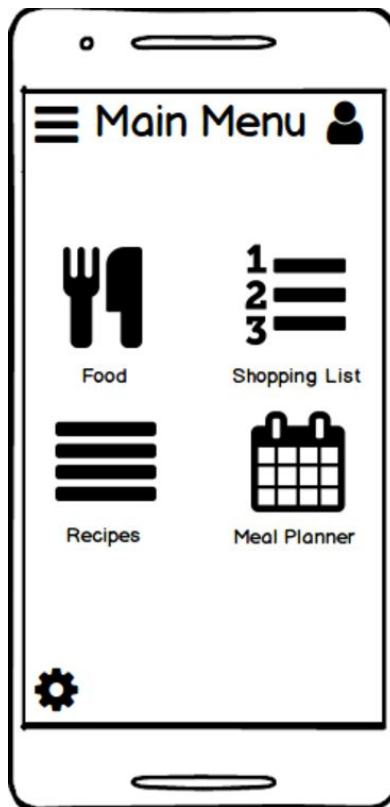


Food management application

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Invision Link: <http://invis.io/RNOASCVPCXM>

Executive Summary

The aim of the project was to create a simple solution to manage food in a household through the use of a managerial app. This report outlines the process of refining a low-fidelity prototype into a mid-fidelity. User research in the form of interviews was conducted in order to remove or refine features that had a negative or positive impact on the user experience.

Once the user research was conducted the initial prototype was refined to create a mid-fidelity design. The final design proposal aims to assist users in managing their household food supply by making it easier to plan meals and manage stock levels.

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Introduction

At the conclusion of the Initial Design Proposal, two low-fidelity wireframe concepts were proposed. One of the concepts was mobile based, and one was web based. The problem space that these concepts aimed to solve was the issue of food wastage. A key idea that was established from our Initial Design Proposal was that the user group we were targeting was homeowners, or everyday people.

We also established that the main issue regarding food wastage within the homeowner user group is poor planning and inaction. We recognize this issue and have decided to move forward with the aim of refining our mobile based concept in this document. This is because we strongly believe that a web based solution will not provide the convenience necessary for it to work as intended.

Usability Testing

Research Goals

The goal of this research is to understand how users feel about using this prototype, and whether it is comfortable enough to come back to and use on a daily basis. We want to see if users think it's simple enough to use on a daily basis, but also that it has enough content and functionality so that users will want to use it everyday.

What do we want to learn from our users for the mobile prototype?

- The main feature of the app is the food expiry section, therefore we want to learn if users find it convenient to navigate to that section.
- What feature in the app will they use the most?
- Is the app easy enough to use?
- Is the app convenient enough to use (time spent in app to complete tasks)?
- Are there any unnecessary features?
- General appearance thoughts.
- Is there anything they would personally add/remove?
- We want to retain users and grow habits of good food waste practises. Therefore we want to learn if the prototype would retain users.

Changes Made to the Prototype for Testing

- The meal planner was overhauled. The new system relies on an in-app search engine that can be used to search pre set meals that can be added to the days meal plan. We also decided to not implement specific meals into the meal planner (eg breakfast, lunch, dinner) as that sort of feature is more associated with a calorie counting or fitness focused meal planner. The purpose of our meal planner is more to have the user be aware of their meals and plan them to reduce waste.
- To make the user feel more personally connected to the app, we decided to add a profile section that could be used to store information about the user. This profile section also gives us the option to add more social features later on if we need.

Test Script

☐ Application should now be open to the home screen or some other neutral position.

“Hello, _____. My name is _____, and I’m going to be walking you through this session today. We’re asking people to try using a mobile application that we’re working on so we can see whether it works as intended. The session should take about 30-40 minutes.

The first thing I want to clarify is that we are testing the application, not yourself. You can’t do anything wrong here. In fact, anything you do that wouldn’t be considered “correct” can also be valuable information to us.. Please note that this application is a prototype, and not yet a fully working model. Some interactions may be implied as opposed to being fully represented. The information you provide us could help us to provide a better, more user-friendly final build.

As you use the app, I’m going to ask you to try to think out loud as much as you can, to say what you are looking at, what you are trying to do within the app, and what you’re thinking in general. This information will be very useful to us, so please be as honest as possible.

If you have any questions at all regarding the app, please ask them. I may not be able to answer them right away, since we’re interested in how people when they don’t have someone to walk them through it. But if you still have any questions when we’re done, I’ll try to answer them then. And if you need to take a break at any point, just let me know.

With your permission, we are going to record your voice along with your interactions with the application for the remainder of the session. The recording will only be used to help us figure out how to improve the site, and it won’t be seen by anyone except the people working on this project.

- ☐ Give them a recording permission form and a pen.
☐ When they have signed, start the recording equipment/software for voice and screen.

Do you have any questions before we begin?

OK. Before we look at the application, I’d like to ask you just a few quick questions.

- Can you walk me through a typical week day in your life?
- Can you walk me through a typical weekend day in your life?
- What are some of your hobbies?
- How many hours a day would you say you use on your mobile phone?

- On a scale of 1 to 5, how proficient are you on a mobile phone?
- What would you say is the most common things you use your phone for?
- What are some of the apps you regularly use on your phone?

OK, great. We're done with the questions, and we can start looking at things.

First, I'm going to ask you to look at this app and tell me what you make of it: what strikes you about it, what you can do here, and what it's for. Just look around and do a little narrative of your actions.

- ☐ Hand the user your first scenario.
- ☐ Allow the user to proceed until you feel like it's no longer producing any value or the user becomes very frustrated.
- ☐ Repeat for each scenario.

Thanks, that was very helpful.

- ☐ Ask your team if they have any additional questions.
- ☐ Ask the observers' question/s, then probe anything you want to follow up on.

Do you have any questions for me, now that we're done?

- ☐ Stop the recording.
- ☐ Thank them and escort them out.
- ☐ Prepare for the post interview discussion.

User scenario scripts

Scenario 1

Now that you have a feel for the broad design and layout of the app, please make your way to the Recipes section. Make a search for 'Butter Chicken' , and add 'Best Indian Butter Chicken to your recipes.

Scenario 2

Going back to the home screen now, and following our previous tasks, you can now add your recipe into your meal planner. Make your way to the Meal Planner section. Currently the prototype only allows planning meals for Monday, so please keep that in mind. Make a search for 'butter chicken' and add that to Monday's meal plan.

Scenario 3

After your recipe is saved, we might need to buy some more ingredients for it, so go ahead and navigate to your Shopping List. We want to add Chicken, Curry Paste, and Milk to the list, so please go ahead and do that.

Scenario 4

Let us say you have since managed to go shopping and now have some new ingredients on hand. The application let's you store your items so you are able to keep a handy inventory stock of what you have and their expiry dates. Please make your way to the Food section and add the following to your inventory:

- Chicken with a Best Before date of 15/10/2018
- Curry Paste with a Best Before date of 02/11/2018
- Milk with a Best Before date if 26/10/2018

Scenario 5

After you have been shopping, we will want to clear the shopping list we created earlier. Please remove Chicken, Curry paste and Milk from your shopping list.

Scenario 6

Again make your way to the main menu screen. We want to go ahead and edit our profile. For the purposes of our testing, we have created a default profile named 'Joe Bloggs'. Make your way to the Profile screen and edit the about me section to say anything you would like, and then save it.

Scenario 7

You have now decided to throw away an expired item of food. Please remove Chicken from your your inventory.

Scenario 8

This scenario doesn't involve any concrete steps and just involves asking the user a question. We show them the push notification that they would get for when a food item is nearly expired and ask them their thoughts on it.

Scenario 9

Launch the application and then navigate to the main menu, then navigate to the settings page.

Recruiting Plan and Screener

Interview Schedule and Work Assignments

Participants will be recruited via reaching out to friends that fit our user profile/s.

The testing room will ideally be at the university or some accessible where all team members and the participant can be on a neutral environment. The room needs to have enough seating for everyone, a table, a projector, and be quiet. A preliminary location for test will be the bookable central library study rooms.

Conducting the Research

We conducted our research in the Central Library at UC, in rooms booked through the library website. All sessions were conducted on Friday 12th October. We recruited 3 users for testing from our Homeowner Persona, as we felt that this is the group who will most benefit from our application. Excluding names for confidentiality, we interviewed:

- One young male in full time work, who lives in his own house
- One female student, living in a flatting type situation
- One male student, living in a flatting type situation

Debriefing sessions

Our debriefing sessions were held immediately after each usability testing session, within the same room, among all team members who were present. The main points considered were:

- What portions went well? Could they be improved?
- At what point/s was the user confused or failed to achieve his scenario?
- What potential changes to the application could make it easier for the user?

Research Findings

User 1

The first user we interviewed completed all the scenarios but stated that many things are tedious to complete. For example they stated that manually entering the best before dates for every food item would get extremely frustrating and would prevent them from using the application. Another thing they found problematic was that the application doesn't launch into the main menu, they didn't understand why this was the case and when we explained our reasoning (that the shopping list was the most important feature and therefore is what the app launches into), they still didn't think it was a good feature. Also once they reached the main menu they said they didn't like the way it looked, that it had too much white space, but that is more of a design problem than a functionality problem. After completing Scenario 9, the user wondered what the point of the settings and profile page was, as they had almost no useful functionality. Overall they enjoyed the simplicity of the layout of the application (except for the launching into the shopping list).

User 2

The second user we interviewed brought up many concerns regarding ease of use. These concerns mainly stemmed from Scenarios 1 and 2. The concern was that the user needs to know what they are looking for. There are no features in place to browse options. This was a big find for us as a recurring theme in this design process was the importance of ease of use. They also repeated user 1's concerns about manually entering the best before dates. This user's feedback for Scenario 8 was negative. They brought up the fact that receiving notifications whenever food is about to go off would be off-putting. They said this was because they try reserve notifications for more important things like messages. Overall this user said they probably wouldn't use this application unless more user friendly features were added that made many of the tasks easier to complete.

User 3

The third and final user repeated the previous two users concerns regarding manually entering the best before dates. They also brought up many scaling issues. This is because in our scenarios there was only a few food items logged into the app. The user brought up the fact that many real world households have a lot of food on stock, and that trying to find certain food items could be tedious. They also didn't like the idea of push notifications regarding food expiry. Overall this user was useful in reinforcing previously noted functionality issues, as well as pointing out more issues to look into. They enjoyed using the application but said that they wouldn't use it in the real world due to the fact it would take too much effort to get it to work (eg entering all the food best before dates).

Summary of Findings

From the interviews we noticed two of areas of main concern. There areas are:

1. **Ease of Use** - This refers to functionality that assists the user with their tasks. Examples of this from our research findings include lack of functionality to help with entering best before dates, assisting with searching for recipes, and sorting items within the application. By addressing these issues it would allow the user to much more easily use our application, thus increasing our user retention which would in turn help decrease food wastage.
2. **User Choice and Personalization** - Refers to giving the user freedom to govern how the application works. Examples of issues like this from our research findings include the lack of settings, customizability regarding push notifications and profile features. By addressing these issues it would give users more incentives to use our application on a consistent bass and therefore decrease their food wastage.

Changes Made to Final Prototype

As mentioned earlier we noticed two areas of main concern. Changes were made to our prototype in regard to each area. The changes made that affected Ease of Use were:

- Categories were added to the recipe search functionality. This allows users to browse recipes from certain categories such as Indian or Vegetarian. Without this feature the user would need to know exactly what recipe they were searching for, now the user isn't restricted and can browse and find recipes in a convenient manner.
- A scanner functionality was added that allowed users to scan their food items and the application would automatically add that item to the Food list with its corresponding Best Before date. This is the most important change that has been made as all users had major issues with manually entering the Best Before dates. This functionality greatly reduces the time taken to complete tasks in this app. The functionality to manually add Food is still there as an option just in case the user wants to manually enter the Best Before dates.
- The application now launches into a home screen instead of the shopping list. This will increase the applications ease of use as the users are initially oriented at the crossroads of the application and can easily navigate to any section that they wish.
- The meal planner has been improved and functions similarly to the Recipe search section. Users can now search for entire meal plans through a search bar or category tiles. This allows users to add full day plans in a single touch rather than manually enter each meal. The categories also allow the user to cater their meal plans to their wants and needs.
- A favourites section has been added to the recipes section and allows the user to bookmark their favourite recipes. This will make it easier for the user to find their favourite and most commonly used recipes.
- Sorting has been added to the Food section. This allows users to easily locate food in their household and determine when it will expire.

Changes made that affected User Choice and Personalization:

- A feature was added that gave the Profile section more purpose. A users favourite recipes can be displayed on their profile, allowing other users to look and see your favourite recipes. This allows the user to feel more connected to other users.
- More options have been added to the Settings section including different lighting mode, and allowing the app to access the camera.
- Many users didn't want push notifications, there an option has been added to the Settings section that allows the user to heavily customize their notification system. Users can choose whether they get notifications or not, and can also choose how close the food is to expiring before a notification is sent.

Conceptual Model

Purpose and High Level Functionality

The high level functionality of our Food Wastage management app is to allow users to:

- Hold an inventory of users food at home and best before dates.
- Enable easier planning of week to week food purchases and meal ideas.
- Provide notification based alerts on best before date information and food that goes unused often.
- Provide suggestions for meals based on food that may be otherwise unused.
- Provide an easy and intuitive way of searching, saving and viewing recipes and meal ideas
- Provide a mechanism for users to create a list of items they wish to purchase

Major Concepts and Vocabulary

- **Shopping List:** A list of all items intended to be purchased at a supermarket
- **Recipe:** A collection of instructions used to cook a meal
- **Meal Planner:** A collection of recipes assigned to different days which allows you to keep track of the meals you intend to cook on a certain day
- **Food:** An item you consume for energy and curb hunger
- **Notification:** An alert that you may receive to indicate an important event occurring
- **Inventory:** A collection of items that you own
- **Best Before Date:** The day an item of food is no longer expected to be of edible quality

Objects/Operations Analysis

Owner	Name, email, biography, photo, favourite-recipes	examine, edit
Shopping list	Items, date added	examine, adding/removing items, print
Food list	Items, quantity, best before, filter/sort	add, remove, search, filter/sort
Item	Expiry-date, name, description, weight, cost, quality, date-purchased	examine, remove, add, edit (quality, quantity), print
Recipe	Ingredients, name, description, time	examine, edit, print, share
Meal Planner	Day, meals/recipes	Search meals, popular plans, add meals/plans, remove
Recipe List	Recipe, categories	examine, add, remove

Conceptual Scenarios

Shopping list

- Adding an Item to shopping list
 - Tap 'Add Item' button
 - Type name of Item into 'Add Item' text box
 - Select the quantity of the item into the quantity box
 - Tap 'Add'
- Removing an Item from shopping list
 - Select the item you want to remove by tapping on it
 - Tap the 'Remove Item' button

Recipe

- Adding a recipe
 - Type name of recipe into search box
 - Tap 'Search Button'
 - Select recipe by tapping on it
 - Tap 'Add to Recipes' button
- Removing an Item from the active recipe list
 - Select the recipe you want to remove
 - Tap 'Remove Recipe' button

Food

- Searching an item
 - Type item in to search bar
 - Or use the filter to find it easier
- Adding an item
 - Tap 'Add' button
 - Type name of item
 - Select quantity
 - Select best before date or use scanner
- Removing an Item
 - Tap the tick box of item/s
 - Tap 'Remove' button
 - Confirm removal

Meal Planner

- Creating a meal plan
 - Select the day you want plan
 - Tap 'Search Meals' to search for a specific meals
 - Or tap 'Popular Plans' to select from popular meal plans

- Select either the specific meal or plan
- Tap 'Add Meal' button

Profile

- Change notification settings
 - Tap Profile icon in the top right corner
 - Tap Settings icon in bottom left corner
 - Move the 'Push Notifications' slider to off
- View users top recipes
 - Tap the Profile Icon
 - Tap the 'My Top Recipes' button
 - Tap a recipe to view it

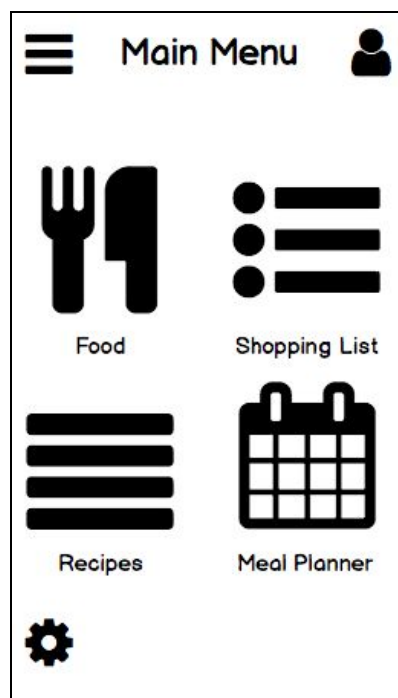
Final Design

Our final design is an improved variation of our first mobile application prototype. To run the app please visit the link below for a more indepth view.

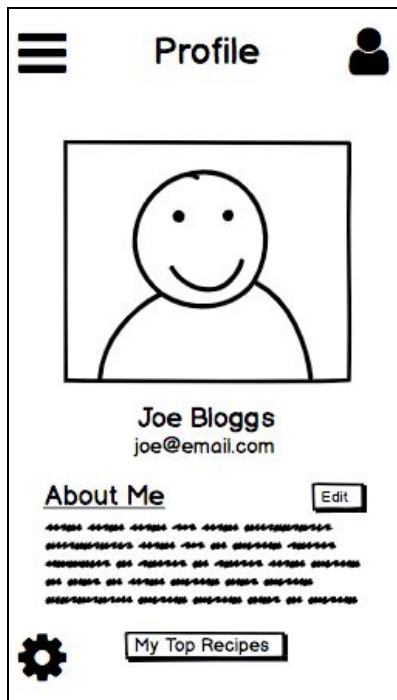
Invision Link: <http://invis.io/RNOASCVPCXM>



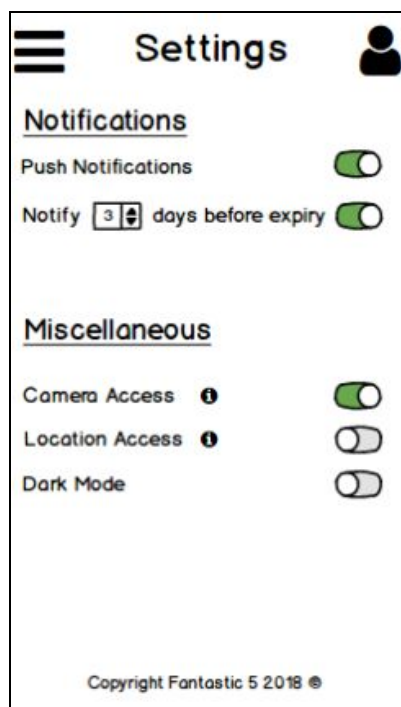
This is the new splash screen that loads upon the application being opened. It is a simple interface that has option to either go to the menu page or profile page. Users feedback was that opening directly to the shopping list screen wasn't what they would want from this app and so this solution allows the users to choose where they want to go depending on the task they are trying to achieve.



This is the newly designed main menu screen. Feedback from our user testing stage was that there was too much white space and it was not visually appealing. We decided to revamp the main menu to be more simplistic and cover more space on the screen, while still keeping it simple enough that you can find exactly what you are looking for with ease.



We decided to add a little more personalisation to our application to make the users feel more welcome. Feedback from our testing phase was that users did not feel it served much of a purpose. We decided to extend the profile to include more features, and have added a section for them to include their favourite recipes, with the anticipation of further versions including a sharing feature and the ability to view other users profiles and favourite recipes.



Users stated that they would like more control over notifications, with some saying that would want to disable them fully. We decided to add a more comprehensive settings page to allow the users to fully decide what the application can and can't do. This includes the ability to set the number of days before a foods expiry to be notified.

The screenshot shows the 'Food' app interface. At the top, there is a hamburger menu icon, the title 'Food', and a user profile icon. Below the title is a search bar with a magnifying glass icon and the text 'search'. The main content area is a table with three columns: 'Items', 'Quantity', and 'Best Before'. The table contains the following data:

Items	Quantity	Best Before
Bread	2 loaves	28/10/18
Milk	2 litres	22/10/18
Eggs	24	15/11/18
Butter	700gm	22/01/19
Apples	3kg	22/12/19
Lettuce	1.5kg	20/10/18
Bacon	1kg	28/10/18
Bananas	1 bunch	15/11/18

At the bottom of the screen, there are two buttons: 'Add' and 'Remove'.

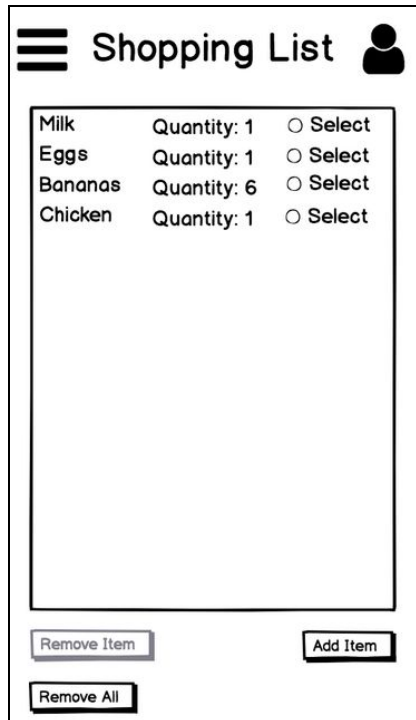
The “Food” section of the app lets users track and follow the food they have bought. We made the addition of tracking food quantities to more accurately track how much food users have. To prevent page congestion, adding multiple items of the same kind will only update the quantity of the item already stored, as opposed to creating a new listing.

The screenshot shows the 'Food' app interface with a modal open for adding a new item. The modal has a title 'Add Item' and contains the following fields and options:

- A text input field containing 'Bananas'.
- A quantity input field containing '1' and a unit dropdown menu set to 'Bunch'.
- A 'Best Before' section with an 'Input' field containing '15/11/18' and a calendar icon.
- An 'OR' option below the 'Best Before' input.
- A 'Scanner' button with a question mark icon.
- 'Cancel' and 'Yes' buttons at the bottom of the modal.

The background shows the same 'Food' app interface as the first screenshot, but the table content is partially obscured by the modal.

Our user tests told us that users found manually entering best before dates was tedious and not rewarding for time spent. The revised prototype includes a shorter date format, as well as a scanner option that enables users to quickly scan food items for best before dates via the camera. This would work with some basic text recognition software, but we decided to also keep the older manual functionality in case of damaged cameras or hard to read food labels.



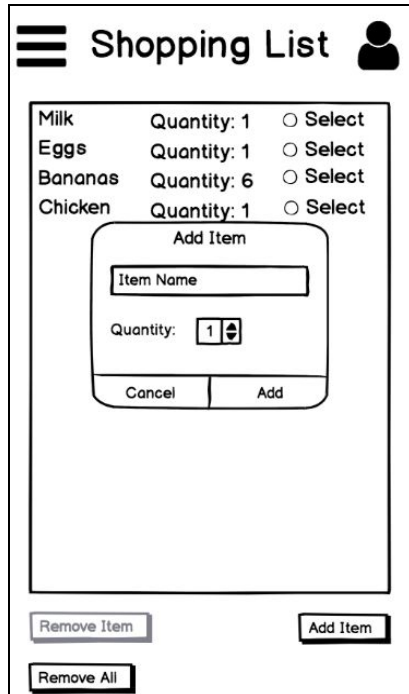
Shopping List

Milk	Quantity: 1	<input type="radio"/> Select
Eggs	Quantity: 1	<input type="radio"/> Select
Bananas	Quantity: 6	<input type="radio"/> Select
Chicken	Quantity: 1	<input type="radio"/> Select

Remove Item Add Item

Remove All

The shopping list layout has not changed too much from our initial design, although we have added the ability to remove all items from the list at once if the user wishes to do so.



Shopping List

Milk	Quantity: 1	<input type="radio"/> Select
Eggs	Quantity: 1	<input type="radio"/> Select
Bananas	Quantity: 6	<input type="radio"/> Select
Chicken	Quantity: 1	<input type="radio"/> Select

Add Item

Item Name

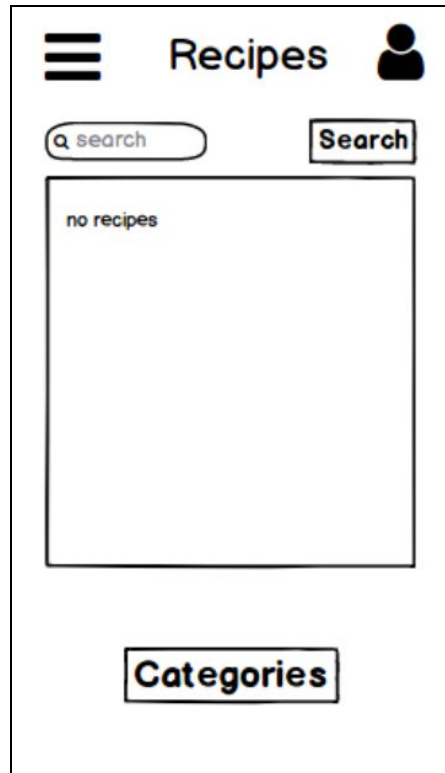
Quantity:

Cancel Add

Remove Item Add Item

Remove All

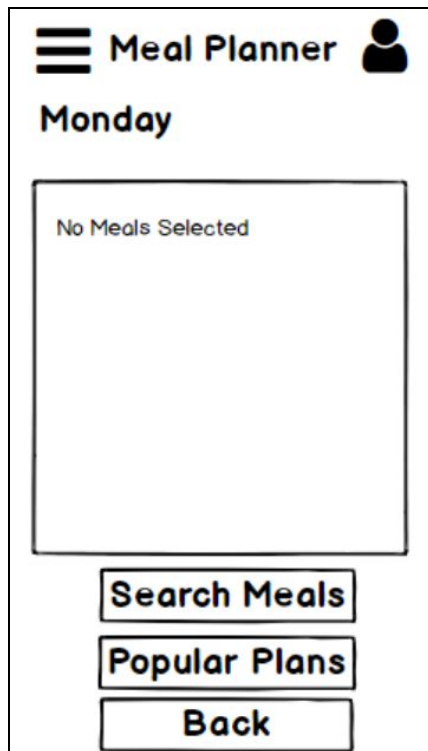
The shopping list now has more options when adding items by being able to select the quantity of the item. This feature was added as the users we tested wanted more functionality from the list.



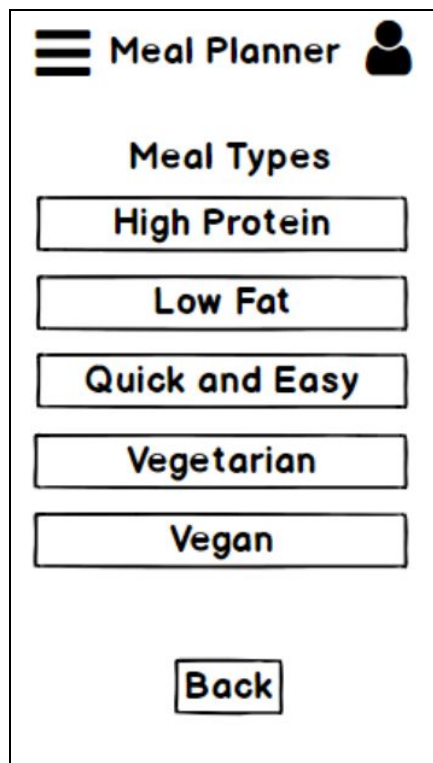
The recipe page lets users search for and store approved recipes either manually or categorically e.g seafood, indian. The goal here is to let users find recipes they like and use these to plan for food purchases and weekly meal plans.



The categories were added post user research as it was found that users were indecisive or had limited knowledge about different food varieties. This lets users get more food variety as well as presenting more options depending on their food stock at hand.



The updated meal planner follows similar changes that were made to the Recipe section. A category button was added that takes the user to a page full of meal plan types. This allows the application to assist the user in deciding what meal plan to follow.



The current meal plan options cover a wide variety a dietary requirements and even has fitness based categories. This makes the meal planner more accessible to users as the user just needs to pick a prearranged plan, instead of constructing one from the ground up.

Edge Cases & Error Handling

An extreme number of recipes is added to the recipe list

This might be relevant to a restaurant who works with a rotating menu or perhaps a home cook who likes variety. To prepare for this, the page will now allow you to additionally search for recipes within your list, as opposed to requiring the user to manually scroll to what they want. Also a max limit of 1000 recipes can be enabled as to keep resource allocation to a minimum, and to limit any clunkiness.

For a QoL adjustment, the recipe list will now be displayed with priority given to recently viewed recipes, followed by alphabetical ordering.

Adding the same recipe multiple times

If a user adds the same recipe link multiple times, this will cause unwanted congestion to the recipe page, which would then require manual deletion from the user. To prevent this, when adding a recipe, a quick search is done to make sure that the recipe is not already stored. If it is, a popup window will be alerted to the user.

Adding an extreme amount of items the food page

This might be relevant to users who might have a huge amount of food products e.g supermarkets. This might be relevant to a restaurant who works with a rotating menu or perhaps a home cook who likes variety. To prepare for this, the page will now allow you to additionally search for food items within your list, as opposed to requiring the user to manually scroll to what they want. Also a max limit of 10000 food items can be enabled as to keep resource allocation to a minimum, and to limit any clunkiness.

Adding a food item multiple times

If a user adds the same item multiple times at once, lets say “apples”, then it unnecessarily congest the food item list. To prevent this when adding food that is already contained within our list, if they both have the same expiry date, then they will be combined into a single listing, with quantity being updated. In the case that they have different expiry dates, then seperate listings will be allowed.

Adding a food item that has already expired

If a user wishes to add a food item that has already expired, a prompt window will be displays asking if the expiry date is correct. If it is correct, the user will be given an option to disable future expiry date warnings for this specific item.

User has an extremely long Profile “About Me” section (5000+ character)

We can allow for this by adding a scrolling function to compensate for larger bodies of text. Will we also implement a max character limit of 10000 to keep user information relevant.

Adding the same shopping list item multiple times If a user adds the same shopping list multiple times, this will cause unwanted congestion to the recipe page, as well as a confusing display of information towards the user, which would then require manual deletion to fix. To prevent this, when adding an item, a quick search is done to make sure that the item is not already stored. If it is, a popup window will be alerted to the user.

The scanner does not function correctly due to a faulty camera or unreadable labels

As these issues are directly out of our influence we decided to include the scanner but also keep the manual inputs of the older version. This lets the user choose whatever is easier given his/her current situation.

Conclusion

Our team is all extremely proud of the final design prototype we have created for a problem space that affects a lot of people in our country. There is currently only a few ways for managing and keeping track of food and best before dates for the average household user, and this often leads to food being unnecessarily discarded. Our goal was to create a streamlined experience with an emphasis on ease of use for the end users. With food waste numbers in NZ being far too high, we believe our design is an elegant solution that allows household users to do their part in reducing food wastage across the board. Combined with the other functionalities such as shopping list planning and meal planning that our application offers, we believe we have created a useful application that could well become a necessity in all households.

As a team we learnt that the most valuable way of gathering feedback on a prototype is to have real users test a lo-fidelity design, as there is a level of bias when it is the developers testing their own software. We gathered valuable opinions and data on our prototype which enable us to further refine and improve our final design.

Our team was surprised at how much feedback could be gathered from User Testing sessions and how valuable it was to continuing to improve our applications design. Without these sessions we don't believe we would have been able to produce an application of the quality we have delivered.

Team Contribution Form

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