SENG 310 Final Report

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1. Problem Description and Motivation

Have you ever gotten stuck deciding what to make for dinner? Have you ever wondered what is in your cupboards, or gone to the grocery store believing you had something, only to return home to find out that it has expired? Have you ever forgotten a critical item on your grocery list, or not know what you can make with the ingredients you have at home?

In everyday life, people normally resolve these issues by purchasing a limited amount of food, searching the web for recipes, or keeping a list while grocery shopping. Although these are all solutions to the problem we are trying to addres ssolve, we wanted to merge these solutions into one application to aid busy users in their everyday lives. This idea was where Aisle Five began.

As we have all encountered these problems, we are proposing Aisle Five to solve them. Aisle Five is an application that will keep track of the items you have in your home and their relevant expiry dates, filter and suggest recipes based on those items, and maintain collaborative lists.

2. Existing Solutions

We were unable to find any applications that encompass a solution to all of the problems that we are trying to address. However, we were able to find some applications that solve certain components.

One of the existing solutions we found was a web/mobile application called *AnyList*. *AnyList* is an application that allows users to create and share grocery lists while also importing and sharing recipes directly from websites. Within the application, users can add items to their lists through either manual entry or voice recognition. The system automatically organizes the items that were entered into their corresponding categories (ie. Dairy, Produce, etc.). Another feature of the list portion of this application involves sharing the user's lists with family or friends to allow for collaboration. Along with these functions, the application allows the user to collect and import recipes from websites and share them among other users.

Another existing solution is an application called *Yummly*. This web/mobile application learns what the user likes and customizes their recipes based on personal tastes and nutritional needs. While in the application the user is able to see the different categories the recipes have been divided into. They can also see a shopping list created from the specific recipes chosen.

Lastly, another solution is the use of default note-taking, lists, or reminders applications to track and save information about groceries and recipes. Due to human tendencies the use of interfaces people are familiar with is frequent. Even though these apps are well integrated into the user experience and interactions within the platform, they offer no functionality to improve or enhance the user experience specific to the problem.

These are all solutions to aspects of our problem, but do not encompass the entirety of the problem we are trying to solve.

3. Proposed Solution

The application we are proposing as a solution to the problem is Aisle Five. We wanted to create an easy to use application that gave the user a rewarding and helpful experience while also promoting creativity for shopping and cooking. Our application was designed to support useful and efficient tasks that are intuitive. This application would be made available through the app stores across mobile platforms.

Aisle Five has 4 main functions:

- *Scan* - Scan a barcode on a grocery receipt to input all purchased items to the function "Kitchen"
- *Kitchen* - Track the items purchased and their relevant expiry dates
- *Lists* - Maintain, update, and collaborate on grocery lists
- *Recipes* - Search and view recipes based on various filters

The *Scan* function of the Aisle Five application involves scanning a receipt from the grocery store or manually inputting ingredients into the Aisle Five app. This function allows the application to keep track of what the user has in their kitchen and when items will expire (either based on expected expiry or exact expiry dates). To maintain accuracy for this section, we would partner with major grocery stores to ensure we have access to their database.

The *Kitchen* function of the application is designed with the conceptual model of a pantry. Shelves with small icons will quickly visualize the items. This allows the user to view the different items that are currently in their kitchen at home as well as find detailed information about each product (such as the quantity, expiry date, date, and place last purchased). This section can be sorted multiple ways such as by category, alphabetically, or by expiry date.

The *List* function of the application is designed to allow for easy access and alteration of lists with the ability to collaborate with others. To ensure ease of use and familiarity, the design resembles default list applications, while maintaining the visual style of the Aisle Five app. This allows the user to keep track of items they require for specific recipes, remember to restock items that have expired, and keep track of items on their lists either added by themselves or other users. Users will be notified of any changes made to the shared list and the lists will be constantly synced among the shared users.

The *Recipes* function of the application allows for users to find and potentially save recipes by selecting one of the four options for searching. These include *Saved Recipes*, *Suggestions, Food in my Kitchen*, and *Advanced Search.* These functions do the following:

- *Saved Recipes* - displays recipes that the user has previously found and saved on the application
- *Suggestions* - suggests to users a variety of recipes based on items in the user's Kitchen, saved recipes, and highly rated recipes
- *Food in my Kitchen* - displays recipes using only ingredients the user currently has in their kitchen

- *Advanced Search* - which allows the user to input specific ingredients that they wish to use, different meal types, dietary restrictions, and other advanced settings. This function allows for users to quickly and easily find recipes to utilize the ingredients that they already have in their home and promote creativity in cooking.

Overall, we have proposed Aisle Five as a solution to the many problems that revolve around organizing and keeping track of items within your kitchen.

4. Personas

4.1 Sam

Sam, a 21-year-old student at the University of Victoria, is studying to become a biochemist. He has a girlfriend and lives with a few roommates off-campus. Along with spending many hours a day studying, he works part-time (Biblio-cafe at UVic, earning $13.50/hr) and is part of an intramural soccer team. He finds himself with a lack of time to spend at the grocery store or cooking large meals. When he does get to the grocery store, he often forgets what he has at home, and ends up purchasing more than he needs, causing these things to eventually expire. He would like a solution to prevent leaving things past their expiration date.

Sam represents the 75% of survey takers who were students, the 53.8% of survey takers who lived with roommates and the 85.6% of survey takers who were between the ages of 19 and 24. We also wanted to hit the busy students who like Sam don't have too much spare time to be worrying about their food. So with students like Sam in mind, we tried to make the application accommodate busy bodies.

4.2 Tom

Tom, a 34-year-old lawyer, who lives in Waterloo, Ontario has a wife and 1 kid (age 2) at home. He works at Pearson Hardman Law Associates in Toronto and has an income of $120,000/year. He often works long hours at the office, and forgets his grocery list at home. This results in him wasting his precious time calling his wife while inside the store to ask what they need. He would love to get more organized and find a way to keep track of what they need to avoid this problem.

When creating Tom we were thinking more outside of the demographics from out surveys with Tom being part of the 36.5% who were male and the 16% who were employed. He was however part of the 53.8% of survey takers were either in a relationship or married. When thinking outside of our major demographic of students, Tom was targeting your average family man who was quite often forgetful.

4.3 Deb

Deb, a 43-year-old single mom of two pre-teens (aged 10 and 12), juggles her children's hockey games with a demanding work schedule. Deb is a professor at the University of Alberta in

Edmonton, Alberta. Deb's biggest challenge is coming home after a long day of work and having to decide what to feed her two growing children. She never knows what to make with the ingredients that she has, so often spends more than half an hour trying to come up with an idea. Her kids are not helpful and do not have any suggestions for what she might make. Most nights she just ends up making the same few meals over and over. However, both her and the kids are sick of the same meals and want something different. She would like some way to come up with new recipes for meals that she can make using the ingredients that she has at home.

Lastly Deb was made keeping in mind the 62.5% of survey takers were female, the 16% employed and the and the 9.6% who had children. With Deb being a single mom who is working full time and having to deal with her children's hockey games, Deb is already very short on time. Additionally Deb doesn't have too much cooking experience which has caused her to continue making the same dishes repetitively. While she wishes to expand her choices but doesn't know what she can even make with the stuff she has.

5. Scenarios and Use Cases

5.1 Scenario One (Sam)

Sam has just spent all day studying at school and is busing home from his soccer game at 9:30 pm. He wants to have grilled cheese when he gets home, but can't remember if he has any bread. He grabs his phone and opens the Aisle 5 app. He looks in his "Kitchen" within the application and filters them by department. Once the "Departments" page loads, he enters the bakery section and checks for his bread. It shows that he has one loaf at home. He notices that he has a notification indicating his milk will expire in 2 days, so decides to stop at the store anyway to get milk.

5.2 Scenario Two (Tom)

Tom has just finished a long day at work and is on his way to the car to head home from Toronto. He opens the Aisle 5 app on his phone and clicks on his notifications. He has a notification that his wife has added a new item to their shared list. He opens the notification which takes him to their shared list. He sees that his wife has added chocolate. He then decides instead of going to his usual grocery store he will stop at Laura Secord instead. He gets the chocolate, and heads home to a happier wife.

5.3 Scenario Three (Deb)

Deb gets home late after work on a Monday. It's already seven and the kids complain of being hungry as soon as she walks in the door. She opens the fridge and looks inside, she has no idea what to make. Deb opens her phone and clicks on her Aisle 5 app. This brings her to the home screen where she opens the "Recipes" tab. She uses an advanced search to filter these recipes to contain only ingredients from home, chicken, and dinner type meals. These are ordered by cook time and she clicks on the first displayed recipe. This

takes her away from the app to a third-party site. She gets started and half an hour later has a never tried before meal on the table, much to her children's delight.

5.4 Use Case One (Sam)

Goal: Check if he has bread at home, and if any other items have expired

1. Sam taps on the Aisle Five app.
2. The app displays the contents of the "My Kitchen" tab.
3. Sam taps the "Categories" filter.
4. The app displays the different categories.
5. Sam taps the "Bakery" category.
6. The app displays bakery items.
7. Sam taps on the notification icon.
8. The app displays the notification screen.
9. Sam taps on the newest notification regarding milk.
10. The app displays the milk product screen, displaying detailed information about milk.

5.5 Use Case Two (Tom)

Goal: Check notification to see what his wife has added to their list.

1. Tom taps on the Aisle Five app.
2. The app displays the contents of the "My Kitchen" tab.
3. Tom taps on the notification icon.
4. The app displays the notification screen.
5. Tom taps on the newest notification regarding Katherine adding to the "Family List".
6. The app displays the different lists, with the "Family List" dropped down and the new item indicated.

5.6 Use Case Three (Deb)

Goal: Find a recipe that will use ingredients in the house, (specifically spinach) to create a dinner/appetizer for her kids.

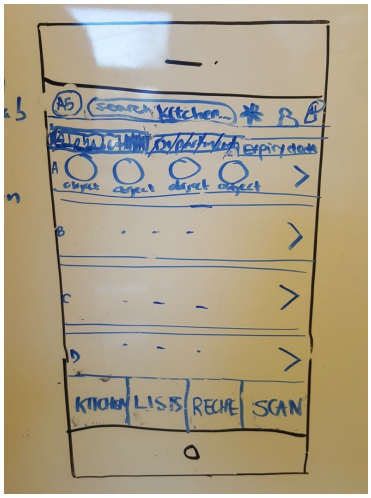
1. Deb taps on the Aisle Five app.
2. The app displays the contents of the "My Kitchen" tab.
3. Deb taps the "Recipes" tab.
4. The app displays the different options for presenting recipes.
5. Deb taps the "Advanced Search" option.
6. The app displays advanced search for ingredients, meal types, and dietary restrictions.
7. Deb checks off "Only ingredients from my kitchen" under the ingredients heading and "Dinner" and "Appetizers" under the meal heading.
8. Deb taps on the "Search specific ingredients to use" search bar.
9. Deb types "spinach" into the search bar and taps the return key.

10. The app displays “Spinach” in the selected ingredients box.
11. Deb taps the done button on the keyboard.
12. The keyboard closes.
13. Deb taps the “Search Now!” button.
14. The app displays recipes organized by cook time.
15. Deb taps and holds on “Creamy Tomato and Spinach Pasta” to save the recipe.

6. Evolution of the Prototype

In consideration of our goals and visual design guidelines, prototype interfaces were discussed and developed for the main functions of the application and functionality to perform the previously defined tasks.Here are the screens developed at the different levels of prototyping for our third persona and use case, Deb.

6.1 Idea

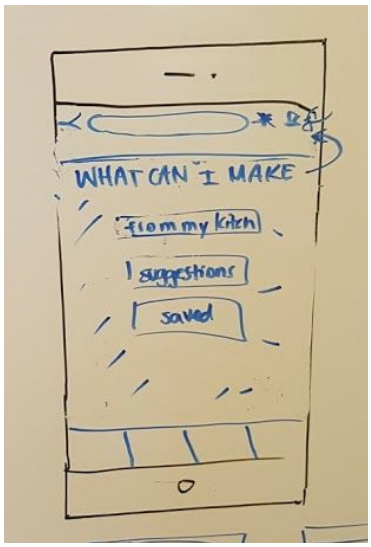


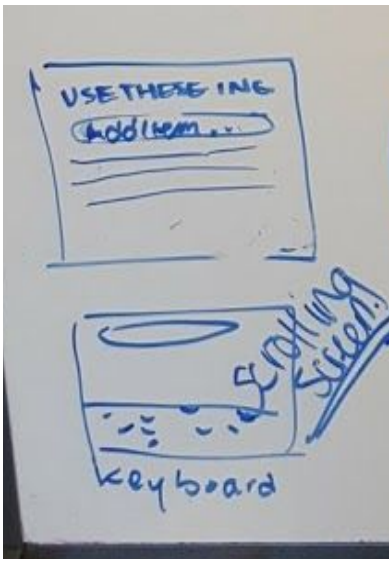
Left: The first iteration of the “My Kitchen” interface.

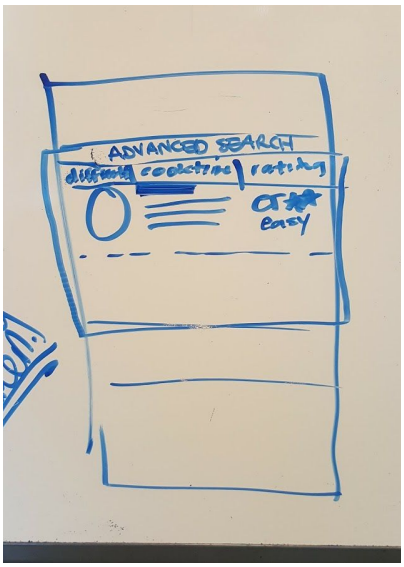
Below Left: The first iteration of the “Recipes” interface.

Below Middle: An iteration of the design demonstrating “Advanced Search” from “Recipes” as a drop down menu.

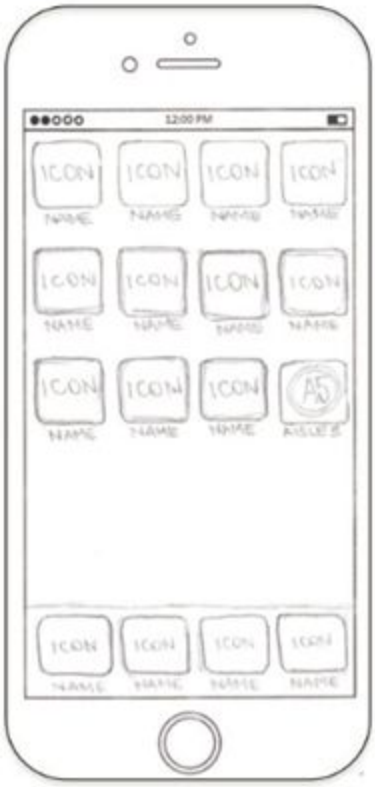
Below Right: An interface showing the results of the “Advanced Search” performed. This portrays the early design of navigation with menus and sub-tabs featured throughout the app.



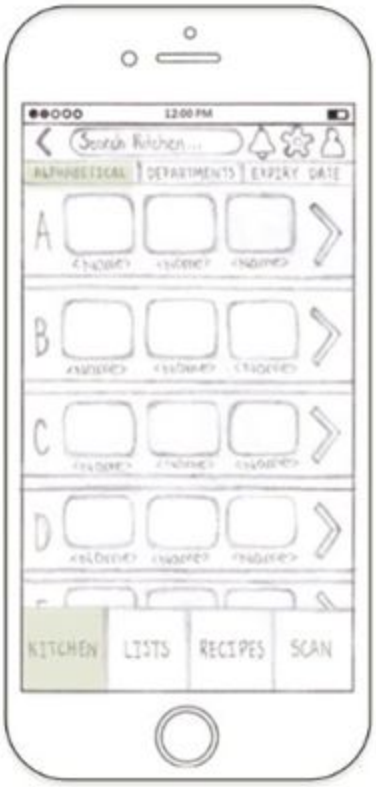




6.2 Low Fidelity Prototype



iPhone home screen



Aisle Five “My Kitchen” screen

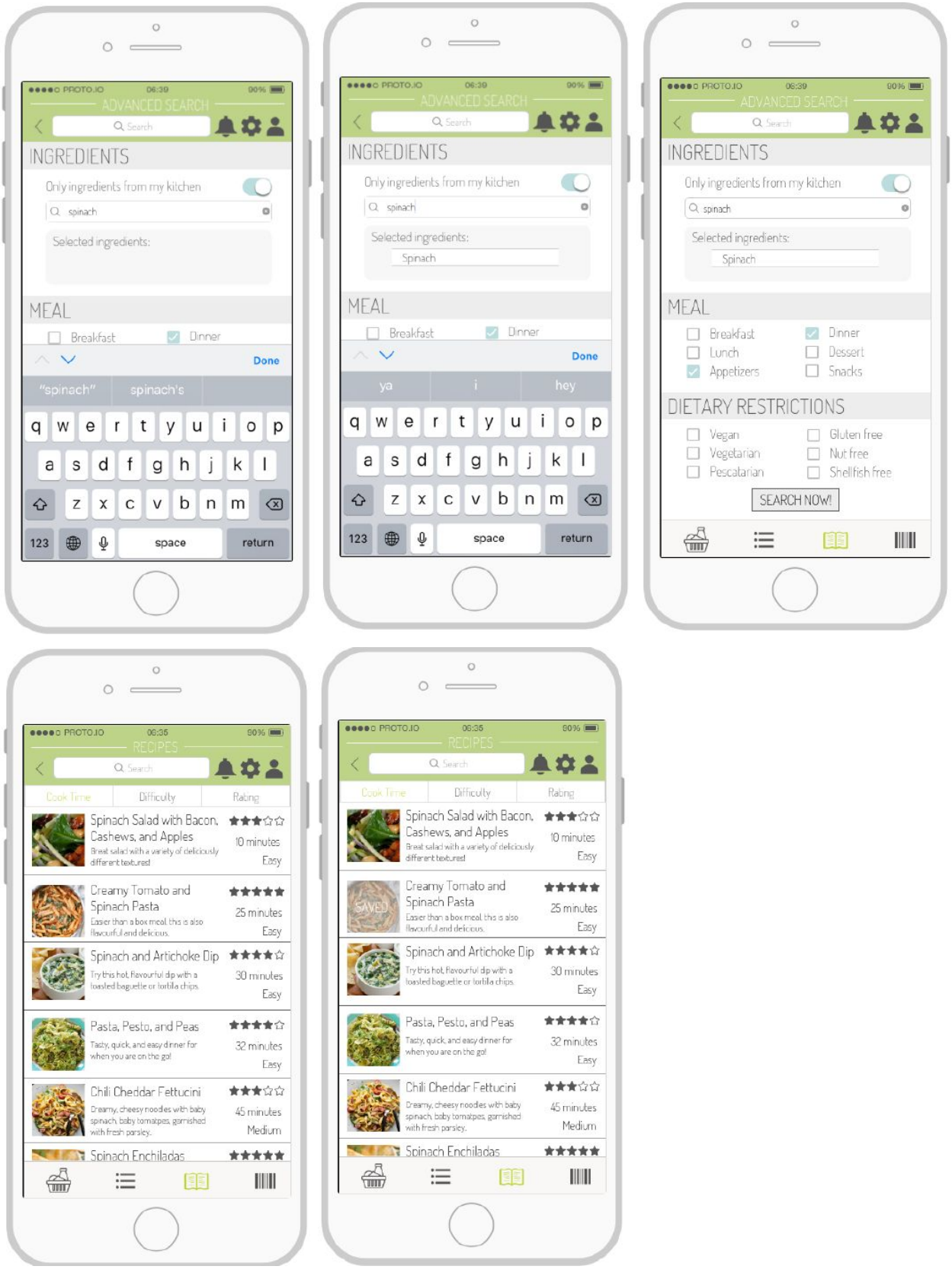
Aisle Five “Recipes” screen

Above left: “Recipes” screen in “Advanced Search” option.
Above middle: User keyboard pop up to type in ingredient.
Above Right: User typing ingredient “chicken”.

Left: Ingredient “chicken” registered, user checks off option “Only from my Kitchen” and meal type “Dinner” screen from the application.
Right: Screen after user clicks “Go!” button and the provided recipe.

6.3 Medium Fidelity Prototype

6.4 High Fidelity Prototype


PROTO.IO 06:39 90%
ADVANCED SEARCH
Search
INGREDIENTS
Only ingredients from my kitchen
spinach
Selected ingredients:
Spinach
MEAL
Breakfast
Dinner
Lunch
Dessert
Appetizers
Snacks
Done
"spinach"
spinach's
ya
i
hey
DIETARY RESTRICTIONS
Vegan
Vegetarian
Pescatarian
Gluten free
Nut free
Shellfish free
SEARCH NOW!
RECIPES
Cook Time
Difficulty
Rating
Spinach Salad with Bacon, Cashews, and Apples
Great salad with a variety of deliciously different textures!
10 minutes
Easy
Creamy Tomato and Spinach Pasta
Easier than a box meal, this is also flavourful and delicious.
25 minutes
Easy
SAVED
Spinach and Artichoke Dip
Try this hot, flavourful dip with a toasted baguette or tortilla chips.
30 minutes
Easy
Pasta, Pesto, and Peas
Tasty, quick, and easy dinner for when you are on the go!
32 minutes
Easy
Chili Cheddar Fettucini
Dreamy, cheesy noodles with baby spinach, baby tomatoes, garnished with fresh parsley.
45 minutes
Medium
Spinach Enchiladas
space
return
123

6.4 Evaluation of the Prototype

For our low fidelity prototypes, a peer evaluated cognitive walkthrough was conducted for our tasks. During the design of our high fidelity prototype, we conducted our pilot study followed by user evaluation studies. The pilot study was conducted first as a means of practicing and to determine if there were any major errors or modifications needed before the user evaluation study.

6.4.1 How

In a lab environment, engineering and design teams gathered to peer evaluate our low fidelity prototypes. With our personas and tasks in mind, a cognitive walkthrough was performed to provide insight and recommendations for future iterations. The user evaluation study was conducted in a natural setting that was convenient for both the evaluators and users. The decision to conduct this user evaluation in a natural setting was based on the fact that our application is portable, as well as our desire to observe the user in a busy/natural environment. The types of data we decided to collect were both qualitative and quantitative. For each given task, we requested the user to think aloud while completing the task, and we recorded our observations. We also took into account the user's facial expressions and body language while completing the task. This information was recorded as our qualitative data. For the quantitative data, we recorded the number of taps, number of errors, severity of each error, and time it took for the user to successfully complete the task.

The tasks users performed include:

1. Search in the bakery for bread and check your notification.
2. Check your notification to see what has been added to your list.
3. Use the advanced search to find a dinner or appetizer recipe using "spinach" and other ingredients in your kitchen.

Each task was created based on our scenarios and main functions. Initially, we planned to create another task to showcase our fourth main function of our application, scanning. However, decided to omit the scan function in these prototypes as it would not be a realistic representation of the function without a built in camera.

After users performed all the tasks, post interview questions were asked to receive user's opinions on the overall experience of using the application. These include:

- Were there any buttons or icons that you were unsure of the meaning for?
- After each task, did the app become easier to use?
- What were your thoughts on the overall design?
- How was your overall experience using the prototype?

6.4.2 Findings

A peer evaluated cognitive walkthrough reported users were satisfied by the use of the seven principles of design. Our visual design received praise for its incorporation of signifiers

and feedback as design elements. Feedback also requested improved consistency on headers to improve navigation.

Quantitative data revealed first time users were able to complete all tasks in an average of 10 taps taking an average of 30 seconds. A common error was navigating to the wrong tab or sub-tab which was diminished with each subsequent task. Another error was during the third task, users would initially try to perform a search or advanced search on the first page loaded (My Kitchen) instead of navigating to the "Recipes" tab.

Qualitative data gathered that users were satisfied with the visual design and workflow, however, some signifiers were not clear at first. Despite this, users found the app easy to use, learn, and remember providing a positive user experience.

6.5 Influence of the Evaluation

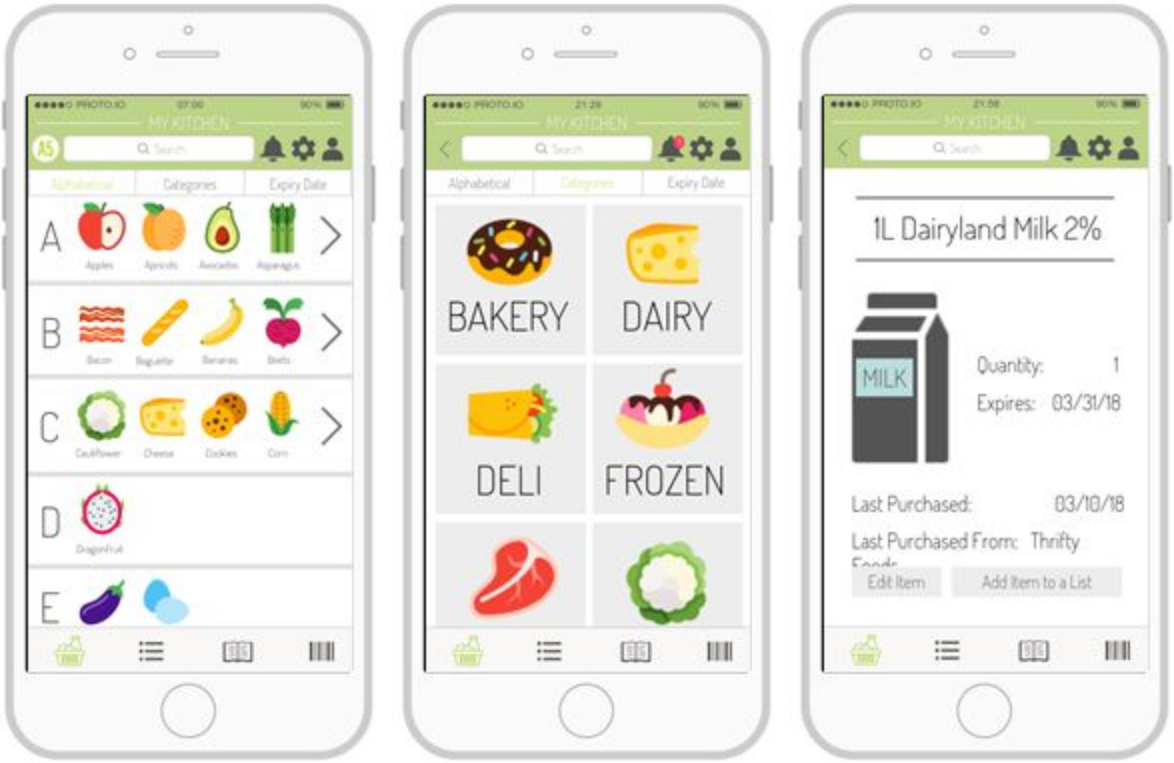
The evaluations provided incredibly useful feedback regarding the design, its elements, and defined tasks of our evaluation. The overall positive reception of the visual design allowed us to move forward with refining the performance of the tasks and left the team satisfied. Based on feedback, we elected to include a title to the top of every screen of the interface as per the recommendations given by the cognitive walkthrough. The user studies helped us to refine the navigation by altering titles and giving feedback through certain signifiers. The pilot study made us recognize a need to improve functionality among the interfaces for explorability, elaborate on the personas and scenarios for the user, and refine the post interview questionnaire. Overall, we learned evaluation at every iteration and level of the design process is critical and it helped us gain focus and insight on past and in future designs.

7. High Fidelity Prototype

Below are some of the main screens from our high fidelity prototype. The rest of the screens described in the use cases can be found by using the links below (For the following 15 days):

Use Case One (Sam): https://share.proto.io/6MRCZM/
Use Case Two (Tom): https://share.proto.io/Y7E7OY/

Use Case Three (Deb): Unfortunately this prototype was created on an account which free trial has now expired. We do have all prototypes downloaded as html files that allow for interactions and can be found in our slack channel.


MY KITCHEN
Alphabetical
Categories
Expiry Date
A
B
C
D
E
BAKERY
DAIRY
DELI
FROZEN
1L Dairyland Milk 2%
MILK
Quantity: 1
Expires: 03/31/18
Last Purchased: 03/10/18
Last Purchased From: Thrifty
Edit Item
Add Item to a List


NOTIFICATIONS
Katherine has added to the list "Family"
Your milk has expired. Don't forget to add to your list!
Katherine saved a new recipe: Check it out!
Your yogourt will expire soon. Don't forget to add to your list!
There are new recipes recommended for you
GROCERY LISTS
Family List
Chocolate (New!)
Eggs
Milk
Muffins
Peppers
Ravioli
My List
RECIPES
Spinach Salad with Bacon, Cashews, and Apples
10 minutes
Easy
Creamy Tomato and Spinach Pasta
25 minutes
Easy
Spinach and Artichoke Dip
30 minutes
Easy
Pasta, Pesto, and Peas
32 minutes
Easy
Chili Cheddar Fettucini
45 minutes
Medium
Spinach Enchiladas

8. Future Work

After completing this project, we have a high fidelity prototype for our Aisle Five application. However, there are many ways that we can continue improving and expanding our current application.

To begin with, we would like to implement a fourth use case and design the prototype for the *Scan* function. We would like to have a complete prototype of the Aisle Five app and its various functions. Therefore, after developing pages for the *Scan* function, we would like to put the screens of all the different use cases together. The completed prototype would provide users with an experience that is more similar to that of the completed application.

There are also some more features that we would like to explore and consider adding to our application. One possible feature includes adding a screen for inputting what the user has eaten that day and removing that food from their kitchen. Along the same lines, items should be removed from the user's *Kitchen* when they indicate that they have used a recipe. Thus, we need to connect the recipe screen and the third-party websites that host the recipes, so that our application removes the used ingredients from the user's *Kitchen*.

While continuing to work on our application, we would also need to communicate with grocery stores. There are two reasons for this. The first reason is to consider using a barcode at the bottom of receipts so that it can be scanned to input purchased ingredients into the user's *Kitchen* in the application. By using a barcode, we could automatically input expiry dates and food into the application without needing to manually input for each item. The second reason is to connect with grocery stores so that if the user wants to add an item to a shopping list, user can add it to their online shopping list for a specific grocery store.

At each stage of the design, we need to continue performing usability studies with users and incorporate what we learned from the studies to improve our design. Eventually, when we have a prototype that we are satisfied with, we would like to code and implement this application. It will be more than just an idea, and instead be a real, useful, and enjoyable application that aid people in their everyday lives.

9. Lessons Learned

Throughout the design of our application, from conception and establishing requirements to prototyping and evaluation, we faced many challenges. Each challenge came with proposed solutions that required discussion and teamwork to make key decisions. These decisions led to the application we have created today. Fortunately, our teamwork did not suffer from these challenges which led to a valuable experience through the process of interaction design.

Some challenges we faced were as simple as deciding on a team name. Other challenges were testing numerous methods for the most accurate requirements gathering or which functions would be

the most important to our users. From each challenge, team members proposed their ideas and they were discussed until the group made a satisfactory decision. There were times when we had to choose colours, overall design as well as make specific functionality decisions. One decision we had to make as a team was the concept of displaying the quantities of each item on the main screen. Although we did think this was a great idea for the application, it was complicated by determining the main unit of measurement (eg. would asparagus be counted in bunches, or singular pieces). In the end, we decided to leave this out as it crowded the main screen, and was unclear for the user. Other decisions we had to make were how many and what main functionalities we were going to undertake for this application; we also had to decide on design choices such as filtering by tabbed menus or a drop down menu. Through research and discussion, we worked together to decide on the 4 main functionalities we have now.

While working on this project we were able to immerse ourselves in the design process, allowing us to fully understand the work put behind the creation of a fully functional application. Viewing the steps from idea through to high fidelity prototypes were both interesting and rewarding as we slowly saw our application evolve. Taking the steps to ensure the proposal, prototypes, and user studies were done efficiently and correctly will aid us if we choose to include UI design in our future career paths.

Appendix

Appendix A. Survey results

Demographics

- 85.6% of survey takers were between the ages of 19 and 24
- 62.5% of survey takers were female, and 36.5% male
- 75% of survey takers were students, with 16% employed, and the others varying between self employed, or unemployed
- 53.8% of survey takers were either in a relationship or married
- 90.4% of survey takers had no children in their care
- 53.8% of survey takers live with roommates

Groceries

- 60.6% of survey takers occasionally forget what groceries they have at home
- 63.5% of survey takers never use a flyer when buying groceries
- 89.4% of people do not use online shopping to buy groceries
- 64% of people never use a flyer when shopping, leaving 36% that do
- 91.3% of people accidentally keep items past their expiry date
- 60.6% of people keep their receipts from grocery shopping
- 8.7% of people never use a grocery list when shopping
- 61% of people that use a grocery list, keep it on a phone

Cooking

- 79.8% of people don’t always know what to make with the ingredients they have

- 88.5% of people use online recipes
- 51.9% of participants cook for themselves or others 5-7 days a week

Appendix B. User Studies