

High-Fidelity Prototype and Summative Evaluation

A Report Focused on Understanding the Real Problems of
Fridge Habits that Lead to Wasted Food

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Course: Design of Interactive Computational Media, CSC318H

Date: November 24, 2024

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High Fidelity Prototype

Instructions for Installation:

1. Enter this link:
<https://www.figma.com/proto/xyfxT4xs6ZisZkigEYHtuc/Fridgid?node-id=410-9107&node-type=frame&t=unkaGUkCliAu2C1Y-1&scaling=scale-down&content-scaling=fixed&page-id=0%3A1&starting-point-node-id=410%3A9107&share=1&show-prototyping-sidebar=1>
2. Use the prototype.

Addressing Issues in A2

1. Adding and Updating Items

Users found adding items unintuitive due to unclear guidance on using the scan button and missing icons. To address this, we implemented a prominently placed, clearly labeled scan button at the center of the interface for better visibility. We also added brief tooltips and instructional text to guide users on how to use the scan button effectively. Additionally, we developed an aggregation feature that combines identical items into a single editing page, streamlining the process and reducing redundancy.

2. Messaging and Notifications

The messaging and notification features were confusing, with unclear buttons and no direct messaging capabilities. To resolve this, we redesigned the chat interface to prominently display a "Start New Message" button for easier navigation. Notification options were simplified by including a direct "notify all" button and clearer text labels for individual recipient selections. Furthermore, the chat icon was updated to better differentiate between viewing message history and starting a new conversation.

3. Fridge Fullness

The fridge fullness feature lacked clarity, and the explanatory blurbs provided were unhelpful. To improve this, we replaced the term "fridge fullness" with a more intuitive name, such as "Fridge Summary" or "Contents Overview." A walkthrough tutorial or tooltip explanation was added to guide users during the first use of this feature. Additionally, we simplified the blurb that appears after a scan to clearly explain the next steps, helping users better understand the feature's purpose.

4. Navigation

Users faced challenges distinguishing between shared and individual items, navigating views, and accessing a "go back" button. To address this, we introduced color-coded and labeled icons to differentiate shared vs. individual items visually. The list view was made interactive, allowing users to directly edit items by sliding on them. Finally, we added a dedicated "go back" button to the filter and item detail screens, enabling seamless navigation across the app.

5. Deleting and Editing Items

Participants wanted quicker delete and edit options, such as long-press functionality and a +/- button for updates. In response, we enabled long-press functionality on the fridge view to allow users to delete items directly. We also added +/- buttons on the editing interface for quick quantity adjustments and designed an intuitive context menu for additional edit and delete options accessible by tapping on an item.

6. Scanning Functionality

Users did not realize the app could scan multiple items at once and expressed a preference for barcode scanning. To enhance this functionality, we added clear options for "Single Scan" and "Multiple Scan" modes with intuitive labels. We also introduced a barcode scanning option for more accurate item recognition and incorporated clear, step-by-step instructions displayed before the scan begins, emphasizing the app's capability to handle multiple-item scanning.

These changes were directly informed by user feedback and have made the prototype significantly more intuitive, efficient, and user-friendly. By addressing these critical issues, we have aligned the design more closely with user expectations and needs.

Addressing Job Stories

1. Grocery Shopping Needs

"When I am shopping for groceries, I want to know which items I need to buy, so I don't purchase unnecessary items."

To help users know which items they need to buy and avoid unnecessary purchases, our prototype includes a filterable and sortable list view that provides a clear inventory of fridge contents. Users can easily identify what needs restocking and update fridge content through three flexible methods: manual input, taking photos of food items, or scanning receipts. These features ensure users maintain an up-to-date inventory, enabling smarter and more efficient grocery shopping.

2. Organizing Food in the Fridge

"When I am putting food into the fridge, I want to have enough space to place foods next to similar categories, so I can organize them effectively."

For users aiming to organize food effectively, the prototype features a fridge fullness estimation telling users how full their fridge is based on what items are logged at that time. This allows users to make better decisions when shopping for new food so that when it comes to organizing the items in the fridge they will not run out of space.

3. Sharing the Fridge

"When I share the fridge with others, I want to know what items are being added or used up, so I don't waste time searching for items or run out unexpectedly."

To address the challenges of shared fridge use, the prototype includes a notification feature that informs users when items are added, used, or nearing expiration. Additionally, a messaging system allows housemates to communicate about specific items, facilitating better coordination. Shared item tracking ensures users are aware of changes, preventing mismanagement and saving time otherwise spent searching for or replacing items.

4. Preparing Meals with Fresh Ingredients

"When I'm preparing meals, I want to see what fresh ingredients are still usable in my fridge, so I can make a meal without wasting food."

When preparing meals, users can utilize both the list and icon views, which display items along with their expiration statuses. Freshness indicators highlight which ingredients are still usable, enabling users to plan meals efficiently while minimizing waste. This feature empowers users to make the most of their available ingredients without letting food go bad.

5. Managing Expiring Food

"When groceries in my fridge are nearing their expiration dates, I want to receive a timely reminder, so I can plan to consume or freeze them before they spoil."

The prototype helps users manage expiring food by providing timely notifications about items nearing their expiration dates. These notifications include prompts suggesting actions like consuming or freezing items, enabling proactive management of food before it spoils. By keeping users informed and offering actionable reminders, this feature significantly reduces food waste and saves money.

Addressing Functional Design Requirements

1. Track What Users Have in Their Fridge

The prototype has a filterable, sortable list view of all items in the fridge with icons on each item for readability. This list is also searchable, making it easy to navigate on top of the filtering/sorting functionality. Additionally, users can click on any item to edit its details, ensuring the inventory remains accurate and up to date.

2. Track How Much Space Users Have Left in Their Fridge

The prototype features a fridge fullness functionality that uses images of fridge contents combined with a list of items to approximate the remaining space. Over time, the system learns and adapts based on user updates, improving its accuracy. This feature helps users plan their fridge organization and grocery shopping more effectively.

3. Remind Users of Which Foods Are Going to Expire

To help users manage expiration dates, the prototype includes a notification system that alerts users when items are nearing expiration. This feature provides timely reminders, ensuring that users can address expiring items and avoid unnecessary food waste, aligning with the need to reduce waste efficiently.

4. Suggest How to Deal with Expired or Expiring Food

The notifications provided by the prototype go beyond reminders and include simple actionable prompts or suggestions. These may include ideas like consuming the items soon or freezing them to extend their usability. This guidance empowers users to make informed decisions about how to handle food that is close to spoiling instead of simply being told that they are out of time.

5. Assist Users in Organizing Food Placement in the Fridge

Although this prototype does not directly give suggestions as to how a user should organize items/placement in their fridge, the fridge fullness estimation along with the food log/tracker allows users to easily identify what is owned by whom which is a common issue user face when organization gets messy when sharing a fridge with multiple people. This further allows users to easily reorganize items in their fridge by owner as users can easily check the ownership of an item if it is unknown.

Evaluation Protocol

Evaluation Goals

The aim of the usability test is to determine usability problems in the fridge management app so they can be addressed. We wanted to know whether our product contained major usability flaws that prevented completion of how they would normally perform their everyday fridge-related tasks. Some of the high-level goals we wanted to test were whether the system was learnable to new users and if the app could be used to efficiently complete tasks on a time constraint since our target users are people who are busy like full-time students or working professionals. With our end users in mind, it was also necessary to test whether the prototype would meet their expectations (as determined by our user research studies in A1) to accomplish the following:

Desired Goals, Needs, Wants:

- quickly know which food in the fridge is about to go bad or has expired.
- know which food items are in the fridge and the amount available.
- be able to determine which foods are theirs and efficiently ask people they share a fridge with if they want to have some of their food

Participants Recruitment:

How Many Participants and Why:

We initially aimed to have 12 participants to evaluate our prototype “knowing that 12 participants would detect a minimum of 87% but an average of 97% of issues that a group of 60 participants would identify.” We wanted to test 5-6 university students and 5-6 working adults.

However due to time constraints, including taking a long time to complete our high-fidelity prototype and conflicting schedules of evaluators and participants, we were only able to test 10 participants in total. We ended up testing 4 part-time workers, 1 full-time worker, and 5 full-time

students. Out of the 10 participants, two of them were pilot testers. With only 8 participants testing our high-fidelity prototype after the changes, we would still be able to cover a significant amount of issues noticed.

Throughout the development process of the high-fidelity prototype, we continuously tested the features as well and updated the prototype based on issues we noticed.

Criteria for Who Was Recruited:

We wanted to target the end users of our application which are people with busy schedules who have difficulty managing their fridges, often shared with others. We determined these participants to be users who experience the type of fridge management failures determined in the data studies.

How - [Initial Demographic Survey](#):

To confirm that our participants matched our criteria, we had them fill out a quick demographic form which included their age, occupation, and how many people they shared the fridge with.

Method 1: Think Aloud Evaluation

Data Collection

Our first data collection method was to complete a think-aloud evaluation of our prototype. We determined that giving our users a list of high-level tasks that align with the user goals identified or their demographic, would be the best way to test the usability goals for our high-fidelity prototype.

The protocol was constructed to collect both quantitative and qualitative data related to the effectiveness, efficiency, and satisfaction of our application design for the user's purposes. We recorded each session either through screen recording, audio recording, or video recording, to provide time marks that allowed us to review and collect our desired data.

To determine the effectiveness of the application from a quantitative objective measure, we looked at the count of errors. For example, the number of wrong pages navigated to, the number of wrong control attempts for items, and how many times a participant had to restart a task. This was to determine if a user could easily complete their desired tasks without having to put much mental or physical effort into it, which aligns with our busy target users. We also counted the number of tasks successfully completed. To determine effectiveness from a qualitative objective, we recorded navigational pattern observations. We wanted to see the steps a user took to accomplish their tasks and determine whether there was a certain reason for them doing a task in that order. For a qualitative subjective measure, we recorded the participant's comments during the completion of the tasks.

Throughout the talk aloud we had a list of sample prompts and questions to ask, but some of it was unstructured, allowing us to evaluate specific questions related to a user's behaviour and their thought process on the application. For instance, "Is there anything you found confusing

about this feature?”, “What are you thinking as you complete this task?”. The participants’ comments also allowed us to determine some qualitative subjective measure of their satisfaction using the prototype.

Finally, to determine the efficiency of the design from a quantitative objective measure, we recorded the time spent to complete each task.

Scenario & Tasks

For the first part of our script, we introduced our assumptions about the participants. Then we told them to “imagine you just came home from the supermarket with lots of new items. You forgot to empty out the fridge, but you’re in a rush to put the new items in before they’re left out too long and get too warm.” This led to our first three tasks which will be explained after the pilot testing. Next we told the participants to “imagine you’re also really hungry and you want to cook something quick. Let’s say you want to make an omelet and the ingredients you need are eggs, butter, and tomatoes.” We also told the participants that “you want to borrow some ingredients from your roommates. You also know that your roommate would get upset if you used their food without them asking and if they didn’t know how much of the ingredients were left.” This led to our final two tasks (also explained in the final tasks section).

The purpose of this script is to be able to examine all of the main functionalities and design requirements of our prototype.

- 1) **Track what users have in the fridge.** This functionality is tested by directing the participants to add new items to the fridge, ensuring each item is updated correctly, as well as editing the items when they want to cook something.
- 2) **Track how much space left in the fridge.** This is tested when the user has to update the fridge fullness after they have deleted the expired items and have added their new items to the fridge.
- 3) **Remind users of which foods are going to expire/go bad soon.** This is tested by allowing the users to find which items have gone bad to make space in the fridge in the first part of the scenario.
- 4) **Allow users to determine which foods belong to them.** This will be tested indirectly as the users will want to know which food is theirs so they can determine which ones they can use right away versus which ones they need to ask permission to use.
- 5) **Communicating with housemates about fridge content.** The user has to determine how to ask their housemate whether they can use one of the food items that doesn’t belong to them, knowing that their roommate would get upset if they didn’t ask to eat their food.

Prototype Pilot Testing

Original Tasks:

- 1) Figure out what items expired so you can quickly remove them from the fridge and throw them away to make space
- 2) Keep track of the new items you're putting in your fridge correctly including when each item expires and who it belongs to.
- 3) Update the fridge fullness to remember how much space is in the fridge next time
- 4) Let's say you want to make an omelet and the ingredients you need are eggs, butter, and tomatoes. You also know that your roommate would get upset if you used their food without them asking and if they didn't know how much of the ingredients were left.

Use the app to help you complete the tasks.

Pilot Study Insights

The original prototype started with the user on the home screen without any prior introduction to the app. The first view shows the fridge fullness, the recalibration button, the fridge "Updates", and "Upcoming Expiries." One of the issues for the first pilot participant was that the expired items were not originally showing up on the Home page, even though they were on the fridge lists in the "Food" tab. When asked to remove the expired items from the fridge, one participant initially didn't notice any expired items so they explained how they wouldn't decide to throw away any of the items.

Another insight was that as someone who has never seen the app before, the pilot participant's first instinct was to click on the items instead of sliding on them to get access to the options. We noticed that the tutorial we had created was hidden in the accounts profile and it wouldn't have been known or obvious how to get to the help from the home screen.

Improvements to High-Fidelity Prototype

Here is a list of changes we made to fix some of the errors encountered during the pilot tests:

- Moved the tutorial to be the starting page when the users first open the prototype.
- Added an "Expired" section on the Home page with the expired items.
- Fixed the issues for the "Search" function by making the keyboard fully interactive.
- Added the "Edit" function to be accessible straight from the Food tab after swiping on the eggs, butter, and tomato items.
- Allowed the users to directly enter a new quantity for an item on the "Edit" page.
- Allowed the users to directly type in the name to "Edit" the "Potato"

Updated Tasks and Script

Since time was limited, and our prototype wasn't able to handle every variable to update, we couldn't change some of the flow interactions to accommodate every order of adding the items. However, we updated the script to tell the users which new items were being added as we had previously forgotten to include that which caused confusion.

We also noticed in our original script we didn't include any items in the cooking ingredients that users had to borrow (they all belonged to themselves). Therefore, we made changes to allow the users to choose an item they wanted to borrow to test that functionality.

Method 2: Follow-Up [Questionnaire](#)

The goal of the questionnaire is to collect additional subjective data after a participant completes the think-aloud session. The questionnaire will help us understand the perceived usability of our prototype as well as how well our design satisfies the goals, needs, and wants of our target audience while completing tasks related to managing their fridge.

Our questionnaire also aims to answer whether the system we designed is learnable, and more importantly to gain a deeper understanding of the user's thoughts on each of the features and whether they found it met their expectations. One of the key issues recognized in A2 was that evaluators had difficulty understanding how to complete a task because it wasn't immediately obvious without assisted guidance. We want to determine if the updates to our design allow users to easily navigate and complete the system tasks on their own efficiently to accomplish their desired tasks.

We included a series of System Usability Scale statements, having the participants give a rating. We then calculated the scores for each user. We determined a quantitative subjective measure by calculating the average score and another average score after removing our pilot testers.

Finally, we had a series of qualitative subjective questions regarding the participants' thoughts on the effectiveness, satisfaction of features, and determined what changes they would make to improve the application design to meet their desired goals.

Study Results

Participant Demographics

The usability testing for our prototype involved 10 participants, carefully selected to represent a range of demographics relevant to our target audience. Below is a summary of the participant demographics:

1. Gender Distribution:

A majority of the participants identified as female (6 participants), while 3 participants identified as male, and 1 participant identified as "other." This distribution allowed us to gather insights from a diverse range of perspectives.

2. Age Range:

Most participants (9 out of 10) were within the 18-29 age group, aligning well with our intended target audience of young adults who are likely to share living spaces. One participant was aged 40-49, providing an additional perspective from a slightly older demographic.

3. Occupational Background:

The majority of participants were students, with 5 identifying solely as students and 4 indicating

they were both students and working part-time. One participant was working full-time, offering insights from someone managing a busier schedule. This mix reflects the lifestyles of individuals who are likely to use a fridge-sharing tool.

4. Fridge-Sharing Context:

Participants shared their fridges with varying numbers of people: 4 participants shared their fridge with 1-2 people. 6 participants shared their fridge with 3-5 people. This demographic information highlights that the prototype was tested primarily with young adults who frequently share living spaces, which aligns closely with our target user group. The inclusion of participants from different occupations and fridge-sharing dynamics also ensured that we received feedback relevant to a variety of real-world contexts. This diversity helps to validate the effectiveness of our design across a range of potential use cases.

What Worked Well During Testing

The usability testing for our prototype revealed several features and interactions that resonated well with participants. These successes reflect the strengths of our design and highlight areas where users felt supported and empowered by the interface.

1. Notification and Messaging Features

Participants consistently praised the **notification feature** for its clarity and functionality. For instance, Loki described it as "smart and effective," emphasizing that it helped them keep track of shared fridge items. Nicole also mentioned, "The options on the notification page covered all options that I could need," which demonstrates that the feature met users' expectations for notifying others about fridge contents. This functionality aligns well with our goal of enhancing communication among shared fridge users.

2. Finding and Editing Items

The ability to find and edit items received positive feedback for its usability. Nicole noted, "I found the items easily, knew the correct actions to update them," and appreciated how intuitive the process felt. Similarly, Celine found the edit page straightforward, stating, "It's faster to just scroll through the list instead of filtering or sorting," highlighting that the default view was sufficient for many users without needing additional effort to filter results.

3. Adding New Items

The process of adding items, particularly through scanning, was well-received. Loki mentioned that they found the scanning feature "intuitive" once they became familiar with it. Loki also appreciated the dual functionality of being able to scan receipts and individual items, finding it "interesting" and effective. This indicates that the flexibility of the adding process was a strong point in our prototype.

4. Fridge Fullness Feature

The fridge fullness feature, while occasionally confusing, was also seen as valuable by several participants. Nicole remarked, “It was cool and liked seeing that there was a visual to go along with the numerical value for the fridge fullness.” Purav echoed this sentiment, stating, “The food fullness feature gave a good overview of the state of the fridge.” This feedback highlights the potential of the feature to provide users with helpful insights into fridge organization and capacity management.

5. Task Efficiency

For simpler tasks like deleting expired items and sending notifications, most participants completed them quickly and without issue. For example, for all of our participants, they could immediately identify expired items and delete them timely. They knew the controls to do this, however sometimes the prototype would glitch due to Figma’s limitations of recognizing the difference in horizontal and vertical scrolling. This shows that straightforward actions in the prototype were easy to perform and did not present significant barriers to users, it was mainly an issue in the Figma software.

In this audio clip, a participant states how it was easy and self-explanatory to know how to delete items. This participant deleted the items in under 10 seconds on the home page.

https://drive.google.com/file/d/1yiDdSe5KSJlNnAOS_wibc72XiYrIUOF/view?usp=drive_link

Another participant uses a different navigational pattern, still efficiently checking the home page to identify expired items right away and locate them in this video:

https://drive.google.com/file/d/1cVeEI0kkifmZAPo4MxhveKj_Ced26i_o/view?usp=drive_link

6. Overall Alignment with Expectations

Many participants felt the prototype aligned well with their needs and expectations. Celine shared that the prototype “effectively tells me what foods are in my fridge and right away I know when it will expire.” Purav echoed this by saying, “I now have access to all the stuff that my roommate also bought, and we can share stuff and reduce buying things we don’t need.” These reflections highlight the prototype’s success in addressing its core goals of reducing food waste and improving fridge management.

Conclusion

Overall, the testing demonstrated that features such as notifications, editing items, and scanning were intuitive and useful for most participants. While there are areas for improvement, the positive feedback indicates that the prototype effectively supports key user needs, especially for managing shared fridge spaces and preventing food waste. The enthusiastic responses to some features reaffirm the potential impact of the design.

What Didn't Work Well During Testing

Although there was significant improvement with the high-fidelity prototype—thanks to feedback from earlier evaluations of the low-fidelity prototype—there were still notable gaps in navigation and functionality that became evident during testing. These shortcomings provided insight into areas requiring further refinement to enhance the user experience.

1. Navigational Differences from Predetermined Flow of Interactions

Navigation remained a challenge for many participants, particularly with features that lacked clarity or intuitive design. One task required participants to locate specific items (e.g., butter, eggs, and tomatoes) to make an omelet and update their quantities. While the intended approach was to use the search bar, most participants ignored this feature and chose to scroll through the list instead. Celine remarked, “It’s faster to just scroll through the list instead of actually filtering or sorting,” indicating that the search bar felt unnecessary for this task. This feedback underscores the need to either simplify the search bar or better integrate it into the workflow to align with user preferences.

2. Fridge Fullness and Recalibration Feature Confusion

Despite improvements to this feature based on earlier feedback, participants still found it unclear and tedious. Some participants were confused by the term “update food log” and struggled to understand its function. For example, Vincent shared, “The instructions about logging food items... didn’t know if [it] meant recalibrating after taking items from the actual fridge.” Similarly, Minji assumed that recalibration would help add items to the fridge rather than simply updating the fullness percentage. These misunderstandings highlight the need for clearer labelling and more explicit instructions.

Additionally, some participants, such as Vincent, found the feature cumbersome, saying, “It’s hard to actually use because it is fully dedicated to how full your fridge really is.” This feedback suggests the recalibration feature should seamlessly integrate with other actions, like adding or removing items, to minimize redundancy and improve usability.

3. Incomplete Interaction Flows

Due to time constraints and the high-fidelity prototype still being a work in progress, some functionality was incomplete, leading to confusion for participants. For example, early testers experienced issues with buttons and icons that were either nonfunctional or difficult to press. Loki noted, “Had trouble swiping on the food items to delete them, but this is a Figma issue,” while Minji pointed out that the recalibration button was misleading, adding, “The screens were not designed in this way, although a real app would not allow for this.” As well, with later testing, some participants wanted to edit the quantities of the food items, or interact with the ‘update food log’ button, however, the incomplete flow of the interactions led to some confusion as the participants didn’t have complete freedom over all the interactions of the application. Grace noted, “I wasn’t able to click on the ingredients directly to adjust quantities and I had to use the search function instead when I knew I saw eggs and butter in my fridge.” These

incomplete flows affected the overall experience and made it harder to evaluate certain features fully.

4. Adding and Scanning Items

Although the scanning feature was generally appreciated, participants faced challenges when errors occurred or when adding multiple items. Yan Qing struggled with correcting a mis-scanned item, stating, “No ability to go back to the camera and rescan.” This lack of flexibility frustrated users and limited their ability to recover from mistakes. Additionally, Minji observed that busy users might not carefully review confirmation pages, remarking, “I don’t think people will check the confirmation page very carefully, especially if they are busy.”

5. Messaging and Notification Limitations

While the notification feature was functional, some participants found it insufficiently flexible for real-world use. Grace shared, “I’d have to wait for a reply and delay my cooking,” highlighting the reliance on timely responses from other users. Minji suggested adding more options, such as pre-written message templates, stating, “It would be helpful if it had a feature where it would give you a few message options like what Apple provides when you can’t take a phone call and want to message them instead of picking up”.

Conclusion

While the high-fidelity prototype demonstrated progress in addressing prior feedback, testing revealed key areas for improvement. Navigation challenges, incomplete interaction flows, and confusion about certain features—such as fridge fullness recalibration—highlight the need for more intuitive design and clearer instructions. Addressing these issues will ensure a smoother user experience and a more polished prototype in the next iteration. By integrating clearer feature descriptions, refining workflows, and improving error recovery mechanisms, we can better align the prototype with user expectations and needs.

Key Findings from Usability Testing

Our usability testing provided valuable insights into the strengths and weaknesses of our prototype, combining quantitative data with qualitative feedback to evaluate its effectiveness. Below, we discuss the findings and contextualize the results with explanations and comparisons to baseline expectations.

1. Task Completion and Errors

Task completion was generally successful, but errors were frequent in some cases: **Grace** encountered 4 navigation errors, struggling with understanding how to use the interface effectively. This participant reported that they “clicked on items instead of slides” multiple times.

Vincent made 15 incorrect clicks when attempting to add items, which indicates significant confusion with this feature. In contrast, participants like **Nicole** and **Ahana** only reported 1-2 errors. This is important because errors in navigation and task execution indicate a lack of intuitiveness in certain areas. For example, Vincent's repeated incorrect clicks suggest that the interface does not provide sufficient visual or textual cues to guide users through adding items. Grace's feedback emphasized that unclear labelling and inconsistencies in interface behaviour contributed to their errors. This aligns with existing design heuristics (e.g., recognition over recall), where users should rely on familiar visual patterns rather than needing to learn new ones. Improvements to interface clarity and consistency are necessary to reduce error rates.

2. Efficiency in Performing Tasks

Task times varied significantly among participants: Adding new items ranged from **1 minute 11 seconds (Nicole)** to **5 minutes (Minji)**. Updating fridge fullness ranged from **30 seconds (Nicole/Sean)** to **3 minutes (Minji)**. This is because longer task times, especially for Vincent and Yan Qing, highlight inefficiencies in the task flow. For instance, Vincent spent extra time trying to confirm and add items manually because the buttons were confusing, while Yan Qing struggled to recalibrate after a mis-scanned item. For some participants, the interaction flow didn't match their expectations, pointing to a gap between user mental models and the prototype's design. Comparatively, Nicole's faster completion times suggest that with clear instructions and labelling, tasks are achievable in under two minutes—an ideal baseline for this context. These findings demonstrate that improving task flows can significantly reduce variability in performance.

Link to video clip 1 - Yan Qing updating fullness:

https://drive.google.com/file/d/199eneLI5E_ry7MO7AjJNbbAJ_QU66dt/view?usp=sharing

3. Navigational Challenges

Errors related to navigation were common: Grace initially missed seeing expired items on the home page. Celine made **6 incorrect clicks on items**, while Loki and Yan Qing encountered 2-3 navigation errors each. Navigational errors impede task efficiency and user confidence. A baseline expectation is that users should be able to complete simple tasks like finding expired items or recalibrating the fridge without confusion. These errors suggest a need for better interface organization and clearer visual hierarchies. Loki commented that they “navigated randomly at first,” highlighting a lack of intuitive guidance. Ahana's issue with skipping tutorial steps also reflects a need for mandatory walkthroughs to ensure foundational navigation skills are established before exploring the app.

Link to video clip 2 - Ahana's tutorial:

https://drive.google.com/file/d/1rx0KVQYNL84oX8Lzh1_GjmYWDmaTMHXF/view?usp=drivesdk

4. Notification and Editing Features

Participants generally completed notification tasks quickly: Times ranged from **6 seconds (Loki)** to **45 seconds (Esha)**. The variation in task time suggests that some users grasped the notification feature more easily than others. The shorter task times suggest the notification feature is relatively easy to use for most participants, which aligns with baseline expectations for such features. However, the longer times indicate a learning curve for others, emphasizing the importance of improving feature discoverability. This feedback indicates that while the notification system is functional, clearer pathways to use advanced options like filtering are necessary.

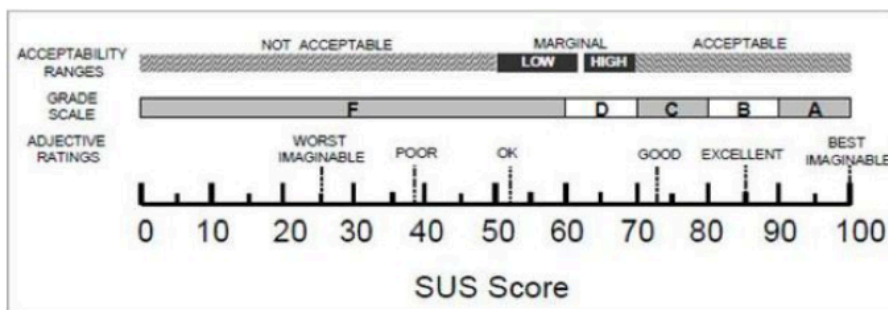
Link to video clip 3 - Esha's tutorial:

https://drive.google.com/file/d/1MuQv0ELoYBjQLn4sobZ8GgEMgNebqLAX/view?usp=drive_link

5. System Usability Scale (SUS) Scores

SUS scores ranged from **50 (Vincent)** to **100 (Ahana)**, with a mean score of approximately **78.25**, placing the prototype in the "acceptable" range. A score of 78.25 is above average, indicating that most participants found the system usable. However, the wide range of scores highlights a disparity in user experiences, with participants like Grace struggling due to interface issues and Esha reporting a seamless experience. Grace noted, "I didn't see expired items at first," and had difficulty navigating, which contributed to their low score. In contrast, Ahana's higher score reflects a more intuitive interaction with the prototype, suggesting that while the design works well for some users, improvements are needed to ensure consistency.

Interpreting SUS score



Lessons Learned and Implications for Design

Lessons Learned:

1. The Importance of Guidance and Clarity

One recurring theme was that users often felt uncertain about the purpose or functionality of certain features. For instance, the fridge fullness and recalibration feature caused confusion, with participants unsure of what “update food log” meant or assuming it would help add items to the fridge. Vincent remarked, “The instructions about logging food items... didn’t know if [it] meant recalibrating after taking items from the actual fridge.” This highlights the need for clearer feature descriptions and consistent terminology.

2. Flexibility in Task Completion While the prototype provided features like a search bar for finding items, many participants preferred scrolling through the list, as it felt more intuitive. Celine noted, “It’s faster to just scroll through the list instead of actually filtering or sorting.” This revealed that providing users with multiple ways to complete tasks can enhance usability.

3. Error Recovery and Prevention Errors, particularly during the scanning process, highlighted the need for better error recovery mechanisms. Yan Qing mentioned, “No ability to go back to the camera and rescan,” when a mistake occurred. Similarly, Minji noted that users might overlook confirmation pages, commenting, “I don’t think people will check the confirmation page very carefully, especially if they are busy.” These findings show that safeguards, such as error prompts or confirmation pop-ups, are essential. These points suggest that “X” buttons and back-arrow buttons would be helpful features of the app.

4. The Value of Intuitive Navigation Navigational challenges were a significant barrier for several participants, especially with incomplete interaction flows. Grace shared, “Expired items did not appear on the home screen... it wasn’t obvious that it was to add food.” These experiences emphasize the importance of intuitive navigation and clear visual hierarchies.

5. Balancing Feature Complexity with Simplicity While some participants appreciated advanced features like fridge fullness, others found them cumbersome or redundant. Vincent remarked, “It’s hard to actually use because it is fully dedicated to how full your fridge really is.” This feedback highlights the need to streamline complex features and integrate them seamlessly into the overall workflow.

Proposed Design Changes

1. Add a pop-up that asks users to make sure their items are scanned correctly before the user completes the “Adding Items” process.

4 out of 10 participants did not think to check the items being listed after scanning, and one even commented “I don’t think people will check the confirmation page very carefully especially if they are busy.” Mistakes or errors can be expected with a feature such as item detection and if users are not careful this can lead to accumulating errors in the food log. Thus, adding a pop-up prompting the user to check if all items are logged correctly could prevent this issue.

2. Simplify Fridge Fullness and Recalibration

The fridge fullness and recalibration feature should be streamlined by automating updates whenever items are added or removed from the fridge. A tooltip or short description should also be included to explain the feature's purpose and functionality. Vincent asked, "What does update food log mean?" Automating this feature and providing clear guidance will reduce confusion and make it easier for users to understand.

3. Enhanced Error Recovery for Scanning

The prototype should include options for users to rescan items or edit details during the scanning process, with a visible "rescan" button added to the confirmation screen. Yan Qing expressed frustration, saying, "No ability to go back to the camera and rescan." Providing these options would improve flexibility and ensure that users can quickly recover from mistakes.

4. Improve Navigation and Visual Cues

Key features such as expired item notifications and recalibration should be made more prominent and accessible. Consistent labelling, larger touch targets, and clearer icons should be implemented to improve usability. Grace noted that expired items "did not appear on the home screen," while Sean struggled with small buttons, making navigation difficult. Enhancing these elements will make the interface more intuitive for users.

5. Pre-Written Notification Templates

The notification system should include pre-written message templates, such as "This item is expiring soon" or "Can you confirm if we need this item?" Minji suggested, "It would be helpful if it had a feature where it would give you a few message options." These templates would streamline communication and make it faster for users to send notifications, especially in shared fridge scenarios.

Reflection

(5/100 points)

The first few users helped us realize there were missing features and screens that we had overlooked during the development of the high-fidelity prototype. As developers, our familiarity with the design and the usability test structure may have caused us to miss these gaps.

If we were to conduct this study again, we would involve users outside of the team in early informal testing to uncover potential bugs and usability issues before starting the official evaluations, even pre-pilot testing. With additional resources and time, we would also explore a different evaluation approach. Specifically, we would invite real roommates to interact with the prototype simultaneously and share their feedback collaboratively. This scenario could provide richer insights into how the tool would function in a shared household setting, even if the findings might be more specific to that context.

Although the team was able to gain a lot of knowledge and feedback on how the design can be refined and implemented, without time constraints, the team could conduct broader testing, and evaluate more potential users of the app (recruit more participants to gather better data on needs, functionality and effectiveness of the program). Moreover, one major improvement we would make is to evaluate the flow of our Figma prototype more so that there is more flexibility between navigation options, e.g. having the option to swipe left on every item on the prototype. We would also have created more variables within the prototype to maintain consistency within the interaction, and to avoid any confusion from the participants.

Appendices

Updated Job Stories

- Changed Job Stories

Usability Study Protocol

- User demographics template

- Usability Testing Protocol

(Protocol & Talk Aloud Script Included)

Consent Forms

- Consent form TEMPLATE

Research Instruments

Observation Recording Tables

- Observation Template

Follow-Up Questionnaire

- SUS & Questionnaire TEMPLATE

Raw Data from Usability Studies

- Raw Data

Documentation of the Data Analysis Process

- Analyzing Evaluation Results

(Comparing Results)

Group meeting notes

Our team communicated very regularly online, constantly discussing new changes that could be made and ideas for how to move the project forward. Beyond that communication, we had some meetings to discuss smaller details regarding the prototype for which our notes are linked below.

Link to notes:

<https://drive.google.com/drive/folders/1dILGJJdGctfKPt5QJBdZ9nb4P4719RgL?usp=sharing>

Nov 23rd Notes

Hey guys, I am testing some of the flows and writing out things I noticed needed fixing - Izumi

Required Fixes

=== recalibrate

- need to connect update food log button from "recalibrate" step
- need the back buttons to connect to something - FIXED

Details I have chosen to ignore - Imk if you guys disagree & think we should add these screens

=== recalibrate

- the back button once you get to the scan page will take you back to only one of the home screens, meaning if the user had already sent a notification before clicking "recalibrate" the screen will not show the "notified" tag

=== adding new items

- currently, the user cannot switch off to another tab when they are in the middle of adding items. ideally, they would be able to tap on the footer elements which should trigger a pop up checking if they want to discard their work

Lessons learned

- the point of components is that any instance of that component will also inherit the same interaction arrows

Nov 20th Meeting Notes

Items to Fix

<high priority>

- add arrows to add grapes - Izumi (COMPLETED)
- Change 'Add items manually' screens, reuse 'update items' screen, more consistent - Izumi (COMPLETED)
- Send notifications, make it a popup rather than an entire screen. - Izumi
- add slide options for all items - edit, delete, message - Izumi (made component but need to add when the food log is done)
- let long hold select items for messages - Anastasia (COMPLETED)
- inbox should be notifications and messages + add messages option that will take them to the select items to send message page - Anastasia (COMPLETED)
- Edit 'Profile' screen - Anastasia (COMPLETED)
- Search item screen - remove items below after searching for item, and make searched item relevant to testing prompt - Yuxi
- Search item screen - change keyboard - Yuxi
- blank search results screen "no items" - Yuxi
- return > search on keyboard - Yuxi
- filtering - Wendy
- update fridge fullness > recalibrate (add info) - Izumi (IZUMI)
- make tutorial - Izumi (DONE)
- add key board to edit / new item screens - Izumi

===== new tasks that need to be done after everyone else finishes their part

- once all the screens are done, arrows need to be drawn from the recalibration pop up to the "food log" page bc idk where it is...

===== new things that I noticed - Izumi

- should we let people slide and delete items when adding them just like the way they can do it on the fridge screen..?
- is it okay if we omit the calendar drop down for each new item on the adding screen?
- on the manual add new item pages, would it make more sense for the "cancel" button be "clear" and to wipe the entry?
- maybe make a "are you sure you want to go back?" pop up for when people click back after scanning
- make sure header & footer stays in place when we scroll
- make sure frame sizes are consistent

<lower priority> - Wendy

- for all "home screens" change the "i" icon to the info icon
- change 'pc' to pieces
- change the food item icon pics
- add info pop up for scanned items
- Change navigation bar footer to 4 tabs
- Consistent Font and size and colour (notifications pop up, account page)
- make sure everything is aligned for the home page
- apparently the footer is floating on some screens, make sure they are grounded

evaluations

set up - Yuxi (+David, Kelsie after midterm on Friday)

- list of tasks for the user
- survey / questionnaire
- list of things to keep track of
- what eval categories this falls under

=====

- setting NOV 25th
- look for ingredients: eggs, tomatoes, butter
- items to keep in the fridge:
 - new items: kiwi, eggs, green onion, yogurt, grapes
 - items being searched for: eggs, tomatoes, butter
 - extra items: shwarma, milk, strawberries, chicken breast, blueberries, salmon