Introduction

Our team has chosen to design, build and market a new interface based on the idea for a "Cooking Instructor", whose purpose is to assist people with learning, preparing and cooking a recipe. We plan to design and implement the interface through Task-Centered System Design (TCSD) - a simple, practical design methodology. This design portfolio contains the 4 phases of TCSD. These include Identification, Requirements, Design and Walkthrough evaluation. These phases will include lists of expected users, tasks, requirements, low fidelity prototypes and a walkthrough of tasks using the refined low-fidelity prototype.

Phase 0: General Background

Background Environment

Food is a central component of any person's everyday life. Thus, the preparation of food is just as important. However, a study has found that nearly 45% of Americans studied did not like cooking[1]. Along with this evidence, our team has come to the conclusion that current interfaces related to cooking, whether through physical copies of cookbooks, internet sources or mobile applications, are disorganized, outdated, incomplete and complicated. They are unable to aptly satisfy the needs of those in our modern generation of minimalist, digital interfaces. To resolve this issue, we set out to design a new interface that improves on this concept, combining the best aspects of each interface in an innovative, intuitive and beautiful interface.

What will the system be used for? What are the general expectations?

In general, the system that our team is designing will be developed in such a way so our users will be able to easily learn and prepare dishes in addition to having easy access to the recipes most pertinent to them. It is expected that this system is highly accessible both technically in terms of the design, but also content wise for the users who wish to learn to cook.

System Constraints

There are multiple factors that may limit the system's design. One of these factors is our budget. We have agreed that the production of our system will be on the cheap end of the

spectrum and so a modest budget is expected, although an actual estimate will not be provided. One element to consider in the budget would be training employees in being sufficient working with C#, as it is the programming language that we will be using to build our interface. A second factor is how we are technically limited by the many variations of a typical user's hardware and operating systems. The third factor is how we are also limited by a potential user's access to the internet. How our system functions online and offline is highly relevant to the interface design. Whether we decide to open and maintain a server to support the online functionality may also have to be considered financially as well.

[1] https://hbr.org/2017/09/the-grocery-industry-confronts-a-new-problem-only-10-of-americans-love-cooking

Phase 1: Identification

Expected types of users

We consider three main user groups, with the first being beginner level cooks. They are the typical users that our system mainly targets. They are comprised mostly of people who wish or need to cook and have minimal to no experience with cooking and lack food preparation skills.

The occasional and second largest group of users would be those who cook frequently. These users would already know the basics of cooking but would like to explore and try new dishes to expand their abilities. They would also benefit from a system that helps improve their efficiency when following a recipe.

The unusual users would be those who cook professionally. They may not see much value in using a cooking application to help improve their skills, however, cooking can be considered community based and can include social aspects, so professionals may see value in using our system to share their recipes in addition to garnering feedback and recognition.

For all of the expected users, no expected training is involved with using our system.

Work Contexts

The "work" setting that our system will be used in would primarily be in the users' own kitchens. Some of the situations do not call for this environment in particular (such as searching for recipes or shopping for ingredients), however, it is most likely that a kitchen would be required in order to finish the overarching task. The typical situation involves finding a recipe that the user is interested in making, then ensuring that they have the necessary ingredients and equipment required before following a series of steps to make their meal(s).

Concrete Task Examples

In order for us to obtain background information to construct concrete task examples, we have used the knowledge of our group, family and friends to articulate expected tasks. In doing so, we run the risk of producing tasks that bear no resemblance to reality. However, since our intended users fall into a broad group which includes regular people who have little experience

with cooking, this also extends to our team as well as our friends and family. Therefore, we believe that we can specify and relate to the tasks presented below. With that in mind, we have done our best to diversify our list of tasks and rid them of any biases and assumptions that we may make while moving forward.

1) Janice Lockheed is a physicist who is also a mother that needs to prepare dinner for her family (a 16 year old daughter, a 10 year old son, and her husband). She was too busy to prepare a meal the week prior, so she searches for a recipe that she can make with the ingredients at her disposal. She gets her daughter Jane to help her prepare the meal while her husband helps her son with homework. Janice discovers that she can make some fancy spaghetti, and then follows the directions provided to prepare the meal, instructing her daughter to assist with the simpler tasks. After dinner, she rates the recipe positively for its low difficulty, quick preparation time and quality.

Discussion:

This example depicts a typical family with average cooking skill using the interface to determine what and how to prepare a meal depending on certain parameters, which in this case happens to be specific ingredients. This is a fairly frequent task from an occasional scenario thus making this task critical. Quite often, people will be unwilling or unable to acquire all the required ingredients in order to prepare a meal. As a result of this, our application should support the ability to find recipes by specifying ingredients possessed by the user. The task example itself was fictionally created from personal experiences and general knowledge. A lot of people, including members of our team, would prefer to stock up on groceries once, as it is more convenient than to go out every time before cooking a certain meal to purchase specific ingredients solely for it. Other times, it may be quicker to use what's available or to find a use for groceries that are about to spoil.

2) Eli enjoys cooking and wants to develop his skills with a more challenging recipe. He searches for a high difficulty seafood recipe, finding “Whole Fish Baked in a Salt Crust”, and

then goes to purchase the required ingredients at the farmer's market. Upon returning home, he prepares to cook the meal and notices that the recipe mentions the need to *fillet*, which is a term he is not completely familiar with. After learning how to perform the required cooking technique by watching a tutorial video, he prints off a paper copy of the recipe since he will be using his hands and doesn't have to worry about getting a paper copy dirty. Eli thoroughly enjoys making the recipe and is pleased with the result, so he marks the recipe as one he'd like to try again in the future.

Discussion:

This task depicts a typical user with an interest in the culinary arts. This user type falls into our second largest group of users which contains those who cook frequently, but may not be strict professionals who wish to continue expanding their breadth and skill with cooking. Our system would support the needs of users who wish to advance their abilities, by satisfying the requirement for a sort that applies to difficulty. Even more important is the search by category as seen in the example by the search for seafood, since food types are very segregated. Though the user group is not the largest, the requirements from this task are crucial to the functionality of the interface. Additionally, cooking can be messy, and many users may wish to produce a throwaway paper copy. The ability to export a recipe from the interface is thus highly necessary. Another essential requirement from this task is the defining of cooking terms, preferably through a video format. Defining terms is a common task for both of our top 2 user groups. As most cooking terms refer to specific techniques, a video is the most ideal method of conveying that information. This fictional scenario was based off of an interview with an avid culinary student, and online research, and it was verified by a separate end-user within the same user group. The interviewee specified how he looks for new recipes through various mediums, such as cookbooks, newspapers and online, lacking the ability to search specifically amongst all those mediums. When reading about the recipe used in the example, the ability to print stood out on the website. The culinary student also described how they have recipes, which are not strictly just standalone meals, that they would save for future reference.

3) Stephan is a first year university student who just started living on his own for the first time. He has moderate knowledge of computers and uses a laptop and smartphone on a daily basis. He rarely cooked for himself before and relied on his mother for everything from grocery shopping to doing his laundry. Shortly after moving to his own apartment, he craves for pasta and decides to make it himself. He searches for recipes of pasta dishes for beginners in various websites and chooses the one that requires the minimum amount of ingredients. He then gets the list of ingredients from the recipe (1 (14 ounce) package of turkey smoked sausage, 8-ounces of pasta, 2 cups heavy cream, 1/2 cup grated Parmesan cheese, 2-pounds of tomatoes). He gathers the cookwares he has and hopes that will be be sufficient (boiling pot, strainer, measuring cups, grater, skillet) to make the dish. He then looks at his stock of ingredients and goes shopping to get the items that he is missing. When he returns home, he begins by measuring and preparing all the ingredients required to make the dish. He then follows one instruction at a time from the recipe, and moves on to the next instruction once the previous steps are completed. In one of the steps, he finds the instruction to dice the tomatoes, but he is not sure how to execute the task. Then he looks up what dicing means in a dictionary before continuing with the next step. He finally completes all the instructions of the recipe resulting in a finished pasta dish. He takes a bite of the pasta and is amazed by his newly learned cooking skill. He copies and saves the recipe in his personal journal for future reference.

Discussion:

This task involves an inexperienced cook who is considered a typical user of the system. The user has little experience with cooking and will benefit from simple and direct instructions. This user also requires a bit of help knowing what kind of cookware and ingredients he will need to create a recipe.

The user performed some actions that will be frequently performed in the system. The most routine step that can be expected was searching for a recipe by name. Other steps like getting a list of ingredients and equipment is also useful for our typical user. Having the ability to look up a term in the middle of following a recipe could benefit the user due to the convenience.

The ability to save the recipe and refer back to it is expected to be performed regularly by the typical user class.

This task was collected through the experience of a family member who happens to be a first year student who just started living on his own. He shared his experience where he wanted to follow a recipe, but did not know what he needed to have in terms of cookware. As a student, he was also on a budget and usually looked for ways to prepare food with less ingredients or reusable ingredients if possible. He also shared how confused he got with cooking terms like dicing, julienne cut and so on.

4) Bob is a busy computer science student who has advanced experience in cooking but has limited time to do so. Bob is proficient in his use of modern technology and uses his smartphone frequently. He is looking for a quick and easy meal to cook through the application. Bob searches up the recipes that are easy to prepare and can be cooked within 20 minutes. He discovers that he can cook fried rice, an easy meal that can be prepared within this time limit. Bob follows the instructions shown on the application to prep and cook the meal. He then saves it as one of his favourites, so he can prepare it again without having to search for it.

Discussion:

This task involves a user who is proficient with technology and experienced with cooking. The user's cooking experience is constrained by his limited amount of time to cook.

This task outlines the filter functionality within the system that the user can utilize to search for recipes that fit their preferences.

This task was collected based on personal experience where one does not have much time to cook and looks for recipes that can be cooked within a certain time.

5) Frank is a user who has intermediate cooking experience, however has frustrations with the traditional mediums he has always used (e.g. cookbooks and websites) to prepare his meals. When following a recipe, he often forgets what step he is currently on. As a solution, he uses

the application to track the current step and to check off all previous steps. He also detests how recipes are frequently written in units he is unfamiliar with. The application allows him to quickly convert the listed units to any standard unit that he is more familiar with. These tools prevent these obstructions and allow him to focus on the cooking experience.

Discussion:

This task example involves a user who has enough prior cooking knowledge to make other parts of the application less important. To this type of user, the main benefit of using the application is to speed up the cooking process by minimizing the negative effects that the described obstacles evoke.

This situation is common with this class of user. The ability to track steps is an essential feature of the application due to this task being commonplace among all traditional mediums. Next, the frequency that the user needs to convert units is variable since it depends on the type of units found in the recipe, as well as the units they are familiar with.

This task example was constructed based on the personal experience of one group member (Aaron). Whenever he cooks by following a recipe (usually found on a website or in a cookbook), he frequently loses the location of the current step on the page since it is saturated with information that is unnecessary to him. Also, more often than not, he finds himself obstructed by unfamiliar units. This leads him to closing the web page or looking away from the cookbook in order to manually convert the units himself using another application.

6) Alice Johnson is a stay at home mother who loves to cook and often invents healthy new recipes for her kids. Alice has basic computer skills, but usually prefers to consult a cookbook if she has to follow a recipe. She usually does not plan on making these new recipes, but she discovers them through trial and error. She writes down the recipes and saves them so that she does not forget the recipes incase she wants to recreate the same dish. Her friend shared that she has difficulty persuading her 4 year old son to eat vegetables and she requested if Alice could share one of her fun recipes. Alice shares one of her invented recipes with her friend. Alice's friend was really happy and was successful in following her recipe.

Discussion:

This task example involves medium to advanced cooks who cook on a regular basis. This user type can belong to the occasional or seasonal user group. This type of user often comes up with their own recipes and does not always end up remembering the steps they followed in creating the dish. When their invented dish becomes a favourite among family and friends, the recipes are often requested and shared.

The user performed a step to save the recipe and this step is a routine step that will be performed by our users. The system can be useful in creating new recipes and sharing them with others, but this might not be performed regularly. This task holds an important aspect in terms of community involvement of the user group, but might not appeal to other user groups.

This task was thought of as an example of an occasional user who might want to use the system to carry out a less frequent action, such as sharing a recipe.

7) Anne Chovi considers herself a novice cook as she cooks for herself on a regular basis. One day, she starts craving for her recently new favourite meal; Tuna Casserole. She was able to quickly access the recipe since she liked it so much last time. This particular recipe feeds a portion of 4 people, but since she is only feeding herself, she scales the portion size to 1. While looking at the ingredient list, she realizes that she doesn't have some of the necessary ingredients. She looks up what can be used for a substitute for milk and eggs. She then proceeds to follow the instructions to prepare the Tuna Casserole. During one of the steps, she must set a large pot of water to boil for a set amount of time, so she sets a timer for that. Then she continues through with the recipe until it is completed. Between the steps, she decided to experiment a little and baked it in with some cheese. After tasting the dish, she makes a note of how much better it tastes with the substitutes and with the cheese she added. She modifies the recipe to make note of the changes.

Discussion:

This task involves a novice cook, Anne, who we would consider to be an occasional user. The task details a complete job done by Anne from finding a recipe to actually cooking a dish based on that recipe. This is a more complicated, but still routine task that contains situations that aren't always common, but are still occasionally done and important. The more routine aspects include quickly accessing her favourite recipe and following steps to complete the dish. The less routine, but still important aspects include scaling portion sizes for her recipe, substituting ingredients and using a timer. The even less routine and less, but still important situation includes modifying and changing a recipe to your desired taste. This task illustrates some environments in which users may not have necessary ingredients and are not motivated or are unable to acquire such items and so use substitutions in their place.

This task was thought up by our team to represent a more complicated situation for our end users. However, it was validated by a friend who mentioned that these are situations that he faces while cooking for himself, although not always all at once. He described that he is always finding himself without the necessary ingredients and consequently substitutes items all the time, scales portion sizes "9/10 times" and only uses a timer for boiling eggs and baking.

Phase 2: Requirements

a) Absolutely Must Include:

i) Ability to search for recipes by name, food category, creator, ingredients

ii) Ability to sort/filter lists of recipes by difficulty, rating, ingredient count, duration

iii) Ability to follow a series of steps to complete a recipe

iv) Convert between standard measurement units

v) Ability to learn cooking terminology

vi) Saving/favoriting recipes

Discussion: We chose to put these requirements in this category because they are the essential things people often do while cooking or preparing to cook when they are new or exploring new dishes. They first look for a dish to make and it is helpful to users if the recipes are organized and sorted in some way (like how cookbooks organize their dishes in different ways). They then follow steps provided by the recipe to make their meal(s). There are also many different measurement units and although only mentioned in one task, it still remains a very important and arguably essential task. We do not want to exclude people who are afraid of using ounces over grams, for instance. Similarly, we do not want to lead beginners astray when coming face to face with new terminology and so the ability to learn cooking terminology is equally important. If users really like a recipe, they would keep a copy or bookmark that recipe.

b) Should Include:

i) Visual indicators (videos/pictures/gifs)

ii) Rating recipes

iii) Scaling portion size

iv) Ability to substitute ingredients

v) Timer

vi) Download recipes

Discussion: We chose to put these requirements in this category because they are still important, although they may be rarer. Visual indicators for the "how-to" and relative portion sizes (how much is a cup), and pictures depicting the actual dish are important. Although they are not essential, we believe these features appeal to many people and are still very important. Rating

recipes is also important, however, end users/user representatives do not usually rate recipes unless they have some sort of blog, journal or otherwise prompted to do so. Although when it comes to recipes, users like to see what other people think and so a rating system is important still. The ability to scale recipes and substitute ingredients are also important. These may be rare or frequently done depending on the user and their preferences, yet remains important. A timer is used by many and is considered an important tool in the kitchen. Although the need for a timer is frequent, it is placed in this category because we could assume the user has a timer of their own as it is a common tool. Downloading recipes is also considered to be quite common and so a feature like this would be important as well. One of the task examples includes the printing of a recipe, but for our sake and purposes, we will offer downloading a recipe as an option which would tie in to the user printing on their own.

c) Could Include:
    i) Modifying saved recipes
    ii) Sharing recipes
    iii) Adding your own recipes

Discussion: We chose to put these requirements in this category because these are lesser tasks that are not so important, although may be occasionally performed. Users who perform these actions typically rely on outside sources and major social media sites to do these. Our system still meets its general expectations and goals even without these requirements.

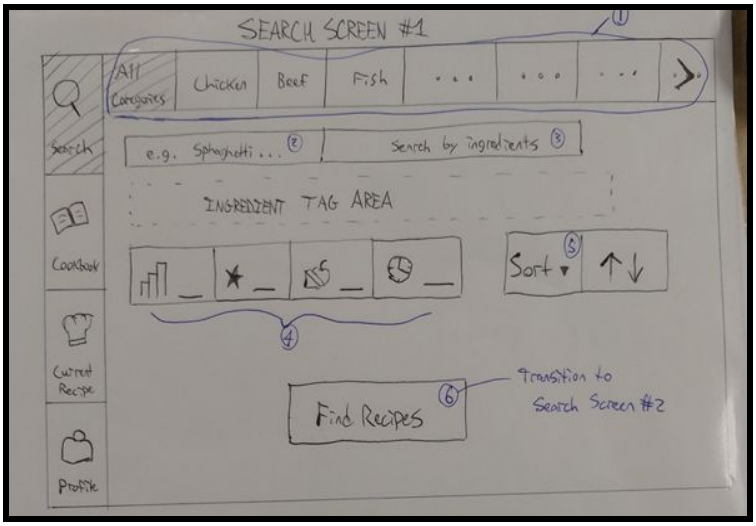
d) Exclude:
    i) Voice commands

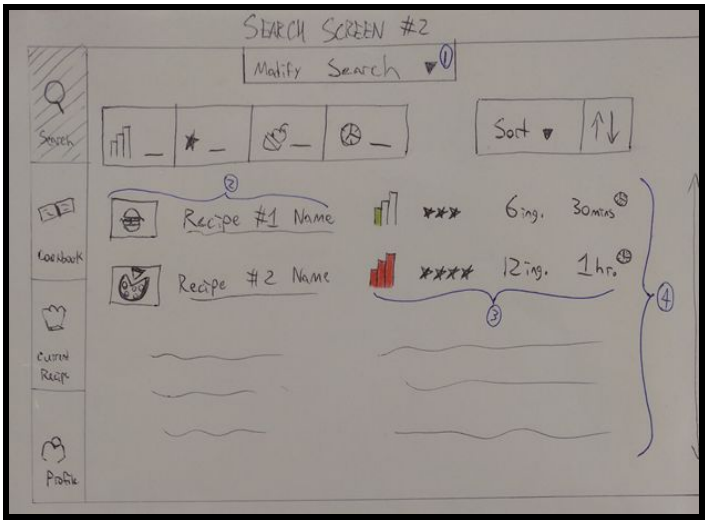
Discussion: None of our tasks cover this requirement. Although we see the benefits, it seems like a task rarely needed. All users/user representatives that were asked about this, responded with never using a feature like that while cooking. We also recognize that voice recognition could be frustrating despite its potential usefulness. Presently, we view a feature like this to be more cumbersome than what it's worth.

Phase 3: Prototyping

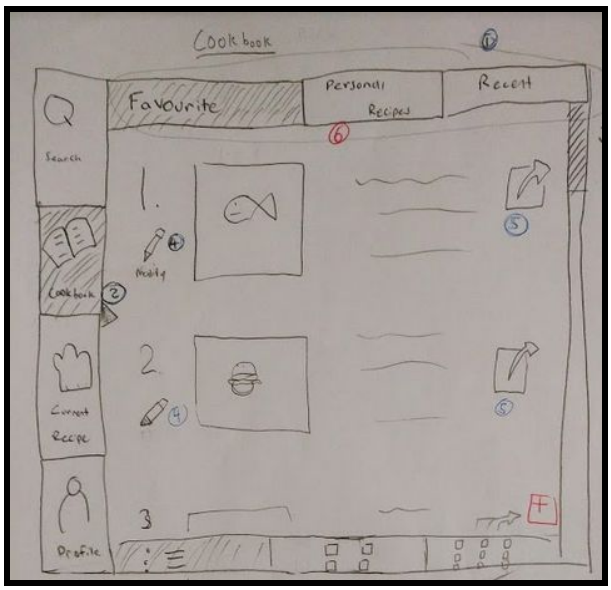
Evolved Prototype

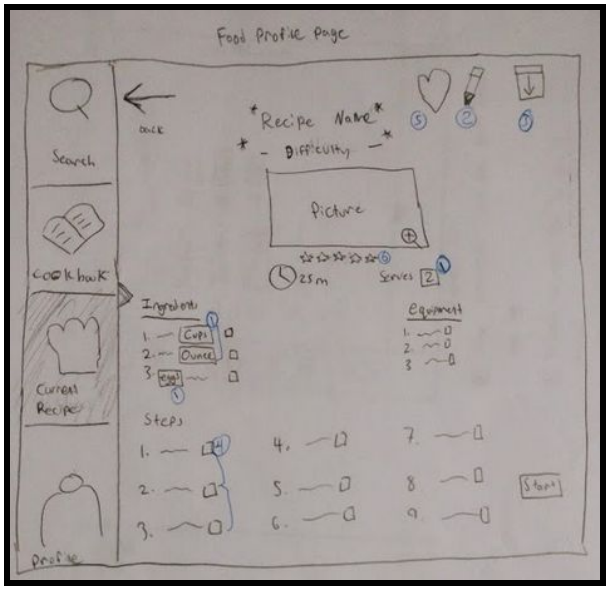
Below are images depicting the most important screens of our refined low-fidelity prototype. Detailed descriptions of the features of these screens along with other complementary screens are outlined in Appendix 1. Furthermore, Appendix 2 contains early prototype iterations along with discussions of how their designs were compared and contrasted in order to aid in refining the following prototype.



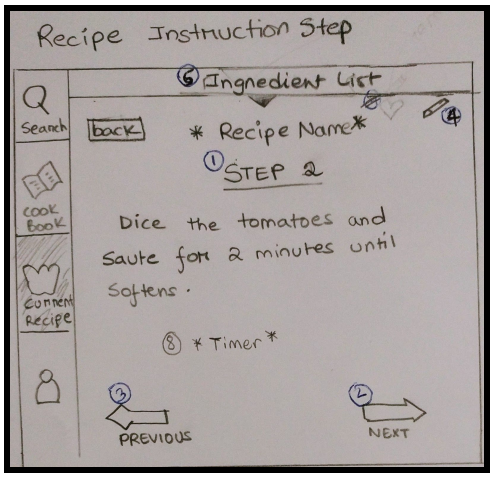


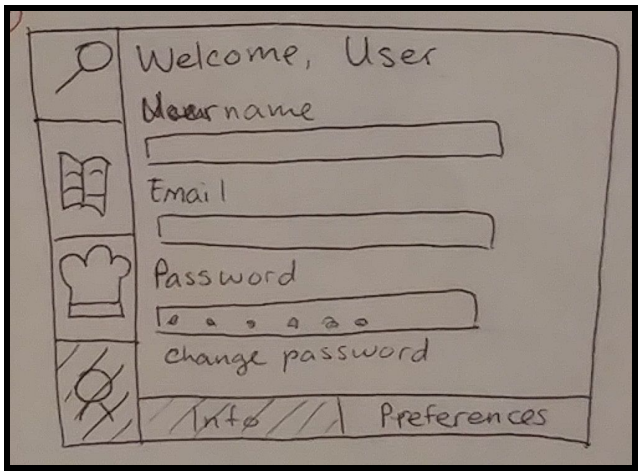
In combination, these two screens depict the search functionality of the system. There is a general search box which can be used to search for recipes by name, creator or matching keywords. The food category to search within is toggleable. Recipes can be constrained based on containing specific ingredients inputted as tags. The user is able to filter recipes by constraining them to specific values for difficulty, rating, ingredient count or preparation time. The user is also able to sort recipes that fulfill all criteria by these four characteristics. Once the "Find Recipes" button is pressed to transition to search screen #2, a list of found recipes will appear along with identifying information. The design also allows modification of the search criteria, rather than having to create a new search.





The cookbook screen is a hub that organizes a user's favourite recipes, recipes they've personally added or those that they've recently viewed. Options are also available to edit or share recipes. The food profile page lists general information about a recipe. The ingredient measurements can be converted to other standard units and the serving size can be modified. The user can also favourite, edit or download the recipe from this screen.





The left screen depicts a specific step of a recipe in progress. A single step description allows the user to focus on one step at a time. The bottom arrows transition between steps and the back button returns to the recipe profile page. If a step contains terminology that the user is unfamiliar with, they are able to tap on the term to get information about it (Appendix 1, Figure 7). A step edit button is also present. At the top, the user can pull down a list of the ingredients along with their measurements for convenience. The screen to the right depicts standard user profile info

(e.g. username, email, password) along with a tab to configure the default preferences of the user.

Final Prototype Evolution Summary:

For our final prototype, we discussed and combined features from previous prototypes and added them on top of the iteration that was presented in class to accommodate all task requirements. This process required much deliberation as various approaches were proposed to fulfill user requirements while maintaining a strictly simplistic and aesthetically pleasing interface. To achieve this balance, we considered the cost of increasing the number of required interactions with the density of information and elements presented on the screen while also considering the complexity and intuitiveness of the design. Initially, there was a notable discussion on how to handle ingredients and category search, and whether to separate them or put them together along with the best ways to achieve this. As seen by the comparison to earlier prototype iterations in Appendix 2, the refined design both incorporates category searching in addition to adding ingredients by tags. This design was chosen due to our belief that categories and other search elements would not work in a mutually exclusive fashion. How exactly to implement search and filtering was quite contentious. From our user tasks, it was evident how critical this was, both in terms of control for the user and the ability to accommodate different user search priorities. In addition, we understood the importance of ensuring these features are highly accessible. Initial iterations for the sort and filter were either cumbersome and complicated, or lacked sufficient ease of use and customization. After recognizing these issues in the proposed designs, we returned to the requirements, then chose to build a simpler sort and filter that kept them separate and explicit, and to limit the user to choosing one sort parameter at a time. Finally, we considered whether it would be too cluttered or more convenient for the user to see some parts of their search bar while browsing recipes, but it was ultimately decided that compacting the search bar at the top did not benefit the user, so it was broken into a separate screen to house the search, with a smaller button to navigate back to edit search queries. The rest of the design followed heavily upon the original one presented, as aside from minor aesthetic choices, the core interface for viewing a recipe, the cookbook tab and user profile did not need much revision.

Phase 4: Walkthroughs

*Please note that all figures referenced in the following walkthroughs are found in Appendix 1.

Task 1

Step	Step Description	Knowledge?	Motivated?	Comments / Solutions
1	Opens application.	Ok	Ok	N/A
2	Presses on "Search by Ingredients" button. (Figure 1)	**Fair Knowledge:** The two search bars being adjacent may be confusing.	The ingredients search is clearly labelled which motivates Janice to select it to complete her task.	**Possible Solution:** The two search bars should be more distinctly separate to enforce the differences between them.
3	Types in each of her ingredients one by one, pressing "Enter" after each one. (Figure 1)	Ok	**Moderate Motivation:** The user may not be motivated to enter all the ingredients	**Possible Solutions:** Autofill ingredients as they are typed so users have to do less typing.
4	Presses on "Find Recipes".	Ok	This is her exact task.	N/A
5	Searches for a recipe.	Ok	**Moderate Motivation:** By nature, searching can be tedious and the longer it takes the less tolerance the user will have.	**Possible Solution:** Display results in a dense manner to make searching easier, while still ensuring the appearance and density do not put off the user.
6	Presses on "Fancy Spaghetti".	Ok	Ok	N/A
7	Presses on "Start" button. (Figure 4)	Ok	Ok	N/A
8	Follows Step 1 provided by the recipe.	Ok	Ok	N/A
9	Presses on the next arrow button. (Figure 5i)	Ok	**High Motivation**: Hands may be a bit dirty to interact with the interface.	**Possible Solution**: Make the interaction area larger, or add other ways to progress, such as double tapping rapidly,

				anywhere on screen.
10	Completes the recipe.	Ok	Ok	N/A
11	Clicks on the stars to rate the recipe. (Figure 9)	Ok	Clearly labelled so if she wishes to rate, it is obvious.	N/A

Walkthrough Analysis:

This walkthrough was performed under the two following assumptions: Janice is a user with average cooking skill, and she has had moderate experience with other digital interfaces.

Janice succeeded in her common task fairly easily, with the areas of greatest concern being constrained to typical searching tedium and doubts about ease of use in regards to entering information and the physical interactions with the interface.

Task 2:

Step	Step Description	Knowledge?	Motivated?	Comments / Solutions
1	Opens Application	OK	OK	N/A
2	Presses on "Seafood" in Categories Bar (Figure 1)	OK	**Moderate motivation:** May not want to scroll through all categories	**Possible solutions:** Customizable category bar so user's most used category floats on top.
3	Presses on "Filter Bar - Difficulty" button (Figure 1)	**Moderate Knowledge:** Eli may be unfamiliar with this icon	Eli wants a difficult recipe. The icons are appealing and he is motivated to experiment with interface.	**Possible solutions:** Label for icons or we could just leave it, or add words to icon. If the user wants to search, they would experiment with the icons.
4	Selects "Hard" for difficulty	Labelled	OK	N/A
5	Presses on "Find Recipes"	Labelled, noticeable position	OK	N/A
6	Presses on "Whole Fish Baked in a Salt	OK	Is the recipe that matches his criteria	N/A

	Crust" recipe			
7	User views the food profile page and goes to market (Figure 4)	OK	Does not have have the items and would like to purchase them	N/A
8	Clicks on "Fillet"	The word stands out from the rest, and consistent appearance for all definable keywords.	Highly motivated because word stands out and naturally goes to investigate. Also is unfamiliar with the word.	N/A
9	Popup of the word definition is shown (Figure 7)	OK	OK	Task example describes Eli watching a tutorial video. We decided that thorough description would suffice.
10	User presses on the "x" to exit out of the definition box (Figure 7)	OK	OK	N/A
11	Clicks download (Figure 4)	Labelled, noticeable position	Would like to print the recipe	There is no option to print directly. For some users, this may appear as though a recipe cannot be printed.
12	Prints recipe	OK	OK	Performed outside of our interface.
13	Clicks Favourite (Figure 4)	Labelled, noticeable position	Would like to try it again in the future, he likes the recipe.	Eli chose not to use the interactive step-by-step instructions and used a printed recipe instead. So he is still on the food profile page.

Walkthrough Analysis:

This walkthrough assumes: Eli is a user with above average cooking experience, and that he is a somewhat proficient user of digital interfaces.

In this walkthrough, the biggest issue was the problem of Eli having to occasionally guess by the appearance of an icon if it supported the task he wished to complete. Unless users are accustomed to standardized icons, this may prove to be a shortcoming of the interface. Though he was able to complete his task, it may have taken longer than necessary, so greater indication for users as to what an icon means, especially since not all users in our user groups will necessarily have experience with digital interfaces, is important to consider.

Task 3

Step	Step Description	Knowledge?	Motivated?	Comments / Solutions
1	Opens Application	Ok	Ok	User has enough computer literacy to open and operate applications.
2	Clicks on search bar (Figure 1 - #2 field)	Yes, since the search bar will have helping text like "e.g spaghetti". The search icon is also universal so it should be easily spotted.	User is searching for a recipe with a general idea. His first instinct would be to search.	The interface has food categories that might also include pasta. User can choose it from the category option and hit find recipes. Having two ways of searching for a recipe might be convenient to a broader user group.
3	Types in "Pasta" in the search bar	Yes, the cursor should guide the user to type in as soon as the bar is selected.	Ok	One potential problem could be that he mistypes. The Search bar does not disappear and user can backspace and correct.
4	Presses "Find Recipes" button (Figure 1 - #6 field)	The button is labeled clearly.	User wants to find recipes of pasta.	N/A
5	Clicks filter button with "Difficulty" icon (Figure 1 - #4)	Poor Knowledge: The user might not have knowledge that the button is for filtering.	Moderate Motivation: The user wants to find all the recipes that are beginner level difficulty. He will need a way to filter the recipes	Potential solution could be to provide clear labels for each filter option so that user can easily understand and select the one he needs.

			via a filter feature, but might not be motivated if presented with too many options with confusing icons.	
6	Selects “Easy” option from dropdown menu in the difficulty filter option (Figure 1 - #4)	Ok.	Ok	The list is clear with three options (Easy, Medium and Hard) and only one selectable radio button.
7	Clicks sort button (Figure 1 - #5)	Button is labelled and noticeably positioned.	Lots of recipes shown in a list and sorting is a way to organize the chaos. User would like to organize by number of ingredients.	The default order for number of ingredients will be ascending but if user wants to change the order, the upward and downward arrow button will toggle the order. (Figure 2 in button on right side of sort)
8	Selects/clicks on radio button beside the option for sorting by number of ingredients	Clear text option.	Ok	N/A
9	Clicks on the first recipe displayed in the list. (Figure 2)	Ok	Ok	The recipes have number of ingredients mentioned beside them so that it is easy to see and select. User might accidently click on wrong recipe. A potential solution might be to include a defined box around each item in the list.
10	Checks off checkbox beside the ingredient items in the ingredients list that he has in his stock (Figure 4)	The checkboxes are beside each item and should indicate they are clickable.	Low Motivation: The user might not be aware that he can check the items off from the recipe page. This feature is not intuitive enough.	The system could provide simple instructions to make the user aware they can check off items and download recipes. Another problem is that if there is a lot of ingredients, it could be tedious and time consuming to go through and click each item.

11	Checks off checkboxes beside the items in the equipment list (Figure 4)	Same as step 10	Same as step 10	Same as step 10
12	Clicks on Download button (Figure 4 - #3)	Ok	User wants to get a copy of the ingredients list so that he can go shopping for the missing ones.	The icon for download is well understood, but there might be users who are not familiar and having a label might be helpful.
13	Click on Download Ingredients only (Figure 4 - #3)	Yes, since the options in the dropdown menu are text in English.	Ok	N/A
14	Takes the downloaded ingredient list to grocery store to get the rest of the missing items	Ok	Ok	N/A
15	Reopens application	Ok	Ok	N/A
16	Clicks on “current recipe” tab on home page (Figure 1)	The tab is labeled in left sidebar.	User want to access the recipe again.	N/A
17	Clicks on start to begin the process (Figure 4)	Ok	Ok	The start button is labelled and has a noticeable position.
18	Follows Step 1 displayed on screen (Figure 5)	Ok	Ok	N/A
19	Clicks the arrow pointing to right to go to next step (Figure 5)	Ok	OK	N/A

20	Comes across the word “dice” in the instruction (Figure 7)	User does not understand the term.	OK	N/A
21	Clicks on the word (Figure 7)	Yes, the word is highlighted in a different coloured font, underlined and has a “?” icon superscript to the word to indicate the user that it is lookable.	User wants to look up the meaning of dicing before he can move on to the next step.	N/A
22	Reads the definition in a pop up that appeared (Figure 7)	Ok	Ok	N/A
23	Clicks on the “x” button to close the pop up. (Figure 7)	Ok	Ok	X might be too small. Instruction of “Press anywhere to exit” might be more helpful
24	Clicks on next step and follows through all the steps	Ok	Ok	N/A
25	Sees the options to rate the recipe, save the recipe or share the recipe (Figure 9)	The options are clearly labelled with icons.	Ok	N/A
26	Clicks on the save button (Figure 9)	The option is labelled and has colour feedback for the heart icon.	Wants to save the recipe for future reference.	The user might accidently click save. Potential Solution would be clicking the button again to undo the save action.
27	User sees a message that the recipe has been saved	Ok	Ok	The recipes are saved in local storage and user does not have the option of cloud storage, so if the user loses the device, the saved recipes will be lost as well.

28	User sees cook book page with the new saved recipe (Figure 3)	Ok	Ok	One potential problem would be rating a recipe after adding to cookbook favourites. Potential Solution would be to add that option in the cookbook or ability to return to completion page after instead of "cook book".

Walkthrough Analysis:

This walkthrough assumes that Stephan is a user with beginner level cooking experience and has enough previous knowledge of other recipe websites and applications.

Stephan was able to complete his task without direct violations, but there are several areas of the design that could be improved. The main area that could be improved is increasing user knowledge by providing instructions whenever possible and labelling buttons and tabs. Some of the features like the ability to check mark and download the ingredient list are not intuitive and providing instruction or a note to inform the user about the features would potentially solve this issue. Also relying on user knowledge to recognize icons should be avoided since not all users in our user groups will necessarily have experience with digital interfaces.

Task 4

Step	Step Description	Knowledge?	Motivated?	Comments / Solutions
1	Opens the application on smartphone.	OK	OK	N/A
2	Search is already defaulted to searching in "ALL CATEGORIES" (Figure 1)	"ALL CATEGORIES" is already selected. Bob understands that this will retrieve all the recipes in any category.	Bob does not want a specific dish, he just wants to search for one that is easy and quick.	N/A
3	Taps on the Difficulty Filter option and presses "Easy" (Figure 1)	**Moderate knowledge:** Filter option buttons are not clearly labelled.	Bob wants to search for easy to cook recipes.	**Potential solutions:** Can add labels to each of the Filter options.
4	Taps on Duration	Duration contains	Bob wants to find recipes	N/A

	Filter option and adjusts the slider to 20 minutes. (Figure 1)	intervals to move the slider to.	that can be cooked within 20 minutes.	
5	Presses on “Find Recipes”.	Button is clearly labelled.	Bob wants to search for recipes and just needs to press one button.	N/A
6	Taps on the “Fried Rice” Recipe. (Figure 2)	Recipe is clear and presents all information, including the difficulty and duration.	He is motivated to click on the recipe that fits his constraints.	N/A
7	Presses “Start” to begin cooking. (Figure 4)	Button is clearly labelled.	Bob wants to start cooking and just needs to press one button to begin.	N/A
8	Completes the first step of the recipe and taps on the “--->” button with “Next” underneath. (Figure 5i)	“--->” usually indicates next.	Bob wants to move to the next step and just needs to press one button to move on.	N/A
9	Completes the rest of the steps of the recipe.	Uses knowledge from previous step to finish the recipe.	Only one button is pressed to move on to the next step until the end of the recipe.	N/A
10	Taps on the heart icon to favourite the recipe. (Figure 9)	The heart icon usually indicates “like” or “love” actions which promotes the “favourite” meaning.	He is motivated since he wants a quick way to refer back to this recipe without having to search for it again.	N/A

Walkthrough Analysis:

This walkthrough assumes: Bob is considered an expert with technology, and Bob is a user who has advanced cooking skills.

Bob has enough knowledge of technology to be able to work his way through the application. Using his knowledge, he can quickly narrow down a recipe according to his preferences using the application’s filter function. With clearly labelled buttons and a simplistic

interface, users like Bob, who are proficient in technology can quickly navigate through the application given with or without time constraints.

Task 5

Step	Step Description	Knowledge?	Motivated?	Comments/Solutions
1	Frank has gotten to the recipe profile screen for "Beef and Onions". (Figure 4)	Yes. Since Frank has intermediate cooking experience, he has enough knowledge to find a recipe that he wants to follow.	Yes. He wants to cook by following a recipe and the first step is finding one, regardless of the search method.	N/A
2	He presses the "Start" button to begin following the recipe. (Figure 4)	Yes. The button is clearly labeled with an appropriate term in English.	Yes. The action is simple since it consists of tapping one button.	N/A
3	He completes step #1 of the recipe. (Figure 5)	Yes. He has experience with cooking, so he should be able to complete some steps without help.	Yes. This step is necessary in order to progress through the recipe.	N/A
4	He presses the "--->" button to mark step #1 as completed and to move onto step #2. (Figure 5)	Likely. The arrow is a universal symbol whose purpose can be inferred from the context of the window.	Yes. The action is simple and it is essential to the step-focused design that Frank cares about.	The arrow label could be changed to "Next Step" to add more clarity to its purpose.
5	He reads the instruction to "Chop the onions", but he has forgotten what quantity of onions he needs. He presses the drop-down ingredients menu button. (Figure 5)	He may not have the knowledge that he can tap at the top to bring down the ingredients list. He may try swiping the menu down and wonder why the button doesn't do anything.	Yes. The action is simple and the transition from the current step window to the ingredients list is immediate. He doesn't have to search for the ingredients in a long list of text. They are simply presented to him right away and he can easily identify the onions in the list.	Add the ability to either tap on the button or swipe it down to view the ingredients list.
6	He presses on the measurement units preceding "onions" in the ingredients list.	Yes, since the units are displayed inside an identifiable button.	He is motivated since he doesn't know what 4 oz. looks like and he doesn't have any equipment to	N/A

	(Figure 8)		measure ounces.	
7	He presses on the "cups" option in the drop-down menu that has appeared in order to convert from ounces to cups. (Figure 8)	Yes, since he understands that this menu is displaying different measurement units.	He is motivated since he is more familiar with measurements in "cups" and has equipment to measure volume in "cups". He also wouldn't be able to continue cooking without this conversion.	N/A
8	He now sees that he needs ½ cup of onions. He presses the pull-up steps menu button to return to step #2 in the recipe. (Figure 8)	Yes, since he realizes that this button acts similar to the ingredients drop-down button that he pressed earlier.	He is motivated since he wants to continue following the recipe.	N/A
9	He completes step #2 of the recipe. (Figure 5)	Yes. He is now able to complete this step using the tools and knowledge acquired in the previous steps of this walkthrough.	Yes. This step is necessary in order to continue making progress through the recipe.	N/A
10	He presses the "--->" button to mark step #2 as completed and to move onto step #3. (Figure 5)	Yes. He already performed this action to transition from step #1 to step #2 of the recipe.	Yes. Once again, the action is simple and it is essential to the step-focused design that Frank cares about.	N/A
11	He completes all the remaining recipe steps and gets to the "recipe completed" screen. (Figure 9)	He is able to finish preparing his recipe. If any similar challenges occurred during the remaining recipe steps, he would be able to use the tools in the application and his knowledge of how to use them to overcome them.	Yes. He has overcome any obstacles in previous steps by using simple tools provided by our interface. He should be able to complete the remaining steps of the recipe in a similar manner.	N/A

Walkthrough Analysis:

This walkthrough assumes: Frank is a user with intermediate cooking experience, and Frank has enough previous knowledge of our application to find a recipe and get to its info screen.

For the most part, the prototype enables Frank to complete his tasks without difficulty due to intuitive button interaction coupled with helpful text, however there are several areas of the design that could be improved. First off, the arrow buttons could be labelled with a more appropriate English term to provide further clarity. Second, the drop-down ingredients page button and the pull-up step page button could both accommodate for tapping and swiping. This would allow users with different intuitions to perform the same action.

Task 6

Step	Step Description	Knowledge?	Motivated?	Comments / Solutions
1	Opens application	Ok	Ok	N/A
2	Clicks on cookbook tab on left side menu bar (Figure 1)	Poor Knowledge: The user wants to add a new recipe to her personal recipes. First time user of the system will not be aware that cookbook has this feature.	Low motivation	User is motivated to add a new recipe and share it with her friend but might not be motivated to click on cookbook since it does not indicate to user that the feature for adding a new personal recipe is in this tab.
3	Selects Personal Recipe section (Figure 12i)	Personal recipes indicates recipes that only user can see.	Motivated to keep all her new recipes stored in one place.	N/A
4	Clicks on "+" recipes button (Figure 12i)	"+" should indicate to add a new recipe.	Ok	N/A
5	Sees a form with details needed for the recipe (Figure 12ii)	Ok	Ok	N/A
6	Types in a recipe title (Figure 12ii)	Ok	Ok	The text box takes in any input format and user has the freedom to type in as many characters as

				possible to save in standard database table. We might want to restrict format.
7	Chooses a difficulty level. Chooses a category (Figure 12ii)	Yes, on clicking the bar, a drop down menu will appear with the options for both the fields. Both fields are required as indicated by asterisks.	User wants to add a recipe for herself and for sharing. Difficulty level and category of food should be of importance.	User might not know that asterisks mean that these fields are required. One solution would be to indicate the usage of asterisks so that the user is aware.
8	Types in one ingredient (Figure 12ii)	Yes, since the instruction on the field states only one ingredient per row.	Adding one ingredient per row might get too tedious and produce low motivation for user.	With increased items in the list, motivation will be low to keep adding a row to add another item. A potential alternative can be adding the items as a comma separated list.
9	Clicks "Add another row" button (Figure 12ii)	Button labeled.	User wants to add the second ingredient.	N/A
10	Types in next ingredient	Ok	Ok	N/A
11	Types in cookware. User types in directions (Figure 12ii)	Same as Step 7-10	Same as Step 7-10	Same as Step 7-10
12	Clicks on '+' icon beside duration field (Figure 12ii)	The '+' and '-' button should be enough to indicate to the user to increase or decrease the duration.	User wants to enter the duration. Pressing + incrementally could be tedious.	The user might not know that the duration is in minutes. There should be a way user can enter the duration directly as well.
13	Clicks on '+' icon beside servings field (Figure 12ii)	same as step 12	same as step 12	The default of 1 makes more sense. Also same as step 12.
14	Does not have a photo so, skips	The missing asterisk indicates the field is	Ok	N/A

	the option (Figure 12ii)	optional.		
15	Presses submit button	Ok	Ok	N/A
16	Sees the newly added recipe in Personal Recipes Section (Figure 12i)	Ok	Ok	N/A
17	Selects share option beside recipe title (Figure 12i)	The button is labelled.	Ok	N/A
18	Chooses email	The share option presented includes email and other social media options.	User want to share the recipe with her friend.	N/A
19	Types in her friend's email in 'to' field and her own in 'from' field	Ok	Ok	N/A
20	Clicks share	Ok	Ok	N/A

Walkthrough Analysis:

This walkthrough assumes that Alice has medium to advanced cooking skills, and does not prefer to use a computer to follow a recipe since she has limited computer literacy. The first step to go to cookbook to add a new recipe was a difficult step in this task because there is low motivation to navigate to that tab. There is no instruction or indication that the cookbook tab has the feature of adding new personal recipes and sharing them. Another shortcoming in the design was failure to provide format instructions. For example, when the user is not knowledgeable that duration is measured in minutes in the form. Some of the steps like adding ingredients one at a time might be too tedious when there are a lot of items to add.

Task 7

Step	Step Description	Knowledge?	Motivated?	Comments / Solutions
1	Opens application	OK	OK	N/A
2	Opens cookbook (Figure 3)	OK	Anne wants to access her favourite recipe.	N/A
3	Click on Tuna Casserole	List of their favourite items presented.	Strongly motivated. Wants this recipe specifically.	Favourite tab is automatically selected in the cookbook.
4	Change portion size to one (Figure 4)	**Modest knowledge**: Serving size is pressable, may not be noticeable even though it's covered in a box.	Anne is only cooking for herself, and not for a group of people.	**Possible solution:** We can highlight it more by giving it some color or a slight hue.
5	Substitute eggs and milk	**Modest knowledge:** Same as above.	Anne doesn't have default ingredients.	**Possible solution:** Same thing as above.
6	Press start	Button is labelled, noticeable position.	OK	N/A
7	Use timer (Figure 5i)	OK	Most people have their own timer but she'd be encouraged to use ours since it's right there.	Timer is presented on the screen on the following steps that require the timer.
8	Clicks next	Button is labelled, noticeable position.	OK	N/A
9	During one of the steps, she decides to bake with cheese	OK	She does this as she has has some left over cheese from last night, she would like to put them to use.	This is not with our interface. She decides to do this on her own, which she has every right to, it's her food after all.

10	Clicks done	Button is labelled, noticeable position.	OK	This is after a series of steps, she would have pressed next many times.
11	Eats meal/tastes dish	OK	OK	N/A
12	She presses the "modify recipe" button (Figure 9)	Shown with other options such as share, rate and save.	Her dish tastes even better with the changes made and would like to make note of these changes.	In this case, she stayed on this page after she eats her meal, so this is no problem. However, if the user decided to close the app or skip this step then getting to this step would take a few extra navigational steps in which the user might not have adequate knowledge to do so.
13	Clicks on change ingredient (Figure 11i)	Anne should have enough knowledge to do this: Only 3 options to choose from.	OK	Limited the amount of options to Anne to just 3 things. Our goal here is to allow anyone, not just someone who is familiar with our system to be able to modify recipes. Even if you never used this feature before, you'd be able to do it.
14	Types cheese (Figure 11iii)	**Modest knowledge:** Typing is no problem. Anne may run into some formatting issues though. The field doesn't limit the user and doesn't provide any restraints. What if Anne doesn't type down a valid ingredient?	OK	**Possible solution:** We could just allow the user to type down an invalid ingredient. This modified recipe will only be available to the user for their own personal use. Or we could also pull a list of actual valid ingredients from some database to define what ingredients are actually valid.
15	Select amount field and types in amount	**Modest knowledge:** This is the same as before, although this is less of a problem as measurements are in numbers and so formatting issues are not hard to fix.	OK	**Possible solution:** Add a constraint so that only numbers are entered with decimals up to a certain degree.
16	Select measuring unit	**Modest knowledge:** Anne is familiar with	OK	**Possible solution**: this is not a problem with the system and she

		measuring units as she is a novice cook but does not remember amount of cheese used.		figures that there is nothing wrong with approximating. We can just leave this as there is the option to edit between steps.
17	Clicks done	Button is labelled, noticeable position.	OK	N/A
18	Clicks on change steps	Button is labelled, noticeable position.	OK	N/A
19	Clicks add instruction (Figure 11iv)	Button is labelled, noticeable position.	OK	N/A
20	Select add after step 7	**Moderate knowledge:** Labelled, drop down menu. She does not remember which step she made the changes on.	OK	**Possible solution:** Make it so that the steps are presented alongside on this screen or add an option to view the list of instructions. Or we can also just leave it, as going one screen before will give you the list of steps, which is not much navigation.
21	Types down instruction	**Moderate knowledge:** Knowledgeable to type down the step but again, she runs into formatting concerns. Also one line of text may not be enough.	OK	**Possible solution:** We could just leave it, as said before, this is for the user's own personal use and it would not be in their favor to add steps that are not beneficial to them. We can also add a text box instead to provide more room for text.
22	Clicks done	Button is labelled, noticeable position.	OK	N/A
23	Clicks saves	Button is labelled, noticeable position.	OK	System provides feedback that it is saved in her cookbook.

Walkthrough Analysis:

This walkthrough assumes: Anne has used this app before enough to know where her favourite recipe is and Anne is a novice cook (self-proclaimed). What we don't assume is that she has ever modified a recipe before.

Anne is able to navigate to her favourite recipes with relative ease, being someone who

has used this app before. Ingredients and serving sizes, are pressable buttons, but there really is no indication saying that you can change them aside from them being boxed. They were implemented this way with simple and streamlined design in mind, although they may blend too well with the environment. However, there is motivation for users to experiment with the interface so they could potentially find that out themselves. Modification of a recipe is an option on the completion page. We will implement this design so that anyone, even if they have never used this feature before, can do it with not too much trouble. To do this, the modification page has limited options. Anne is able to do this with relative ease although she comes up with formatting issues. At large, this doesn't affect her too much as she does not input anything invalid as it would not be to her benefit to do so as it is for her own personal use.