

COS70004 User Centred Design

UCD 4

TRACKCARE's Usability Evaluation Report

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Acknowledgement Of Country

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Contribution Statements

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Executive Summary

This report explains and reviews the usability evaluation of the TrackCare app, a wandering detection prototype, created to help caregivers in monitoring people with dementia. The evaluation included four participants who completed eight tasks, resulting in an average System Usability Scale (SUS) score of 77.5, which indicates good usability. Participants appreciated the app's user-friendly design and advanced tracking features, but several usability issues were also noted.

One major issue was with the navigation, specifically concerning the "Edit Zone" button, which was hard to see due to its colour and position. Suggestions for improvement included changing the colour and placing it at the bottom part of the screen. Also, adding consistent "Back" buttons were suggested. The app's calendar was another concern, it only allowed scheduling for the current month, suggesting a need for a more flexible calendar feature. Confusing names for the options in the profile settings also led to user mistakes, highlighting the need for a better-organized layout. Participants also pointed out that the location-sharing function takes several steps and suggested adding a straightforward "Share Location" button in the "Map" section to make emergency responses easier.

The report also recognized some limitations, such as weaknesses in participant selection and difficulties with remote testing. Future evaluations should focus on including experienced caregivers and addressing a broader range of tasks. In summary, although the TrackCare app is user-friendly and well-designed, resolving these issues will enhance its effectiveness and user satisfaction, providing caregivers with better support and a more user-friendly experience.

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1 BACKGROUND

This report aims to give a detailed walkthrough and explanation of the usability evaluation carried out for "TrackCare," a Wandering Detection App aimed at helping caregivers monitor people with dementia (PWD). The main objective is to evaluate the usability of the TrackCare app prototype by testing specific tasks to confirm that it effectively addresses the needs of caregivers.

Globally, around 47 million people currently live with dementia, and this number is projected to rise to 131 million by 2050 (Prince et al., 2016). With this increasing trend, there is an urgent need for innovative solutions that can support caregivers and help individuals with dementia maintain their independence. TrackCare aims to meet this demand by providing caregivers with a smart app equipped with features to detect wandering behaviours, thereby enhancing safety and promoting autonomy for individuals with dementia.

The usability evaluation concentrates on three key goals: effectiveness, efficiency, and satisfaction. Effectiveness examines whether caregivers can complete essential tasks successfully, while efficiency measures the time taken to accomplish these tasks. Satisfaction reflects the overall user experience, which is critical to encouraging ongoing use of the app.

A case study on an already existing app equipped with GPS tracking, fall detection, and two-way calling functionality showed that such features significantly improved the daily activities and overall quality of life for individuals with dementia (Doyle et al., 2024). By designing TrackCare with these proven usability principles in mind, the app aims to not only meet the functional needs of caregivers but also provide an enhanced overall experience for users.

2 USABILITY REQUIREMENTS

To evaluate the usability of the TrackCare app for dementia caregivers, the main focus is on three key usability metrics: **Effectiveness**, **Efficiency**, and **Satisfaction**. These metrics are central to understanding how well the app supports caregivers in providing timely, informed care.

- **Effectiveness** measures the proportion of caregivers who can complete each task independently, as well as those requiring assistance. By analysing the completion rates, usability obstacles that might hinder caregivers in performing critical tasks can be identified. This metric is crucial to assess whether the app's layout and features align with caregivers' expectations for ease of use, especially given the high-stakes nature of dementia care.
- **Efficiency** focuses on the time required for caregivers to complete tasks without assistance. Since time is often of the essence in caregiving, tasks should be designed to minimise delays, with an intuitive interface that allows users to act swiftly. Efficiency targets are set according to each task's complexity, ensuring that caregivers can navigate the app quickly while retaining accuracy, thereby supporting their ability to respond effectively in urgent situations.
- **Satisfaction** captures caregivers' subjective experience with the app, particularly how difficult or easy they find each task. By setting target satisfaction ratings, we ensure that TrackCare provides a straightforward, user-friendly experience that meets caregivers' needs. A high satisfaction rating indicates that caregivers feel confident and comfortable with the app, an essential factor in fostering trust and promoting regular usage.

Together, these metrics provide a comprehensive view of the app's usability, highlighting areas for improvement while ensuring that TrackCare effectively supports caregivers in their essential role. Below are the target criteria for those usability requirements of each task, as well as the justification about reasons of choosing that task and deciding the target values.

Task 1:

Table 1: Target criteria values for Task 1 (Health Status Check)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: Check the health vitals of Edward, such as Heart Rate, Blood pressure and Oxygen Saturation levels.	Proportion of participants who complete task without assistance	75%
Caregivers	Effectiveness	Task: Check the health vitals of Edward, such as Heart Rate, Blood pressure and Oxygen Saturation levels.	Proportion of participants who received assistance	Less than 25%
Caregivers	Efficiency	Task: Check the health vitals of Edward, such as Heart Rate, Blood pressure and Oxygen Saturation levels.	Average unassisted task completion time	Within 1 minute
Caregivers	Satisfaction	Task: Check the health vitals of Edward, such as Heart Rate, Blood pressure and Oxygen Saturation levels.	Average task difficulty rating (1 = very hard, 10 = very easy)	More than 9

Justification: This task is crucial for caregivers who need reliable, immediate access to the health vitals to monitor the wellbeing of individuals with dementia, as delays or navigation issues could affect timely care. By assessing how easily caregivers can locate and interpret these vitals, we can evaluate the app's layout, intuitiveness, and information organisation, which are essential for supporting rapid, informed decision-making. The target values were set with the understanding that this task should be simple and quick to complete. For effectiveness, it was assumed most caregivers could find vitals without assistance, setting a low assistance threshold to catch usability issues. For efficiency, a rapid task completion time was prioritised to meet the demand for swift access to information. Lastly, a high ease-of-use target was set to ensure that the app provides a straightforward, user-friendly experience, allowing caregivers to confidently navigate the interface even in time-sensitive situations. These targets reflect the task's simplicity and align with both usability standards and the unique needs of dementia care.

Task 2:

Table 2: Target criteria values for Task 2 (Location Checking)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: You have received an alert from the app that Edward has wandered away from the safe zone. Track the current location of Edward.	Proportion of participants who complete task without assistance	75%
Caregivers	Effectiveness	Task: You have received an alert from the app that Edward has wandered away from the safe zone. Track the current location of Edward.	Proportion of participants who received assistance	25%
Caregivers	Efficiency	Task: You have received an alert from the app that Edward has wandered away from the safe zone. Track the current location of Edward.	Average unassisted task completion time	Within 2 minutes
Caregivers	Satisfaction	Task: You have received an alert from the app that Edward has wandered away from the safe zone. Track the current location of Edward.	Average task difficulty rating (1 = very hard, 10 = very easy)	More than 7

Justification: This task is essential for those caring for individuals with dementia, as immediate location tracking helps prevent potential risks. By analysing how easily caregivers can locate the individual after receiving an alert, we can evaluate the app's design, alert functionality, and mapping accuracy, which are essential components for helping caregivers respond swiftly and decisively. For effectiveness, we expect that 75% of users can complete the task independently, reflecting the potentially high complexity of quickly accessing live location data. While the remaining users may need guidance as some participants, especially the target user group, do not have a technical background. The efficiency target of a two-minute completion time ensures the location can be accessed promptly, supporting timely intervention. For satisfaction, a difficulty rating target of over 7 was chosen to ensure the app is not only functional but also provides a user-friendly experience under pressure. These values reflect the critical nature of tracking features, emphasizing speed, usability, and clarity for caregiver support.

Task 3:

Table 3: Target criteria values for Task 3 (Zone Setting)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: Set '1' safe zone region and '2' danger zone regions to monitor Edward.	Proportion of participants who complete task without assistance	75%
Caregivers	Effectiveness	Task: Set '1' safe zone region and '2' danger zone regions to monitor Edward.	Proportion of participants who received assistance	25%
Caregivers	Efficiency	Task: Set '1' safe zone region and '2' danger zone regions to monitor Edward.	Average unassisted task completion time	Within 3 minutes
Caregivers	Satisfaction	Task: Set '1' safe zone region and '2' danger zone regions to monitor Edward.	Average task difficulty rating (1 = very hard, 10 = very easy)	More than 6

Justification: This task is significant for dementia caregivers who need to establish precise tracking zones that help them quickly identify and respond to wandering risks. This is a complicated task for participants that allows us to assess the app's intuitiveness, flexibility in mapping regions, and overall ease of setup. For effectiveness, we expect a 75% independent completion rate, assuming that caregivers can intuitively navigate the zone-setting feature without needing assistance. However, a 25% assistance rate accounts for any potential difficulties in setting multiple zones, helping to identify areas for improvement in guidance or interface clarity. For efficiency, a 3-minute completion time was set, as accuracy in placing zones is essential and may require extra steps or adjustments, particularly for inexperienced users. Finally, a moderate satisfaction rating is aimed at ensuring that the zone-setting process remains straightforward enough to inspire confidence in caregivers, even if some guidance is needed initially. These target values were carefully selected to align with the task's multi-step nature and the need for a clear, user-friendly interface to support caregivers in managing risks effectively.

Task 4:

Table 4: Target criteria values for Task 4 (Location Navigation)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: Your home is in Selby. Navigate from your home to the current location of Edward using a car route.	Proportion of participants who complete task without assistance	50%
Caregivers	Effectiveness	Task: Your home is in Selby. Navigate from your home to the current location of Edward using a car route.	Proportion of participants who received assistance	50%
Caregivers	Efficiency	Task: Your home is in Selby. Navigate from your home to the current location of Edward using a car route.	Average unassisted task completion time	Within 2 minutes
Caregivers	Satisfaction	Task: Your home is in Selby. Navigate from your home to the current location of Edward using a car route.	Average task difficulty rating (1 = very hard, 10 = very easy)	More than 7

Justification: This task was chosen to assess how effectively and efficiently the TrackCare app supports caregivers in finding directions, which is crucial in emergencies. Target values were selected based on the potential challenges caregivers may face while using a navigation feature within a caregiving app, which may differ from standalone GPS apps. For effectiveness, a 50% completion rate without assistance was chosen to reflect this complexity and the likelihood that some users may need guidance, highlighting potential areas where the app's navigation function could be streamlined. For efficiency, the goal is a completion time of less than two minutes, as accessing directions should be quick and intuitive. Finally, a high satisfaction rating was set, with a target difficulty rating above 7, aiming to ensure caregivers find the task straightforward and the navigation tool easy to use. These values were chosen based on the familiarity many users have with navigation features and reflect a need for a seamless experience in time-sensitive situations.

Task 5:

Table 5: Target criteria values for Task 5 (Disable tracking)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: The app allows tracking of Edward to be disabled when required, for privacy reasons. Disable the connectivity of the watch to the app.	Proportion of participants who complete task without assistance	75%
Caregivers	Effectiveness	Task: The app allows tracking of Edward to be disabled when required, for privacy reasons. Disable the connectivity of the watch to the app.	Proportion of participants who received assistance	Less than 25%
Caregivers	Efficiency	Task: The app allows tracking of Edward to be disabled when required, for privacy reasons. Disable the connectivity of the watch to the app.	Average unassisted task completion time	Within 1.5 minutes
Caregivers	Satisfaction	Task: The app allows tracking of Edward to be disabled when required, for privacy reasons. Disable the connectivity of the watch to the app.	Average task difficulty rating (1 = very hard, 10 = very easy)	6 or more

Justification: This task is essential for caregivers to have clear and immediate control over the app's tracking features, which is critical to maintaining the privacy of individuals with dementia. In scenarios such as private activities or medical appointments, caregivers may need to temporarily disable tracking. By evaluating this task, the team can assess the app's interface clarity and responsiveness when handling privacy-related actions. The target values for this task were set with simplicity in mind. The effectiveness target expects at least 75% of participants to complete this task independently, with no more than 25% requiring assistance. This reflects the assumption that the feature should be simple enough for most users to handle without help. For efficiency, the goal is to complete the task within 1.5 minutes, ensuring that caregivers can quickly disable tracking when necessary. The satisfaction target aims for a rating of 6 or higher (out of 10), indicating that caregivers find this feature relatively easy to use.

Task 6:

Table 6: Target criteria values for Task 6 (Scheduling a health Checkup)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: Schedule a health Checkup appointment for Edward on 24 th October at 2PM.	Proportion of participants who complete task without assistance	75%
Caregivers	Effectiveness	Task: Schedule a health Checkup appointment for Edward on 24 th October at 2PM.	Proportion of participants who received assistance	Less than 25%
Caregivers	Efficiency	Task: Schedule a health Checkup appointment for Edward on 24 th October at 2PM.	Average unassisted task completion time	Within 1 minute
Caregivers	Satisfaction	Task: Schedule a health Checkup appointment for Edward on 24 th October at 2PM.	Average task difficulty rating (1 = very hard, 10 = very easy)	More than 6

Justification: This task is vital for caregivers who need to schedule regular health checkups for individuals with dementia efficiently. The ability to quickly and accurately schedule appointments help prevent potential errors and avoid conflicting medical visits. By examining how easily caregivers can use this feature, we can assess the app's design, user-friendliness, and efficiency in managing essential caregiving responsibilities. The target values are set to be clear and focused on making things simple and efficient. For effectiveness, the expectation is that 75% of users should be able to complete this task independently, with less than 25% requiring assistance. This assumes that the scheduling function is straightforward enough for most users to manage without help. The efficiency target is set at under one minute to ensure that the app allows quick scheduling with minimal hassle. Lastly, a satisfaction target of more than 6 indicates that caregivers should find the task easy and intuitive, without causing frustration or confusion. These targets are intended to confirm that the app can support caregivers in managing health-related appointments promptly and effectively, improving their overall experience and reducing the stress associated with scheduling tasks.

Task 7:

Table 7: Target criteria values for Task 7 (Share Location of PWD with an emergency contact)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: Share the location detailed of Edward with Rob, his son who lives in the city.	Proportion of participants who complete task without assistance	50%
Caregivers	Effectiveness	Task: Share the location detailed of Edward with Rob, his son who lives in the city.	Proportion of participants who received assistance	50%
Caregivers	Efficiency	Task: Share the location detailed of Edward with Rob, his son who lives in the city.	Average unassisted task completion time	Within 2 minutes
Caregivers	Satisfaction	Task: Share the location detailed of Edward with Rob, his son who lives in the city.	Average task difficulty rating (1 = very hard, 10 = very easy)	At least 6 or more

Justification: This task is designed to assess a vital communication feature that enables caregivers to quickly share the real-time location of the person they are monitoring. Being able to share location details is crucial in emergency situations or when coordinating with family members, ensuring the safety and well-being of the individual with dementia. The task focuses on evaluating how easily caregivers can locate and use this function, which helps gauge the app's layout and clarity in handling essential interactions. The target values are set with the understanding that this is a moderately advanced feature. A lower effectiveness threshold of 50% without assistance reflects the possibility of some caregivers needing extra support due to the task's complexity. A target completion time of within 2 minutes acknowledges that the interaction may take longer than simpler tasks, given its importance. The satisfaction rating is set at 6 or more to indicate that while this feature may require a bit more effort, it should not leave users feeling frustrated or overwhelmed.

These values aim to ensure that the app's sharing function remains accessible to a broad range of users while recognising that the task demands a higher level of interaction.

Task 8:

Table 8: Target criteria values for Task 8 (Deleting an emergency contact)

User Group	Usability Goal	Measuring Instrument	Metric	Target Value
Caregivers	Effectiveness	Task: Delete the contact 'Mary' from the emergency contact list.	Proportion of participants who complete task without assistance	100%
Caregivers	Effectiveness	Task: Delete the contact 'Mary' from the emergency contact list.	Proportion of participants who received assistance	0%
Caregivers	Efficiency	Task: Delete the contact 'Mary' from the emergency contact list.	Average unassisted task completion time	Within 1 minute
Caregivers	Satisfaction	Task: Delete the contact 'Mary' from the emergency contact list.	Average task difficulty rating (1 = very hard, 10 = very easy)	At least 9

Justification: This task focuses on testing a fundamental feature within the app—updating and managing emergency contacts. For caregivers, having the ability to easily delete or change an emergency contact is crucial, as situations can change rapidly, requiring immediate updates. This task aims to ensure that this basic function is clear and easy to follow, helping caregivers maintain confidence while managing the app.

The effectiveness target of 100% completion without assistance reflects the assumption that all participants, regardless of their technical experience, should be able to accomplish this task on their own. The completion time of under one minute ensures that the feature is quick to use, preventing delays or confusion that could disrupt caregiving routines. A satisfaction rating of at least 9 emphasises that this task should be nearly effortless, providing a smooth and reassuring experience for users.

These values are designed to confirm that the app remains intuitive and accessible, even for essential tasks like updating emergency contacts, so caregivers can focus on providing care without being hindered by technical complexities.

3 USABILITY EVALUATION METHOD

3.1 Participants

Each team member selected one participant without any specific requirements, resulting in a diverse group for the usability evaluation of the TrackCare application. Among the total participants, 50% were male and 50% were female, with an age distribution showing that 75% were between 18 and 24 years old, while 25% were between 25 and 34 years old. Half of the participants had experience caring for a person with dementia or an elderly individual, and 50% had prior experience with GPS tracking systems. Additionally, 50% of participants had previously used healthcare-related applications. Before using the TrackCare application, 50% expressed interest in utilising the app, 25% were not interested, and 25% were uncertain at the time. This profile differs from the primary user group of caregivers, who are typically older and may have varying levels of experience with technology. This highlights the importance of creating an easy-to-use design that meets the diverse needs and experiences of all users.

Table 9: Participant characteristics for TrackCare's usability test

Participant	Gender	Age	Experienced with caring person with Dementia	Experienced with GPS Tracking system	Experienced with Healthcare purpose app's	Future interest of using TrackCare app
1	Male	18-24	No	No	No	No
2	Male	18-24	Yes	Yes	Yes	Yes
3	Female	18-24	Yes	Yes	No	Yes
4	Female	25-34	No	No	Yes	Maybe

3.2 Materials

3.2.1 Informed Consent:

The Informed Consent form is designed to inform participants about the nature and scope of the project, as well as the expectations involved upon agreeing to the evaluation. Created from a Microsoft Form, we aimed to give contextual information regarding 'TrackCare', a Wandering Detection Application. The goal is to ensure the participants gain a comprehensive

understanding about this interview, any potential benefits or risks of their involvement, their specific role in this project, and the tasks they will be asked to complete.

The first part of the Informed Consent form details the project origin, evaluation methodology and duration of the session. It also addresses privacy concerns –while video recording will be conducted, participants have the choice to decline facial recordings and could skip any questions that make them feel uncomfortable. The second section contains questions that seek explicit consent from participants, including their agreement to participate, permission to be recorded and an acknowledgement of their full comprehension of the project nature.

3.2.2 Demographic Questionnaire:

The Demographic Questionnaire was developed to collect relevant information about the participants to understand the group involved in the usability evaluation of the TrackCare application. This questionnaire included a range of questions designed to collect demographic details, such as gender, age, backgrounds and experiences, which aimed to analyse the usability evaluation results effectively.

Understanding participants backgrounds and their previous experiences with key features of the app such as caregiving needs, GPS tracking systems, and healthcare related mobile applications was essential to assess whether they could provide evaluations alike to those of real-life caregivers. It was important to determine if the participants shared similar perspectives with caregivers. The final demographic question addressed participant's interest in this type of app, helping to estimate the demand for such applications in life.

3.2.3 Task List

The purpose of this task list is to provide participants with a clear and sequential guide to specific activities necessary for evaluating the TrackCare application. The primary goal is to assess the usability and functionality of the app through realistic tasks, reflecting everyday interactions that caregivers would typically have with the app. By following these tasks, we aim to test the implemented features and their ease of usability, identify potential usability challenges and areas needing improvement, ultimately enhancing the overall user experience.

The task list was created using an online survey format in Microsoft Forms, where participants complete each task in a set order. Each task is accompanied by a brief explanation of what is

expected, followed by a rating scale question to assess the difficulty of each task from the participant's perspective.

Section 1: Evaluator Details

This section records each participant's unique Participant ID to maintain anonymity while tracking their responses.

Section 2: Evaluation Tasks

Context of Use and Instructions for Participants

In this evaluation, the participant assumes the role of a caregiver responsible for monitoring Mr. Edward Starc, a person living with dementia. The participant will use the TrackCare Wandering Detection Prototype to continuously observe and track Edward's movements and well-being. This scenario replicates a real-world caregiving context, allowing the participant to explore and interact with the app's features while performing the assigned tasks.

The participant is to carefully read each task's instructions and rate the difficulty experienced on a scale of 1 (Very Hard) to 10 (Very Easy). For instance, a rating of 8/10 would indicate that the task was easy and straightforward, while a rating of 3/10 would suggest that it was challenging. Accurate ratings are essential for gathering feedback to enhance the app's usability and functionality.

Task 1: Checking Health Vitals

In this first task, the participant is instructed to use the app to check Edward's key health vitals, including his heart rate, blood pressure, and oxygen saturation levels. Once completed, the participant is asked to rate the difficulty they experienced using a scale from 1 to 10. This task helps assess the accessibility and user-friendliness of the app's health monitoring feature.

Task 2: Tracking Location After Receiving an Alert

In this scenario, the participant receives an alert from the app indicating that Edward has wandered away from the designated safe zone. The participant is required to use TrackCare to locate Edward's current position. Upon finishing the task, the participant rates the difficulty on the 1-10 scale, providing insights into the intuitiveness of the app's alert and tracking functions.

Task 3: Setting Up Safe and Danger Zones

The participant is tasked with setting up one safe zone and two danger zones within the app to monitor Edward's movements. This feature allows the creation of geographic boundaries that trigger alerts when Edward exits the safe zone or enters a danger zone. After completing the task, the participant rates the difficulty level on the 1-10 scale, which helps evaluate how easily users can define and customize zones for monitoring.

Task 4: Navigating to Edward's Location Using a Car Route

In this task, the participant is given a scenario where Edward has wandered away from home in Selby. The participant must navigate to Edward's current location using the app's car route feature. They are instructed to use the navigation tool within the app to plot a route from their home to Edward's location. After completing this, the participant is asked to rate the difficulty on the 1-10 scale. This task evaluates the ease of using the app's navigation feature, especially in an emergency.

Task 5: Disabling Watch Connectivity for Privacy

Privacy control is an essential aspect of the TrackCare app. In this task, the participant is instructed to temporarily disable the connectivity between Edward's watch and the app to simulate the need for a privacy measure. Once the participant has completed this action, they are asked to rate the difficulty on the 1-10 scale. This task helps determine how user-friendly the app's privacy settings are.

Task 6: Scheduling a Health Checkup Appointment

In this task, the participant is required to schedule a health checkup appointment for Edward on October 24th at 2:00 PM. This feature tests the scheduling capabilities of the app. After completing the scheduling task, the participant is asked to rate the difficulty on the 1-10 scale, providing feedback on the usability and efficiency of the scheduling process.

Task 7: Sharing Edward's Location with His Son

The participant is instructed to share Edward's current location with his son, Rob, who lives in the city. This task aims to assess the app's ability to share location information, ensuring that caregivers can communicate crucial details with family members or emergency contacts. After completing this task, the participant rates the difficulty on the 1-10 scale.

Task 8: Deleting an Emergency Contact

For the final task, the participant is instructed to delete the contact named 'Mary' from Edward's emergency contact list. This task evaluates the app's contact management and modification features. Upon completing the task, the participant is asked to rate the difficulty on the 1-10 scale, helping assess the accessibility and intuitiveness of managing emergency contact information.

Copies of these tasks, as they appeared to the participants, will be submitted separately for review at the end of this report.

3.2.4 Satisfaction Questionnaires:

The post evaluation questionnaire is designed to gain insights of user experience with the prototype by using quantitative and qualitative methods. By combining the System Usability Scale (SUS) with specific, open-ended questions about key aspects of the prototype, the form allows a comprehensive assessment of usability criteria. These include ease of use, user satisfaction, functionality effectiveness, design and layout appeal, and privacy control—all critical factors in determining how well the system meets user needs and expectations. This dual approach captures not only how users interact with the system but also their subjective impressions, providing actionable feedback for improvement.

The Prototype-Specific Questions section complements the SUS by gathering qualitative feedback on design, layout, and core features of "TrackCare" like location tracking. It also covers the clarity of instructions and privacy settings, ensuring ease of understanding and control over personal data. Additionally, it invites user suggestions for new features, allowing for a more user-centered approach to improvements. **The System Usability Scale (SUS) section** provides a standardised measure of usability, assessing how frequently users would like to use the system, the perceived complexity, and ease of learning. It also examines the integration and consistency of functions, ensuring a coherent user experience, and gauges user confidence, indicating comfort and control when using the system. This structured, quantitative approach highlights usability strengths and areas for improvement. Together, these sections provide a comprehensive view of usability, capturing both overall satisfaction and detailed insights into specific functionalities.

3.3 Figma Prototype

The highly fidelity Figma Prototype of the wandering detection app can be accessed through this link:

[TrackCare Prototype Link](#)

3.4 Procedure

This section explains how the usability evaluation for the TrackCare app prototype was conducted. A high-fidelity Figma prototype was used, allowing participants to interact with the app through direct touch. Each participant joined remote online sessions, where team members guided them through the evaluation. Firstly, participants completed the inform consent and demographic questionnaire to provide their personal information and experience with dementia care. Secondly, the evaluators explained the purpose of the evaluation and observed the participants as they completed each task, noting any challenges faced. Participants were encouraged to actively voice their thoughts aloud as they navigated through the prototype, providing real-time feedback on their experiences and difficulties. This think-aloud approach allowed the evaluators to gain deeper insights into the participants' thought processes and identify areas for improvement. This process helped the team understand real-world user interactions and refine the app based on user feedback. Lastly, they were asked to do the satisfaction questionnaire, which contains SUS and open-ended questions.

The table below provides details of each session, showing how participants were sourced, the testing method, and key observations.

Table 10: Procedure Description table

P	Participant sourced by?	Remote/face to face?	Brief description of procedure
P1	Marcus Tran	Remote	Marcus conducted an online meeting with P1, where P1 interacted with the latest version of the prototype – a high fidelity Figma prototype of TrackCare. P1 was asked to perform the evaluation tasks – in doing so interacting extensively with the prototype.
P2	Arun Ragavendhar Arunachalam Palaniyappan	Remote	Arun introduced Participant 2 (P2) to the high-fidelity Figma prototype, explaining the context of use and what the evaluation aimed to achieve. He then guided P2 to start the evaluation. P2 went through each task step-by-step, exploring the features and interacting fully with the prototype to give detailed feedback.
P3	Le Yen Chi Pham	Remote	Chi and P3 joined an online meeting to conduct the user evaluation. P3 navigated the high-fidelity prototype extensively to finish the listed tasks
P4	Tserennadmid Battulga	Remote	Tserennadmid shared the high-fidelity Figma prototype with P4, where she evaluated how P4 performed the assigned tasks, in doing so helping the team in finding out any limitations with the prototype.

4 RESULTS

The results section presents the outcomes of the usability evaluation conducted for the TrackCare app. The evaluation focuses on three primary goals: effectiveness, efficiency, and satisfaction. Effectiveness measures the proportion of participants who could complete tasks independently without errors, while efficiency captures the time taken to perform each task. Satisfaction ratings reflect the perceived difficulty of each task from the participants' perspective. By analysing these metrics, the results offer valuable insights into the app's strengths and areas needing improvement, helping guide necessary refinements to enhance the user experience and overall functionality of TrackCare.

4.1 Effectiveness and efficiency

Task 1:

Table 11: Performance measures and difficulty ratings for Task 1 (Health Check)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	100	0	0	1.25 (1m 15 s)	9
2	100	0	0	0.65 (39s)	9
3	100	0	0	0.37 (22s)	9
4	100	0	0	0.42 (25s)	10

As observed above, all four participants successfully completed Task 1, which involved checking the health vitals of the person with dementia from the 'Home' page. The participants found it straightforward to click on the tab displaying key health information such as blood pressure and heart rate. Despite Participant 1 taking slightly longer than the others, all participants rated the task as 'Very Easy,' with difficulty ratings ranging from 9 to 10. Task completion times varied between 22 seconds and 1 minute 15 seconds, reflecting that users could access the health information quickly and accurately without making any errors. This indicates that the health vitals feature is accessible and user-friendly, providing essential information to caregivers with minimal effort.

Task 2:

Table 12: Performance measures and difficulty ratings for Task 2 (Location Checking)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	100	0	0	1.5 (1m 30s)	8
2	0	1	1	1.12 (1m 7s)	8
3	100	0	0	1.33 (1m 20s)	7
4	100	0	0	0.4 (24s)	10

Task 2 involved checking the location of the person with dementia from the 'Map' page, upon receiving an alert. As seen in Table 12, 75% of users completed the task without assistance. Participants 1, 3 and 4 completed the task independently, rating it 8, 7 and 10 in terms of difficulty, indicating that they found it relatively easy to accomplish. Especially, Participant 4 completed the task in the shortest amount of time with only 24 seconds. On the other hand, Participant 2 required assistance. He made an error during the task but still rated it an 8, suggesting that the difficulty might have been due to lack of clarity in the instructions or interface layout. Overall, the results indicate that while the feature is generally accessible, some improvements in clarity and guidance could enhance independent task completion.

Participant 2 faced challenges during Task 2 and made an error while trying to locate the feature on the 'Map' page after receiving an alert. The participant was given an indirect hint, encouraging him to pay closer attention to the interface without revealing anything.

Task 3:

Table 13: Performance measures and difficulty ratings for Task 3 (Zone Setting)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficulty Rating (1 = Very Difficult, 10 = Very Easy)
1	100	0	0	2.6 (2m 36s)	7
2	100	0	0	0.95 (57s)	9
3	0	1	0	1.25 (1m 15s)	7
4	100	0	0	0.93 (56s)	6

Task 3 required participants to set a safe zone and two danger zones on the 'Map' page. As shown in Table 13, the majority of participants (75%) completed the task unassisted. Completion times varied, with participants taking between 56 seconds and 2 minutes 36 seconds, which was slower than other tasks. Difficulty ratings ranged from 6 to 9, indicating that most participants found the task manageable, though some experienced moderate difficulty. Participant 3 was unable to complete the task without assistance due to difficulties navigating and locating the 'Edit' button. These results suggest that, while the zone-setting feature is generally accessible, the extended completion times and difficulty ratings indicate areas for improvement in clarity and ease of use. By refining the

interface and enhancing the intuitiveness of the zone-setting process, the app can better support caregivers in efficiently managing safe and danger zones.

Task 4:

Table 14: Performance measures and difficulty ratings for Task 4 (Location Navigation)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	0	1	1	1 min	7
2	0	1	0	1.09 (1m 5s)	8
3	100	0	0	0.88 (53s)	8
4	100	0	0	0.47 (28s)	8

Participants 1 and 2 required assistance to complete the task of navigating to Edward's location, while participants 3 and 4 managed to finish it without help. The unassisted task completion rate was 50%, indicating that navigating to the intended location posed a challenge for some users. Task completion times varied from 0.47 minutes to 1.09 minutes, suggesting that once participants understood the process, it was relatively quick to accomplish. The difficulty ratings ranged between 7 and 8, showing that most participants found the task moderately easy, but occasional errors and the need for assistance suggest there may be usability issues with the navigation interface. Improving the clarity of navigation instructions or button visibility could help all users complete the task independently in future evaluations.

Participant 1 overlooked the indicators in the 'Map' section that showed the tracking location, causing them to move back and forth between different pages of the app. A team member had to step in and guide the participant to the correct feature before they could complete the task.

Participant 2 did not make a direct mistake during this task. He was navigating correctly and was close to completing it but got slightly confused about finalizing the steps. He needed a bit of help and a hint to confirm that he was on the right track, after which, he himself went to the tracking route page and selected the correct option.

Task 5:

Table 15: Performance measures and difficulty ratings for Task 5 (Disable tracking)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	100	0	0	1.66 (1m 40s)	10
2	0	1	1	1.55 (1m 33s)	7
3	100	0	0	1.18 (1m 11s)	8
4	100	0	0	1.58 (1m 35s)	1

Task 5 involved disabling the connectivity between Edward's watch and the app, for privacy reasons. Majority of the participants (75%) successfully completed the task successfully, except for Participant 2, who required assistance. Task completion times ranged from 1 minute to 1.66 minutes, indicating that participants could carry out the required steps relatively quickly. Difficulty ratings varied from 7 to 10, suggesting that most of them found the task fairly easy, although participant 2 encountered an error and required assistance, which may indicate a minor usability issue. Overall, the results show that the feature is accessible and user-friendly, with potential for minor adjustments to address any occasional confusion.

Participant 2 experienced confusion and made an error due to the ambiguous labelling in the profile settings, which made it difficult to choose the correct option. While trying to disable the tracking of the person with dementia (PWD), the participant was unsure whether to switch off "Location Sharing" or "Watch GPS," as both seemed quite similar, but only one was the correct choice. An indirect suggestion was provided, encouraging the participant to carefully review the task details and think about what the feature was designed to accomplish, without explicitly revealing the answer.

Task 6:

Table 16: Performance measures and difficulty ratings for Task 6 (Scheduling a health Checkup)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	0	0	1	0.75 (45s)	7
2	0	0	1	0.74 (44s)	5
3	0	0	1	1.32 (1m 19s)	6
4	0	0	1	0.95 (57s)	8

Task 6 required participants to schedule a health checkup for Edward on October 24th at 2:00 PM using the app's calendar feature. However, due to a limitation in the prototype, users were only able to set appointments for the month of September, which prevented them from successfully completing the task as instructed. As shown in Table 16, this issue resulted in a 0% unassisted task completion rate, with all participants encountering the same problem and making errors. Task completion times varied between 44 seconds and 1 minute and 19 seconds, indicating that while participants were able to navigate the app and interact with the calendar, the inability to select the correct month posed a significant obstacle. Despite these challenges, participants were still able to use the app to set appointments for the available month of September, demonstrating some level of familiarity with the interface. Difficulty ratings for this task ranged from 5 to 8, which suggests that participants generally found the app easy to use but faced clear frustrations due to the calendar's limitation. Addressing this issue by enabling the selection of future months is crucial to improve the app's usability and ensure participants can complete the task correctly in future evaluations.

Task 7:

Table 17: Performance measures and difficulty ratings for Task 7 (Share Location of PWD with an emergency contact)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	0	1	2	1.75 (1m 45s)	6
2	0	1	1	1.74 (1m 44s)	8
3	0	1	0	1.07 (1m 4s)	7
4	100	0	0	1.05 (1m 3s)	5

Task 7 required participants to share location of the PWD with one of the emergency contacts. As shown in Table 17, 75% of participants requiring assistance, this suggests that the placement of the button on the 'Emergency' page, rather than the 'Map' page, may not align with user expectations. Participants 1, 2, and 3 all initially looked for the location-sharing feature on the 'Map' page, which indicates a potential design flaw. Users intuitively expect to share location directly from a map page. This expectation misalignment led to increased task times, ranging from 1 minute 3 seconds to 1 minute 45 seconds, as participants navigated between pages.

Only Participant 4 was able to complete the task without assistance, rating its difficulty as 5. Difficulty ratings from other participants, which fell between 5 and 8, imply that while challenging, the task became more manageable with evaluator guidance. This feedback points toward a need for design adjustments, placing the 'Share Location' button on the 'Map' page could align more closely with user intuition, potentially reducing both task time and user frustration.

Task 8:

Table 18: Performance measures and difficulty ratings for Task 8 (Deleting an emergency contact)

Participant ID	Unassisted Task Completion Rate	Assist	Errors	Task Completion Time (min)	Difficult Rating (1 = Very Difficult, 10 = Very Easy)
1	100	0	0	0.33 (20s)	10
2	100	0	0	0.45 (27s)	9
3	100	0	0	0.28 (17s)	8
4	100	0	0	0.28 (17s)	9

In this task 8, participants were instructed to delete an emergency contact. All participants successfully completed this task on their own, achieving a 100% unassisted completion rate with no errors or need for assistance. The time taken to finish the task ranged between 17 and 45 seconds, indicating that the task was performed quickly and efficiently. The difficulty ratings given by participants varied from 8 to 10, showing that they found the task simple and easy to perform. These outcomes suggest that the delete feature is designed effectively, making it easily accessible and intuitive for users. This aligns with user expectations for a basic function like removing a contact, highlighting the feature's strong usability.

4.2 Satisfaction and comment data

The difficulty ratings for each task were collected from all participants, using a scale from 1 (indicating the task was very difficult) to 10 (indicating the task was very easy). The Table 19 below presents a detailed summary of each participant's difficulty rating for all eight tasks, along with the average difficulty rating for each task across all participants. These ratings provide insight into how users perceived the ease of completing each task and highlight which tasks were more challenging or intuitive based on participant feedback.

Table 19: Difficulty ratings for total 8 tasks and the average score

Task	Difficulty Rating - P1	Difficulty Rating - P2	Difficulty Rating - P3	Difficulty Rating - P4	Average Task Difficulty
1	9	9	9	10	9.25
2	8	8	7	10	8.25
3	7	9	7	6	7.25
4	7	8	8	8	7.75
5	10	7	8	1	6.50
6	7	5	6	8	6.50
7	6	8	7	5	6.50
8	10	9	8	9	9.00

Table 20: Participant's SUS score and notable comments

User	SUS score	Notable Comments
1	65	<p>"The app was straightforward to use, the UI was simple and features such as appointments and tracking location was not complex at all"</p> <p>"Some buttons need a few clicks to use, the share location button wasn't the clearest to find, the calendar wasn't able to change months"</p> <p>(about the design and layout) ".... adjusting the colour of the edit zone button to be recognisable. Show route to location is convenient although slightly hard to find"</p>
2	92.5	<p>"The prototype had an advanced map with zone editors with various zones and a direct tracking route to the PWD. I was surprised and impressed to see this feature in the prototype. The home page had quick updates and navigation toggles, which was quite intuitive to use as well"</p> <p>"The calendar section did not allow me to choose the month ' October ', to schedule an event. This could have been better implemented."</p> <p>(about the design and layout) "Yes, it met my expectation very well. Just the Calendar section can be improved, and the profile settings' naming conventions can be better sorted to avoid ambiguity."</p>
3	77.5	<p>"The colour scheme feels fresh and modern and overall, it is easy to navigate through the app"</p> <p>"Some of the transitions between screens felt a little slow"</p> <p>(about the design and layout) "The interface looks nice, but I found myself searching for some features. Maybe rethinking the menu structure or adding clear labels could make it more intuitive."</p>

4	75	<p>“Design and layout of the interface of the app is nice.”</p> <p>Only certain buttons working. After clicking on the one button, you can only choose 1-2 buttons next otherwise it is not working.</p> <p>(about instruction or prompts in the app) “Not the best. If I read some instruction before doing the evaluation, I could have done it better. Prompts in the app is not clear.”</p>
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Analysis:

Based on the System Usability Scale (SUS) responses from the post-evaluation questionnaire, the average SUS score for TrackCare was calculated at 77.5. This score is above average, indicating that the app demonstrates high usability. The participants found the prototype generally easy to navigate and could successfully complete the majority of assigned tasks without significant difficulty.

Participants’ comments further highlighted their experience. The design and layout were appreciated for being simple and straightforward, with one participant specifically mentioning the effectiveness of the color scheme. Notably, the Map page was praised for its advanced features, including zone editors and a direct tracking route for the person with dementia (PWD). Another positive aspect was the Home page, which provided quick updates on PWD’s health vitals such as blood pressure and heart rate.

However, the participants also identified areas needing improvement. A common issue raised was the inconsistency in button functionality, as some buttons required multiple clicks or failed to respond as expected. Another recurring concern was the calendar feature, which did not allow users to switch between months, limiting its functionality. Additionally, some participants found the naming conventions within the profile settings ambiguous, which caused confusion when selecting certain options.

Despite these issues, the participants viewed the app as effective in fulfilling its primary purpose of location tracking, which they rated highly, with the lowest difficulty score being 8 out of 10 for this feature. The likelihood of recommending the app to others was also rated positively, with an average recommendation score of 8 out of 10. These insights suggest that while the app’s core functions are solid, refining specific areas would further improve the overall user experience.

4.3 Summary of Evaluation Testing Results

Table 20: Summary of TrackCare's Evaluation Testing Results

Task	Proportion of participants who complete task without assistance	Proportion of participants who received assistance	Average unassisted task completion time (min)	Average task difficulty rating	Achieve the target (Yes/No)
1	100%	0%	0.67	9.25	Yes
2	75%	25%	1.09	8.25	Yes
3	75%	25%	1.43	7.25	Yes
4	50%	50%	0.86	7.75	Yes
5	75%	25%	1.49	6.50	Yes
6	0%	0%	0.94	6.50	No
7	25%	75%	1.4	6.50	No
8	100%	0%	0.34	9.00	Yes

The evaluation testing results for TrackCare demonstrate positive usability, with most tasks meeting the target of high unassisted completion rates. Six out of eight tasks achieved this target, indicating that TrackCare's interface supports user independence and is largely intuitive. Notably, tasks 1 and 8 showed 100% unassisted completion, with high difficulty ratings (7.25 to 9.25), suggesting these tasks were easy for participants to complete without assistance. Tasks 2, 3, 4, and 5 required assistances for 25% to 50% of participants, but still met the target, showing they were manageable despite some usability issues. These results indicate that, while these tasks may need minor improvements for greater intuitiveness, they were not overly challenging.

However, tasks 6 and 7 failed to meet the target for unassisted completion, highlighting specific usability issues. Task 6 had a 0% unassisted completion rate, due to interface issues, while Task 7 had a 25% unassisted rate with most participants needing guidance. Both tasks received the lowest difficulty ratings (6.5), suggesting they were more complex or confusing than others. This gap in usability indicates areas for refinement, as these tasks affected overall user experience and efficiency. In general, the usability evaluation was effective in identifying the strengths in intuitive design, as well as pinpointing critical areas for improvement, providing valuable insights for enhancing TrackCare's effectiveness, efficiency and satisfaction in future updates.

5 USABILITY PROBLEM IDENTIFICATION AND RECOMMENDATIONS

The usability evaluation of the TrackCare app highlighted four key issues impacting the app's navigation, functionality, and overall user experience. Participants encountered challenges with navigating between screens and locating essential features, particularly in relation to zone editing and the sharing of location information. Additionally, problems were identified with the static calendar section, which restricted users from scheduling beyond the current month, and with ambiguous naming conventions in profile settings, leading to confusion. By addressing these issues, improvements can be made to enhance the app's intuitiveness, efficiency, and user satisfaction, particularly in critical caregiving scenarios.

Problem 1: Navigation and Zone Editing

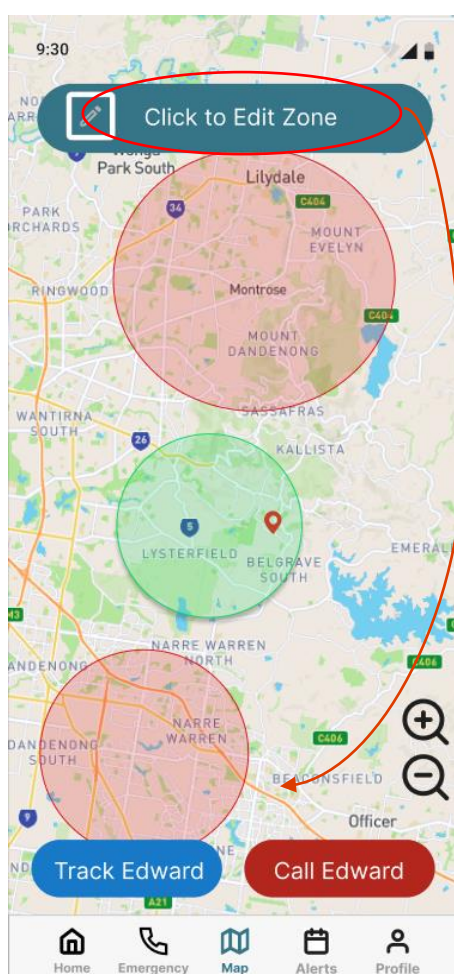


Figure 1: Maps page

Problem Summary: Participants 1, 3, and 4 experienced confusions while navigating between screens and accessing sub-screens such as "Edit Zone," "Track Location," and "Location Navigation." Participant 4 specifically struggled with the placement and visibility of the "Edit" button, as it was positioned at the top in a green colour that blended with the background. Participant 1 reported difficulty locating the "Edit Zone" button, which was similarly positioned at the top and lacked contrast with the background, making it easy to miss. Additionally, Participant 3 noted general confusion when attempting to return to the previous screens after completing actions.

Severity Assessment: The difficulty in navigating and finding essential features impacts task efficiency and user confidence. It can lead to user frustration and potentially cause users to abandon tasks if they cannot easily backtrack or identify key pathways.

Severity Rating: High – This issue affects critical functions such as setting zones and tracking locations, making it essential to address for overall app effectiveness.

Recommendation: The ideal way to fix this problem is to revise the navigation structure by ensuring the consistent presence of "Back" buttons across all main pages and internal pages. The visibility of essential controls like the "Edit Zone" button can be improved by changing its button colour and placing it in a more accessible location at the bottom of the screen. Clear icons and breadcrumb navigation can be added to help users track their navigation path effectively.

Problem 2: Calendar Functionality

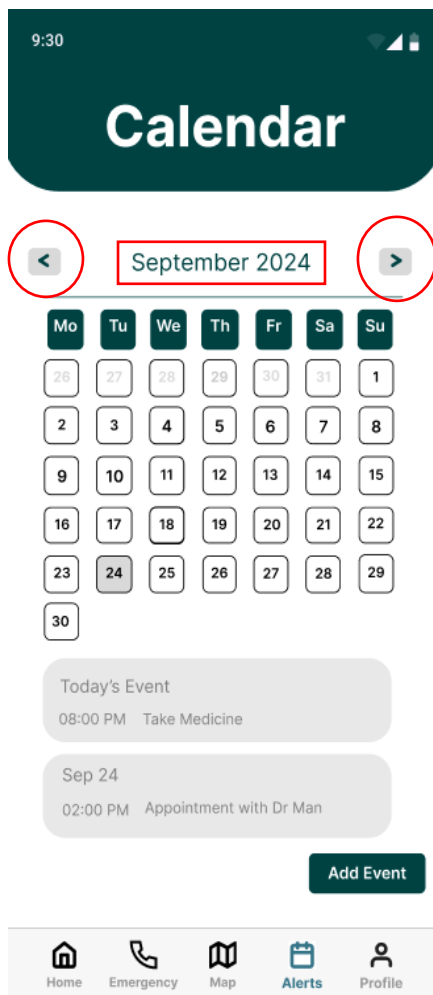


Figure 2: Calendar Page

Problem Summary: All 4 participants highlighted issues with the calendar section. Each one of them mentioned that the calendar tab was static, preventing them from selecting a different month, such as October, which restricted scheduling appointments beyond the current month.

Severity Assessment: The lack of essential functionality in the calendar impacts the effectiveness of managing appointments, a key feature for caregivers. It can result in user frustration and hinder effective scheduling, lowering overall user satisfaction.

Severity Rating: Low – Although this issue does not directly impact core features like tracking, it compromises the app's utility as an effective caregiving tool.

Recommendation: This issue should be resolved by creating individual pages for each month and linking them to the main calendar page. Users should be able to navigate between months using navigation arrows or dropdown menus. This adjustment would make scheduling more flexible and practical for caregivers, thereby improving the app's overall usability.

Problem 3: Profile and Settings Ambiguity

The page has too much information and looks cluttered. 'Profile' and 'Settings' can be split and implemented as 2 separate pages

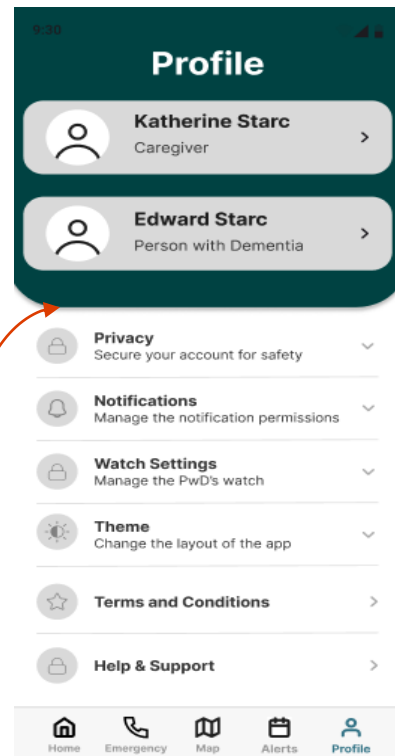


Figure 3: Profile and Settings page

The settings have 2 options which are totally different and perform different functions, but have a similar name, thereby confusing the user.

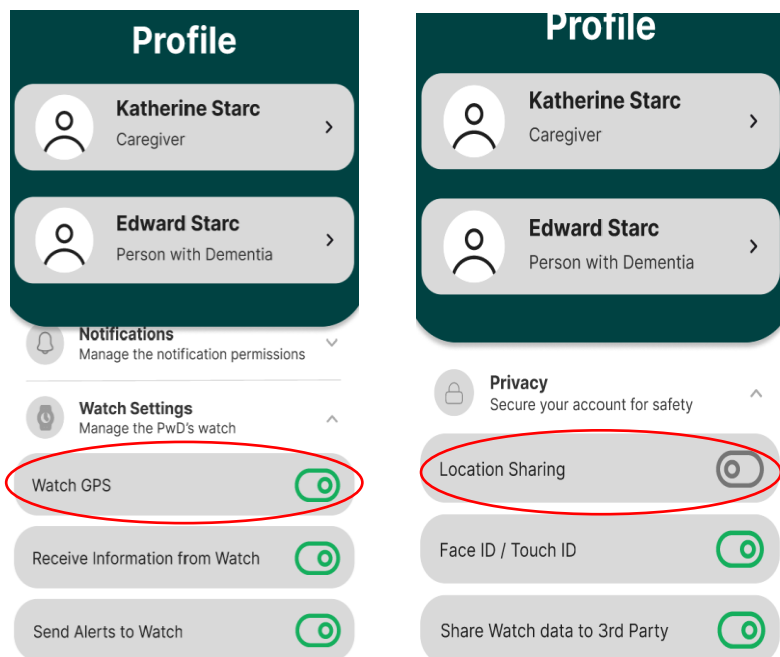


Figure 4: Settings Options

Problem Summary:

Participant 2 highlighted confusion due to unclear naming in the profile settings, making it hard to choose the right options. For the task of disabling the tracking of the PWD, the participant was confused whether to turn off the option “Location Sharing” or the option “watch GPS” as both seemed to be very similar but only one of them was the correct one. Participant 4 struggled with finding privacy-related features, as they were mixed with general profile settings, causing difficulty in distinguishing between them.

Severity Assessment:

Clear and distinguished naming of the options and organised menus are key to reducing user confusion and ensuring that they make the right adjustments confidently. Ambiguity and a cluttered layout can lead to mistakes or avoidance of important settings, impacting overall usability and user trust.

Severity Rating: Medium – This problem affects the app’s ease of use and could lead to confusion or misuse of key privacy features.

Recommendation:

Profile settings should be updated with clear, distinct and easy-to-understand labels that directly describe each option's purpose, avoiding complex language. The menu should be reorganised to separate general settings from privacy options, creating a dedicated "Settings" section to make privacy controls more visible. User testing should be conducted to confirm that these changes help caregivers easily find and understand the app’s options.

Problem 4: Sharing Location with Emergency Contacts

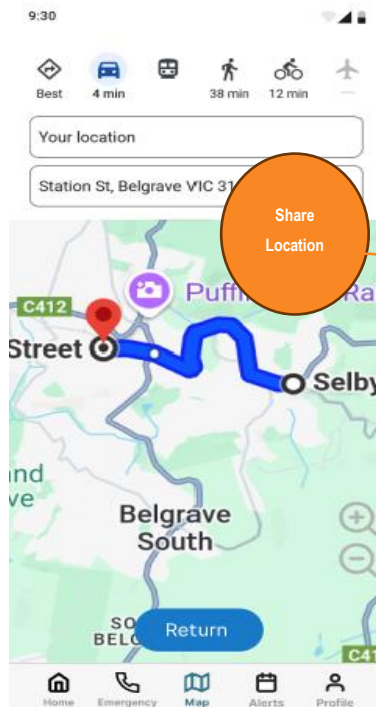


Figure 5: Tracking route page

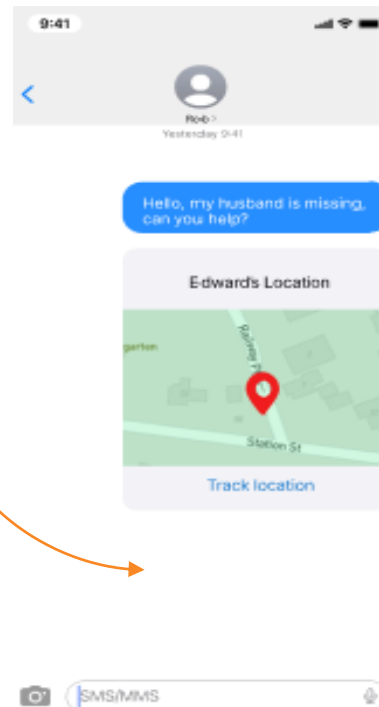


Figure 6: Emergency Contact Page

Problem Summary:

Participants 2 experienced difficulties with the location-sharing feature. Participant 2 expected to find the sharing option on the "Map" page but had to navigate to the "Emergency" tab, which felt tedious. Due to this, it was observed that Participant 2 took extra time navigating between pages to locate the feature

Severity Assessment:

This issue affects the app's emergency response efficiency. In critical situations, caregivers need to quickly access and share location information without navigating through multiple screens, as every moment can be vital.

Severity Rating: Low – While not as crucial as the primary tracking function, refining location sharing can greatly enhance user confidence and streamline emergency procedures.

Recommendation:

This issue can be fixed by introducing a direct "Share Location to Emergency Contact" button within the tracking route page in the "Map" section, while maintaining the existing option in the "Emergency" tab as a secondary choice. This approach reduces the time and effort required for caregivers to share crucial information swiftly, enhancing the app's effectiveness in handling emergencies.

6 LIMITATIONS

6.1 Overview

The usability evaluation of the TrackCare app was successful in identifying key issues and areas for improvement. However, like any research project, it had some limitations that affected the depth and accuracy of the findings. These limitations mainly stemmed from challenges with participant selection, task feasibility, evaluation coverage, and testing methods. Reflecting on these limitations can help improve future evaluations and provide more reliable insights into the app's effectiveness for caregivers managing individuals with dementia.

6.2 Limitations and Improvements

Participant Selection

Ideally, participants in the study would have been caregivers with real-world experience in taking care of persons with dementia. However, due to recruitment challenges, the team had to rely on participants without this specific background. This meant that some usability issues unique to caregivers might not have been identified. Despite this, the participants provided valuable feedback for general usability. Moving forward, focusing on recruiting experienced caregivers would help ensure more accurate feedback for the app's target audience.

Another limitation was the small participant pool, with only four participants. This meant that if two participants could not complete a task unassisted, it did not necessarily indicate a usability problem, as each participant's feedback represented 25% of the total input. To address this, the team carefully inspected and analysed how participants struggled with tasks, determining whether these issues were related to design flaws. We believe this approach provided an objective view, helping to mitigate potential biases in participants' responses.

Task Clarity and Feasibility

Certain tasks, such as scheduling an appointment for the next and upcoming months, were included in the evaluation but could not be fully tested due to a limitation in the prototype in the calendar section. This affected participants' ability to provide comprehensive feedback on those tasks. In future studies, tasks should be chosen to match the prototype's capabilities, and limitations should be clearly communicated to participants upfront to avoid confusion.

Coverage of Use Cases and Scenarios

The evaluation aimed to cover 8 key tasks to thoroughly evaluate and test the essential features of the TrackCare app. The team followed the 80-20 rule of evaluation and testing, which prioritises the most critical 20% of features to address 80% of user needs, focusing on core functions that would have the highest impact on users. Based on feedback, the team refined this approach to a 90-10 rule, addressing even more features iteratively. However, despite these efforts, there's a chance that certain rare or unique scenarios may not have been fully tested. To ensure the app's effectiveness in real-world caregiving situations, future evaluations should expand the range of scenarios tested and involve a broader set of users with diverse backgrounds and experiences.

Remote Testing Constraints

All testing was conducted remotely, with participants' interactions being recorded on video. While this allowed for effective observation, it had some limitations compared to face-to-face testing. In-person face to face evaluations can capture non-verbal cues, subtle facial expressions, and interactions that might not be as visible in a video. To address this, the team encouraged participants to think aloud while using the app and carefully watched their actions on screen. For future evaluations, combining remote and in-person testing could provide a fuller understanding of participant behaviour.

Inconsistent Button Functionality

During testing, there were occasional issues with button functionality. Some buttons didn't always work as expected, leading to confusion for participants. This inconsistency could affect the reliability of the feedback. Ensuring all buttons work consistently in the prototype phase would provide a smoother experience for participants and lead to more accurate feedback.

By acknowledging these limitations, future usability evaluations of TrackCare can aim to be more thorough, leading to better insights into the app's effectiveness, efficiency, and user satisfaction.

7 APPENDICES

- Informed Consent
- Demographic Questionnaire
- Task List
- Satisfaction Questionnaires
- Spreadsheets of data [collected from evaluation]

8 REFERENCES

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