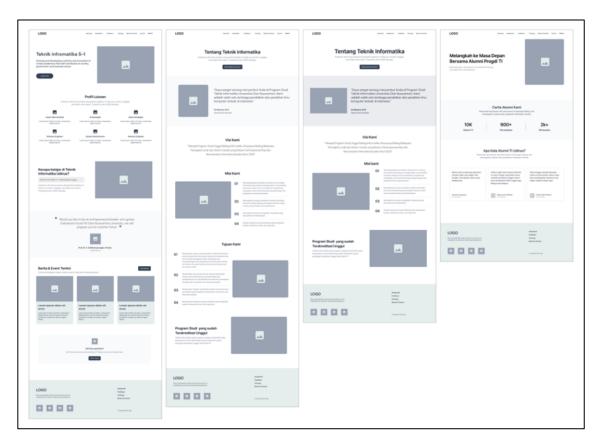


Figure 1. Wireframe of the Informatics Engineering Study Program Profile

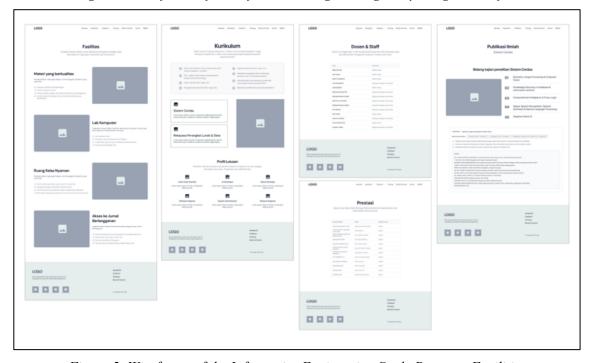


Figure 2. Wireframe of the Informatics Engineering Study Program Facilities

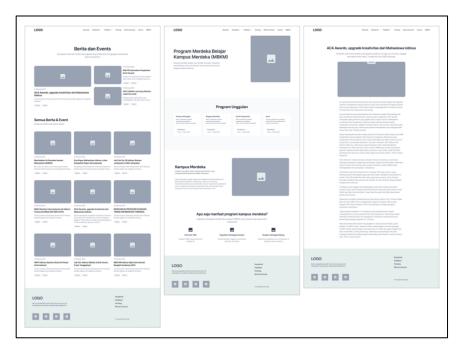


Figure 3. Wireframe of the Informatics Engineering Program and News

The wireframes above illustrate the design for each feature of the Dian Nuswantoro University's Informatics Engineering Study Program website. These wireframes will guide the prototype development.

#### **Prototype**

This stage follows the wireframe creation, implementing it into a high-fidelity prototype design. This stage results in a UI for the Informatics Engineering study program website that includes colors, illustrations, images, copywriting, and layout according to the design. The design for the Informatics Engineering study program website produces features and appearances that meet user needs by adding several features and an attractive user interface. The prototype was created using Figma software. Below are the design results:

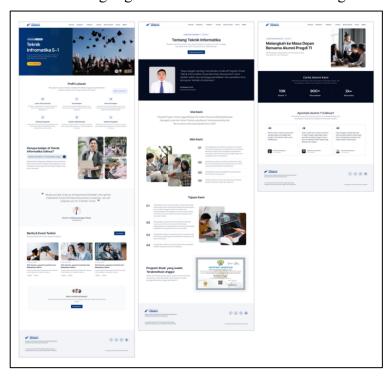


Figure 4. User Interface Design of the Informatics Engineering Study Program Profile

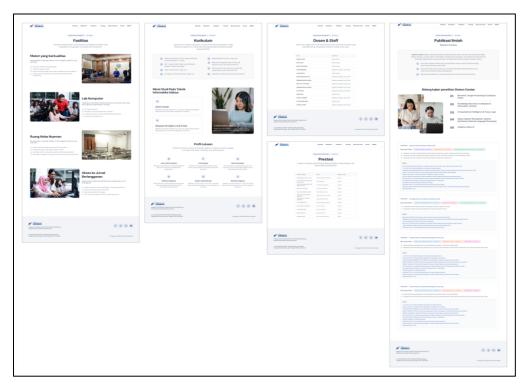


Figure 5. User Interface Design of the Informatics Engineering Study Program Facilities

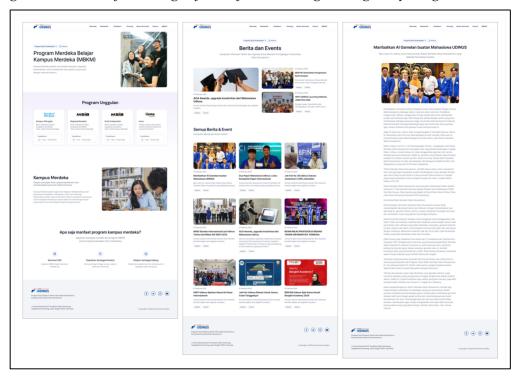


Figure 6. User Interface Design of the Informatics Engineering Program and News

#### **Test**

In this stage, testing the design solution created by the researcher is conducted with respondents. This involves displaying the Informatics Engineering study program website prototype to respondents, who then fill out a questionnaire. This test uses the User Acceptance Test (UAT) method, aiming to assess whether the software meets user needs (Pillai & Hemamalini, 2022). It goes beyond just meeting system specifications and usability, validating whether the system is acceptable to users (Hady et al., 2020). Below is the scoring table presented in the questionnaire:

Table 3. Scoring Weights

Very suitable (5)	A
Suitable (4)	В
Neutral (3)	С
Not suitable (2)	D
Very unsuitable (1)	Е

Table 4. UAT Questions

No.	Questioner	Answer					Value						
		A	В	C	D	E	A	В	C	D	E	Results	
1.	Are you able to easily understand the various menu features provided by this system?	3	2	0	0	0	15	8	0	0	0	92	
2.	Are you able to easily find information about the Informatics Engineering study program provided?	1	3	1	0	0	5	12	3	0	0	80	
3.	Can you understand the information available in the application?	2	2	1	0	0	10	8	3	0	0	84	
4.	Is the appearance and design of this application attractive and enjoyable to use?	3	2	0	0	0	15	8	0	0	0	92	
5.	Do you find it easy to navigate through the application's interface?	2	1	2	0	0	10	4	6	0	0	80	
6.	Do you feel comfortable and assisted by the information or instructions provided in the application?	2	2	1	0	0	10	8	3	0	0	84	

Explanation of Table 3.4 regarding UAT questions: a) First Question: Based on the table, the responses from five respondents to the first question had a total score of 23. The average for the first question is 23/5 = 4.6. The percentage score is  $4.6/5 \times 100 = 92\%$ ; b) Second Question: The responses from five respondents to the second question had a total score of 20. The average for the second question is 20/5 = 4. The percentage score is  $4/5 \times 100 = 80\%$ ; c) Third Question: The responses from five respondents to the third question had a total score of 21. The average for the third question is 21/5 = 4.2. The percentage score is  $4.2/5 \times 100 =$ 84%; d) Fourth Question: The responses from five respondents to the fourth question had a total score of 23. The average for the fourth question is 23/5 = 4.6. The percentage score is  $4.6/5 \times 100 = 92\%$ ; e) Fifth Question: The responses from five respondents to the fifth question had a total score of 20. The average for the fifth question is 20/5 = 4. The percentage score is  $4/5 \times 100 = 80\%$ ; f) Sixth Question: The responses from five respondents to the sixth question had a total score of 21. The average for the sixth question is 21/5 = 4.2. The percentage score is  $4.2/5 \times 100 = 84\%$ . Based on the total value from 6 questions, the total score is 512. With an average score of 512/6 = 85%. This result indicates that the usage and information provided on the Informatics Engineering study program website meet user needs.

#### **Conclusion**

Based on the research conducted on the design of the user interface prototype for the Dian Nuswantoro University's Informatics Engineering study program website using the Design Thinking method, it can be concluded that this design addresses existing problems by providing solutions such as redesigning the user interface and adding features like live chat, a photo collection of activities on the homepage, IT-related video references, a scroll back feature, and an alumni feature linked to LinkedIn. The design was tested with five respondents by directly displaying the prototype and filling out questionnaires regarding the design assessment. Respondents gave positive feedback, indicating that the solution design met user needs and provided an attractive user interface. Thus, the design of the Informatics Engineering study program website successfully addresses existing problems and provides positive impacts for users.

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