

PHASE 5 - Report

Final Implementation and Heuristic Evaluation



WiseWal.ai
(Savings and Expense tracker with AI based financial advisor)

Team 2

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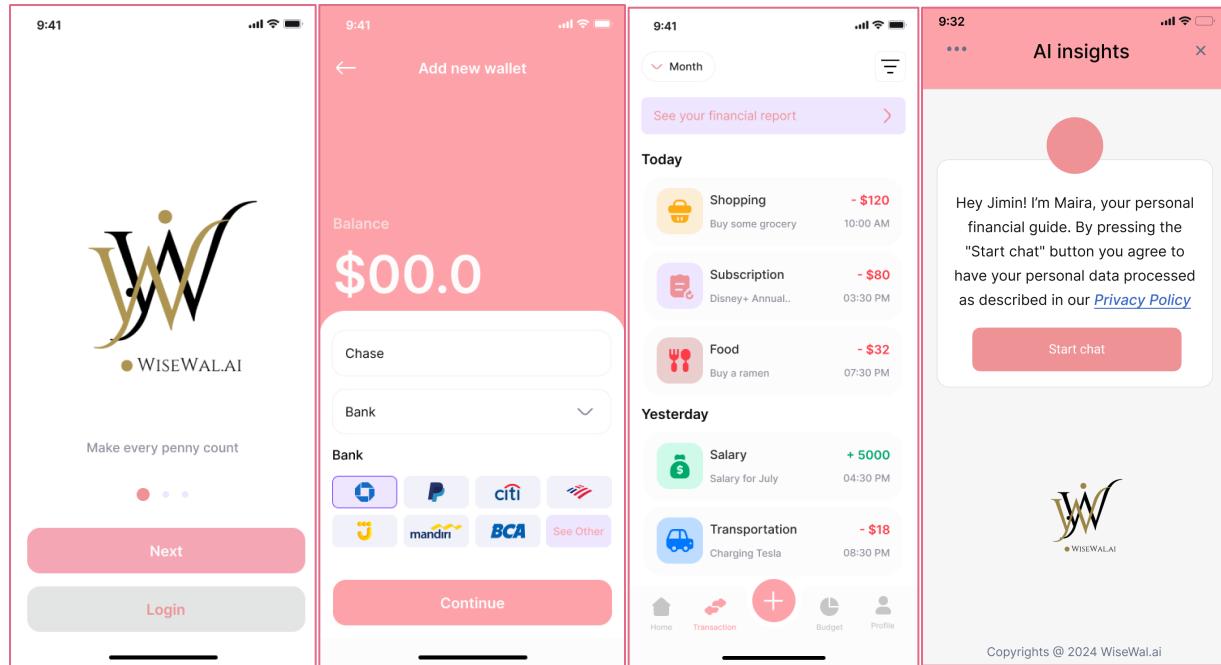
1. Introduction

In the evolving landscape of personal finance management, the challenge of effectively tracking expenses and planning budgets remains paramount for individuals striving for financial stability and growth. **WiseWal.ai** emerges as a sophisticated solution, **combining the conventional aspects of financial tracking with the innovative edge of AI-driven advice**. This app is designed to address the common pitfalls of financial management, including lack of insight, difficulty in maintaining budgets, and the overwhelming nature of financial decision-making.

By integrating AI technology, WiseWal.ai aims to transform user data into personalized, actionable advice, thereby empowering users to make informed financial decisions, track their spending more efficiently, and plan their budgets with greater precision.

Design Approach: The user interface (UI) is crafted to be intuitive and user-friendly, catering to both novice and experienced users. Key features are easily accessible, and information is presented in a clear, concise manner to avoid overwhelming the user. The design philosophy revolves around minimalism and functionality, ensuring that users can navigate the app smoothly and efficiently.

1.1 Key Design Snapshots of WiseWal.ai



2. Design

2.1 Design overview of WiseWal.ai:

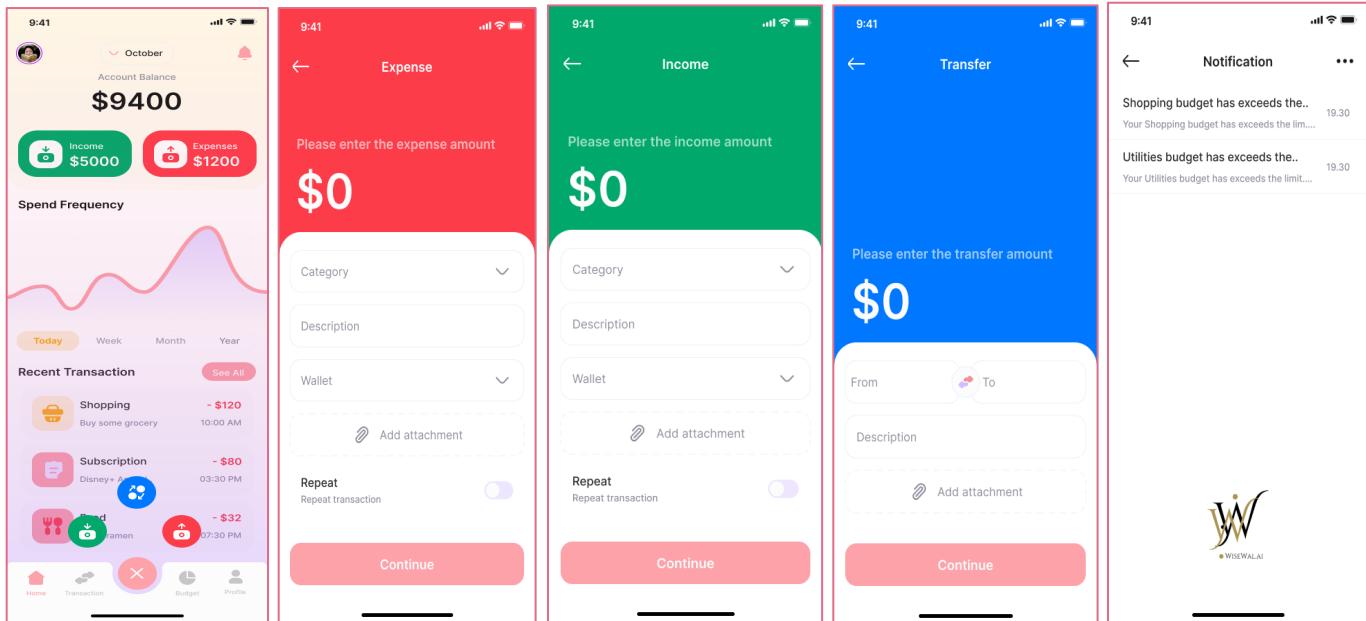
The design of our app is guided by principles of clarity, simplicity, and user engagement. We aim to create an environment where managing finances is not only intuitive but also visually appealing. This involves a strategic layout that emphasizes ease of navigation and minimizes user effort to perform common tasks.

2.2 Key Design Elements:

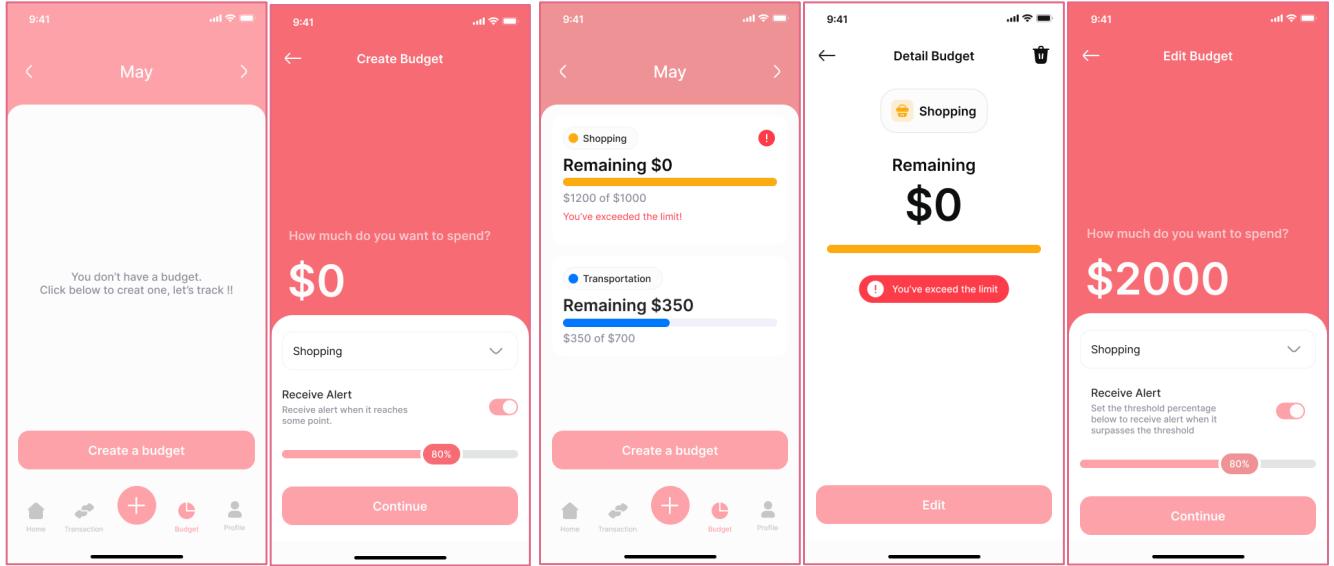
- Color Scheme:** We use a calming palette of **pale link and peach**, which are often associated with peacefulness. These colors are chosen to **reduce anxiety** about financial matters and to make the app feel more secure and stable.
- Typography:** The app uses modern, **easy-to-read fonts** with adequate spacing to enhance readability. **Important figures** (like total expenses or savings) are **bolded** to catch the user's eye quickly.
- Iconography:** Icons are simple and representative of their functions, designed to be easily understood at a glance. This helps in reducing the learning curve for new users and in speeding up navigation for returning users.
- Interactive Elements:** Buttons and interactive elements are designed with distinct colors to stand out from the informational content. They are also large enough to be easily tapped, catering to users on various devices, including those with smaller screens.

2.3 Design of the major tasks' interface:

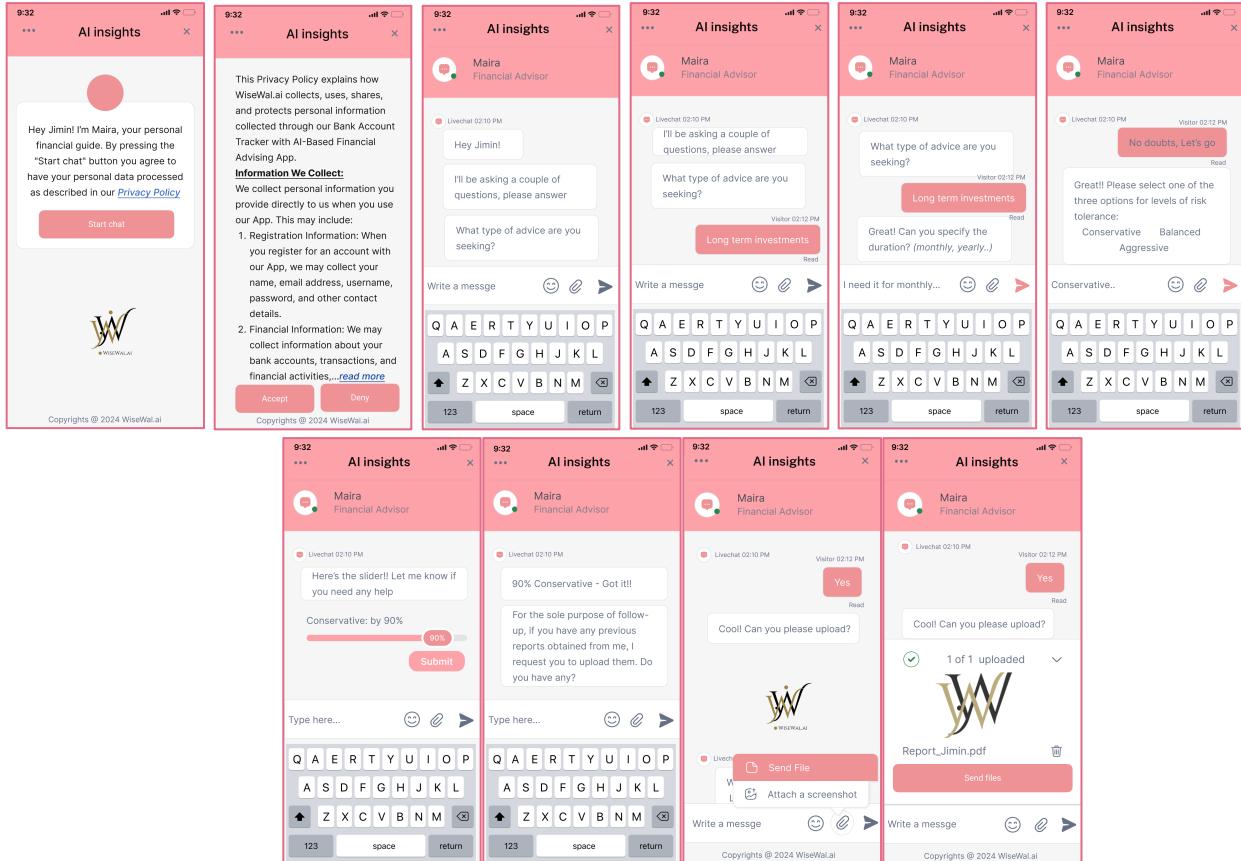
HOME PAGE, ADD EXPENSE/ADD INCOME: These pages include the home page, adding new expense, adding new income, adding the digital transactions that were done using Zelle/ApplePay/Wallet



BUDGET PLANNING PAGE: Interface have the pages for the user to plan a budget, set alerts and get notifications. This scenario is the Task 2 which is the medium difficult task in our user testing. The user can plan a budget, set an alert for a particular threshold percentage, based on which they can be notified about the limit exceeding's if they do so. The notifications can also set or updated in the settings block.



AI ADVICE - BY CHATBOT MAIRA: This interface pages shows the AI based financial advice obtaining process from the AI - integrated financial advisor - Maira. (Task 3 in user testing)



3. Implementation

3.1 Operating Systems:

WiseWal.ai is accessible on multiple platforms, ensuring users can manage their finances anytime, anywhere.

- Android: Requires Android 8.0 (Oreo) or newer.
- iOS: Requires iOS 12.0 or later.

3.2 Future Technologies for Implementation:

1. **Operating System:** We will deploy our application on both iOS and Android platforms to ensure broad accessibility and user engagement. Utilizing cross-platform frameworks will also be considered to streamline development.
2. **Programming Languages:** The core application will be developed using **Python** for backend services due to its robust libraries and frameworks that are well-suited for financial data processing and machine learning tasks. For the frontend, we will employ **JavaScript** along with **React Native** to provide a seamless and responsive user interface.



3. **Toolkits and Frameworks:** For the AI-based financial advisor, **TensorFlow** and **PyTorch** will be employed to handle machine learning operations, due to their extensive support for deep learning models which are crucial for predictive analytics in financial advising.



3.3 Limitations and Trade-offs:

1. **Cross-Platform Development:** While using a framework like **React Native** for **iOS** and **Android** deployment accelerates development and **reduces costs**, it may lead to decreased performance compared to native applications. This trade-off is justified by the significantly lower development and maintenance costs, making it a viable option for our initial rollout phase.

2. **Python for Backend Services:** Choosing Python offers **extensive library support** and a strong community for developing AI-driven features. However, **Python's slower runtime** can be a drawback for real-time data processing tasks. We mitigate this by implementing **critical performance-dependent components** in faster languages like **Go** or **Rust**, ensuring that performance bottlenecks are minimized.



3. **Machine Learning Frameworks:** Using TensorFlow and PyTorch allows us to leverage state-of-the-art machine learning techniques, but it requires substantial computational resources and expertise. The trade-off here is higher operational costs for better predictive accuracy and personalization capabilities. This is justified by the enhanced user experience and precision in financial advice, which are expected to drive higher user retention and satisfaction.

4. Evaluation

4.1 User Testing

Pilot User testing: Prior to the real user testing the product was first tested with one of our classmates as a part of pilot user study. Once the outcomes looked good and the procedure went smoothly we proceeded with the real user testing.

Key Results of Pilot User Testing:

- The participant was able to navigate through the app's features smoothly, demonstrating a clear understanding of the user interface without requiring additional guidance.
- They completed all assigned tasks within the expected time frame and reported finding the app intuitive and user-friendly.
- The feedback highlighted the app's responsiveness and the logical arrangement of features, which significantly enhanced their user experience.
- Additionally, the classmate provided constructive feedback that confirmed the relevance of our current design choices while suggesting minor enhancements that could make the experience even more engaging.

4.1.1 Selection of users: *Description of how we found the users*

For the usability testing phase of our project, we carefully selected three representative users from our target population to ensure a broad and relevant set of feedback:

1. **User 1** - A Doctoral candidate in the Agriculture department at North Carolina State University (NCSU), in their mid-20s with medium tech-savviness. This user represents academically inclined individuals who regularly manage their finances but may not be deeply familiar with advanced financial tools.
2. **User 2** - An undergraduate student in the Statistics department at NCSU, aged 17-19, with lower tech-savviness. This user helps represent younger users who might be new to managing finances independently and are less familiar with financial apps.
3. **User 3** - A Master's student in the Engineering Management program at NCSU, in their early 20s with high tech-savviness. This user is accustomed to using technology solutions for daily operations and represents users who might seek sophisticated features in an app.

4.1.2 User Briefing Process: *Description of how users were briefed*

Objective and Purpose: We started the briefing by clearly explaining the objective of the usability test. We informed the participants that the purpose of the session is to evaluate the usability and functionality of the savings and expense tracker app, emphasizing that reason that they are testing the app for. We made it clear that their feedback is valuable for improving the app's design and user experience.

Confidentiality and Consent: We ensured that the participants understand that their responses and data will be confidential and used solely for the purpose of improving the app. Further we obtained their consent to record the session, explaining that video and audio recordings will help the development team observe interactions and listen to verbal feedback accurately.

Introduction to the App: The Facilitators started to provide a brief overview of the app, including its main functions and goals. We explained in a clear way that the app is designed to help users manage their finances with tools for tracking expenses, creating budgets, and receiving personalized financial advice from an AI advisor.

Detailed Task Instructions:

1. **Task Explanation:** Walk through each task that the participant will perform. For example:
 - a. **Adding Expenses:** Show them the interface where expenses are added, explain how to enter details, and how to categorize expenses.
 - b. **Setting Budgets:** Describe how to access the budget setting feature, how to set a budget for different categories, and what information they need to input.
 - c. **Using the AI Advisor:** Explain how to interact with the AI advisor, what kind of advice they can expect, and how they can implement this advice in their financial planning.
 2. **Tools and Controls:** Introduce and explain any tools or controls they will use during the test, such as buttons, sliders, or input fields. Highlight any specific interactions they need to perform, like swiping, tapping, or typing.
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4.1.3 Procedure of User Study and Team member roles: *Description of how user test was conducted (including roles of the project members)****Demo Script:***

For the execution of usability study we had prepared a detailed demo script which consisted of the workflow to be followed during the usability testing, probing questions to be asked and feedback inquiry that had to be done.

Task Description:

The index cards kind of task description were created for all the three tasks. These task description sheets were handed over to the users while they tested our prototype.

Conducting the Real User Study:

We conducted the study for 3 real users as mentioned in the *section 4.1.1*

The step-by-step breakdown of the usability study execution is as follows:

1. **Introduction and Icebreaker:** The facilitators - Reshma and Manasi began with a welcoming introduction, explaining the purpose of the study and participants' expectation. An icebreaker was used to comfort participants and ease communication.
2. **Background Questions:** Initially demographic information was collected to assess participants' previous experience with budgeting apps and technology. This step helped us in understanding their background and how it might influence their interaction with app.
3. **Consent:** We ensured that the participants read and agreed to consent, acknowledging their voluntary participation and the use of their data for research purposes.
4. **Task Execution:** The Facilitators guided participants through the usability tasks, while the observers (Yukta, Suraj and Aditya) were observing their interactions and noting any difficulties or points of confusion. We allowed them to perform tasks without assistance to get genuine feedback on the app's usability.

Task 1 (Easy): Adding/updating income and expenses.

Task 2 (Medium): Planning or setting up a budget.

Task 3 (Difficult): Obtaining AI-curated financial advice.

5. **Systematic Observations and Probing Questions:** The observers observed and documented non-verbal cues and asked probing questions after each task to delve deeper into participants' thought processes and experiences. (*Please refer the Demo script in the Appendix section for Probing questions*)
6. **Wrap-Up Questions and Feedback:** To conclude, we asked open-ended questions to gather overall impressions, suggestions for improvement, and any additional comments participants may have. This served as suggestions for further iterative redesigning.

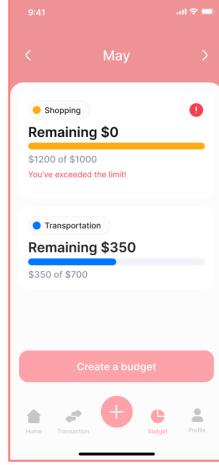
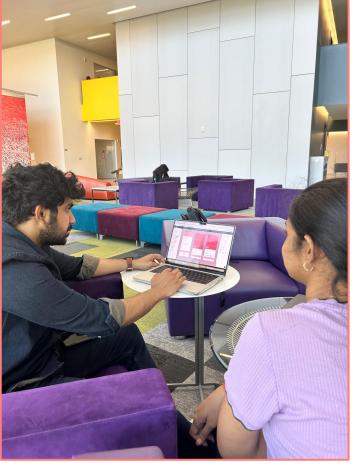
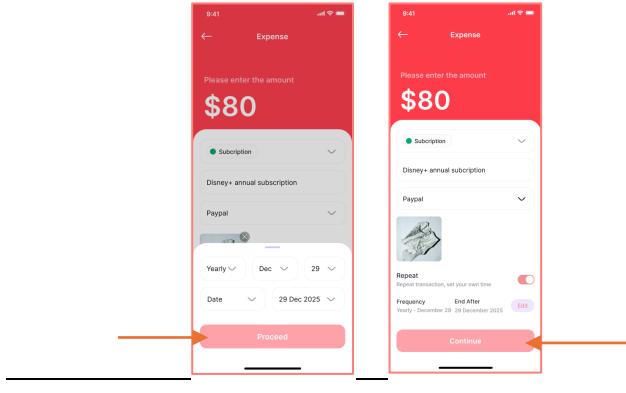
Roles of team members:

The roles of team members are as follows:

Facilitators: Reshma Rajashekaraiah, Manasi Bhagwat

Observers: Yuktasree Muppala, Aditya Sonar, Suraj Raghu Kumar

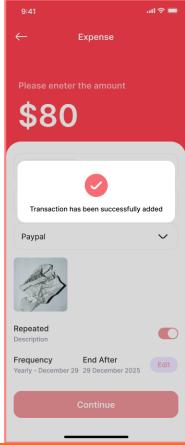
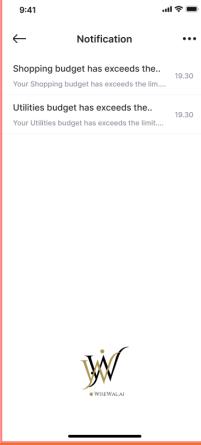
4.1.4 Lists usability problems uncovered by this final evaluation

Users No.	Usability Problems found
User 1	<p>After setting a new budget, there is no immediate feedback or confirmation provided to the user. This absence can leave users uncertain whether their changes were saved.</p>  
User 2	<p>Inconsistent labeling of action buttons across different screens. Some screens use "Proceed"; others use "Continue".</p>  

User 3



- Users cannot undo accidental expense entries easily.
- The application expects users to remember the budget limit set months ago without displaying it in the notification.

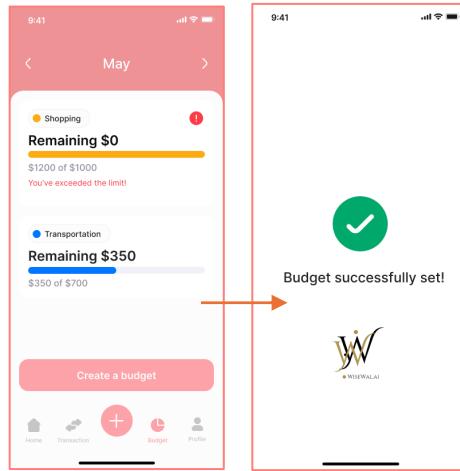



4.1.5 Proposed Changes for usability problems – *description of proposed design changes that would address usability problems*

For Problem 1: By User 1:

Problem: After setting a new budget, there is no immediate feedback or confirmation provided to the user. This absence can leave users uncertain whether their changes were saved.

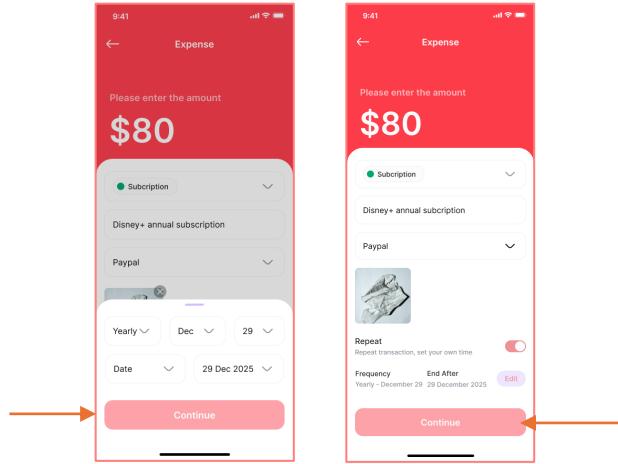
Fix: Implement a clear, visible confirmation message and notification whenever a budget is successfully set or updated.



For Problem 2: By User 2:

Problem: Inconsistent labeling of action buttons across different screens. Some screens use "Proceed"; others use "Continue".

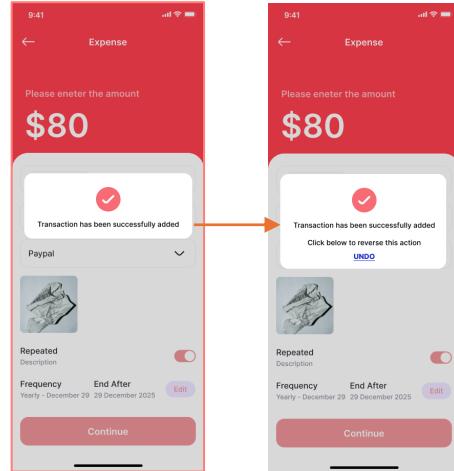
Fix: Standardize the labels across all screens to maintain consistency. (made it as “continue”)



For Problem 3: By User 3:

Problem: Users cannot undo accidental expense entries easily

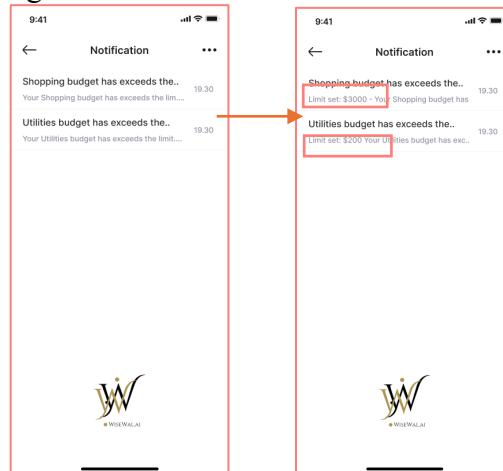
Fix: Add an "undo" button to reverse recent entries quickly.



For Problem 4: By User 3:

Problem: The application expects users to remember the budget limit set months ago without displaying it in the notification.

Fix: Include the set budget limit within each notification about exceeding the budget.



4.1.6 Hypothesis summary

Hypothesis: Financial Management and Decision Making is Satisfactory

Participants who use the financial management app will report higher satisfaction levels and perceive the app as more usable compared to participants who do not use the app/the ones who use other competitor applications which are basically a separate parts of finance tracking applications and financial advice seeking applications

User No.	Average no. of clicks per task	Total Testing Time Taken (mins)	Usability Problems count	User Satisfaction Rating (Scale of 10)
User 1	20	26	1	8/10
User 2	25	35	1	8/10
User 3	15	20	2	9/10

Number of participants	3
Mean time taken by users (in mins.)	20
Average Ratings for user satisfaction	8.33/10
Median of time taken by the users (in mins.)	20

4.1.7 Dependent and Independent variables:

Independent Variables:

Independent variables are the factors that you manipulate to observe their effect on the dependent variables. These are the variables you change in an experiment to test their impact on another aspect of the study. We considered the below independent variables:

- AI Advice Personalization:** The degree of customization in the financial advice provided by the AI, categorized as low, medium, and high personalization.
- Interface Complexity:** Varying the complexity of the user interface to see how it impacts users with different levels of tech-savviness.

How to implement this ?

Independent Variable - AI Advice Personalization:

We aim to operationalize this by designing three versions of the AI module:

- Low Personalization:** The AI offers generic financial advice based on standard financial principles without considering individual user data.
- Medium Personalization:** The AI uses basic personal data such as income level and monthly expenses to tailor advice.
- High Personalization:** The AI incorporates comprehensive data, including past spending behavior, financial goals, and real-time transactions, to offer highly specific advice.

Dependent Variables:

Dependent variables are the outcomes you measure in the experiment, which are affected by the manipulation of the independent variables. These are used to assess the effects of the changes you introduce. We considered the below dependent variables:

1. **User Satisfaction:** Measured through post-interaction surveys or questionnaires that assess users' overall contentment with the app, focusing on aspects like ease of use, perceived utility, and satisfaction with the AI advice.
2. **User Engagement:** Quantified by metrics such as session duration, frequency of app usage, and the number of interactions per session.

How to implement this?

Dependent Variable - User Satisfaction:

1. This could be measured using a standardized tool like the System Usability Scale (SUS) to provide a global view of subjective assessments of usability.
2. Additional direct questions related to the perceived helpfulness and relevance of the AI's advice could be included in the survey.

Dependent Variable - User Engagement:

1. Analyzing user interaction logs to track the frequency and duration of app usage over a defined period.
2. Monitoring the depth of engagement, such as the number of financial entries made, budgets set, or interactions with the AI advisor.

5. Heuristic Evaluation Results

Overview:

Our heuristic evaluation was conducted by five team members, each examining different aspects of the WiseWal.ai interface, which integrates functionalities such as an AI financial advisor, expense tracking, and budget management. This methodological approach provided comprehensive insights into various user interaction points.

5.1 Results summary from each team member

Individual Contributions:

Each evaluator focused on specific UI components, identifying a range of usability issues varying in severity from cosmetic problems to usability catastrophes that could significantly impair user experience:

1. **Evaluator #A** inspected the AI Financial Advisor UI.
2. **Evaluator #B** analyzed the Expense Adding and Updating UI.
3. **Evaluator #C** examined the Visualization Dashboard.
4. **Evaluator #D** reviewed the Budget Planning Interface.
5. **Evaluator #E** looked into Budget Notification functionalities.

Summary of Heuristic Evaluation by Team Members:

Note: The detailed Heuristic Evaluation report of each team member has been attached in the appendix section

Evaluator A: Reshma Rajashekaraiah

Focus Area: AI Financial Advisor UI

Key Issues:

- Missing 'back' button leading to process restarts (Severity 3)
- Need for visible cues to aid memory (Severity 2)
- Overly technical tooltips (Severity 1)
- Complex and cluttered graphs (Severity 2)
- Inconsistent action button labeling (Severity 4)
- Inconsistent date formats (Severity 1)

Evaluator B: Manasi Bhagwat

Focus Area: Expense Adding and Updating UI

Key Issues:

- Lack of expense type validation (Severity 2)
- Absence of an 'undo' button for accidental entries (Severity 2)
- Inconsistent font styles (Severity 1)
- No loading status indicator (Severity 3)
- Ambiguous error messages during submission failures (Severity 3)

Evaluator C: YuktaSree Muppala

Focus Area: Visualization Dashboard

Key Issues:

- Decorative elements that distract from key information (Severity 1)
- No feedback on data submission errors (Severity 3)
- Lack of logical data checks (Severity 2)
- Insufficient help documentation detail (Severity 2)
- Inconsistent color schemes across reports (Severity 1)

Evaluator D: Aditya Sonar

Focus Area: Budget Planning Interface

Key Issues:

- UI inconsistencies like button styles and color schemes (Severity 3)
- Lack of immediate feedback postbudget setting (Severity 2)
- No warnings for exceeding income during budget planning (Severity 1)
- Lack of shortcuts for experienced users (Severity 2)
- Navigation difficulties post initial budget setup (Severity 3)

Evaluator E: Suraj Raghu Kumar

Focus Area: Budget Notification UI

Key Issues:

- Vague notifications on budget exceedance (Severity 3)
- Unhelpful and complex help documentation (Severity 2)
- Inability to customize notification frequency (Severity 1)

- Cluttered and overwhelming budget notifications (Severity 1)
- Lack of visible budget limits in notifications (Severity 2)

Overall Insights:

The evaluation highlights several areas of improvement across different aspects of the application, focusing heavily on enhancing user control and freedom, improving error prevention, and ensuring consistency and clarity in the user interface. Key proposals include standardizing UI elements, implementing logical data validations, adding clear and direct feedback mechanisms, and simplifying complex interfaces to improve user understanding and navigation.

5.2 Aggregated results from HE discussions

The heuristic evaluation conducted on the WiseWal.ai app involved a detailed review of various interface components by our team evaluators, each focusing on different aspects of the user experience. The evaluation aimed to identify usability issues that could impede user satisfaction and efficiency while using the app. Below is an aggregated summary of the findings, followed by an interpretation of the results.

Aggregated Findings:

1. Visibility of System Status (H1):

Multiple evaluators identified issues with the lack of system feedback during operations such as loading and error occurrences. The **absence of immediate feedback when setting budgets** or submitting data was a recurring theme, pointing to a significant need for implementing progress indicators and confirmation messages.

2. User Control and Freedom (H3):

Concerns were raised about the **lack of "undo" functionality** and navigation issues that could trap users in certain screens without the ability to go back or correct mistakes. This lack of user control was noted as a major impediment to a smooth user experience.

3. Consistency and Standards (H4):

Inconsistencies in UI elements such as button labels, font styles, and color schemes were highlighted across different interfaces. These inconsistencies can confuse users and degrade the overall aesthetic and functional coherence of the app.

4. Error Prevention (H5):

Several critical issues were noted in error handling, particularly in forms where the type of data entry was not validated, and logical checks were absent. This could lead to the entry of incorrect or illogical data, potentially compromising the app's functionality.

5. Recognition Rather Than Recall (H6):

The need for **reminders and cues in the interface** to aid user memory when transitioning between tasks or entering related data in different parts of the app was emphasized. This would help reduce cognitive load and enhance user efficiency.

6. Aesthetic and Minimalist Design (H8):

Overcomplexity in graphical representations and cluttered information presentation were identified as areas that could overwhelm users. Simplifying these elements is crucial to improving clarity and focus.

7. Help Users with Errors (H9):

Error messages were often vague or not constructive, leaving users without clear directions on how to resolve issues. Enhancing the clarity and helpfulness of error messages is essential.

8. Help & Documentation (H10):

The existing help and documentation were found to be either too complex or not comprehensive enough, making it difficult for users to find relevant information quickly and easily.

Interpretation:

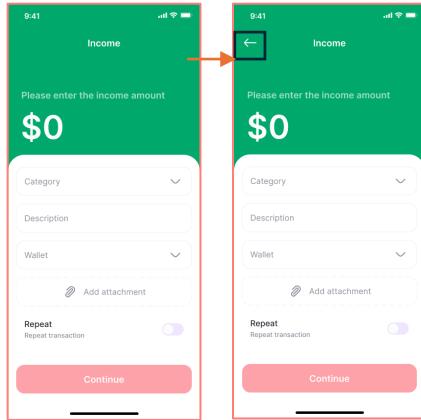
The heuristic evaluation of WiseWal.ai revealed a pattern of usability issues centered around system feedback, user control, consistency, and error prevention. These issues collectively suggest that the app currently lacks several critical user centered design principles, which could significantly impact user satisfaction and retention.

- **System Feedback and User Control:** The lack of feedback and control options could lead to user frustration, particularly when actions are irreversible or when the system status is unclear. Addressing these issues would not only improve usability but also instill a sense of confidence in the users.
- **Consistency:** Consistency in design is pivotal in helping users learn and navigate the app more effectively. Standardizing UI elements would reduce the learning curve and enhance the user experience.
- **Error Prevention and Documentation:** Robust error handling and comprehensive documentation are essential for minimizing user errors and providing necessary support when users encounter difficulties. Improving these areas would likely increase user trust and dependency on the app.

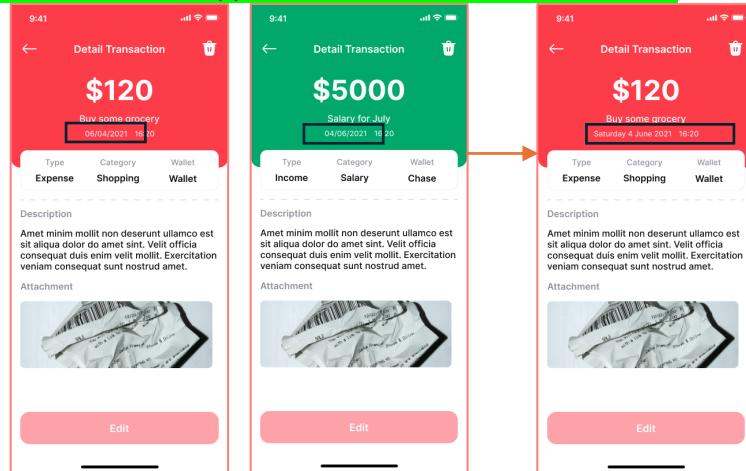
Overall, addressing these identified issues through targeted design and functional enhancements could lead to a more intuitive, reliable, and userfriendly application, ultimately driving higher engagement and satisfaction.

5.3 Heuristic Evaluation Fixed Issues and Solutions

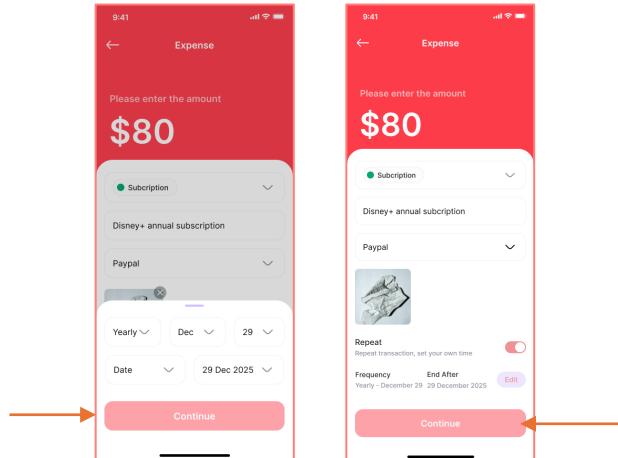
1. **H-3 User Control & Freedom] [Severity 3] [Found by: A]** The 'back' button is missing on the income details input screen, forcing users to restart the process if they enter incorrect information. **Fix: Add a 'back' button allowing users to correct mistakes without restarting.**



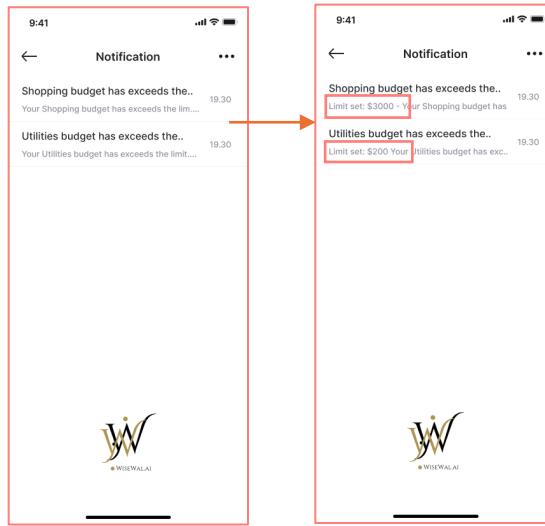
2. [H-2 Match Between System & Real World] [Severity 1] [Found by: A] The date formats vary between screens (MM/DD/YYYY on some and DD/MM/YYYY on others). **Fix:** Standardize the date format across the application based on the user's locale.



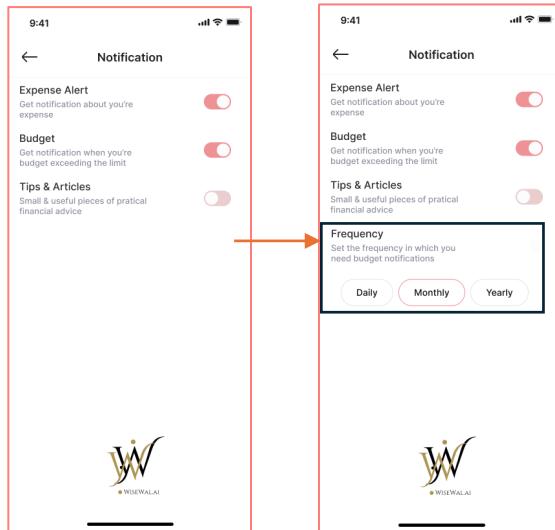
3. [H-4 Consistency & Standards] [Severity 4] [Found by: A] Inconsistent labeling of action buttons across different screens. Some screens use "Proceed", others use "Continue". **Fix:** Standardize the labels across all screens to maintain consistency.



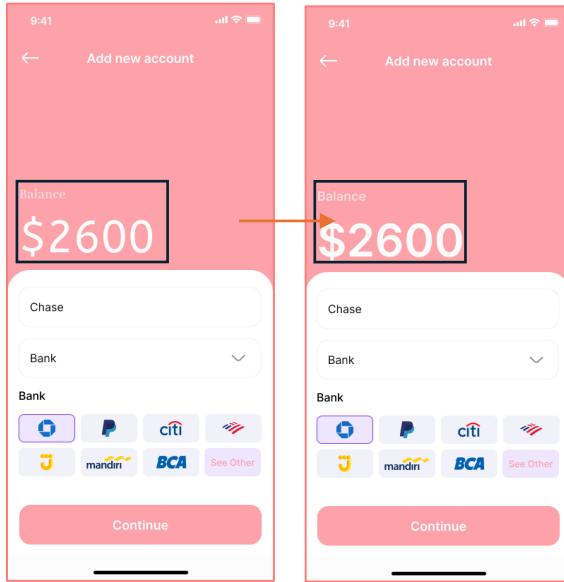
4. [H-6 Recognition Rather Than Recall] [Severity 2] [Found by: E] The application expects users to remember the budget limit set months ago without displaying it in the notification. **Fix:** Include the set budget limit within each notification about exceeding the budget.



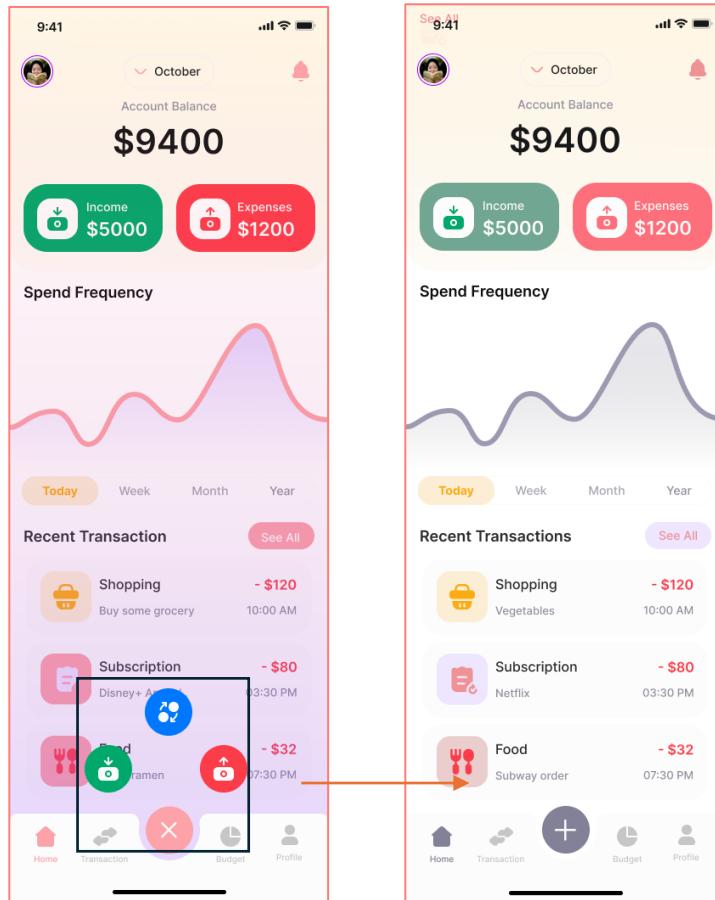
5. [H-3 User Control & Freedom] [Severity 1] [Found by: E] Users cannot customize the frequency of budget notifications. **Fix:** Allow users to set preferences for how often they receive budget notifications.



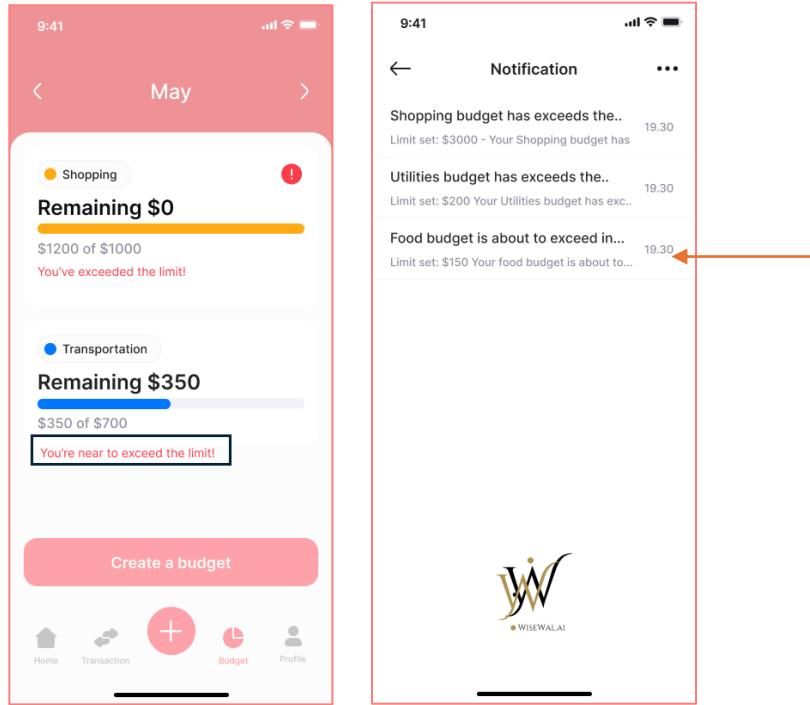
6. [H-4 Consistency & Standards] [Severity 1] [Found By: B] Discrepancies in the font styles used across different parts of the interface. **Fix:** Use a uniform font style throughout the application to enhance the visual consistency.



7. [H-8 Aesthetic & Minimalist Design] [Severity 1] [Found By: C] The monthly summary reports contain unnecessary decorative elements that distract from key information. **Fix:** Simplify the design by removing decorative graphics.



8. [H-5 Error Prevention] [Severity 1] [Found by: D] The interface allows users to exceed their income while planning budgets without any warnings or checks, which could lead to unrealistic budget planning. **Fix:** Introduce checks that warn users when their planned spending exceeds their reported income, preventing common budgeting errors.



5.4 Guidelines Consideration: (*Guidelines that were considered and that were not*)

Below is a detailed discussion of the guidelines that were considered significant and those that were less emphasized during the evaluation process:

Heuristic Guidelines Considered:

1. Visibility of System Status (H2-1):

This heuristic was extensively considered because it directly impacts the user's ability to understand ongoing processes within the app. Issues such as **lack of loading indicators or absence of confirmation messages after actions** (e.g., setting a budget) were identified. These findings underscore the necessity for continuous feedback to keep users informed, reducing confusion and potential frustration.

2. User Control and Freedom (H2-3):

This heuristic addresses the user's need to navigate freely and correct mistakes easily, which is crucial in financial applications where input errors can have significant repercussions. Our evaluation highlighted the absence of 'undo' options and inflexible navigation, which could lead users to feel trapped in their actions.

3. Consistency and Standards (H2-4):

Consistency is a cornerstone of user trust and ease of learning. Our evaluators found discrepancies in button labels, font styles, and color schemes across different

parts of the app. These inconsistencies can lead to a disjointed experience that may confuse users, especially new ones, and slow down their interaction with the app.

4. Error Prevention (H2-5):

A significant number of issues were related to error prevention. The app allowed users to make illogical entries (e.g., negative income) and lacked adequate validations for various forms. Enhancing error prevention measures is crucial to minimize the chances of user mistakes that could detract from the app's utility and accuracy.

Heuristic Guidelines Not Prioritized:

1. Recognition Rather Than Recall (H2-6):

This heuristic was not a primary focus during our initial evaluations. The issues identified were more about the interaction mechanics and less about users needing to remember information from one part of the application to another. Although important, this guideline was considered less immediately impactful compared to direct interaction issues such as system feedback and user control.

2. Flexibility and Efficiency of Use (H2-7):

While this heuristic is valuable, especially for power users who require more sophisticated interactions, it was not heavily emphasized in our first round of evaluations. Our initial focus was on making the app usable and reliable for all users before optimizing for efficiency and customization.

3. Aesthetic and Minimalist Design (H2-8):

Although some evaluators noted the presence of overly complex graphs and unnecessary decorative elements, this heuristic received relatively less emphasis compared to more critical functionality and interaction issues. The initial goal was to establish a solid foundation of usability before refining the aesthetic aspects.

Reasoning for Not Prioritizing Some Guidelines:

1. **Strategic Focus:** The decision to focus on certain heuristics over others was driven by the immediate needs identified through initial user feedback and the nature of the app as a financial tool where **clarity, control, and error prevention are paramount**.
2. **Resource Allocation:** Given the constraints in time and resources, prioritizing guidelines that address fundamental usability issues was deemed more beneficial for the initial phases of development. This approach ensures that the app meets basic user expectations for functionality and reliability before adding layers of optimization and aesthetic refinement.

6. Reflections

The following is a summary of the reflections that were obtained as a team. The **individual reflections have been submitted by all of us on moodle**.

The Iterative Design Process Takeaway:	Milestone 1: Project Proposal	Milestone 2: Requirement Gathering	Milestone 3: Low Fidelity Prototype	Milestone 4: High Fidelity Prototype	Milestone 5: Implementation
Importance of empathy and user-centered approach	Set clear objectives and features based on target audience needs	Effective user interviews to uncover pain points and needs	Focusing on basic app layout and structure	Refine visual design and interactive elements	Translating design into professional products, while adjusting for technical constraints
Continuous improvement through user feedback	Early user research essential to validate and refine features	Feedback leads to design revisions for better usability and navigation	Identified improvements in navigation and label clarity through testing	Adjustments based on feedback to enhance user engagement	Ensuring design consistency and cross-device compatibility
Integration of design principles and user research	Adjustments made for flexibility in budget tools based on feedback	Emphasize more extensive usability testing for robust feedback	Importance of broader user testing and stakeholder involvement	Need for more comprehensive user testing during this phase	Stressing on collaboration between design and users for efficient testing

Note: Please check the appendix in next page for the detailed individual contributions of heuristic evaluation

APPENDIX

I. Individual Heuristic Evaluations done:

Note: (The implemented fixes are highlighted in green)

Evaluator #A: Reshma Rajashekaraiah

1. Problem

AI Financial Advisor UI of the WiseWal.ai application

2. Violations Found

1. [H-3 User Control & Freedom] [Severity 3] The 'back' button is missing on the income details input screen, forcing users to restart the process if they enter incorrect information. **Fix: Add a 'back' button allowing users to correct mistakes without restarting.**
2. [H-6 Recognition Rather Than Recall] [Severity 2] The interface requires users to remember information from one part of the application when entering data in another, without visible prompts or reminders. **Fix: Add visible cues or reminders on all screens where users are expected to recall information.**
3. [H-10 Help & Documentation] [Severity 1] The tooltips provided for financial terms are too technical and not user-friendly. **Fix: Redesign tooltips to include simpler language and more direct explanations.**
4. [H-8 Aesthetic & Minimalist Design] [Severity 2] Overly complex graphs on the dashboard clutter the interface. **Fix: Simplify the graphs and provide an option to view detailed data on demand.**
5. [H-4 Consistency & Standards] [Severity 4] Inconsistent labeling of action buttons across different screens. Some screens use "Proceed", others use "Continue". **Fix: Standardize the labels across all screens to maintain consistency.**
6. [H-2 Match Between System & Real World] [Severity 1] The date formats vary between screens (MM/DD/YYYY on some and DD/MM/YYYY on others). **Fix: Standardize the date format across the application based on the user's locale.**

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
[H2-1: Visibility of Status]						
[H2-2: Match Sys & World]		1				
[H2-3: User Control]				1		
[H2-4: Consistency]					1	
[H2-5: Error Prevention]						
[H2-6: Recognition not Recall]			1			
[H2-7: Efficiency of Use]						
[H2-8: Minimalist Design]			1			
[H2-9: Help Users with Errors]						
[H2-10: Documentation]		1				

Total Violations by Severity		2	2	1	1	6
Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)						

Evaluator #B: Manasi Bhagwat

1. Problem

Expense adding and updating UI of the WiseWal.ai application

2. Violations Found

- [H-5 Error Prevention] [Severity 2] The form to enter expenses does not validate the type of expense, potentially allowing users to submit incorrect data. **Fix:** Implement dropdown menus with predefined categories to reduce user error.
- [H-3 User Control & Freedom] [Severity 2] Users cannot undo accidental expense entries easily. **Fix:** Add an "undo" button to reverse recent entries quickly.
- [H-4 Consistency & Standards] [Severity 1] Discrepancies in the font styles used across different parts of the interface. **Fix:** Use a uniform font style throughout the application to enhance the visual consistency.
- [H-1 Visibility of System Status] [Severity 3] The system does not show a loading status when processing expense data, which can confuse users about whether the process is complete. **Fix:** Implement a progress bar or spinner during data processing phases.
- [H-9 Help Users with Errors] [Severity 3] Ambiguous error messages when submission fails due to network issues. **Fix:** Provide clear and specific error messages that suggest practical steps for resolution.

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
[H2-1: Visibility of Status]				1		
[H2-2: Match Sys & World]						
[H2-3: User Control]			1			
[H2-4: Consistency]		1				
[H2-5: Error Prevention]				1		
[H2-6: Recognition not Recall]						
[H2-7: Efficiency of Use]						
[H2-8: Minimalist Design]						
[H2-9: Help Users with Errors]				1		
[H2-10: Documentation]						
Total Violations by Severity		1	2	2		5
Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)						

Evaluator #C: Yuktasree Muppala

1. Problem

Visualization dashboard of the UI showing monthly summary reports.

2. Violations Found

1. [H-8 Aesthetic & Minimalist Design] [Severity 1] The monthly summary reports contain unnecessary decorative elements that distract from key information. **Fix:** Simplify the design by removing decorative graphics.
2. [H-1 Visibility of System Status] [Severity 3] The system does not provide feedback when an error occurs during data submission, leaving users unsure if their actions were successful. **Fix:** Implement immediate, clear feedback mechanisms after each user action.
3. [H-5 Error Prevention] [Severity 2] Inadequate checks against illogical data entries (e.g., negative income values). **Fix:** Integrate logical data validation to prevent such errors.
4. [H-10 Help & Documentation] [Severity 2] The help section lacks detailed explanations and examples for interpreting complex financial data in the reports. **Fix:** Expand the help documentation to include examples and video tutorials.
5. [H-4 Consistency & Standards] [Severity 1] Inconsistent color schemes used in different sections of the report, causing confusion. **Fix:** Standardize color schemes for similar types of data across all reports.

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
[H2-1: Visibility of Status]				1		
[H2-2: Match Sys & World]						
[H2-3: User Control]						
[H2-4: Consistency]		1				
[H2-5: Error Prevention]			1			
[H2-6: Recognition not Recall]						
[H2-7: Efficiency of Use]						
[H2-8: Minimalist Design]		1				
[H2-9: Help Users with Errors]						
[H2-10: Documentation]			1			
Total Violations by Severity	2	2	1			5

Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)

Evaluator #D: Aditya Sonar

1. Problem

Budget planning Interface of WiseWal.ai – setting up the budget page

2. Violations Found

1. [H-4 Consistency & Standards] [Severity 3] Inconsistency in the UI elements such as button styles and color schemes across different budget planning screens. This inconsistency can lead to confusion and a less intuitive user experience. **Fix:** Standardize UI elements like buttons, fonts, and color schemes throughout the budget planning section.
2. [H-1 Visibility of System Status] [Severity 2] After setting a new budget, there is no immediate feedback or confirmation provided to the user. This absence can leave users uncertain whether their changes were saved. **Fix:** Implement a clear, visible confirmation message or notification whenever a budget is successfully set or updated.
3. [H-5 Error Prevention] [Severity 1] The interface allows users to exceed their income while planning budgets without any warnings or checks, which could lead to unrealistic budget planning. **Fix:** Introduce checks that warn users when their planned spending exceeds their reported income, preventing common budgeting errors.
4. [H-7 Flexibility & Efficiency of Use] [Severity 2] The budget planning tool lacks shortcuts and flexibility for experienced users who manage complex budgets, such as quick copy features for similar monthly budgets. **Fix:** Add features like templates or the ability to copy previous budgets to streamline the budgeting process for frequent users.
5. [H-3 User Control & Freedom] [Severity 3] Users find it difficult to navigate back or revise their entries once they progress past the initial budget setup page. This lack of control can frustrate users who need to make adjustments. **Fix:** Enhance navigation options to include more visible 'back' and 'edit' buttons at every stage of the budget planning process.

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
[H2-1: Visibility of Status]			1			
[H2-2: Match Sys & World]						
[H2-3: User Control]				1		
[H2-4: Consistency]				1		
[H2-5: Error Prevention]		1				
[H2-6: Recognition not Recall]						
[H2-7: Efficiency of Use]			1			
[H2-8: Minimalist Design]						
[H2-9: Help Users with Errors]						
[H2-10: Documentation]						
Total Violations by Severity		1	2	2		5

Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)

Evaluator #E: Suraj Raghu Kumar

1. Problem

Budget planning UI of the WiseWal.ai application – notifications for budget exceeding

2. Violations Found

1. **[H-9 Help Users with Errors] [Severity 3]** When users exceed their budget, the notification is vague and does not guide them on how to rectify the situation. **Fix:** Improve notifications to include suggestions for managing expenses better.
2. **[H-10 Help & Documentation] [Severity 2]** The help documentation is difficult to navigate and does not provide specific answers to frequently asked questions. **Fix:** Revise the documentation to be more task-oriented and include a searchable index.
3. **[H-3 User Control & Freedom] [Severity 1]** Users cannot customize the frequency of budget notifications. **Fix:** Allow users to set preferences for how often they receive budget notifications.
4. **[H-8 Aesthetic & Minimalist Design] [Severity 1]** The budget notifications are cluttered with too much information, making it difficult to quickly ascertain key points. **Fix:** Redesign the notifications to highlight key information in a more digestible format.
5. **[H-6 Recognition Rather Than Recall] [Severity 2]** The application expects users to remember the budget limit set months ago without displaying it in the notification. **Fix:** Include the set budget limit within each notification about exceeding the budget.

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
[H2-1: Visibility of Status]						
[H2-2: Match Sys & World]						
[H2-3: User Control]		1				
[H2-4: Consistency]						
[H2-5: Error Prevention]						
[H2-6: Recognition not Recall]			1			
[H2-7: Efficiency of Use]						
[H2-8: Minimalist Design]		1				
[H2-9: Help Users with Errors]				1		
[H2-10: Documentation]			1			
Total Violations by Severity	2	2	1	0	5	
Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)						
