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# Design and Development of a Web-Based Lost Pet Application Using the Design Thinking Method

**Yehezkiel Gabriel Sinulingga[1]*, Jackri Hendrik[2], Leony Hoki[3]**

[1,2,3] *STMIK TIME*

*Fuglores123@gmail.com[1*], jackri.hendrik@gmail.com[2*],leony.hoki@gmail.com[3*]*

**Abstract**

This study produced a web-based lost pet application design using the Design Thinking method. User surveys were conducted to understand real needs and challenges, guiding the development of features. The result is a user-centered solution that makes reporting and finding lost pets more structured and efficient.

***Keywords***: *Lost Pet, Web-Based Application, Design Thinking*

## 1. Introduction

Losing a pet can be a stressful experience for owners[1], yet there is still no centralized platform to help report and find lost pets efficiently[2], thus causing low amount of reunification. Most people rely on social media or printed posters, which often lead to incomplete and unverified information. This study aims to design a web-based application that helps users report and search for lost pets in a more structured way. Using the Design Thinking method, which focuses on understanding user needs through surveys and iterative development[3], this project provides a user-centered solution to improve the chances of reuniting pets with their owners.

## 2. Research Methods

This research aims to design and develop a web-based pet lost-and-found application using the Design Thinking method. This approach was chosen to foster innovation and create user-centered solutions by challenging assumptions, redefining problems, and generating prototypes for testing[4]. The method requires user data, which in this case will be collected from pet owners through surveys and questionnaires.

The development process begins with five stages: Empathize, Define, Ideate, Prototype, and Test[5]. In the Empathize stage, the focus is on understanding the needs, experiences, and challenges faced by pet owners who may lose or find pets. The Define stage involves analyzing this information to clearly state the problem that the application must solve. Next, during Ideate, various possible solutions are generated and explored to address the identified problem. These ideas are then brought into the Prototype stage, where initial versions of the application are designed to visualize and test core features. Finally, in the Test stage, these prototypes are evaluated with users to gather feedback and refine the application for better usability and effectiveness.


**Fig. 1:** Phases of Design Thinking Process

### 2.1. Emphatize

The first stage of the design process is Empathy, where the author seeks to deeply understand the experiences and needs of users of the pet lost-and-found web application. To achieve this, questionnaires were used to collect broad quantitative data on user preferences, challenges, and desired features, while interviews provided deeper insights into their emotions and expectations[5]. Together, these methods offered both general patterns and detailed context, forming a solid foundation for defining the problems to be solved in the next stage.

After distributing questionnaires to pet owners as the main target audience, the author identified several key insights regarding the features and expectations they would like to see in a pet lost-and-found website. The conclusions drawn from the findings are as follows:

1. Respondents struggle to begin searching for lost pets as they are unsure where to start.
2. They want a dedicated platform for reporting lost and found pets.
3. Clearer information on the pet's last known location is desired.
4. Respondents want an easy way to upload pet photos.
5. A detailed description form (color, size, unique traits, etc.) is expected.
6. Direct contact with the reporter or finder is considered important.
7. A map showing the last seen or found location is needed.

Based on these findings, the process will continue to the Definition stage.

### 2.2. Definition

After gaining a deeper understanding of users in the Empathize stage, the next step is the Define stage, which focuses on formulating specific problems to be addressed in the design of the pet lost-and-found web application. In this stage, data collected from questionnaires is analyzed to identify key patterns and insights, allowing the author to determine the core user needs and translate them into clear design challenges that can guide the development of relevant solutions.

### 2.3. Ideation

In the Ideation stage, the author develops creative solutions based on insights from the Empathize and Define stages, aiming to generate innovative ideas that address user needs and problems. For the design of the pet lost-and-found web application, this involves exploring relevant features, creating an intuitive and efficient interface, and considering both user feedback and current trends in reporting applications. The proposed application will be named Carihewan, with the outcomes of this stage concluded below.

1. Interactive map for last-seen or found locations.
2. Photo upload support.
3. Detailed description form (name, color, size, traits, etc.).
4. Direct contact between reporter and finder with data security.
5. Tips and guidance page for handling lost pets.
6. Post verification to ensure authenticity through an admin dashboard.
7. Ability for users to monitor the approval status of their posts and manage outdated submissions.

The Ideation stage serves as the foundation for developing an initial prototype, which will be evaluated by users in the subsequent stage.

### 2.4. Prototype

After generating potential ideas, the next stage is Prototyping. In this stage, the most viable ideas are developed into user flows, style guidelines, wireframes, and concrete prototype designs. The prototype serves as a visual representation of the planned pet lost-and-found web application and will be used for further evaluation. It will be tested with potential users to identify usability issues and gather feedback, which will then be applied to refine and optimize the prototype prior to final implementation.

## 3. Result and Discussion

### 3.1. Website Result

The following are the results of the final product after a series of refinements made during the prototyping stage. The prototype was iteratively improved based on user feedback and evaluation, leading to a more functional and user-friendly design. This final version reflects the implementation of features identified in the earlier stages, ensuring that the website effectively addresses the needs of pet owners in reporting and finding lost pets.

**a.** The homepage of the CariHewan application is designed with a simple and intuitive interface to facilitate both reporting and searching for lost pets. The header displays the logo on the left and navigation elements on the right, including search, "Lost and Found," reports, help, and profile access. The main content is divided into two columns: the left side dynamically displays pet images through API integration, while the right side provides two primary action buttons, "Report Lost Pet" and "Report Found Pet," each supported

by visual icons. A tagline and participatory message further emphasize the application's purpose, while the use of structured layout, soft colors, and clear iconography enhances user experience.

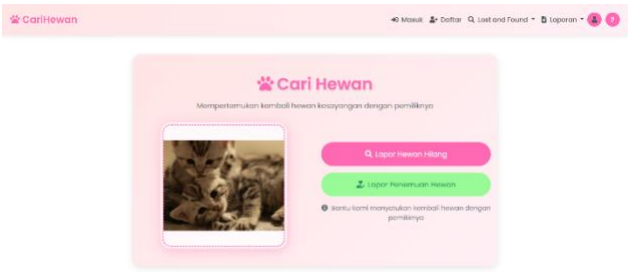


**Fig. 2:** Homepage

**b.** The Login page is designed for simplicity, featuring two main input fields, "Email" and "Password," each with supportive icons, and a pink "Login" button to submit user credentials, followed by a pop-up confirmation upon successful entry. A link at the bottom directs new users to the Registration page, which includes required fields such as full name, email, phone number, and password confirmation, all structured with icons for clarity. Data normalization is applied to ensure that information is stored separately and securely, preventing overlaps between users. Once authenticated, the header automatically updates by removing the "Login" and "Register" options and displaying the profile icon to indicate active user access.

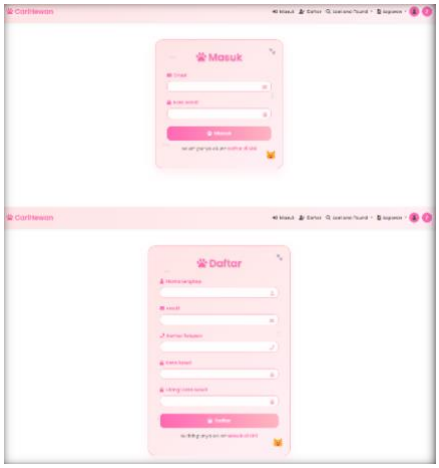


**Fig. 3:** Login and Register page

**c.** The Lost and Found section of the CariHewan application presents two main report categories, "Lost Pets" and "Found Pets," accessible through the navigation menu. Reports are displayed as cards containing pet images, brief descriptions, and structured details such as species, last known or found location, and reporting date. Lost pet reports emphasize the owner's account of disappearance, while found pet reports provide discovery details without owner information. Each card can be expanded via a modal window showing additional details, including images, characteristics, location, and reporter contact information. Pagination is implemented to manage report display, while consistent visual elements and interface structure ensure a cohesive and user-friendly experience across the application.

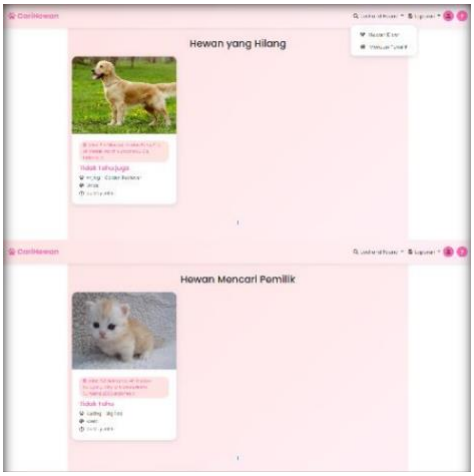


**Fig. 4:** Lost and Found page

**d.** The reporting page consists of three main components: report type selection, reporting forms, and user report history. Users first choose between “Lost Pet” or “Found Pet,” each leading to a context-specific form. Forms include detailed pet information and integrate an interactive Bing Maps API for accurate location input, standardized through GeoConverter. A history page allows users to review submitted reports, view approval status, and manage entries. This design ensures a clear, efficient, and organized reporting process with consistent interface and accurate location integration.

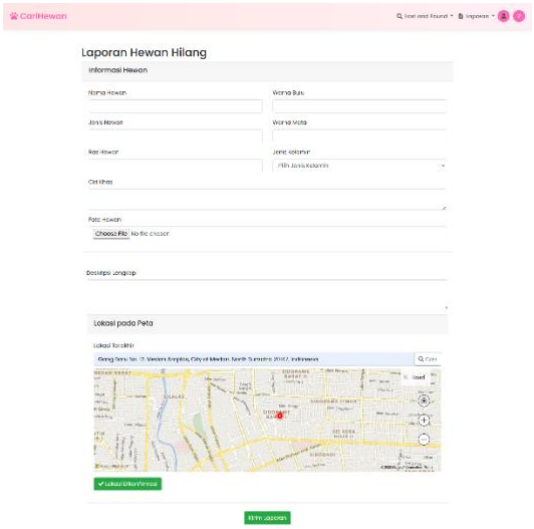


**Fig. 5:** Reporting form page

**e.** The User Profile page, accessible via the profile icon in the header, centralizes account information in a structured card layout. It displays the user’s visual identity (profile icon, name, and email), detailed personal data (full name, email, phone number, and join date), and includes a red “Logout” button to securely end the session.

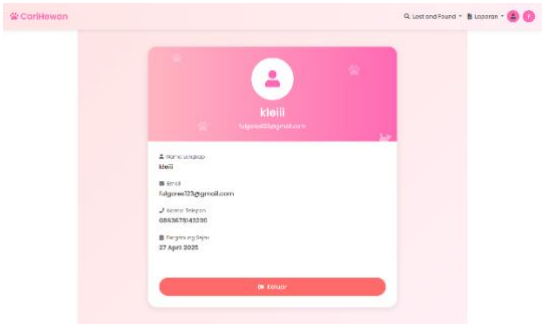


**Fig. 6:** Profile page

**f.** The Help page, accessible via the header icon, provides step-by-step guides for reporting lost or found pets, along with practical search tips. A “Need More Help?” section offers additional support through direct links to the application’s official Instagram and a feedback form, ensuring user guidance and accessible communication channels.


**Fig. 7:** Help page

**g.** The Administration page serves as a secure workspace for administrators, accessible via authentication. It provides a dashboard with key metrics (users, pending and approved reports) and management modules for reports and users. Designed with a distinct interface, it supports efficient monitoring, content control, and system management.

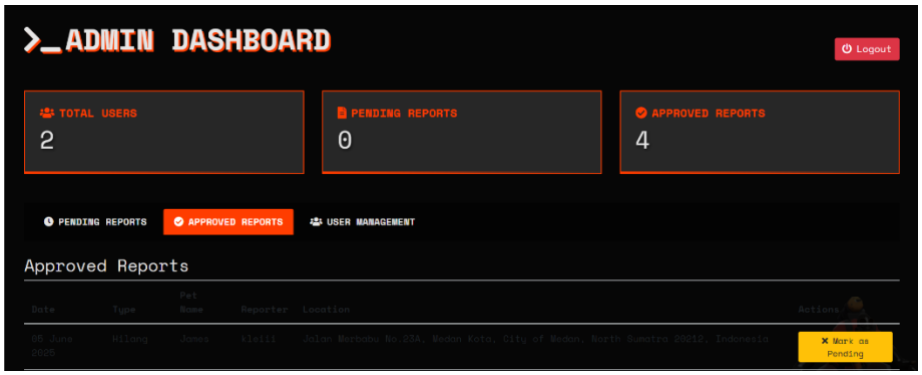


**Fig. 8:** Admin dashboard

### 3.2. Testing

The testing was conducted through a questionnaire involving 95 respondents, consisting of pet owners, animal enthusiasts, and developers. The results indicate high satisfaction: 96.9% favored the interface design, 90.6% were satisfied with the reporting form, 96.9% rated Bing Maps integration as excellent, 90.6% found the reporting process clear, and 90.6% expressed overall satisfaction. These findings demonstrate that the application is effective, user-friendly, and well-aligned with user needs.

## 4. Conclusion

Based on the research and application of the Design Thinking method in developing a web-based pet loss reporting application, it can be concluded that:

1. Design Thinking proved effective in producing a solution aligned with user needs;
2. The application successfully facilitates pet loss and discovery reporting, as confirmed by user acceptance testing
3. the interface and features were designed from real user data and feedback, ensuring relevance and practical applicability.

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