

The Evolution of *Shoop*:

Digital Design Iteration and Lab-Based Evaluation

Assignment 2, 2018
INFO30004



(The Group Formally Known As Shopping Cart)

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Executive Summary

Shoop™ is a phone application intended to improve the in-store grocery shopping experience. To ensure that the design process was conducted efficiently with minimal development costs, user-based usability evaluations were conducted at the University of Melbourne Interaction Design Laboratory. Pre- and post-questionnaires were utilised to gather auxiliary quantitative information to supplement and contextualise data obtained from the evaluation.

Drawing from previous findings, the team redesigned the paper prototype based off problems identified from conducting expert-based cognitive walkthrough evaluations. The following design changes were made to ameliorate the issues:

- Removed enforcement of “quantity selection” when adding items to a shopping list.
- Addition of a “favourites” list to allow users to track regular items persistently and speed up the creation of future lists.
- Improved app navigation by reorganising the UI flow to be more logical and aligned to application use-cases.
- Improvement of in-store routing by adding clear feedback and a more usable item “check-off” mechanism.

A digital prototype was constructed based off the new design to facilitate evaluation interviews. It supported four tasks that revolved around core features of the app. The order of the tasks was critical as later tasks drew upon past interactions—this was to mimic the natural progression users would likely follow when genuinely using the app. The tasks were:

1. Manage your Favourites List.
2. Build your Shopping List.
3. Collect all the items on your Shopping List (plan your route and navigate the supermarket).
4. Scan a new receipt to track spending.

Following the user evaluations, we proposed a series of future design recommendations to target problems highlighted by the evaluation data. We found:

Learnability Issues

Users experienced a steep learning curve upon first use—once they understood how the application was intended to be used, their navigation through the app was drastically more coherent. The addition of a favourites system significantly steepened the learning curve due to the interface’s complexity. This is intended to be solved with a tutorial that is enforced upon first use.

Poor Discoverability

The swipe menu on the map screen was not well-identified—the two dots were meant to denote which “slide” the user was currently on. These visual cues were small and insignificant, which impacted how discoverable the feature was. Additionally, once the user discovered the swipe menu, its purpose was unclear. We proposed that the swipe menu is to be changed in favour of a static info screen with an icon for additional data.

Confusing Interfaces

The way that users were intended to put in item purchases was misleading. The main task of the money management system is the scanning of receipts, which facilitates the data analytics generated on the page. We suggested that if the navigation bar icon was a barcode rather than a dollar sign, users would be more likely to correctly identify how to input purchase information and what the main function of the money management component was.

Unclear Signifiers

Lastly, subjects had trouble differentiating between the Edit List and Clear List options when viewing their Favourites and Shopping List. This problem can be cured simply by combining the two into one all-encompassing “Edit” button—Clear List would be an option within an overarching Edit screen.

Restatement of Problem

Ultimately, supermarkets seek to gain market share over competitors. This is traditionally achieved by differentiation of services and products to provide customers with a better in-store shopping experience (Levy, Weitz, & Grewal, 2012). A positive shopping experience yields a distinct advantage as both customer satisfaction and repatronage is positively impacted (Terblanche, 2018). Thus, a high calibre in-store experience is in the best interest of both customers and suppliers (Sánchez-Fernández, Angeles Iniesta-Bonillo, & Holbrook, 2009). The service aspect of the supermarket experience has remained relatively unchanged for decades (Stallard, 2017), and there exists an opportunity to introduce technology to improve it.

The in-store grocery shopping experience can be categorised into a number of customer experience touchpoints (Stein, & Ramaseshan, 2016)—these elements encapsulate the various areas that can be enhanced to differentiate a particular store. Research on the effect of technology on customer touchpoints has shown that digital solutions can significantly improve the retail experience (Foroudi, Gupta, Sivarajah, & Broderick, 2018). Specifically, process, communication, product interaction, and technological touchpoints are most notably impacted by a digital application that focuses on enhancing the in-store shopping experience (see Appendix 2).

Our team proposed that a mobile-based solution could streamline the in-store retail experience by leveraging technology to impact the aforementioned touchpoints. Through triangulation of data sourced from three semi-structured interviews and one questionnaire (with 34 respondents), we isolated the key functionality that our target users would value:

- A modernised, simple way to construct a shopping list and keep track of frequently-purchased items. Easy access to product information from the same interface was also desirable (stock, descriptions, price, etc.).
- The ability to generate an in-store route from a particular shopping list, allowing the user to pick up the necessary items in an efficient and timely manner.
- Expenditure-tracking with an integrated shopping list that could potentially bring value to consumers and providers.

Cognitive walkthroughs conducted in Assignment 1 highlighted a number of key problems with the initial design. The following aspects were addressed:

Tediousness and Redundancy

The initial design forced the user to enter a “quantity” field when adding an item to their shopping list. This was found to not only be redundant, but was irritating due to the frequency by which the field had to be entered. This mechanism was completely removed.

Lack of External Cognition Support

Cognitive walkthroughs revealed that there was no easy way to quickly find frequently used items—users were forced to “search” for them each time they wanted to construct a shopping. This was cured by the addition of a persistent “favourites” list that users could use to quickly access notable grocery items.

Suboptimal Interface Navigation

The number of “clicks” necessary to navigate the various elements of the list-related sections of the app was unnecessarily high. This was predominantly due to having new windows spawn as an overlay rather than a separate full screen. This was addressed by porting pop-up windows into their own full window and tweaking the UI page stack.

Unclear Feedback

Lastly, there was a distinct lack of feedback when using the map screen functionality. Specifically, when users were required to check off an item from the shopping list after finding it in the store, both *how* to check off the item (by swiping), and *whether* a check-off was successful was unclear. Visual feedback was added when after checking off an item, and an additional check-off button was included along with the swipe check-off method.

Drawing from our results, we decided to prioritise the following usability aspects in our evaluations:

1. Confirm the efficacy of our overhauling design changes.

Core functionality has been radically restructured with a new major system being implemented since the previous version of *Shoop*—namely, the Favourites system. Consequently, it is the major priority in this study to confirm that the new systems successfully:

- Improve the functionality and efficiency of the application significantly enough to justify the increase in complexity.
 - Mitigate the functional problems identified in previous expert-based evaluations.
 - Improve the long-term user experience in managing shopping lists.
2. Determine whether the new navigation structure between different systems was more intuitive.
 3. Identify new usability problems pertaining to other major components of the app, such as the mapping tool and the collection of expenditure data.

4. Identify general usability of the system by quantification of the app's learnability, as well as general user experience when interacting with the application (i.e. how satisfying, enjoyable, or motivating the interaction is).

It is likely that new usability issues have emerged due to the extensive overhaul of our design: the evaluation served to identify and shed light on these issues. In addition, we sought to ensure that the problems uncovered were meaningful with respect to the target user group (Preece, Rogers, & Sharp, 2015).

While eye-tracking-related information is of focus for interaction lab studies, we concurrently prioritised obtaining qualitative information. This was primarily due to resource limitations with respect to time, funding, and availability of interviewees. Qualitative data-gathering methods included two questionnaires and verbal discussion when appropriate during the evaluation—these sources were intended to supplement the core evaluations by providing context. In particular, we were interested in assessing how aligned the test users were to our target audience and persona.

Users

Shoop is a relatively complex mobile application due to its unique functionality. Consequently, users are likely to encounter a steep learning curve upon initial use. Therefore, we decided to pitch our app towards people who are inclined to utilise technology for both enjoyment and assistance with daily functions. We want to target individuals who seek to optimise regular life functions—we want our target users to use *Shoop* to get their shopping done effectively and efficiently. Additionally, the target audience consists of individual shoppers in order to further the likelihood of adoption—this is under the assumption that an individual shopper is more likely to use an external tool to streamline the process.

In essence, this group is:

- More likely to make the initial time and effort investment in learning *Shoop* to reap the potential benefits. These individuals would both enjoy using *Shoop*, and they are
- Suited to continued use of the tool to improve shopping efficiency.

The user evaluations uncovered design problems that our target users valued—this enabled us to ensure that the design was appropriate and acceptable for the user population (Preece et al, 2015). We wanted to confirm that the target group would not reject the technology or experience a poor interface that might lead to dissatisfaction or annoyance (Preece et al, 2015). Furthermore, our team strived to minimise the inherent tendency of designers to design for themselves (Preece et al, 2015).

Five participants were evaluated in order to help reduce wasted resources during the design process of our application. Studies undertaken by Nielsen and Landauer (1993) found that five is the optimal number of candidates to balance uncovering a high percentage of usability problems (approximately 84%) with minimal evaluation costs (Nielsen & Landauer, 1993).

The participants were all students at the University of Melbourne who are undertaking a third-year undergraduate usability engineering subject. This likely impacted their behaviour in the evaluation process as the participants were familiar with the format and the importance of user-centred studies.

All participants were required to complete a pre-evaluation questionnaire that extracted various auxiliary user information. The data can be grouped into three categories:

1. Data that evaluated the candidate's inclination to use technology.

- All candidates felt that using technology is enjoyable (see Appendix 10.1), and
- more specifically, they also enjoy using smartphone applications (see Appendix 10.2).

2. Grocery shopping habits.

- All but one candidate went grocery shopping on a regular basis, with 2 out of 5 individuals going regularly (see Appendix 10.3).
- However, there were relatively mixed responses when prompted if they were interested in an app that streamlines grocery shopping (see Appendix 10.4).

3. Aspects of the individual that would hinder the quality of evaluation data or disrupt the evaluation process.

- All interviewees were comfortable and able to be assessed through our evaluation format—they exhibited no characteristics that required us to deviate from the standard procedure.
- It is important to note that 2 out of 5 candidates wore glasses at all times (see Appendix 10.5), and this noticeably impacted the accuracy of the eye-tracking equipment.

The interviewees predominantly resembled our persona, Stephen (see Appendix 3), with the exception of one user that did not regularly grocery shop. All candidates fell inside the young adult (18-24) age bracket and attend university. Stephen is fond of technology and uses it to better his work and organisational skills—questionnaire data verified that all participants are aligned with this mindset. Lastly, 2 out of 5 participants are individual grocery shoppers, and 2 out of 5 shop for more than two individuals, indicating that most of our test users fall within the target audience.

Tasks

Task-based analysis is a critical tool for clearly defining the problem at hand, as well as creating informed design requirements and solutions that take into account multiple stakeholders (Cooper, Reimann, Cronin, & Noessel, 2014). In order to test the digital prototype, old tasks from Assignment 1 were modified and new tasks were developed to pinpoint user requirements. At this stage in the design process, we primarily focused on refining the list construction screen, the mapping feature, and the newly adopted receipt-scanning system.

In Assignment 1, we analysed the following three tasks:

1. **Building a shopping list from scratch.**
2. **Using a completed shopping list to navigate the supermarket with the map.**
3. Tracking expenditure on groceries for the month of March.

Of these tasks, we retained **(1)** and **(2)** and removed (3) for usability evaluation in the IDL. Previously, building a shopping list and navigating the supermarket were identified as high significance tasks, whereas tracking expenditure was deemed only to be of medium significance (see Appendix 4). This decision is supported by initial questionnaire data: respondents agreed “locating specific items” and “forgetting to purchase items” were the two most prominent pain points of the grocery shopping experience. Retaining Tasks (1) and (2) allowed us to prioritise testing of the features that directly addressed these problems—the shopping list and the map. While these two tasks remained the same, we modified the User Actions and Interface Feedback according to the new design (see Digital Prototype section and Appendix 5 for modified old tasks).

In addition to the previous tasks, we devised two new tasks in order to test our revised design: **(a) managing one’s Favourites by adding and removing items** and **(b) scanning a receipt**. We chose these tasks in particular because they pertain to core functionalities of our application (i.e., list-building and money management), but they are specific to the new design. That is, both the Favourites feature and the receipt scanner were implemented in part to solve problems identified during the cognitive walkthrough in Assignment 1; neither existed prior to the latest design iteration (see p. 21 for prototype changes). As such, it was imperative to gather information about these never-before-tested features.

(In-depth descriptions of the new tasks begin on following page.)

NEW TASK 1	
Name: Managing Favourites list, i.e. adding and removing items to/from Favourites.	
Frequency: Could be low or high frequency, depending on user preferences: their reliance on shopping lists as part of their shopping process, how often they change up what they buy, and how often they want to modify their Favourites (i.e. adding or removing items). For example, a user might build their Favourites one time only, and use it with every subsequent shop. Another user might consistently make changes to their Favourites.	
Significance: Medium to high significance. The Favourites system is not integral to the shopping experience (users can construct a Shopping List without 'favouriting' anything), but it makes list-building significantly quicker, particularly for subsequent shops and returning users. This is because it eliminates having to search and browse for specific items every single time the user wants to create a new shopping list.	
Issues: Difficult to convey the immediate difference between the Favourites and Shopping List tabs. Need to present these two lists in a way that clearly distinguishes them from each other, but also shows how they can be used in tandem.	
Technology: Smartphone with our application, linked to store data and item information (names, brands, prices, stock). Current technology that makes use of a similar 'Favourites' system is the Spotify Library, in which users are able to 'Save' items for quick access (ease of listening, building playlists). Additionally, people may refer back to a list of their commonly purchased items (in their notes on their phone or on a piece of paper) every time they shop, or re-use shopping lists.	
User Actions	Interface Feedback
Step 1: Navigate to the lists tab (leftmost tab on navigation bar)	Highlights list tab in bottom navigation bar. Displays screen with two tabs: the Favourites (left) and the Shopping List (right). The Shopping List (right) is active by default. These scrollable pages will either be empty or populated, depending on whether or not the user has added items to either list. (In this case, the user has some items in their Favourites, but their Shopping List is empty.)
Step 2: Click '+' button	When the shopping list is empty, instructions appear directing users to use the '+' button to populate their list. Clicking the '+' button brings up a dropdown menu containing two options: 'Add to list from favourites' and 'Search new'.
Step 3: Search for new items	Selecting 'Search new' from the '+' menu

	<p>dropdown displays the root search/browse screen. An additional 'Return to shopping list' button appears just above the navbar.</p>
<p>Step 4: Use either the search bar or category menu to find products</p>	<p>Using the search bar generates results in real time as characters are entered in.</p> <p>Tapping a category icon moves them to a follow up screen containing sub-categories or product choices. The name of the category that they previously chose will be presented as the title of the new screen.</p> <p>These screens are intuitively scrollable, thus indicating that they can be used like a catalogue.</p>
<p>Step 5: Favourite items by clicking on the star icon located on the respective product panel</p>	<p>Tapping the star icon will directly add the item to Favourites. The star icon will begin unfilled, and tapping it will both fill it in and highlight it, i.e. change colour (from grey to green), to indicate that the item has been 'favourited'.</p>
<p>Step 6: Navigate back to the root search/browse screen in order to make further selections. (Then, repeat Steps 4-5 until finished.)</p>	<p>Users can get back to the root search/browse screen by (a) using the back button or (b) clicking the 'Begin new search' button.</p> <p>(a) The back button brings the user to the most recent previous screen, which should still be recognisable and in their memory. Going 'back' is clearly communicated through this alone.</p> <p>(b) The 'Begin new search' button will appear above the navbar in the bottom right. This will take users directly back to the home search/browse screen.</p>
<p>Step 7: Check Favourites to confirm everything has been added</p>	<p>Users can return to their Favourites, which will contain all their 'favourited' items, by (a) clicking on the list tab in the navbar, then navigating to the Favourites tab or (b) clicking the 'Return to favourites' button</p> <p>(a) Clicking on the list tab in the navigation bar will take the user to their completed list (with the Shopping List tab active and the Favourites tab greyed out). They can click on</p>

	<p><i>the Favourites tab, highlighting it, which will then mean the Shopping List tab becomes grey. The Favourites interface is a scrollable display of the users' 'favourited' items, their price details, and stock information.</i></p> <p><i>(b) The 'Return to favourites' button will appear above the navbar in the bottom right. This will take users directly back to the Favourites tab of the lists screen.</i></p>
<i>Step 8: 'Unfavourite' an item</i>	<p><i>Clicking the 'three dots' in the top right will bring up a dropdown menu with three options: Clear, Undo, and Edit. Edit will bring up a selectable display of all items on their Favourites with an open circle on the left of each panel. Clicking the panel will fill in the circle and highlight the panel, and two buttons, 'Cancel' and 'Remove', will appear at the bottom of the screen, just above the navbar. Tapping 'Remove' will remove the item from the user's Favourites. This will be clearly visible, as the item will disappear from the final Favourites list.</i></p> <p><i>Users can also unfavourite items by tapping on a filled-in green star in the search/browse screen, if they are on that page.</i></p>

NEW TASK 2	
Name: Scanning a new receipt to track spending in the app (e.g. for budgeting purposes)	
Frequency: Dependent on the user's sensitivity to price and their budgeting habits—users may or may not be inclined to track spending using the app. In this case, the user budgets by month. Budgeting can occur weekly, monthly, or yearly.	
Significance: Medium significance, as tracking expenditure is not essential for grocery shopping, but budgeting is often linked to expenditure on meals and food. The more price-sensitive an individual, the higher the significance of this task.	
Issues: Need to consider <i>how</i> receipts will be scanned into our application. This includes what physical motion users take to capture the receipt (especially if the receipt is long) and what their existing mental models are based on existing applications with receipt-scanning capabilities. Users might be inclined to capture the whole receipt, take multiple pictures of a longer receipt, or scan only the barcode.	
Technology: Smartphone with our application and receipt-scanning/parsing capabilities. If scanning barcodes, need to be linked to store data. If scanning whole receipt, need to be able to parse the text on the receipt (store, item name, price details). Currently, grocery shoppers can keep track of expenditure with some combination of paper receipts, spreadsheets, bank account history, and/or personal financing applications. Current receipt-scanning applications include Ibotta, Evernote Scannable, and Receiptmate.	
<i>User Actions</i>	<i>Interface Feedback</i>
<i>Step 1: Navigate to the money tab (middle tab on navigation bar)</i>	<i>Highlights money tab in navigation bar. Directly switches to the money management screen, which will display a bar graph of spending and various action buttons below the graph: Scan New Receipt, Show All Spending History, and Show Spending Breakdown.</i>
<i>Step 2: Click 'Scan New Receipt'</i>	<i>Displays camera screen: shows what is physically in front of the phone's camera (presumably, the receipt) and a clickable circular button with a camera icon to indicate</i>
<i>Step 3: Position phone over the physical receipt</i>	<i>Follows standard camera interface—what is visible on the screen will shift with movement of the phone.</i>
<i>Step 4: Capture receipt</i>	<i>Pressing the camera icon button will bring up a pop-up window with the question 'Add this receipt?' and Y/N options (an 'X' and a check</i>

	<i>mark) so the user can respond.</i>
<i>Step 5: Confirm addition of new receipt</i>	<i>Tapping the check will confirm the addition of the receipt and make the pop-up window disappear, leaving the camera interface underneath. The receipt data will be added to the expenditure repository of the application.</i>

Selecting these four tasks (the two previous Assignment 1 tasks and the two new tasks) allowed us to answer key evaluation objectives pertaining to the efficiency, learnability, memorability, and utility of our application. We presented the tasks to users in scenario form—in which users planned and completed a ‘shop’. This allowed us to concretise the situation of use and make design decisions accordingly (Cooper et al., 2014). The following table displays the task-based scenario we presented to lab participants (see Appendix 6 for the printout used in the IDL), as well as which evaluation objectives were addressed with each task:

Task (as Presented to Participants)	Relevant Evaluation Objectives
<p>Task 1: Manage your Favourites list.</p> <p>a. Add the following items to your Favourites:</p> <ul style="list-style-type: none"> i. Fresh Royal Gala Apple ii. Banana Organic iii. Helga’s Grain Bread Mixed Grain iv. Woolworths Select Lite Milk <p>b. You realise you don’t want milk on your Favourites list anymore. Remove Woolworths Select Lite Milk from your Favourites.</p>	<ul style="list-style-type: none"> • Do users understand the + and ... buttons on the Favourites/List screen? <ul style="list-style-type: none"> ○ Are they inclined to click them for their intended purposes? ○ Do users know what the menu options mean, i.e. “Add to list from favourites” and “Search new” under the ‘+’ button, or clear/undo/edit under the ‘...’ button? • How do users navigate between the Favourites/List and Search/Catalogue screens now that the Search/Catalogue icon has been removed from the navigation bar? <ul style="list-style-type: none"> ○ Do they use “Return to” buttons or the list icon in the navigation bar? • How quickly can users build a Shopping List? <ul style="list-style-type: none"> ○ Do users understand how to use the search bar and category menu to find items? ○ How quickly can the category menu and sub-screens be navigated? ○ Can users find, Favourite, and add things to their Shopping List quickly? ○ Do users make use of their Favourites to build their Shopping List? • Do users understand the difference between and intention behind Favourites and Shopping List? <ul style="list-style-type: none"> ○ Do they make use of the Favourites screen correctly or do they build Shopping Lists from scratch?
<p>Task 2: Build your Shopping List.</p> <p>a. Add the following items to your Shopping List:</p> <ul style="list-style-type: none"> i. Fresh Royal Gala Apple ii. Helga’s Grain Bread Mixed Grain iii. Tip Top Blueberry & Vanilla Cafe Loaf iv. Connoisseur Ice Cream Cookies & Cream 	

	<ul style="list-style-type: none"> • Are users able to fix their mistakes when constructing their lists? <ul style="list-style-type: none"> ◦ Do users know how to remove and edit items on their list?
<p>Task 3: Now, you want to collect all the items on your Shopping List. Plan your route and navigate the supermarket.</p> <p>Subtasks:</p> <ol style="list-style-type: none"> a. Pretend you've reached the apples. What should you do now? b. Remind yourself of the items you need in the Bread section and their product details. 	<ul style="list-style-type: none"> • Can users find the map screen now that it is located within the list screen? • Will users understand how to find items in the store using the map and routing features? • Do users understand they need to manually check off items? <ul style="list-style-type: none"> ◦ Is there sufficient feedback when a user checks off an item? • Can users find the product details of an item along their route from the map screen? <ul style="list-style-type: none"> ◦ Is it obvious this functionality exists? ◦ How valuable do users find this function?
<p>Task 4: Pretend you have completed your shop. Scan the new receipt to track your spending in the app.</p> <p>Subtask:</p> <ol style="list-style-type: none"> a. We will provide you with a real mobile phone (blank screen) and a physical receipt. Please scan the receipt. 	<p>Digital Component</p> <ul style="list-style-type: none"> • Are users able to determine how shopping data is put into the application (scanning)? <ul style="list-style-type: none"> ◦ Is it obvious this functionality exists? • Can users find the 'Scan New Receipt' button with ease? • Is there sufficient feedback to indicate a receipt has been successfully added to the application? <p>Physical Component</p> <ul style="list-style-type: none"> • How do users go about scanning a physical receipt? <ul style="list-style-type: none"> ◦ What motion do they exhibit? ◦ Do they take a picture (or pictures) of the whole receipt or a specific portion of it? ◦ Are they inclined to take a single picture or multiple pictures? Or do they think to 'record' the receipt?

Digital Prototype

In this assignment, we opted to use a digital prototype to create a high-fidelity, concrete representation of the critical components in our re-designed interactive system (Beaudouin-Lafon & Mackay, 2012). Unlike the paper prototype in Assignment 1—a low-fidelity prototype which allowed for quick, inexpensive, and early user testing (Thornton, 2013)—the digital prototype took much longer to create. Additional drawbacks of the high-fidelity prototype include:

- (a) difficulty implementing system modifications,
- (b) receiving user feedback on minor “fit and finish” details instead of larger system issues, and
- (c) prototype bugs that disrupt user-testing (Rettig, 1994).

Drawback (c) was especially evident in the lab evaluation when users ran into limitations of the prototype while trying to complete the tasks. For example, it was unfeasible to account for every possible way in which users could add items to their Shopping List, so users may have reached a screen that did not accurately reflect their actions (such as having a four-item shopping list after only adding one item). In such cases, user confusion reflected issues with the *prototype* rather than the *actual system*. Nonetheless, the digital prototype was advantageous because it clearly defined a navigational scheme and provided users a fully-interactive, user-driven, exploratory experience. (Rudd, Stern, & Isensee, 1996).

Evolution of Design

The cognitive walkthrough from Assignment 1 revealed both large and small problems related to our design. Informed by these key findings, their severity, and the feasibility to implement effective solutions, we made the following changes in our newly designed digital prototype. Key design changes are denoted with an asterisk (*)—these changes are presented in side-by-side screen comparisons on p. 21.

Note: The abbreviations in the leftmost column identify the modes (and if applicable, the tools) to which each design change is relevant. (GN = General Navigation, L = List, SB = Search/Browse, MA = Map, MM = Money Management)

	Design Changes	Problem Addressed	Justification
GN	1. Moved home screen (lists) to leftmost tab of navbar *	Uncommon position of home button in previous iteration: confusion because home button was second from left (out of five tabs). Severity: Medium	<ul style="list-style-type: none">• Better aligns with existing mental models: standard for home button to be in leftmost or centre position of navbar

GN	<p>2. Removed separate tabs for Search/Browse and Map *</p> <p>a. Reduced total number of tabs (5→3)</p> <p>b. New navbar modes:</p> <ol style="list-style-type: none"> Lists Money Management Account <p>c. Search/Browse and Map tools integrated into Lists mode</p>	<p>Unclear distinction between ‘modes’ and ‘tools’ made it difficult to identify how different features (i.e. Shopping List, Search/Browse, and Map) were related and interdependent. This led to issues in understanding how the Shopping List updated when searching for items and how the Map updated with respect to Shopping List changes.</p> <p>Severity: High</p>	<ul style="list-style-type: none"> Clearly distinguishes between ‘modes’ and ‘tools’ Aids in understanding of how screens are related (or unrelated) to each other Communicates stronger link between overarching modes and relevant tools <ul style="list-style-type: none"> E.g. Search/Browse and Map are tools that are directly linked to the user’s Shopping List
L	<p>3. Implemented Favourites system *</p> <p>a. ‘Star icon’ to favourite an item</p> <p>b. Linked to Shopping List and Search/Browse</p>	<p>List construction was cumbersome and took too long. Users had to build their Shopping List from scratch for every shop by manually searching and/or browsing for each individual item. This undermined the efficiency goal of our application.</p> <p>Severity: High</p>	<ul style="list-style-type: none"> Expedites list construction: <ul style="list-style-type: none"> Easy access to frequently-purchased or favourite products Users can forego searching for some or all items in subsequent shops (i.e. do not have to build from scratch every time)
L	<p>4. Added item removal and list-editing capabilities</p> <p>a. Three dots menu with Clear, Edit, and Undo options</p>	<p>Inability to remove items from their Shopping List. This was an oversight in the paper prototype.</p> <p>Severity: High</p>	<ul style="list-style-type: none"> Users should be able to edit their Shopping List beyond just adding items to it
L /SB	<p>5. Removed quantity interface *</p> <p>a. Required restructuring of Money Management system: implemented receipt-scanning functionality (see Design Change 10)</p> <p>b. ‘Star’ icon to favourite an item</p> <p>c. ‘List’ icon to add an item to user’s shopping list</p>	<p>Quantity input deemed tedious and necessary—redundant and too many clicks needed to simply add one given product to the Shopping List.</p> <p>Severity: High</p>	<ul style="list-style-type: none"> Users more concerned with <i>what</i> they needed to buy, not <i>how much</i> of each item they need to buy. Simplifies user decision-making process by eliminating extraneous information <ul style="list-style-type: none"> E.g. users could change their mind or end up buying a different quantity than they specified
L /SB	<p>6. Restructured categories and subcategories</p> <p>a. Flatter catalogue layout</p>	<p>Questionable category specificity—ambiguous definition of what constitutes a ‘category’ and too many clicks needed to get</p>	<ul style="list-style-type: none"> Expedites list construction: allows users to browse the catalogue and find specific items quicker

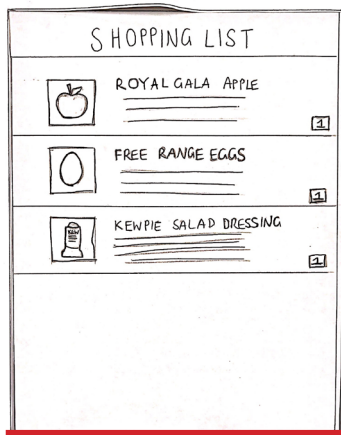
	<p>i. 'Fruits > Apples > Royal Gala' → 'Fruits & Vegetables > Royal Gala, Organic Banana, etc.'</p> <p>b. Item groupings based on existing catalogue models, e.g. Woolworths and Coles</p>	<p>through sub-screens and reach specific items to add to Shopping List.</p> <p>Severity: Medium</p>	<ul style="list-style-type: none"> • Reduces number of clicks required to ultimately add an item to the Shopping List • Better aligns with existing mental models: large supermarkets influence how users group and categorise products in their mind
L /MA	<p>7. Added active 'Route' button on Shopping List page *</p> <p>a. Only appears when Shopping List is populated</p> <p>b. Opens Map screen and initiates routing</p>	<p>Previous design assumed the Map automatically updated with changes to the Shopping List. This resulted in a lack of clear feedback for path generation and list-to-map updates.</p> <p>Severity: High</p>	<ul style="list-style-type: none"> • Clarifies link between Shopping List and Map <ul style="list-style-type: none"> ◦ Eliminates confusion of routing when Shopping List is empty because 'Route' button only appears when Shopping List is populated • Allows for users to <i>actively</i> execute (click 'Route') and evaluate (observe immediate screen switch and path generation) • Better aligns with existing mental models: current mapping technologies, i.e. Google or Apple Maps, generate the path after explicit action (e.g. pressing a 'Go' button)
L /MA	<p>8. Start the swipeable menu halfway up on the Map screen</p> <p>a. Can minimise by swiping down or tapping the 'down arrow'</p>	<p>Poor accessibility of bottom menu containing ordered list and product details: previous design began with swipeable menu minimised, with a small 'up arrow' indicating it could be pulled up. It was unclear the menu existed due to low visibility.</p> <p>Severity: Medium</p>	<ul style="list-style-type: none"> • Makes bottom menu more obviously available to users by increasing visibility • Will likely increase use of the bottom menu feature
L /MA	<p>9. Modified method to 'check off' items while at the supermarket *</p> <p>a. Added checkboxes to each item panel on the ordered list menu</p> <p>b. Optional to check off items, at user's will</p>	<p>Previous design lacked defined feedback for users to evaluate when they checked off an item. It also failed to consider whether the application would make checking off items mandatory for users (which could potentially be annoying).</p>	<ul style="list-style-type: none"> • Clear signifiers and affordances to check off items (as opposed to previous automatic prompts to mark items as collected) • Optional check-off lessens burden on user to constantly rely on application

	c. 'Official' Shopping List (in Lists mode) stays unchanged, but ordered list on bottom menu updates as each item is checked off	Severity: Medium-High	<ul style="list-style-type: none"> Improved feedback because unfilled, grey checkbox turns to filled in, green checkbox
MM	10. Implemented 'Scan Receipt' functionality a. Result of removing quantity interface (see Design Change 5)	Previously, the application relied on quantity input to automatically generate digital receipts for expenditure tracking. Removing the quantity interface posed a data collection problem: our application needed an alternative way to collect spending data. Severity: High	<ul style="list-style-type: none"> Less dependent on contingent factors (i.e. quantity and supermarket price changes), which ensures higher accuracy of the receipts stored in the application Greater user involvement—user takes more active role in monitoring expenditure and planning finances <ul style="list-style-type: none"> More feedback from manually inputting data (e.g. with the camera)
MM	11. Added '<' and '>' arrows to bar graph on Spending screen	Unclear capabilities, time, and reach of graph. Previous bar graph design lacked signifiers to communicate the graph's time-frame was adjustable. Severity: Low	<ul style="list-style-type: none"> Indicates to users they can click the arrows or swipe to adjust the time-frame of the graph
MM	12. Incorporated 'Spending Breakdown' a. Pie graph of different types of products (following from categories) formed from receipt repository	Little to no summary statistics available in previous design. Users may want a higher-level view of their grocery shopping finances. Severity: Low	<ul style="list-style-type: none"> Adds utility to expenditure tracking feature Increases interest in and enjoyment of grocery spending

(Visualisation of key design changes and digital prototype screenshots begin on the following page.)

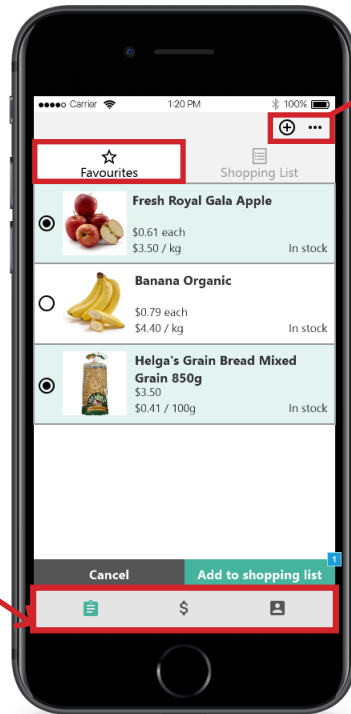
(See Appendix 8 for additional screens of the digital prototype, particularly the Money Management and Account pages that were not central to our evaluation tasks.)

* Key Design Changes



Revised navbar

1. Moved home screen (lists) to leftmost tab of navbar
2. Removed separate tabs for Search/Browse and Map

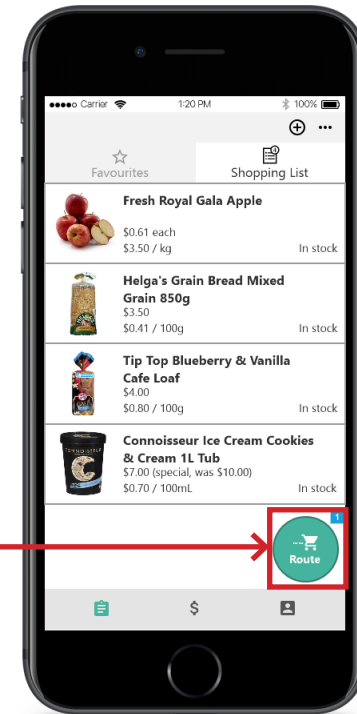


3. Implemented Favourites system

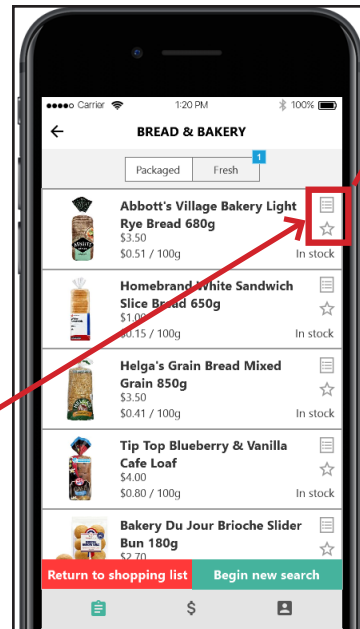
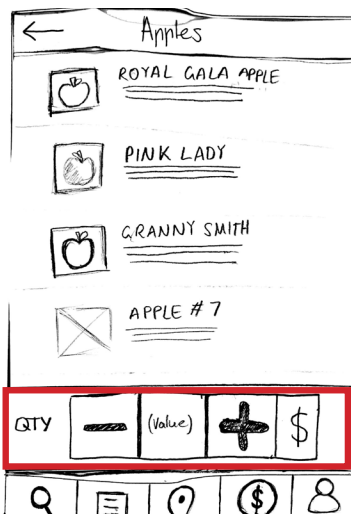
Able to:

- Add items from Favourites to Shopping List and
- Search for new items

2c. Tools integrated into modes

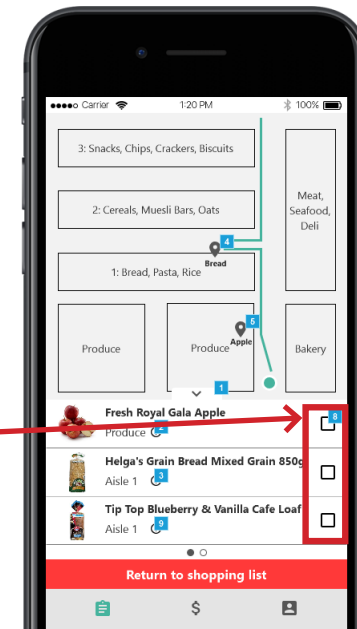
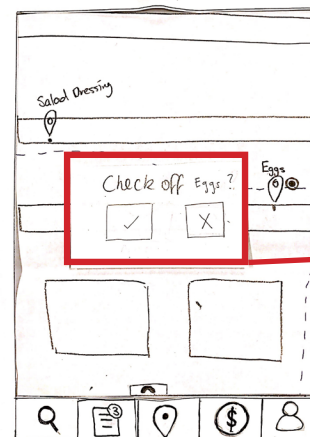


7. Added active 'Route' button on Shopping List page



5. Removed quantity interface

- b. 'Star' icon to favourite item
- c. 'List' icon to add item to shopping list

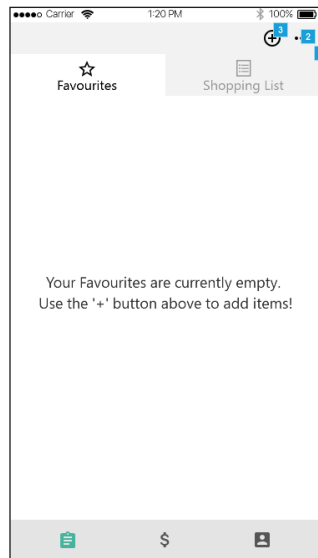


9. Modified method to 'check off' items while at the supermarket

- a. Added checkboxes to each item panel on the ordered list menu

Digital Prototype: Screens and Functionality

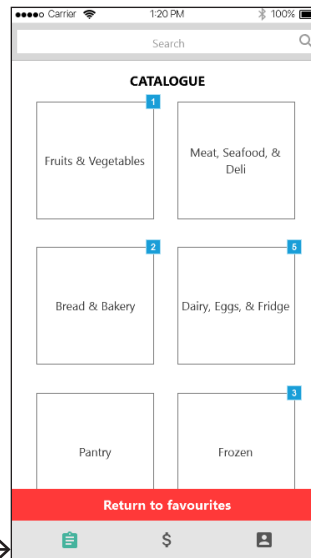
Managing Favourites



Empty Favourites

How to access: Click on 'Favourites' tab in Lists mode.

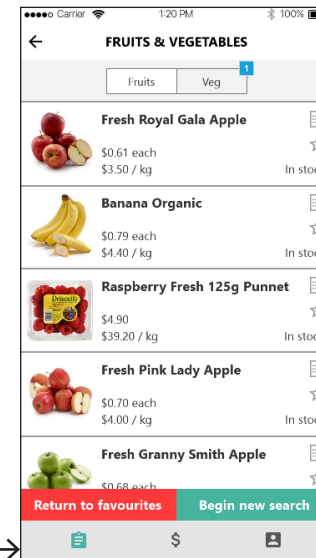
Functionality: Place where user's Favourite (or 'starred') items are stored.



Root Search/Browse

How to access: Tap '+' button then 'Search New' in dropdown menu

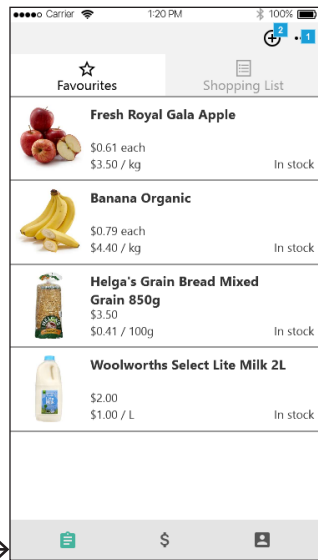
Functionality: Search bar for specific items or browse the scrollable catalogue of products to add items to their shopping list.



Selected Category (e.g. Fruits & Veg)

How to access: Select a category from the Catalogue screen

Functionality: Scrollable display of relevant items and their product details. Users can 'star' items to favourite them.

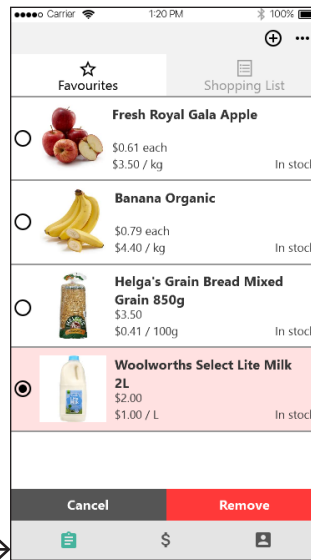


Populated Favourites

How to access: Finish adding items to Favourites, then:

(a) click 'Return to favourites' or
(b) click Lists mode in navbar, then the Favourites tab.

Functionality: Scrollable display of all favourited items and their product details.

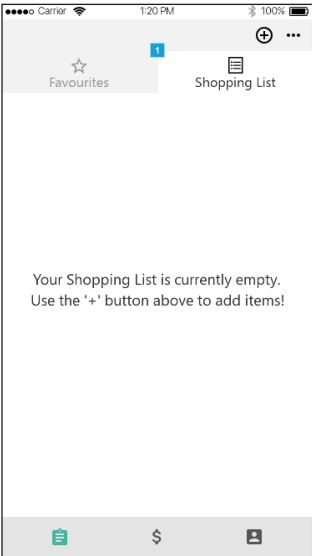


Favourites Removal

How to access: Tap '...' button then 'Edit' in dropdown menu

Functionality: Selectable version of Favourites list. Users can tap on any item to select and remove it from their Favourites.

Building Shopping List

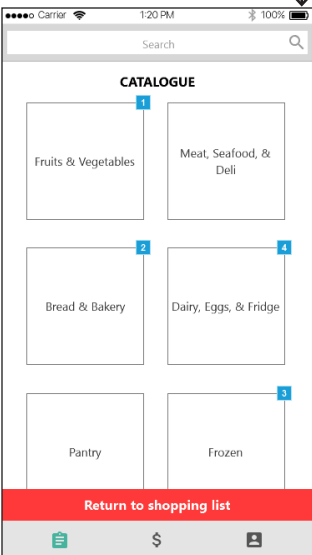


Empty Shopping List

How to access: Default home screen if Shopping List is empty. Otherwise, Click on 'Shopping List' tab in Lists mode.

Functionality: Place where items added to Shopping List are stored.

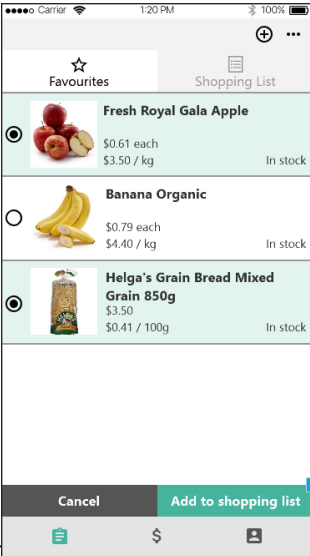
(Can add items to Shopping List in two ways: from Favourites or by new search.)



Root Search/Browse

How to access: Tap '+' button then 'Search New' in dropdown menu

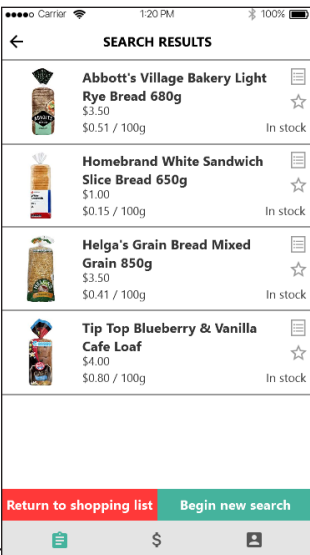
Functionality: Search bar for specific items or browse the scrollable catalogue of products to add items to their shopping list.



Add from Favourites to Shopping List

How to access: Tap '+' button then 'Add to list from favourites' in dropdown menu.

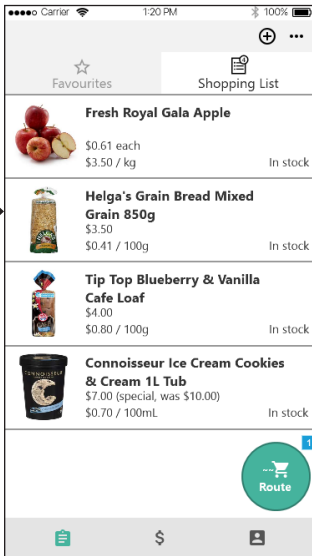
Functionality: Selectable version of Favourites list. Users can tap on any item to select and add it to their Shopping List.



Search Results

How to access: Type desired item (e.g. "bread") in search bar at the top of the Catalogue screen.

Functionality: Scrollable display of relevant items and their product details. Users can tap the 'list' icon to add items to their Shopping List.

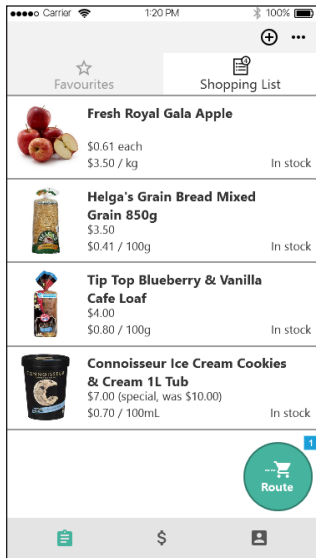


Populated Shopping List

How to access: Finish adding items to Shopping List, then: (a) click 'Return to shopping list' or (b) click Lists mode in navbar, which lands on the Shopping List tab.

Functionality: Scrollable display of all added items and their product details.

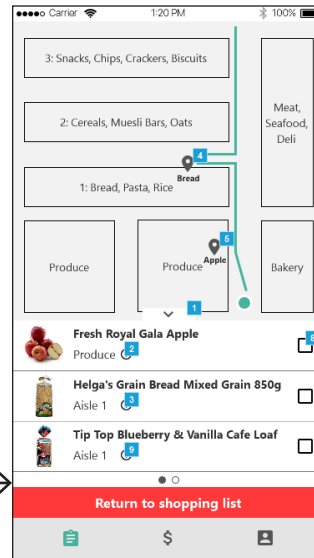
Planning Route and Navigating the Supermarket



Populated Shopping List

How to access: Finish adding items to Shopping List, then:
(a) click 'Return to shopping list' or
(b) click Lists mode in navbar, which lands on the Shopping List tab.

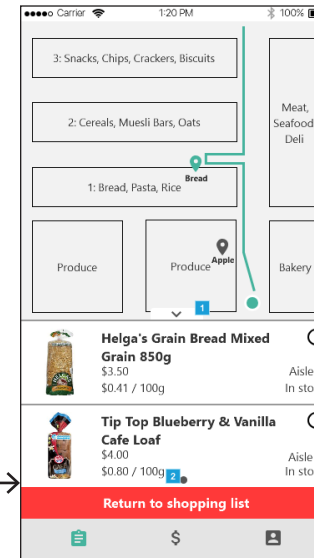
Functionality: Scrollable display of all added items and their product details. Routing enabled when Shopping List is populated.



Map with Ordered List Menu

How to access: Click 'Route' button on populated Shopping List page. Menu begins 'pulled up'. Otherwise, swipe up on a minimised menu or swipe right on an already-opened menu.

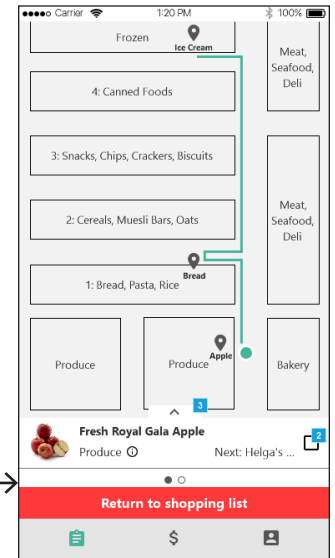
Functionality: Generates optimal path and displays ordered Shopping List items and their location (e.g. aisle number). Tickboxes afford item check-off.



Map with Product Information Menu

How to access: Either
(a) click 'i' information button on specific item panel,
(b) click on a location pin on the map,
or (c) swipe left on an already-opened menu.

Functionality: Displays relevant product details (brand, name, price, stock, sale info).

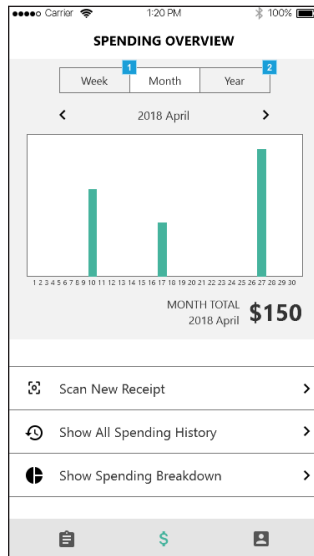


Map with Minimised Menu

How to access: Click the small 'down arrow' or swipe down to minimise the menu overlay.

Functionality: Increase visibility of underlying map but retain check-off abilities and information about upcoming items. View can be adjusted by dragging the map around. 'Current location' point updates with the user's position in the store.

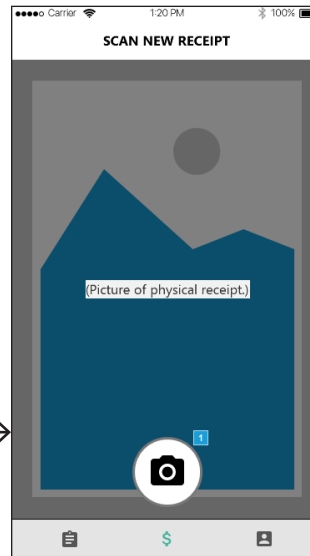
Scanning New Receipt to Track Spending



Spending Overview (Month-Graph)

How to access: Click Money mode in the navbar

Functionality: Displays time-expenditure bar graph. Graph is adjustable (through buttons above) and left-right swipeable. Time on x-axis, expenditure on y-axis. From this page, can scan a new receipt, view spending history in chronological order, or view spending breakdown.



Scan New Receipt

How to access: Click 'Scan New Receipt' in the Spending Overview page (which is the root Money Management screen)

Functionality: Users can manually input spending data by scanning their receipts.



Confirm Addition of Receipt

How to access: Press the 'camera' button to capture and scan the physical receipt.

Functionality: Pop-up window asks user to confirm the addition of the new receipt to their expenditure repository.

Method

This section aims to clearly outline the procedure of our usability evaluation, what measures were taken, and why they were chosen.

Evaluation Goals

Corresponding to our design recommendations from Assignment 1, our usability evaluation looked to address and assess the efficiency, learnability, memorability, and utility of our application.

Key evaluation goals included:

- Determine whether the participant can distinguish between the Favourites and Shopping List
- Determine whether the participant understands the embedding of 'tools' inside 'modes' and whether they can access them correctly to complete tasks (e.g. for List Mode, and Money Management Mode).
- Determine whether the user feedback for the Mapping Tool enabled the user to successfully navigate through the store.
- (*See Tasks section for in-depth evaluation goals.*)

Participants

The five participants were conveniently sourced from the INFO30004 Usability Engineering cohort, where each participant elected a preferred time-slot to attend a usability evaluation.

(This is explained in depth in the Users section of the report.)

Equipment

To give us a better idea of the visual affordances and discoverability of our application's interface, we utilised a video-based method of eye-tracking which included:

- **Tobii Eye Tracker Bar**
- **Tobii Eye Tracking software**

According to Navalpakkam and Churchill (2014), eye-tracking data is valuable for usability evaluations because "eye fixations are taken to be a good proxy for cognitive attention." This means the eye-tracking method quantitatively measures where a user looked, for what duration, and in what sequence (Navalpakkam & Churchill 2014). In order to increase the accuracy of our eye-tracking data, the Tobii Eye Tracker software was calibrated per participant prior to starting the evaluation recording.

The digital prototype for our application was constructed with **Axure**:

- **67 images** were used, which corresponded to specific screens of the prototype.
- This process is explained in-depth in the Digital Prototype section of the report.
- The key limitation of high-fidelity prototyping with Axure was that prototype bugs disrupted user testing and did not accurately demonstrate complete functionality of our application.

In addition, we used:

- **Printouts of the tasks**, to which participants could refer back throughout the usability evaluation to remind them of the specificities of the task.
- **A smartphone**, with which participants were instructed to use for the physical component of Task 4 ('scan the receipt to track spending')
- **A receipt**, which would be 'scanned' by the participant in the physical component of Task 4 (see above)
- **Laptops**, which were used by the evaluators to take notes and to have the participant take the pre-questionnaire and post-questionnaire.

Usability Evaluation

1. Explanation of Usability Evaluation

To undertake our usability evaluation, we assigned roles of interviewer, note-takers, and facilitator to our group.

Responsibilities of the interviewer:

- Introduce the application's purpose to participants
- Make the participants feel comfortable, emphasising that we are not testing their ability and assuring that if they have issues completing tasks it is likely others have as well.
- Remind participants that we are looking for honest, constructive feedback to encourage them to verbalise their thoughts.
- Guide participants through the usability evaluation
- Ask qualitative questions to better understand participants' thoughts and feelings toward a task
- (See Appendix 9 for the Script for Conducting a Usability Evaluation.)

Responsibilities of the note-takers:

- Record observations per task per participant behind the one-way mirror. Verbal, visual, audio, and eye-tracking data of the participants' responses were monitored.

Responsibilities of the facilitator:

- Greet participants as they enter the staging room
- Ensure participants consent to the usability evaluation

- Before the usability evaluation, have participants complete the pre-questionnaire
- After the usability evaluation, have the participants complete the post-questionnaire.

Prior to conducting our first usability evaluation, we undertook a pilot run to ensure that all the equipment was in proper working order.

2. Pre-Questionnaire

We utilised the data collection tool *Typeform* to record and aggregate participants' answers to ten questions. These questions were a mixture of Yes-No, Multiple Choice and Likert Scale. From these questions we hoped to gain a snapshot of the basic characteristics of our participants. By extension, we sought to use this information in combination with our data findings to draw conclusions and make design recommendations. (See Appendix 11 for pre-questionnaire data.)

3. Task Overview

The four tasks tested consisted of three (Tasks 1-3) which tested key functions of 'List Mode', and one (Task 4) which tested a key function of the 'Money Management Mode'. The participants were provided a print-out of the tasks in full to which they could refer back at any time during the usability evaluation (see Appendix 6).

Overview of 'List Mode' Tasks:

1. Manage your **Favourites List**

- This required participants to build a Favourites List from scratch and remove an item from the Favourites List.
- Task 1 began on an empty Favourites List screen, and required the participant to recognise the '+' icon as a way to search for new items to add to Favourites. This also required participants to recognise that the 'star' icon was used to add items to the Favourites List. To remove items from Favourites, the participant was required to recognise the '...' (three dots) icon as a way to navigate to the editing mode.

2. Build your **Shopping List**

- This required participants to utilise the three different methods for constructing a 'Shopping List': Favourites, Catalogue Search, and General Search (typing).
- The Shopping List screen was initialised to be empty, and required the participant to recognise the '+' icon from Task 1 had the option to 'Add items from favourites to list'. This also required participants to recognise the 'list' icon was used to add items directly to the Shopping List.

3. Collect all the items on your Shopping List (plan your **route** and **navigate** the supermarket)

- This required participants to 'route' their optimal path for their Shopping List of items, check off items, and see more product information about their items.

- b. Task 3 began on a screen of the Shopping List with items already in it. The participant was required to recognise that the 'shopping cart' route button was used to create an optimal path to shop. The participant was also required to 'check off' items, and click the 'i' (information) icon to learn more about the specific product.
- c. A key limitation of our usability evaluation for Task 3 was that the laboratory setting did not account for the real-life task of physically navigating a store. For example, participants experience *situational impairment* when shopping with a basket or shopping cart while holding a smartphone. This aspect was not tested in our usability evaluation.

Overview of 'Money Management Mode' Task:

4. **Scan** new receipt to **track spending**

- a. This required participants to navigate to 'Money Management Mode', and then take a photo of their receipt in real-time.
- b. Task 4 was designed to help us to determine whether participants could navigate in an straightforward and timely manner from the home screen ('Shopping List' in List Mode) to the the Money Management Mode (indicated by the '\$' symbol) if asked to 'scan a receipt to track spending'. We intentionally decided to start the participant on the List Mode as this was more likely to mimic the real life sequence of actions after 'completing their shop' in our usability evaluations. It was important for us to assess discoverability of the embedded tool, and by extension, its ease of use.

The order of tasks was intentional because it allowed the past knowledge of completing each prior task to inform future decision-making and interactions. This allowed us to guide the participant through the application in a realistic manner.

4. Likert Scale

After every task was completed, our interviewer asked the participant to rate the level of difficulty the user experienced to complete the task. This was self-reported by the participant using a Likert scale rating, where **1** indicated a task was '*very difficult to complete*', and **5** indicated a task was '*very easy to complete*'. In addition, this question allowed us to understand how participants felt the application could be improved (e.g. "What could be improved about the application to make your '4' into a '5'?"). Further, this gave the participant another opportunity to explain their rationale and/or approach to a task. This was significant as it allowed us to see whether our 'expected' mental models matched those of the participant.

5. Discussion: Qualitative Questions

Six qualitative questions were asked of the participant following their completion of the four tasks. This gave the participant the opportunity to offer additional verbal feedback about the application that they may not have touched upon when preoccupied with completing the task. The questions addressed how likely the participant would be to use the application, their understanding of the different modes and tools, what features they thought were successful,

and their criticisms of the application. (See Appendix for the Script for the Usability Evaluation for the questions.)

6. Post-Questionnaire: System Usability Scale (SUS)

We again used the data collection tool *Typeform* to record and aggregate participants' answers to thirteen questions. These questions all utilised a Likert Scale, where **1** indicated '*strongly disagree*', and **5** indicated '*strongly agree*' to the provided statement. The statements alternate between positive and negative sentiments to prompt respondents to more carefully consider the question, and subsequently, provide more meaningful responses (Sauro, 2011a). This style of questionnaire aims to reduce *acquiescence bias*, which can occur when users "go on autopilot" and tend to agree with all statements (Sauro, 2011a). In addition, this style also aims to reduce *extreme response bias*, where a participant provides all high (5's) or low (1's) ratings to the post-questionnaire (Sauro, 2011a). By adopting the use of SUS, we also aimed to not overtly lead the respondent toward a specific answer, we achieved this by having both positively and negatively geared questions. This directly improved the accuracy of responses about their overall experience with the application. (See Appendix 11 for post-questionnaire data.)

Results

See highlights video at:
<https://youtu.be/4B46Mwphhkc>

Our application has three main functionalities:

1. **Building and maintaining user-specific shopping lists**
2. **Navigating supermarkets while grocery shopping**
3. **Using the application to track and analyse grocery spending and finances**

The functionality of each section is interdependent. For instance, supermarket navigation is defined by what is currently in the user's shopping list. However, the actual *usage* of each component remains exclusive, and consequently, the usability of each component can be assessed independently.

Holistically, *Shoop* was well-received, achieving an average SUS score of **76** (see Appendix 11.1). Drawing from studies conducted by Sauro (2011b), this would place *Shoop* in the 75th percentile (see Appendix 11.2). This indicates that our app exhibits strong perceived ease-of-use (Sauro, 2011b), however, it is important to note that this value only incorporates five data points, and thus, should be taken lightly.

Our evaluation was broken down into three sections; we analysed the usability of each main application component in isolation. The last section—which covers the money management component—also addresses how easily and correctly the user can *navigate between* each component of the application and employ their functionality in conjunction.

1. Shopping List Component: List Management

This section aims at evaluating both the *mechanical* aspects of how users **physically use the interface** to perform list-management operations, as well as whether users understand **when and how** to use each operation.

We needed to establish whether the participants could intuitively understand the semantic distinction between the **favourites list** and the **shopping list**. This was the most significant feature added in the new design—the problems it addressed and functionality it provided only work if the user *understands* the mechanism and intention behind its use.

Being able to identify and perform these operations is fundamental to the application, because the ultimate function of the system stems from the items on the list.

The list management operations are as follows:

- Adding items to list(s).
 - Pressing the correct 'add' button from the list screen.
 - Finding the desired item in the search and category menu.
 - Pressing the correct 'add to list' button on the desired item entry.
- Transferring items from the favourites list to the shopping list.
- Removing items from list(s).

Summary of Significant Evidence

The observed performance per participant for each list management operation is as follows:

List Management Operations		Participant				
		1	2	3	4	5
Identified the correct 'add item' button in the list screen menu	Succeeded	No. Participant tried to add from favourites instead.	Yes, no mistakes.	Yes, no mistakes.	No.	Yes, no mistakes.
	Time spent	Low	Medium	High. Thoroughly investigated each option.	Very low.	High. Thoroughly investigated each option.
Finding items in the category screen.	Choice accuracy	High, no mistakes.	Medium. No mistakes but confused which category contained certain items.	High, no mistakes.	High, no mistakes.	High, no mistakes.
	Time spent	Low	Medium	Low	Low	Low
Pressing the add-to-list button on item entry	Button recognition	Identified that the buttons added to list, and correctly chose the star.	Identified that the buttons added to list, but incorrectly chose the add to list button	Identified that the buttons added to list, and correctly chose the star.	Identified that the buttons added to list, but incorrectly chose the add to list button	Identified that the buttons added to list, but incorrectly chose the add to list button. Indicated afterwards that this was a mistake and corrected it.
	Time spent	Low	Low	Medium	Low	Low
Transferring items from favourites to shopping list.	Succeeded	Yes.	At first did not use favourites, but figured it out eventually.	Yes. Commented positively about feature.	No. Manually searched for each item from scratch.	No. Manually searched for each item from scratch.

	Time spent	Medium	High	Low	High	Medium
Removing items from lists.	Succeeded	Yes, but had some trouble navigating to three-dots menu.	Yes.	Yes, but confused by similarity of Clear/Edit/Undo terminology.	Yes, but one mistake: tried to click on item panel first.	Yes, but one mistake: tried to click on item panel first.
	Time spent	Low	Low	Medium	Medium	Medium

Relevant comments by participants for the first two tasks:

- “This kind of app is always hard to begin with but easy once you have done it once”
- “Not very clear where everything is initially but is probably easy to learn”

Assessment and Summary of Findings

Adding new items to lists and understanding the two-list system:

From the list screen, there are numerous ways to add items to the shopping list:

- Search directly for item with search bar and add to shopping list
- Search directly for item with search bar, add to favourites, then transfer to shopping list
- Navigate to item with category screen and add it to the shopping list
- Navigate to item with category screen, add to favourites, then transfer to shopping list
- Transfer existing item on favourites into the shopping list

We intended to provide mechanisms to expedite list construction and modification. Assignment 1 revealed that list management was noticeably slow and cumbersome, and long-term list management functionality was **completely missing**. This meant that even if users became more experienced with the application, they would not have been able to improve the usage efficiency as redundant actions were enforced, leading to poor user experience.

However, the increased functional complexity evidently resulted in major increases in the complexity of the UI.

Consequently, the first-time users experienced initial confusion and hesitation on this screen. Based on mostly qualitative assessment of the evaluation data, the crux of the causes of user confusion were deemed to be:

- I. **Too many options were available, making it difficult for a new user to understand the system.** The user requires a better grasp of the different parts of the app *before* they can start to identify and understand the options.
 - Most users either made errors initially or took a significant amount of time to assess how to use the interface. This was corroborated with interview questions

and comments made during the evaluation.

- II. **The two-list system does not align with the user's mental model of shopping list.** The participants tended to be intuitively aware of the idea of adding items to a list but did not immediately realise the distinction of the two lists and their purpose.
 - At first, users often mistook the favourites list as the shopping list and vice versa. Users expressed confusion at reading the different types of 'add to' buttons.
- III. **The application did not do enough to guide and aid the user at adjusting their mental model to fit the system mechanisms.** Thus, there is a significant learning curve for first time users. This issue is related to point II.

Conversely, the evaluation also revealed some strengths of the new design and demonstrated that many of the previous problems were successfully addressed. The noteworthy positive aspects were:

- I. **The two-list system successfully resulted in faster and less tedious list management capability.**
 - Support is discussed in point II.
- II. **Participants thought the different possible actions were distinctly useful in different use-cases.** For example, the favourites system both improved the speed of item addition, as well as preserved long-term user preferences. On the other hand, the direct searching mechanics were more convenient for rare, one-off item choices.
 - This was revealed mostly in post-interview discussion after consulting the participants on their thoughts on the two-list system and the search system. Most participants expressed that they thought these were useful features.
- III. **Participants understood the purpose and distinction of the mechanisms *after the fact*, once they had completed the tasks.** Once they had physically used the favourites list to transfer items to the shopping list, they realised how it worked even if at first it was unclear.
 - Once realised the correct usage, all participants vocally expressed their understanding during the evaluation.
- IV. **The system mechanisms were logical enough to be learned effectively (high learnability potential).** While the system was somewhat overwhelming at first (as mentioned above) every participant demonstrated clear learning throughout task completion.
 - More cautious users—those who carefully examined interface icons and how everything fit together—seemed to 'figure it out' after inspection and mostly proceeded with no errors. The users who made mistakes were those who were more hasty and experimented with the interface in an ad-hoc manner. While this supports the notion that the system's mechanical aspects are *logical enough to be learned quickly*, it indicates that the initial confusion factor is a problem. Participants in a lab environment are unlikely to 'give up' on an app if it seems overwhelming at first, but real-world users are much more inclined to do so.

Finding and adding items with category and search menus:

In general, the findings for this part of the application were simple. Participants did not encounter much difficulty and navigated to their items quickly. A summary of the findings are as follows:

- I. **Users easily identified the search bar on this screen.** It resembles a standard 'search' interface and was immediately obvious for all users.
- II. **Making category organisation flatter improved user experience and allowed users to find items faster than in the first iteration.** It made it easier for users to identify which items were in which category since they were smaller categorisations.
- III. **Users relied almost exclusively on the *images* rather than on the category or product names to navigate the menu.** Images evoke recognition of what is in which category very quickly (Hutchins, 1995), rather than reading the name of a category and having to *recall* what items could be inside each one. The only time the users seemed to care about the prose titles was once they got to the final menu, where specific items were listed. This is where they consulted the product name and details to ensure they got the details correct. (For example, wholemeal bread instead of multigrain).
 - Supported by eye-tracking data (see Appendix 13.1) as well as interview responses.

When it came to the 'add to list' buttons, which are present for each item entry, some users pressed the incorrect adding button: adding to the current shopping list when they intended to add to favourites, or vice versa. However, every user who made this mistake was one who *did not understand the distinction between the lists*. We concluded this was most likely the cause of the mistake, rather than the icons themselves being unclear. Consequently, our findings were:

- IV. **Removing the quantity interface for adding items was a successful change. It made adding items to lists easier and quicker.**
 - Every participant who initially took the time to distinguish between the two different lists later correctly identified the mapping between the 'add to list' button and the 'add to favourites' button. Secondly, some participants who chose incorrectly later commented about this once they had figured out how the system worked, stating that they now realised which one they should have pressed.
- V. **Participants easily understood the feedback after selecting these buttons.** They noticed the 'highlights' immediately, that something had changed, and assumed that the corresponding item was now on the list—regardless of whether they had chosen the correct one.

(See the Limitations subsection for a discussion of the search-bar evaluation.)

Editing and removing items from lists:

The findings for this list operation were also straightforward and consistent—a common problem was revealed. All users realised that the ‘three-dot’ top right menu button was the most likely place to find list editing/removal options, but:

- I. **The available editing actions within the menu were ambiguous to the user.** ‘Clear list’ and ‘edit list’ both appear, and what each one meant was unclear and almost every user was confused.

(The conclusions and design recommendations based on list-operation findings are discussed in part I. of the Conclusions and Recommendations section of the report.)

Limitations of Analysis

In this section there were **two** major limitations.

Firstly, the usefulness and effectiveness of the search-bar *functionality* could not be accurately determined. This was due to limitations of the prototype itself—the search results which appeared when the user interacted with the search bar essentially had to be hard coded. Consequently, the trials do not reflect the accuracy or ease of use of the search functionality.

We could assess the affordance of the search bar UI element itself, but the insight was limited.

The major limitation of our research was to do with how the participants handled making mistakes in the system. As discussed, there were numerous minor mistakes made in the early phases of the evaluation; it would have been valuable insight into the usability and safety of the application if we could observe how the users went about correcting their errors.

Unfortunately, our digital prototype was relatively complicated due to the high number of simultaneously available actions. The prototype was simply unable to correctly handle every combination of user input. Hence, participants would occasionally make mistakes but could not continue using the prototype to try and *correct* their errors—the prototype behaved erratically and incorrectly. While we could still assess some aspects, such as when users verbally commented on their intentions, this limited our findings into this area.



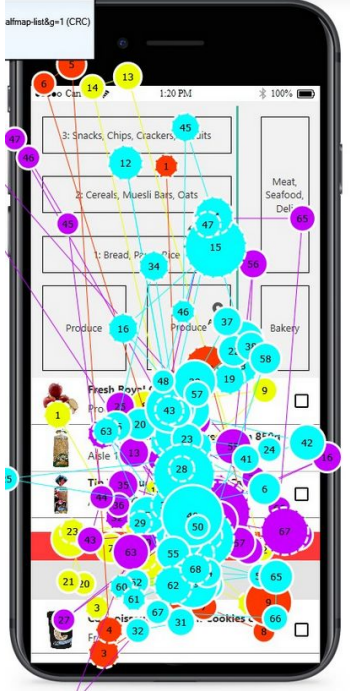
2. Map Screen and Routing Component

This section focuses on how well users were able to interpret the mapping and routing features. The most important aspect to investigate here was the ‘bottom menu’, which contained the user’s current shopping list, in optimal order. This provided the user with the ability to check off items as they picked them up.

Specifically, we needed address the following components of the map screen section:

- Making the connection between the current shopping list and the map screen list.
- Realising that the items can be ‘checked off’.
- Understanding the map screen feedback.

Summary of Significant Evidence

<p>This heat map showed users were preoccupied with the bottom menu.</p>	<p>This heat map showed users made the connection between the bread entry in the bottom bar and the corresponding feedback of item marker on the map.</p>	<p>This gaze plot showed users focused on the bottom menu and navbar. Even if they averted their gaze, they returned to this area of the screen.</p>
		

The average score of *'how easy they found the task to complete'* on a Likert scale of 1-5 (1 being very difficult, and 5 being very easy) was 4.2.

Assessment and Summary of Findings

Routing with the generated path:

In general, all but one participant clearly understood the interpretation of the map routing, and immediately expressed satisfaction with the feature. This was the most straightforward part of the application, since it closely resembles common GPS applications like Google or Apple Maps, which people use regularly. The findings here are:

- I. **Participants easily interpreted the generated path and interface.** Note that we are directly referring to the *map* element on this screen; not including the bottom menu.

Accessing and using the bottom menu to check off items:

There was more potential for misinterpretation of the bottom menu, as this component of the involved more user interactions. Assignment 1 revealed the 'bottom menu' was hard to find. Fortunately, this design—which made the menu 'swiped-up' by default—handled this problem quite well. The new design had several positive results:

- I. **The bottom menu was easily found.** All participants quickly found and interacted with the bottom menu. In fact, it was so apparent that some users became preoccupied with it, to negative effect. This is discussed below.
- II. **Users understood the check-off feedback clearly.** While some users struggled to understand how to check off items, those who did achieve it all seemed to recognise the corresponding 'check off' of the map routing marker.
 - Participants verbally confirmed this. The eye-tracking data showed their eyes moved from the checkbox area to the map-screen marker area, implying that they consciously noticed the feedback.

The main problems we identified in this application component were also related to interface complexity:

- III. **Users spent most of their time and attention trying to interact with the bottom menu.** This could be due to them immediately understanding the map itself or could be due to the bottom menu being confusing and overly complicated.
 - Eye-tracking data showed that users spent most of the time looking at different features at the bottom of the screen.
- IV. **The current swipe menu design does not add enough useful functionality to justify the added interface complexity it creates.** Many participants did not understand the point of the swipe menu in conjunction with the map screen, prompting confusion. It complicated the interface and distracted from the more important features. The product details functionality (accessed by swiping the bottom menu to the right) was intended as a supplementary, niche usage feature. However, this notion was unclear to users, and it created further confusion about how the rest of the UI linked together.
 - By extrapolation of the first finding, users were spending *too much* time observing and thinking about the bottom bar than they should have.
 - Users sometimes became preoccupied trying to look at the 'more info' swipe menu, causing them to either misunderstand the check-off menu or completely overlook the main purpose of the map screen. Users seemed to assume that this extra part was somehow integral—or at least equally important—to the routing feature, even though it is not.
 - Users who found this screen seemed to refuse to interact with the check-off list thoroughly—and complete the task at hand—until that had properly deciphered the product-detail menu.

Limitations of Analysis

The most obvious limitation in our evaluation of the map screen is the fact that its main purpose could not be closely simulated with a digital prototype in a lab environment. Participants could not actually use the app to follow a route and walk around an actual store. Consequently, it is hard to know how well the routing interface would work in reality despite the fact that users ‘thought’ it would work.

Furthermore, this ‘simulation limitation’ calls into the question our first finding; users demonstrably did not pay much close attention to the routing interface itself in our trials. However, it is impossible to know whether this would be the case in a real-world application. Clearly, if users were *actually walking around* in a real store they would have to pay attention to the routing more than they did in our trials, but the *extent* is unknown. It is highly likely that participants subconsciously recognised that the routing interface could not be meaningfully interacted with—due to the environment—and consequently immediately ‘jumped’ to the part of the interface which they could interact with; the bottom menu.

3. Scanning Receipt: Money Management Mode

This section evaluates how intuitive the placement of the Camera tool inside the Money Management Mode was for users, and how easy it was for users to complete the task of capturing spending information by ‘scanning’ a physical receipt. By embedding ‘tools’ inside ‘modes’, we aimed to better inform the user of how tools worked in relation to their respective mode. This was a suggested design recommendation following Assignment 1.

Summary of Significant Evidence

This heat map highlighted users assessed the entire Spending Overview Screen and successfully identified the ‘Scan New Receipt’ button.	This gaze plot showed users knew how to operate the Camera Tool.
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The average score of *'how easy they found the task to complete'* on a Likert scale of 1-5 (1 being very difficult, and 5 being very easy) was 4.

Assessment and Summary of Findings

The key findings for this component are divided into two categories; using the money management tab, and navigating to it. The results regarding the mode itself are as follows:

- I. **Participants found it easy to use the money management interface.** Once the participant was already on the Money Management Mode, it was intuitive how to navigate to the Camera Tool.
 - This was evident from the eye-tracking heat map and gaze plot, which both indicated that users picked out the key buttons to complete the task. In addition, all users took less than a few seconds to select the 'scan new receipt' feature and take a photo of the prop receipt which was provided to them.
- II. **There is insufficient feedback indicating a receipt had been successfully added after it is scanned.** After one user explicitly commented on this it was realised that we had completely overlooked a feedback icon or indicator.
 - Participant 1 verbally stressed this oversight.
- III. **Participants indicated that they were unsure what information on the receipt the application wanted them to capture.** The design intention was for the user to scan the

barcode component of the receipt, which would contain the relevant data for the system to use. However, the application interface did not signal or afford this specific behaviour.

- Supported by observation of participant behaviour; some tried to take photos of the entire receipt rather than the barcode specifically.

IV. Participants had difficulty understanding how to access the Camera Tool from the Shopping List screen. The '\$' icon was not sufficient as a signifier to what functions were inside the dollar sign.

- Participant 1 suggested that we increase the discoverability of the Camera Tool explicitly.
- Other users attempted to look in the account tab before trying the money management tab.

Limitations of Analysis

There were more 'simulation limitations' involved in this section, but not to the same extent as in the map routing component. The main evaluations and digital prototype interactions were done on a desktop computer, which obviously cannot be used to take photos and scan items as it is not a handheld device. However, since we wanted to evaluate how participants would *physically* try to 'scan receipts', we simulated this part of the task using a provided phone and a provided receipt.

This yielded quality data, however, it also resulted in awkward and unnatural 'transitions' in the evaluation process, where an evaluator had to produce the props, hand them to the user, and inform them that they should use those to complete the final portion of the task rather than the desktop computer. This transition likely gave the participants unintended hints or prompts about how to complete the task, which may have undermined part of the evaluation itself to some unknown degree.

Conclusions and Recommendations

We have structured our design conclusions and recommendations into sections that address each of the three components of the results and findings from the evaluation. The conclusions have been drawn from the main findings of each corresponding component in the findings and analysis section.

1. Shopping List Component: List Management

From our findings, we identified that the biggest source of confusion for first-time users was caused by the system complexity and lack of well-conveyed mental models from the system mechanics. This resulted in a steep learning curve, which our participants (as first-time users) did not intuitively understand.

We found that users were generally good at learning the intended usage *after* observing it once. Further, the users who experienced continued difficulty were those who jumped to incompatible mental model conclusions. By including a tutorial, we would be able to guide the user from beginning and prevent confusion later.

The final design recommendations are as follows:

- I. Introduce a step-by-step tutorial which, when a new user first opens the app, quickly and unobtrusively walks the user through the basic usage of the two list system. This should accomplish the following in future designs:
 - Ensure the user is aware of the existence and distinction of the two lists.
 - Ensure the user has a more accurate mental model of system mechanisms.
 - Provide context on how to interpret the numerous list management options.

Note that further testing would be required to determine the least intrusive tutorial implementation which could accomplish this task, as an exceedingly long or slow tutorial would have an adverse effect on the all important first time user experience.

- II. (Minor recommendation.) Adjust some menu options to be more explicit and clear. For list editing, the 'clear list' button should be removed from the menu and instead should only appear elsewhere once the user enters 'edit mode' by pressing the edit. This should remove the ambiguity between two labels both referring to some kind of item removal functionality.
- III. (Minor recommendation.) Alter category search menu to have each category item (for example, 'dairy, eggs and fridge' or 'fruits and vegetables') include a picture of all types of items included within each respective category item. This would better inform a first time user which category to click on in order to efficiently navigate towards their desired item.

2. Map Screen and Routing Component

The findings for this component clearly indicated that the majority of the issues were related to the complexity created by the bottom menu.

We concluded that we need to reconsider the balance of functionality and interface complexity for this screen, and ultimately **remove the 'swipe menu' component of the Bottom menu in the map screen.**

While this feature provided *some* functionality—fast access to extra information about a product—this came at the expense of a cluttered and complex screen that users found difficult to navigate, and ultimately the findings revealed that the small gain in functionality was not worth the large decrease in system usability.

The only good solution to this problem is to remove the feature completely. The ability to view specific details about a product is still possible in the dedicated list screens, and we concluded it is not particularly necessary to be able to also do this from within the map screen during routing as well.

3. Scanning Receipt: Money Management Mode

We identified two main problems with this part of the application in our findings. There were issues with affordance and labelling, which did not clearly indicate what the user should do when it came to navigation and scanning receipts. Secondly, the scanning completion was missing feedback.

Our recommendation for improving these simple oversights is to:

- I. Change the '\$' icon on the navigation tabs to better reflect that it contains receipt scanning functionality. An icon that incorporates a dollar sign *and* a barcode icon would solve this problem.
- II. Adjust the labelling on the 'scan receipt' button to make it more informative. Rather than prompting the user to 'scan receipt', it should say 'scan receipt **barcode**'. Additionally, the button within the money management tab which activates scanning should have the same barcode icon, which would more clearly communicate that the user should use that feature to scan the barcode rather than the entire receipt.
- III. Implement a feedback mechanism for scanning receipts. This should be added in with a simple success or fail popup after receipts are scanned.

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Appendices

1. Meeting Minutes

1.1 - Minute 1

Meeting notes		
Date: 23rd of April, 2018		
Present: Jaiden, Helen, Alex, Jenny, Claire		
Things to do:		
Who	When	What
EVERYONE	Meeting at Baillieu for 24th of April	Refining/redesigning
Key items discussed:		
<ul style="list-style-type: none">- redesigning the tasks- interface design will inform tasks- big changes responding to high severity problems - circumvent problems- Questionable category specificity<ul style="list-style-type: none">- important - keep system, but more user testing (different versions - with different depths/flatness) - mini cogwalk- Potential swipe up from bottom interface for list - and changing homepage from list- default to search mode if nothing in the folder- quantity input - modification; have users add items directly from search screen<ul style="list-style-type: none">- highlighting options or ticking - affects money tracking (scanning of receipts)- inability to remove items from the list menu and search - swipe across to remove- explicit directions from map?<ul style="list-style-type: none">- instructions - 'aisle 5' prompts per item- automatically updates list - based on proximity - this requires field testing - but what if people put their phone away!!!- another bar at the bottom - which shows which item is next - and just a simple tickable box which then updates - because it will also be able to prompt items you have forgotten- no need to declutter the interface with undo buttons		

- Including features to route maps - i.e. optimal route, fastest, cold items last, in list order
- FREQUENTLY PURCHASED
 - catalogue of things you have bought
 - open to frequently purchased item
 - Section for favourites - LIST - favourite items - and then to add them to the lists;
 - separate from frequency - generated
- Alex's thought re: favourites/list functionality
 - greyed out options to re-highlight based on previous shopping patterns with the most frequently purchased ones at the top
 - global list that persists - and frequency of purchases - brings it to the top of the list
 - you can arrange yourself - basic stuff at the top
- preset lists you can construct

1.2 - Minute 2

Meeting notes		
Date: 24th of April, 2018		
Present: Jaiden, Helen, Alex, Jenny, Claire		
Things to do:		
Who	When	What
Key items discussed:		
Structural oversight from previous version: previously we lacked: <ul style="list-style-type: none"> - Global list based on prior purchases - responding to expedite list construction <ul style="list-style-type: none"> - more efficient to be able to build from 'remembered' items - mimicking the user system for Spotify - playlist (general ones you can use) vs. saved songs - favourites list - starring items actively? <ul style="list-style-type: none"> - favourite list mode 		

- separation of list - for dietary requirement - more work.... maybe redundant
- main menu screen - no indication of 'when you are going shopping' - to move into a shopping mode; no way of declaring of going shopping....
 - Online (path generates) vs. Offline (library based)
- suggestion of a 'library' static list
 - equivalent of 'saved songs'
- Opening App - 'Go Shopping' vs. 'Manage Account'
- 'Manage Account' → library functionality - equivalent of 'saved songs'
- DISTINCTION BETWEEN **INSTANCE (via 'go shopping' mode)** VS. **GENERAL (library)** of shopping
 - creation of preset lists
 - playlist idea - could be named 'recipe'
- Instance of Shopping List
 - closing the app accidentally - it will not wipe the list, it will require active ticking off/swiping items
- So Map Nav is linked to 'GO SHOPPING' functionality
 - central button; circular (obvious icon) - 'Shop' or 'Shoop'
- List screen is now Library/Favourite Screen - functionality to be determined
- When not in 'shopping' mode: can only star items - however, cannot actively build preset lists?
- DO we implement multiple lists?
 - too many extra interface steps to learn how to build multiple lists
 - simpler with one, not that much gained by multiples
- Majority of the functionality - would be MANAGEMENT, rather than active
- Map button to not be an options - NOW CENTRAL BUTTON IS BUILD A SHOPPING LIST → map functionality comes after
 - ideas: basket/shopping cart item - affordances to make it more obvious to the user to make a list
- Include: help button
- Login page that explains how the app works at a basic level
- default store in management features -
- Considerations of complexity of the app
- Model some functionality after myFitnessPal - the central button to inform more options for the specific mode
- After the map feature has routed - you should be able to add more items to the list via search menu
- Shopping List/Favourites tabs inside a the List Mode
 - tabbing between the two submodes - and the shopping list button comes up first
 - in the favourites menu there are adding buttons - that will put it to the your shopping list
 - when you favourite - 'added to favourites'

- when you add to shopping list - 'added to shopping list' (feedback like Spotify)
- **NOTE:** compromising - prioritising user interface experience over efficiency of making a list
- Option to clear the list - to start again - must actively tick things off

Design Changes:

Task 1 Problems

1. Flatter search, done button in search
2. ambiguity in adding items to shopping list
 - a. quantity selector scrapped, search screen is only accessible through the list screen so that it's obvious you're adding to those list. there's a visual queue (icon) to denote addition of items to list.
3. quantity input is tedious and necessary
 - a. quantity selector scrapped
4. inability to remove items from shopping list
 - a. 3 dot menu offers edit option, follows typical design patterns for bulk editing.

Task 2 Problems

1. Lack of clear feedback for list to map updates and path generation
 - a. you can only get to the routing menu from the list view which is more intuitive.
2. accessibility of bottom menu containing product details and ordered list
 - a. the next item to be pick up on the map screen is "peeking" at the bottom of the screen, and prompts the user to drag it up with a "handle".
3. redundancy of lists screen and optimised list menu
 - a. functionality is more clearly separated - the map view is inside the list screen in the new design
4. possible confusion when following path
5. lack of defined feedback when user checks off an item
 - a. Lack of feedback is mitigated as the user is now explicitly checking off items by swiping, each item on the list is prompted as users check them off which reminds them of what they need to get. Feedback is provided for what item you're currently going to

1.3 - Minute 3

Meeting notes

Date: 30th of April, 2018

Present: Jaiden, Helen, Alex, Jenny, Claire

Things to do:		
Who	When	What
Helen	Monday 7th May	Start Axure prototype <ul style="list-style-type: none"> - Main features that always stay on the screen - bottom navbar - Work on money, account screens - Possibly start writing tasks
Key items discussed:		
<ul style="list-style-type: none"> - Made flow chart to organise Axure screens/elements needed <ul style="list-style-type: none"> - On Google Drive - Refined re-design - Start prototyping 		

1.4 - Minute 4

Meeting notes		
Date: 7th May, 2018		
Present: Jaiden, Helen, Alex, Jenny		
Things to do:		
Who	When	What
Key items discussed:		
<ul style="list-style-type: none"> - Went over prototype <ul style="list-style-type: none"> - Need to sort out interactivity based on tasks - Tobii setup 		

1.5 - Minute 5

Meeting notes		
Date: 14th May, 2018		
Present: Jaiden, Helen, Alex, Jenny, Claire		
Things to do:		
Who	When	What
Jaiden	24 May	<ul style="list-style-type: none"> - Executive Summary - Re-statement of the Problem - Users
Helen	24 May	<ul style="list-style-type: none"> - New Task Descriptions - Digital Prototype
Alex	24 May	<ul style="list-style-type: none"> - Results - Conclusions and Recommendations
Jenny	24 May	<ul style="list-style-type: none"> - Methods - Presentation
Claire	24 May	<ul style="list-style-type: none"> - Highlights video - Appendices
Key items discussed:		
<ul style="list-style-type: none"> - Delegation for report - Consolidated evaluation data - Reflected on key points of lab evaluation 		

1.6 - Minute 6

Meeting notes
Date: 21st May, 2018
Present: Jaiden, Helen, Alex, Jenny, Claire

Things to do:		
Who	When	What
Jaiden	24 May	<ul style="list-style-type: none"> - Executive Summary - Re-statement of the Problem - Users
Helen	24 May	<ul style="list-style-type: none"> - New Task Descriptions - Digital Prototype
Alex	24 May	<ul style="list-style-type: none"> - Results - Conclusions and Recommendations
Jenny	24 May	<ul style="list-style-type: none"> - Methods - Presentation
Claire	24 May	<ul style="list-style-type: none"> - Highlights video - Appendices
Key items discussed:		
<ul style="list-style-type: none"> - Finalising report details - Received feedback about specific parts (presentation, structure, content) from groupmates - Have parts done by 24 May (Thu) so we can look it over together before submitting 		

2. Restatement of Problem

Customer Experience Touchpoint	Example Improvements
Process elements	<ul style="list-style-type: none">➤ Optimising waiting times➤ Aiding store navigation➤ Speeding up customer service aspects
Communication elements	<ul style="list-style-type: none">➤ Easy access to:<ul style="list-style-type: none">○ Promotional information (sales)○ Item information (price, stock, etc.)
Product interaction elements	<ul style="list-style-type: none">➤ Ensuring :<ul style="list-style-type: none">○ High product quality○ A wide selection of products○ A pleasant store environment
Technological elements	<ul style="list-style-type: none">➤ Reducing friction when finding and purchasing items➤ Potential for self service functions

3. Persona



Stephen, 25

Living Conditions:

Stephen is a Commerce student living in Melbourne, Victoria. He has been living in the north-western suburbs of Melbourne for the last 2 years, about 15-20 minutes outside of the CBD. Previously, he lived at home with his parents - who were in the outer suburbs - but has recently moved closer to the city in order to make his school and social life easier.

He does not own a car and mainly relies on PT to get around, usually using the trams around his area. His housemate owns a car but rarely drives it; but it is available to Stephen to use as well if he desperately needs it.

Stephen is a touch frugal due to his limited income as a student, but is not overly stressed about money for the time being. However, he does want to earn more in the future and eventually have what is deemed by society to be a 'successful' career.

Lifestyle and commitments:

Stephen deliberately maintains a fairly busy schedule, juggling university, work, and playing in a band with his friends.

He currently studies commerce at RMIT university. He has been underloading his university work because he is in no rush to finish and enjoys the student lifestyle. Equally, he likes to have more time available to put real effort to do well in his subjects, and still leave time for extracurricular activities and work. This is his fourth and final year at university.

He works part time as a salesman for a company which produces and sells bolts and screws (and so on) for construction purposes, but has recently been offered the opportunity to move into a junior management position, which he is taking and is investing a lot of time into as well.

Stephen moderately monitors his fitness; he makes sure to stay in relative shape and occasionally goes to the gym, but doesn't prioritise his fitness highly amongst other things.

Stephen went on a 'gap year' trip after high school to backpack on his own across America, which he found to be a fun and enriching experience. This helped him become more independent and outgoing as he left high school.

Finally, he plays casually in a band called 'Usable Music' with his long time friends from high school. Jerry plays drums in the band and is also his housemate at the moment. The band is more of a hobby than a serious endeavour, but nonetheless they make time for regular practice sessions and sometimes play at small venues.

Attitude and personality:

Despite seeming to 'take his time' with his studies, Stephen is a reasonably ambitious person, and does like to commit himself to work hard on things when he needs to. He handles responsibility well. However, he also doesn't have a narrow ambition for his career and likes to try a lot of different things; but whatever he does do he sets high standards for himself. In a social context, he is a reasonably relaxed person who gets along well with most people. When it comes to work or errands though, he prefers not to waste time, to be efficient and not procrastinate. As mentioned earlier, Stephen likes to keep himself busy with a large variety of activities.

Stephen is extroverted and likes to hang around with people often, but sometimes prefers to undertake tasks on his own, mostly due to his high standards. He hates group assignments for this reason, for example. On occasion, Steve can become defensive if people make fun of him about things he cares about, and is a bit standoffish, but generally he is easy going.

Technology access and usage:

Like most young adults these days, Stephen heavily relies on his smartphone to get around, stay in touch with people, organise his schedule and so on. He also owns a laptop which he uses for work and school, and carries it around with him most of the time. It is important to him to always have technology accessible to him if possible, and he tends to use digital formats for work and organisation over physical things. His household has a strong, stable internet connection and a decent WIFI router.

Sometimes he wants to play games on his laptop but it is not powerful enough to run modern high-end games, and he does not own a desktop PC or any gaming consoles to play with. This isn't a huge priority for him though as he prefers to spend his time on less 'wasteful' activities.

Shopping habits:

Despite being very busy Steve is not super organised and has many time commitments. As a result his shopping schedule is somewhat 'sporadic' and not consistent. He will tend to buy whatever he needs at a given time when he can fit it in, with a couple of small sporadic shopping trips a week, supplementing occasional large 'stock-ups' which he might try to do once a month or so. These bigger shopping trips usually involve buying a lot of items which last a long time, as well as utility items for the house such as toilet paper, cleaning materials and the like.

When he is in the shop he usually likes to try and save time and not dawdle around too much; he likes to try to optimize his shopping route in the store if he knows exactly what he wants to

buy, since he usually shops at the same Woolworths store which is nearby. He buys reasonably good food and likes to cook, rather than only getting cheap packaged meals like a typical student might. When he is short on time he prefers to eat out at a local restaurant rather than resort to microwave meals or instant noodles, for example.

4. Assignment 1 Tasks

4.1 - A1 Task 1

TASK 1	
Name: A newly-registered user is building a shopping list from scratch. They have not used the application before, so there is no user history information available.	
Frequency: If routinely shopping, maybe once a week or once every two weeks. Also dependent on the user's reliance on shopping lists as part of their shopping process. Subsequent shops will make use of user history to improve the experience—therefore, this 'from scratch' approach will only occur once. Subsequent shops will be slightly different but most of the steps will be the same.	
Significance: Using a list is not essential to the grocery experience: questionnaire respondents mostly claimed they used shopping lists with varying frequency. However, "forgetting to purchase an item" was deemed one of the largest sources frustration in the grocery shopping questionnaire. Thus, building a shopping list is of high significance because it is (a) linked to another major feature of the application, i.e. the mapping feature, and (b) it aids user memory, in addition to the search and browse functions.	
Issues: Some users may want to forego the shopping list altogether. Also, "forgetting items" is a complex problem to solve: it is difficult to pinpoint <i>when</i> they will forget (e.g., forgetting to put it on the shopping list) or <i>what</i> they will forget.	
Technology: Smartphone with our application, linked to store data and item information (names, brands, prices, stock). Current technology includes paper and pen for keeping a list, a notes application, or existing applications with list functionality.	
<i>User Actions</i>	<i>Interface Feedback</i>
<i>Step 1: Navigate to the browse and search tab</i>	<i>The bottom menu bar will highlight the appropriate icon, corresponding to whichever 'screen' the user is currently looking at. The browse and search screen has a search bar at the top of it to indicate to the user that they can browse for items.</i>
<i>Step 2: Use category menu to find food items in the listing</i>	<i>Tapping a category icon will immediately move them to a follow up screen containing sub-categories or product choices. The name of the category that they previously chose will be presented as the title of the new screen.</i>

	<i>These screens are intuitively scrollable, thus indicating that they can be used like a catalogue.</i>
<i>Step 3: Make an item choice and select/highlight it.</i>	<i>After tapping an item, the entry on the catalogue screen will become highlighted. Secondly, the 'quantity selector' interface will appear at the bottom of the screen whenever a product is 'selected' (highlighted).</i>
<i>Step 4: Add the item to shopping list by selecting a quantity to buy, using the increment/decrement interface.</i>	<p><i>Tapping the increment or decrement buttons (plus or minus signs) will adjust a visible counter value, representing the purchase quantity that is currently chosen. If the device has sound activated, these actions would be accompanied by a subtle clicking sound.</i></p> <p><i>Further, doing this action directly adds the item to the shopping list. To indicate this change, the bottom bar icon representing the shopping list screen will change to show a little 'bubble' above it, with a number on top which corresponds to how many items are in the current shopping list.</i></p>
<i>Step 5: Navigate back to the browse and search screen, in order to make further selections. (Repeat steps 2-5 until finished.)</i>	<i>The back button immediately returns the user to the most recent previous screen, which should still be recognisable and in their memory. Going 'back' is clearly communicated through this alone.</i>
<i>Step 6: Use search bar to search for additional items.</i>	<i>Using the search bar generates a 'results' list in real time as characters are entered in.</i>
<i>Step 7: Choose items and quantity.</i>	<i>See steps 3 and 4. (Screen functionality is the same.)</i>
<i>Step 8: Check shopping list.</i>	<i>Clicking on the list tab in the navigation bar will take the user to their completed list. The list interface is a scrollable display of the users' selected items, their price details, stock information, and quantity.</i>

4.2 - A2 Task 2

TASK 2

Name: Using a completed shopping list, navigate the store with the map screen.	
Frequency: Dependent on how often the user grocery shops, likely once every week or once every two weeks. Use of mapping feature is also dependent on familiarity with store layout and the presence or absence of time constraints (e.g., needing to be in and out of the store in 10 minutes).	
Significance: High significance, because users are busy people with various commitments. Time is valuable—hence the need for an optimal route. “Locating items” was also identified by users as one of the most useful features our application could offer. This is supported by evidence from the questionnaire.	
Issues: If the location of one product changes, it would be difficult for users to find and obtain that product. Could run into problems gathering and updating data across multiple supermarket chains.	
Technology: Smartphone with our application, linked to store data and item information (names, brands, prices, stock). Current interfaces that guide users through the supermarket include aisle labels and supermarket signs. Mapping applications (though not directly related to grocery shopping) include Apple and Google Maps.	
<i>User Actions</i>	<i>Interface Feedback</i>
<i>Step 1: Navigate to mapping feature</i>	<i>Clicking the map icon highlights the map tab in navigation bar. Directly switches to the map screen, which will be populated with clickable location pins of the items in the user’s shopping list.</i>
<i>Step 2: View optimal item pickup ordering</i>	<i>Small ‘arrow’ tab at bottom of the screen, to indicate to the user that they swipe up to access this information menu.</i> <i>Displays list-view of the items on the user’s shopping list, in the order they should be picked up.</i>
<i>Step 3: View product details</i>	<i>The bottom of the menu (continued from Step 2) has two dots, representing the left/right swiping abilities. One dot will be highlighted, depending on if they are looking at the ‘ordered shopping list’ (on the left) or the ‘item details’ (on the right).</i> <i>Starting from map-only view, product details can be accessed by tapping a specific item’s location pin (which will bring up the bottom menu).</i>

	<i>If menu is already visible, product details can be accessed by swiping left. The last-viewed item will appear. In the case that the user has not previously viewed any product details, the details for the next item in the ordering will appear.</i>
<i>Step 4: Follow optimal path to navigate the store</i>	<i>Path is highlighted on the store map. Using geolocation, the user's position in the store is tracked and displayed with a moving point.</i>
<i>Step 5: Check off each item after collecting it along the route</i>	<i>Window with 'Check off item?' pops up. Y/N buttons are provided below for the user to respond.</i>

4.3 - A1 Task 3

TASK 3	
Name: Tracking expenditure on groceries for the month of March (e.g., for budgeting).	
Frequency: Dependent on the user's sensitivity to price and their budgeting habits. In this case, the user budgets by month. Budgeting can occur daily, weekly, monthly, or yearly.	
Significance: Medium significance, as tracking expenditure is not essential for grocery shopping, but budgeting is often linked to expenditure on meals and food. The more price-sensitive an individual, the higher the significance of this task.	
Issues: Price data must be accurate to create digital receipts—supermarket prices frequently change, and inconsistencies between the application's price information and in-store prices could put users off. It may be difficult to source the data from a lot of supermarkets or niche grocery stores. Also, need to consider organisation of data into different time frames (daily, monthly, etc.) and visual displays (pie charts vs. bar graphs).	
Technology: Smartphone with our application, linked to store data, user purchase history (based on their shopping lists), and item information (specifically, prices). Currently, grocery shoppers can keep track of expenditure with some combination of paper receipts, spreadsheets, bank account history, and/or personal financing applications.	
<i>User Actions</i>	<i>Interface Feedback</i>
<i>Step 1: Click on money icon in the navigation bar</i>	<i>Highlights money tab in navigation bar. Directly switches to the money management screen, which will display a bar graph of spending</i>

<p><i>Step 2: Change graph to Month mode</i></p>	<p><i>User selects 'M' button above the graph. Graph time frame adjusts accordingly. Date on x-axis, expenditure on y-axis. Bar heights corresponds to expenditure on each day.</i></p> <p><i>(Graph time frames: Day-12am to 11:59pm, Month-DD/MM, Week-Sun to Sat, Year-Jan to Dec.)</i></p>
<p><i>Step 3: View entire spending history</i></p>	<p><i>Displays new screen with list of every instance of spending, ordered chronologically (top is most recent, bottom is least recent). Each element in the list contains expenditure (\$) and date (DD/MM/YY).</i></p>
<p><i>Step 4: View most recent purchase</i></p>	<p><i>Scroll back to top of list for most recent purchase. Selecting the most recent purchase will lead to a screen with the digital receipt for that day. The digital receipt resembles a standard receipt: it is scrollable and displays the relevant date, store, items, and prices.</i></p>

5. Modified Old Tasks

5.1 - Old Task 1 (Modified for New Design)

OLD TASK 1 (MODIFIED FOR NEW DESIGN)	
Name: A fairly new user is building a shopping list. They have used the application once before in order to add several items to their Favourites.	
Frequency: If routinely shopping, maybe once a week or once every two weeks. Also dependent on the user's reliance on shopping lists as part of their shopping process. Subsequent shops will make use of user history to improve the experience—therefore, this 'from scratch' approach will only occur once. Subsequent shops will be slightly different but most of the steps will be the same.	
Significance: Using a list is not essential to the grocery experience: questionnaire respondents mostly claimed they used shopping lists with varying frequency. However, "forgetting to purchase an item" was deemed one of the largest sources frustration in the grocery shopping questionnaire. Thus, building a shopping list is of high significance because it is (a) linked to another major feature of the application, i.e. the mapping feature, and (b) it aids user memory, in addition to the search and browse functions.	
Issues: Some users may want to forego the shopping list altogether. Also, "forgetting items" is a complex problem to solve: it is difficult to pinpoint <i>when</i> they will forget (e.g., forgetting to put it on the shopping list) or <i>what</i> they will forget.	
Technology: Smartphone with our application, linked to store data and item information (names, brands, prices, stock). Current technology includes paper and pen for keeping a list, a notes application, or existing applications with list functionality.	
<i>User Actions</i>	<i>Interface Feedback</i>
<i>Step 1: Navigate to the lists tab (leftmost tab on navigation bar)</i>	<i>Highlights list tab in bottom navigation bar. Displays screen with two tabs: the Favourites (left) and the Shopping List (right). The Shopping List (right) is active by default. These scrollable pages will either be empty or populated, depending on whether or not the user has added items to either list. (In this case, the user has some items in their Favourites, but their Shopping List is empty.)</i>
<i>Step 2: Click '+' button</i>	<i>When the shopping list is empty, instructions appear directing users to use the '+' button to populate their list. Clicking the '+' button</i>

	<i>brings up a dropdown menu containing two options: 'Add to list from favourites' and 'Search new'.</i>
<i>Step 3: Add items to Shopping List from Favourites</i>	<i>Selecting 'Add to list from favourites' from the dropdown menu will bring up a selectable version of the user's Favourites. Users can tap on specific items they want to move into their instance-specific Shopping List, then click the 'Add to shopping list' button in the bottom right (above the navbar).</i>
<i>Step 4: (Repeat Step 2.) Then, search for new items (that are not already 'favourited').</i>	<i>Selecting 'Search new' from the '+' menu dropdown will bring up a display of the root search/browse screen. An additional 'Return to shopping list' button will appear just above the navbar.</i>
<i>Step 5: Use either the search bar or category menu to find products</i>	<p><i>Using the search bar generates results in real time as characters are entered in.</i></p> <p><i>Tapping a category icon will immediately move them to a follow up screen containing sub-categories or product choices. The name of the category that they previously chose will be presented as the title of the new screen.</i></p> <p><i>These screens are intuitively scrollable, thus indicating that they can be used like a catalogue.</i></p>
<i>Step 6: Add items to Shopping List by clicking on the list icon located on the respective product panel</i>	<p><i>Tapping the list icon will directly add the item to the shopping list. The list icon will be highlighted, i.e. change colour (from grey to green) to indicate that the item has been added to the user's shopping list.</i></p> <p><i>Further, the icon on the shopping list tab within the lists screen (next to the favourites tab) will change to show a little 'bubble' above it. The bubble will contain a number on top which corresponds to how many items are on the current shopping list.</i></p>
<i>Step 7: Navigate back to the root search/browse screen in order to make further selections. (Then, repeat Steps 5-6 until finished.)</i>	<i>Users can get back to the root search/browse screen by (a) using the back button or (b) clicking the 'Begin new search' button.</i>

	<p>(a) The back button brings the user to the most recent previous screen, which should still be recognisable and in their memory. Going 'back' is clearly communicated through this alone.</p> <p>(b) The 'Begin new search' button will appear above the navbar in the bottom right. This will take users directly back to the home search/browse screen.</p>
<p><i>Step 8: Check Shopping List to confirm everything has been added</i></p>	<p>Users can return to their Shopping List, which will contain all their added items, by (a) clicking on the list tab in the navbar or (b) clicking the 'Return to shopping list' button</p> <p>(a) Clicking on the list tab in the navigation bar will take the user to their completed list (with the Shopping List tab active and the Favourites tab greyed out). The list interface is a scrollable display of the users' selected items, their price details, and stock information.</p> <p>(b) The 'Return to shopping list' button will appear above the navbar in the bottom right. This will take users directly back to the Favourites/Shopping List screen, with the Shopping List tab active.</p>

5.2 - Old Task 2 (Modified for New Design)

OLD TASK 2 (MODIFIED FOR NEW DESIGN)
<p>Name: Using a completed shopping list, navigate the store with the map screen.</p>
<p>Frequency: Dependent on how often the user grocery shops, likely once every week or once every two weeks. Use of mapping feature is also dependent on familiarity with store layout and the presence or absence of time constraints (e.g., needing to be in and out of the store in 10 minutes).</p>
<p>Significance: High significance, because users are busy people with various commitments. Time is valuable—hence the need for an optimal route. "Locating items" was also identified by users as one of the most useful features our application could offer. This is supported by evidence from the questionnaire.</p>

Issues: If the location of one product changes, it would be difficult for users to find and obtain that product. Could run into problems gathering and updating data across multiple supermarket chains.

Technology: Smartphone with our application, linked to store data and item information (names, brands, prices, stock). Current interfaces that guide users through the supermarket include aisle labels and supermarket signs. Mapping applications (though not directly related to grocery shopping) include Apple and Google Maps.

<i>User Actions</i>	<i>Interface Feedback</i>
<i>Step 1: Navigate to mapping feature</i>	<i>When the user's Shopping List is populated, a 'Route' button will appear. Clicking the 'route' button directly switches the display to the map screen, which will contain a swipeable menu with the ordered list and product details, as well as clickable location pins of the items in the user's shopping list.</i>
<i>Step 2: View optimal item pickup ordering</i>	<i>Displays list-view of the items on the user's shopping list, in the order they should be picked up. Users can minimise this menu by clicking the small arrow tab at the top of the overlay.</i>
<i>Step 3: View product details</i>	<p><i>The bottom of the menu (continued from Step 2) has two dots, representing the left/right swiping abilities. One dot will be highlighted, depending on if they are looking at the 'ordered shopping list' (on the left) or the 'item details' (on the right).</i></p> <p><i>Product details can be accessed by (a) tapping a specific item's location pin (which will bring up the bottom menu) or (b) clicking the 'i' information button on the item in the ordered list.</i></p> <p><i>(If menu is already visible, product details can be accessed by swiping left. The last-viewed item will appear. In the case that the user has not previously viewed any product details, the details for the next item in the ordering will appear.)</i></p>
<i>Step 4: Follow optimal path to navigate the store</i>	<i>Path is highlighted on the store map. Using geolocation, the user's position in the store is tracked and displayed with a moving point.</i>

Step 5: Check off each item after collecting it along the route

Clickable tick boxes are located on each item panel in the optimal list ordering on the swipeable menu. The boxes begin unchecked, and clicking on them will fill them in with a check mark and turn the filled box green.

6. Tasks Printout for Usability Testing

Task 1: Manage your Favourites list.

- a. Add the following items to your Favourites:
 - i. Fresh Royal Gala Apple
 - ii. Banana Organic
 - iii. Helga's Grain Bread Mixed Grain
 - iv. Woolworths Select Lite Milk
- b. You realize you don't want milk on your Favourites list anymore. Remove Woolworths Select Lite Milk from your Favourites.

Task 2: Build your Shopping List.

- a. Add the following items to your Shopping List:
 - i. Fresh Royal Gala Apple
 - ii. Helga's Grain Bread Mixed Grain
 - iii. Tip Top Blueberry & Vanilla Cafe Loaf
 - iv. Connoisseur Ice Cream Cookies & Cream

Task 3: Now, you want to collect all the items on your Shopping List. Plan your route and navigate the supermarket.

Subtasks:

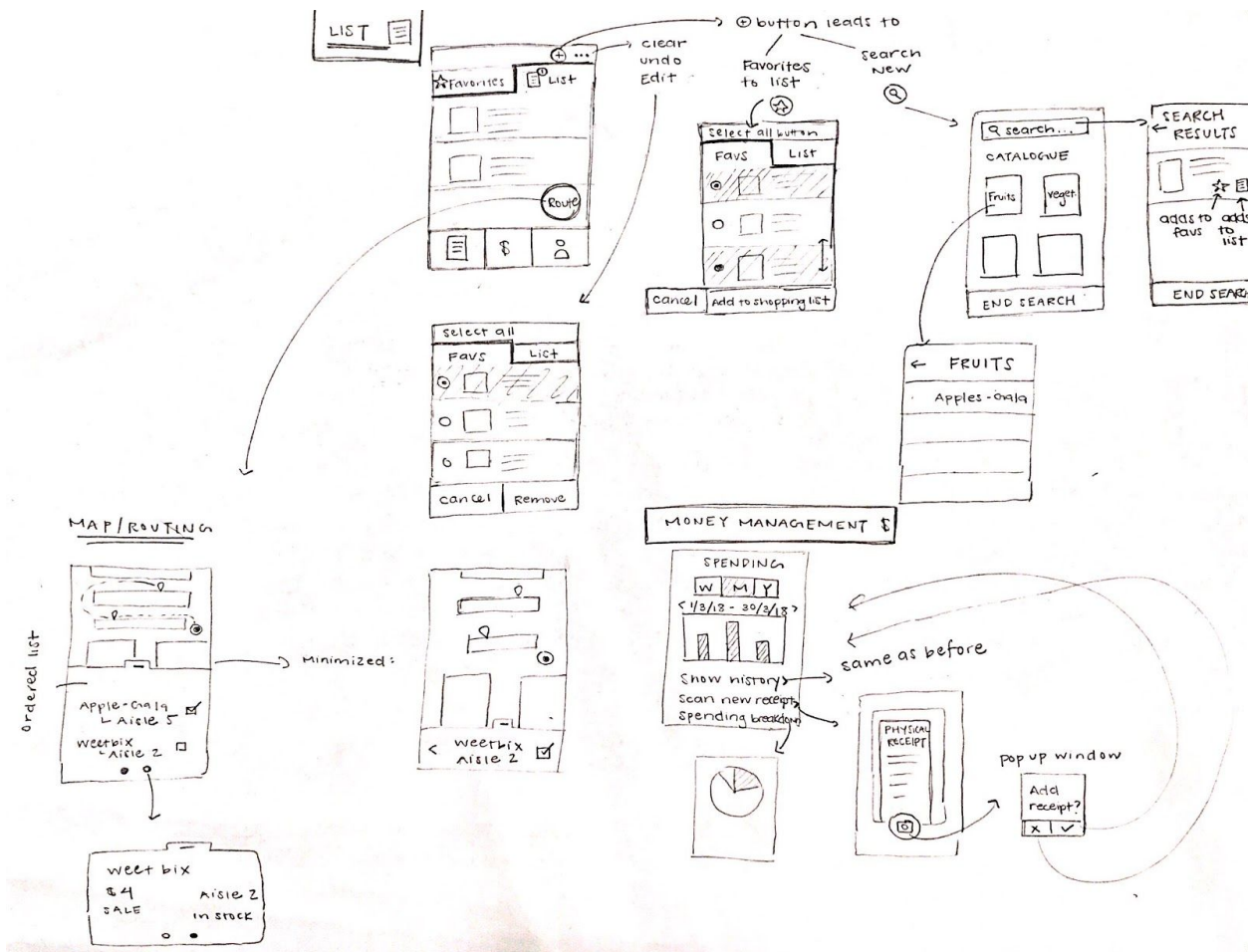
- a. Pretend you've reached the apples. What should you do now?
- b. Remind yourself of the items you need in the Bread section and their product details.

Task 4: Pretend you have completed your shop. Scan the new receipt to track your spending in the app.

Subtask:

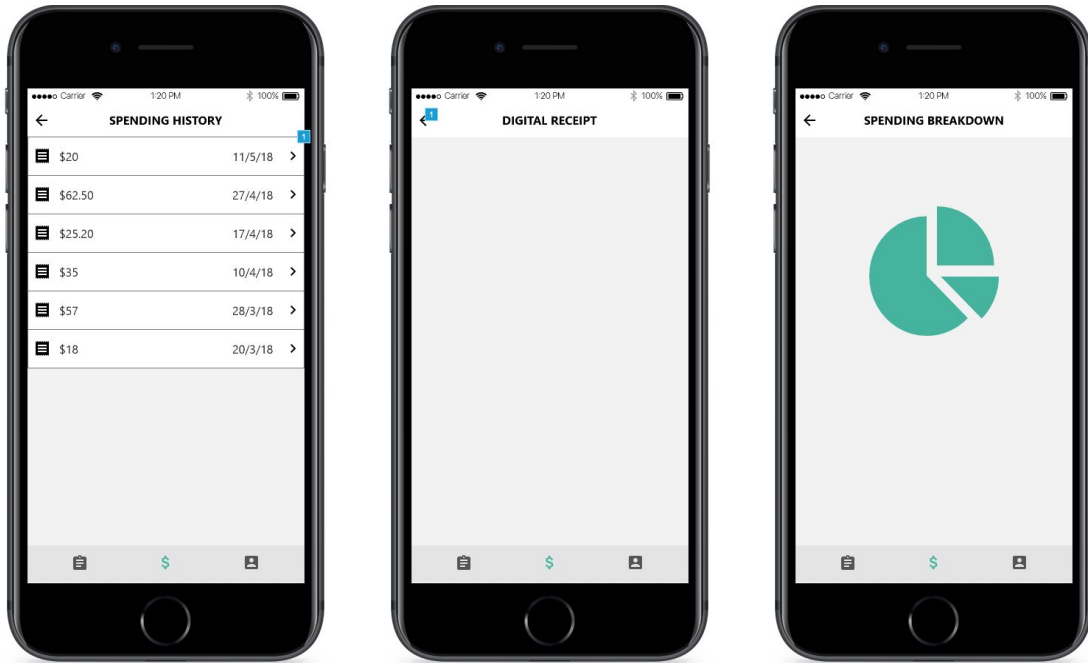
- a. We will provide you with a real mobile phone (blank screen) and a physical receipt. Please scan the receipt.

7. Final Re-Design Sketch

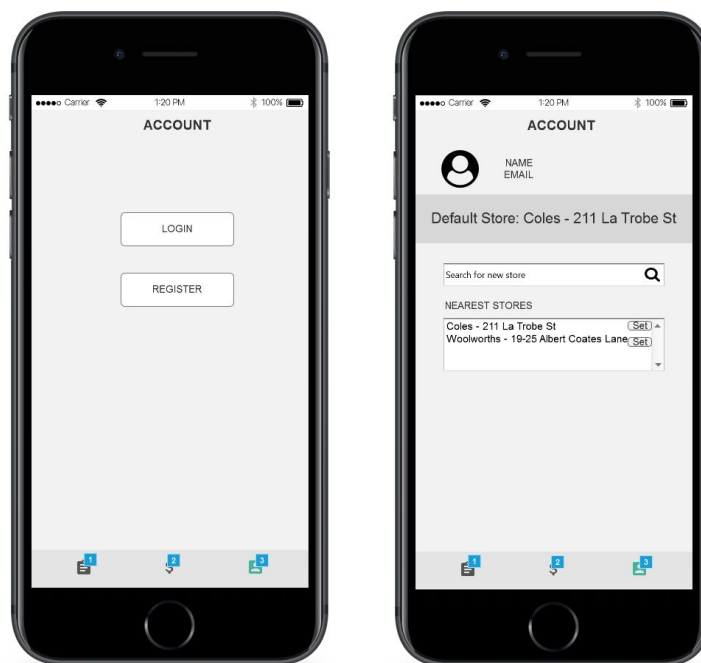


8. Additional Screenshots of Digital Prototype

8.1 - Extra Money Management Screens



8.2 - Account Screens



9. Script for Conducting Usability Test

Introduction

Hi my name is ____, and today we are undertaking a short study in the form of a usability evaluation on how to enhance the retail experience in the context of supermarkets.

It is important to note that we aren't testing your ability to complete the tasks, but rather we are testing the usability and functionality of the mobile application. It is likely that if you have issues other people have experienced the same/similar problems. We are looking for constructive, and honest feedback about our application, *Shoop* - please let me know if there is something confusing, unclear, etc - this will help us make future improvements to our application, and form key points of considerations for our report. At the same time, if there is anything that particularly works for you as the user, we are interested in what particular elements or features were ideal.

Recording

We will be recording your session with the Tobii Eye tracker, and its related software. Your recording will be used just for my group's analysis of our application, and its strengths and weaknesses. The recording will not be passed on or disseminated to the public.

Consent Form

We have a **Consent form** for you to sign - so have a read through, and please let me know if you have any questions.

Preliminary Questionnaire

1. Age
2. Gender
3. Living with family, or living out of home

Qualitative Questionnaire

1. [TO BE WRITTEN]

Further Information about the Application

The main aim of our app is to improve the shopping experience by making it more efficient, and less fiddly. So we have a few modes on our application that look at making shopping lists, navigating through a store, and managing spending.

Do you have any questions before we start the session?

Tobii Eye Tracker Set Up

1. Press start recording

2. Make sure individual is seated with white dots in the middle
3. Get them to have their eyes follow the dots around the screen
4. Verify it

NOTES for Conductor:

- **Spacebar** to start tasks
- **F10** to exit
- **Ask how difficult on a scale of 1 (very hard) - 5 (very easy) to complete the task**
 - How could this be improved?

Post-Questionnaire

1. How likely would you be to use this application when shopping?
2. Did you understand how to use the category menu to find items?
3. Did you understand the intention behind having a favourites list and shopping list?
4. Do you think these three modes are useful?
5. Any additional feedback you wanted to give:
 - a. Successful features?
 - b. Criticisms of the application?

10. Pre-Evaluation Questionnaire Data

Raw Data: <https://jaidenfairoze.typeform.com/report/LWAWSk/kcMtp45wjZVQ8Fp1>

Table 10.1

“I enjoy using technology” - Likert Scale Score	Number of Candidates
5	4
4	1

Table 10.2

“I enjoy using smartphone apps” - Likert Scale Score	Number of Candidates
5	4
4	1

Table 10.3

Grocery Shopping Frequency	Number of Candidates
Twice or more a week	2
Once a week	1
Less than once a week	2

Table 10.4

Interest in an application that streamlines grocery shopping (Likert scale)	Number of Candidates
5	1
4	2
3	1

2	1
---	---

Table 10.5

Use of glasses when viewing monitors	Number of Candidates
True	2
False	3

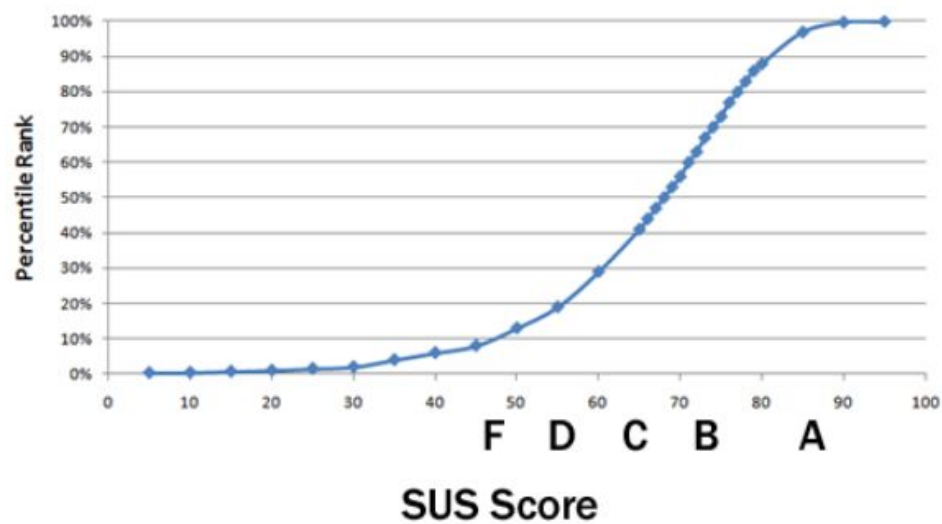
11. Post-Evaluation Questionnaire Data

Raw Data: <https://jaidenfairuze.typeform.com/report/moUF23/cQWJezQpc2ZHUIOF>

Table 11.1

Participants (from first to last)	SUS Score
1	67.5
2	85
3	90
4	65
5	72.5

Figure 11.2



12. Lab Evaluation Notes

12.1 - Alex's Evaluation Notes

Participant 1: SS

Task 1: Managing favourites list - adding and removing items.

- Confused about adding TO list versus adding FROM list. She tried to add to the shopping list from the favourites list instead of searching for items.
- Correctly understood to use the star icon to add to favourites instead of the direct shopping list, and seemed to navigate the category screen fine.
- Didn't really take that long!
- "Not very clear where everything is initially but is probably easy to learn"
 - Harder for first time user.
 - Have an edit function within the actual favourites menu itself.

Task 2: Build a shopping list. (Use favourites and search)

- Identified the distinction between adding from the favourites and the 'add new'. She chose to use the favourites and did so correctly.
- When adding new ice cream via searching, she instead added to favourites instead of directly adding it to the shopping list.
 - She expected it appear in favourites (as it 'would do' but the prototype did not support this option, which caused confusion.)
 - It seems like the user instinctively want to add to favourites -> shopping list since that was the 'flow' they used originally, and thus did not realise the alternate option of just adding directly to the shopping list from the search bar area instead bypassing the favourites list.) It would be interesting to see if they do this instinctively when they have not first been asked to use the favourites list.
 - Possibly need to make it more clear that the two options are separate, otherwise users might learn one way of doing it, and never explore the other features, because what they are doing works and it's not obvious that there are alternative 'paths' to achieving the same goal (each with their own level of efficiency).

Task 3: Navigate Store with map screen.

Task 4: Scan your receipt after shopping

- Took one photo of the whole receipt instead of the barcode specifically (?)
- "There should be a list of receipts that come up after the confirmation of scan page, to provide feedback that the new one has properly been added into the system"
- More feedback is required.

Discussion:

Likely to use this app, it would be really helpful. She likes the map screen routing. Yay!
She goes once every two weeks, bulk buying. Since she has to buy so much it would help to find everything efficiently coz often she misses stuff.

She found the category menu intuitive and self explanatory to navigate.

Favourites list was conceptually understood, i.e you can use the favourites list to easily access frequent items, however would 'take a little while to get the hang of it'.

Final thoughts:

+

ROUTING IS GOD TIER. Liked how the favourite and shopping list were next to each other and intuitively easy to switch between them.

It would be cool to add in: the price with items in the list.

-

It's not super clear where everything is as a first user

She thinks it's probably not that hard to learn however.

Participant 2: HD

Task 1: Managing favourites list - adding and removing items.

- Adding to list:
 - Identified to press search new instead of add from favourites
 - Added to shopping list instead of favourites list.
 - He was able to navigate the categories easily. Seems intuitive.

Prototype got desynced and kinda fucked it, since the item that was going to be removed was already gone. However the user did instinctively go to the triple dot menu button. He suggested that the favourites menu should have stars there to directly unstar them in the favourites menu itself rather than using the edit menu button

Task 2: Build a shopping list. (Use favourites and search)

- Took a while to identify the two operations on the add new screen (fav add vs list add), but it made sense once he actually examined the interface more closely.
- Searched correctly for ice cream and added to list fine.
- Found searching way easier than the category screen apparently.
- Failed to realise he could add items FROM the favourites screen, but instead searched manually for each item.
- Didn't know milk would be in the dairy category, but instead should have milk in it's own category. He verbally indicated that we would rely on images to quickly see where things were instead of knowledge/recollection of what constitutes 'dairy'.

- Good point about recall vs recognition here: If we specify category 'types' then the user is having to recall which category a particular in-mind item would be in. Rather, the category should have an image which instantly triggers recognition of which things would be in which category.

Task 3: Navigate Store with map screen.

- 'Very good feedback' for checking off items. Was initially confused but i think that was due to poor understanding of the task, not the interface. Once it was verbally clarified what he was supposed to be simulating he immediately pressed the correct buttons.
- He thinks the application should consider frozen foods picking up last despite the route optimization, because they could melt if he picks them up early.

Task 4: Scan your receipt after shopping

- Took a while to identify the money screen at the bottom bar. Jenny had to verbally hint with the word 'spending' to help the participant make the connection between receipt scanning and money tracking, so that he would click on the dollar symbol icon. User initially clicked on the account screen and seemed to not understand what he was looking at for a while. This may be due to the incomplete nature of the prototype's visuals, but hard to say.

DISCUSSION:

He would probably use this app every time.

He would never forget to purchase things if he used this app and the map/checkbox system was very handy. He annoyingly often forgets items and where to find them and he fkn hates dat shit.

For the categories, he emphasises that the pictures should be the main mechanism for identifying what things are within each category rather than text

ONLY realised the meaning behind the favourites once he identified the distinction between the two, which he did not successfully do on his own at first glance.

Does not know what the money management screen even does. Thinks the MM screen should *actively prompt* about spending efficiency, I.E. "btw coles had a similar item cheaper than what you bought", rather than just *passive* information that the user can seek out.

Participant 3: LB

Task 1: Managing favourites list - adding and removing items.

- Nailed it.
- Mentioned that there is a lot of stuff on screen and requires a lot of visual investigation to find UI thing as well as find the food items on the category screen. He did however correctly identify things and made no mistakes, but it wasn't inherently instinctive, it required cognition. So far, each participant that looked carefully was about to correctly identify everything, after deliberation. However, those who kind of jumped to conclusions

ended up making mistakes and getting confused. The consequent confusion is hard to determine however, as bugs in the complexity of the PP led to inconsistent feedback (after certain strings of mistakes) which were not actually intended to happen in the design.

- Generally speaking though, our functionality might not be *safe* enough in that hasty users had the tendency to make mistakes which led to greater confusion and so forth. That being said, the mechanisms *are identifiable to users* upon unassisted inspection, even as a first time user, which is a positive.

Task 2: Build a shopping list. (Use favourites and search)

- Clearly understood and enjoyed the functionality of the favourites list. “Bang Bang Bang”. Indicated concern that the favourites list could grow too long, which undermines its usefulness. but caveats that it is the responsibility of the user.

Task 3: Navigate Store with map screen.

- Once again, this participant carefully examined the screen before clicking things. After about 10 seconds he saw that the bottom menu could be alternated, and subsequently correctly figured out how everything worked, in the way that aligned with the design intentions. This point is along the same lines of earlier, that the amount of information was initially quite ‘a lot’ and users are required to cognitively process everything manually so to speak. This is a problem potentially for hasty first time users who might get frustrated.
 - (-) Churn rate risk
 - (+) Functionality is functional and identifiable, *given that users are willing to investigate*. Under the lab conditions, obviously, users are not going to give up in frustration since they are explicitly in a lab environment, so it all worked well. But based on the level of inspection required there is definitely a risk of new real world users just being like “what is all this stuff?” and giving up on the app. This would have to be confirmed in field studies or something.
 - This issue is compounded by the fact that, as mentioned, mistakes once made cause extra confusion due to navigational complexity. So, the likelihood of an initially confused user kind of pressing something randomly to see what happens, making a mistake, and then give up after not understanding what the heck actually happened. SAFETY ISSUES and over complexity of interface.
 - Perhaps need to reconsider balance of functionality and interface complexity. The functionality is seemingly very good given that users interpret them correctly (all users that did the tasks correctly commented things like ‘wow, that’s really useful’ and ‘oh cool i can do that really quickly’ which indicates that the features are working as designed. But the downside is that adding so many UX features has the potential to overwhelm and confuse users who make *any* wrong assumption about the interface/systems... our margin for

error with aligning to the mental models of the users **much too low.**

Task 4: Scan your receipt after shopping

DISCUSSION:

Feature suggestion: Import ingredients from a recipe to automatically populate lists with some preset thing.

Mentioned that the category menu is straightforward since it functions similarly to aisle categories in a supermarket, and since this is a grocery app it intuitively sets up the correct mental model to interpret it correctly.

Was initially confused about the distinction between favorites and shopping list, but said that once he progressed with the app, it all made sense and was a very useful feature. It seems that investigation correctly communicated the intention behind the two lists.

Overall, lots of feedback for actions, was good.

For list editing, he thinks the clear button should only show up once 'edit' mode has been pressed, rather than being there already in the triple-dot menu. This would make the app safer as they won't clear it accidentally, and also won't confuse between the edit one and a time and full clear, which made all users so far hesitate for that part of the task.

Participant 4: RL

Task 1: Managing favourites list - adding and removing items.

- "This kind of app is always hard to begin with but easy once you have done it once"
 - A lot of users seem to be putting together the app mechanisms *after the fact* after only one completion of the task, even though it is a struggle.
 - Perhaps a literal step by step tutorial function when the user is new, which forcibly directs them through each feature, would be worthwhile for this application? I.e. a tutorial walkthrough with actual highlighted arrows and so forth.

Task 2: Build a shopping list. (Use favourites and search)

- Notes that for different stores, the favourite items might not reapply, which makes it not useful. Our lists only work on a 'per-store' frame of reference.

Task 3: Navigate Store with map screen.

Task 4: Scan your receipt after shopping

- SMASHED IT MATE.

- First participant to go straight to the money management screen for this task. Navigated correctly really quickly!

Participant 5: SM

Task 1: Managing favourites list - adding and removing items.

- Similar behaviour to P3, took a while to investigate but figured it out
 - Made one mistake where he added to list instead of favourites but then observed the star, and realised that that probably was what he should have done instead (correct).
- Successfully discovered how to remove items after some investigation.
 - Suggested that hovering over icons should present a tooltip suggestion; but this would not be applicable to a phone app. The tutorial option mentioned earlier would probably be a good alternative teaching tool.

Task 2: Build a shopping list. (Use favourites and search)

- Was the first user to explicitly investigate the correct 'add from favourites button' but then decide NOT to do it. He clearly did not understand what that button/option was or meant.
- Got confused about the different types of apples; thought they were different kinds of apple.
 - Perhaps we should simplify the item types into more general things? Rather than store-specific, branded products.

Task 3: Navigate Store with map screen.

- Was confused about what the bottom menu actually represented. He mentioned that he should try to 'add apples into shopping list' once he found them in the store, even though the apples are already there.
 - Did not understand the idea that the shopping list was the thing that defined which items were being located in the store, and did not make the connection between the list and map screens. Fundamentally seemed to misunderstand the purpose of the app here.
- The user became preoccupied with the bottom menu and switching between the two bottom-menu items, which distracted him from recognising the bigger picture functionality which was that the map screen is designed to direct you around a real store *based on your selected shopping list items*.
 - May be a limitation of the lab testing, as being in a real store might make it more obvious and there would be real world feedback for the icon updating as he moved around and stuff.
 - However, this extra real world feedback wouldn't even help if the user never even knew the routing feature existed, and thus never opened this screen while shopping!

Task 4: Scan your receipt after shopping

- Surprisingly had no trouble instinctively navigating correctly for this task.
- Confused about whether he would take a photo of the whole thing or just parts of it i.e. barcode.
 - There is no reason to not explicitly say 'scan receipt barcode' on the UI, instead of 'scan new receipt'. This would easily solve this issue. The button which leads to the scan new receipt feature should have a barcode icon on it as well, like MyFitnessPal does, which makes it obvious AF.

DISCUSSION:

Category menus were understood.

Favourites mechanism was once again understood posteriori.

12.2 - Helen's Evaluation Notes

Participant 1: SS

<p>Task 1: Favourites</p> <ul style="list-style-type: none">• 'Add to list from favourites' confusing<ul style="list-style-type: none">◦ Tried to add to favourites by using the 'Add to list from favourites' button (error, this is not possible)◦ Initially failed to understand difference between Shopping List and Favourites◦ Figured out she needed to 'Search new' after clicking on the Favourites tab◦ All correct after clicking 'Search new'• Used 'Return to favourites' button to confirm she had everything she added• Removal: had some trouble navigating to the three dots menu<ul style="list-style-type: none">◦ First instinct to actually click the item rather than go to the three dots• Comments<ul style="list-style-type: none">◦ Easy to learn but definitely a learning curve◦ Make it more clear what is in the three dots menu—potentially just have edit function outside on the screen• Difficulty (1-very hard, 5-very easy): 3-neutral<ul style="list-style-type: none">◦ Not very clear where everything is◦ Once you get used to it, easy to remember	<p>Task 2: Shopping List</p> <ul style="list-style-type: none">• Used Favourites to add to shopping List<ul style="list-style-type: none">◦ Correct intention behind the favourites list• Knew to 'Search new' for the items that weren't already on her Favourites list<ul style="list-style-type: none">◦ However, she used the star icon to favourite items rather than directly clicking on the list icon to add them to the shopping list◦ The prototype did not support this action, i.e. the items didn't show up in her favourites, and they just populated the shopping list page• Difficulty (1-very hard, 5-very easy): 4-easy<ul style="list-style-type: none">◦ Easier than previous task◦ Confusing when starring items led to populating the list and not the favourites—inclined to use star icon (over list icon) because familiar with it—issue with prototype, not with use
<p>Task 3: Map/Route</p> <ul style="list-style-type: none">• 5-very easy• No issues with Route button or info button• Very clear layout and affordances	<p>Task 4: Receipt</p> <ul style="list-style-type: none">• Physical component: took one picture of whole receipt• Comments<ul style="list-style-type: none">◦ Suggested maybe having more feedback with scanning receipt, e.g. having a list of

	receipt show up after confirming a new receipt
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Discussion

- Likes routing feature—most helpful because makes locating items easier
- Upon reflection, understands intention of Favourites/Shopping List tabs and the distinction
- Noted that taking a picture of receipt is better than manually inputting or typing the information
- Initially unclear where everything is, but easy to remember after learning

Participant 2: HD

<p>Task 1: Favourites</p> <ul style="list-style-type: none"> • Didn't initially switch to Favourites tab (not necessary but) • Acts more on impulse than previous participant—doesn't take time to look at app and evaluate it before starting, more inclined to just start clicking • Used list icons instead of star (error) <ul style="list-style-type: none"> ◦ Solution: add more feedback when people click star icon and list icon • Removal: knew to click three dots • Mixed up Favourites and Shopping List <ul style="list-style-type: none"> ◦ Did not distinguish between two available lists ◦ We should consider making this more clear 	<p>Task 2: Shopping List</p> <ul style="list-style-type: none"> • Built Shopping List from scratch using 'Search new' for each item, didn't use Favourites to make it • Used both search bar and categories <ul style="list-style-type: none"> ◦ Enjoyed using the search bar • Able to distinguish between list and star icons (had trouble in Task 1 but figured it out here) • Difficulty (1-very hard, 5-very easy): 4-easy <ul style="list-style-type: none"> ◦ Search made it easier, saves time, don't need to look through categories • Comments <ul style="list-style-type: none"> ◦ Include pictures for categories, not just text—easier to identify what to click ◦ Further refine categories (potential confusion in grouping milk into Dairy/Eggs, thought ice cream might be included) • In retrospect, understands intention behind Favourites and Shopping List tabs—makes life easier
<p>Task 3: Map/Route</p> <ul style="list-style-type: none"> • Good feedback • Clicked location pins—clear affordances and signifiers • Checked off apples after prompted • 5-very easy and obvious what to do 	<p>Task 4: Receipt</p> <ul style="list-style-type: none"> • Went to account screen first, not the '\$' tab (error) • Once he figured out receipt scanning was in the '\$' tab, it was easy to find the 'Scan New Receipt' button

<ul style="list-style-type: none"> • Comments <ul style="list-style-type: none"> ◦ Suggested we consider the optimal ordering of items (e.g. making frozen foods like ice cream last in the pick-up order) 	<ul style="list-style-type: none"> • Physical component: took one picture of whole receipt • 5-very easy • Comments <ul style="list-style-type: none"> ◦ Suggested highlighting a specific part where the receipt needs to be capture rather than the whole receipt ◦ Solution: Explicit instructions
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Discussion

- 5-very likely to use this every time he went shopping
 - Would never forget what he needs to purchase
 - Very useful
 - Tech-inclined
- Understood categories
- Did not initially understand intention behind Favourites and Shopping List, but agreed it would be helpful
- Wanted to explore '\$' page more
 - Might have liked to see more with price comparison in the app
- Felt it was easy to navigate for a first time user
- Really liked the search function

Participant 3: LB

<p>Task 1: Favourites</p> <ul style="list-style-type: none"> • Didn't switch to Favourites tab (not necessary so this is fine, but not accounted for in prototype 'Return to...' buttons) • Correctly clicked '+' button and 'Search new' • Correctly clicked on star icons to favourite items • 4-easy <ul style="list-style-type: none"> ◦ Acknowledged limitations of prototype, might be inclined to say 5-very easy if the app was fully functional • Removal: a bit confusing because clear/undo/edit all seemed like quite similar options/actions to him <ul style="list-style-type: none"> ◦ Brought up similar design in Spotify model 	<p>Task 2: Shopping List</p> <ul style="list-style-type: none"> • Used Favourites as intended <ul style="list-style-type: none"> ◦ Used the 'Add to list from favourites' button ◦ Really enjoyed this feature ◦ Faster, more efficient • Used search bar (reminded him that it was available for use if he wanted to) • Unsure whether or not he needed to return to the shopping list to confirm that an item had been added, or if he could keep building in the same screen <ul style="list-style-type: none"> ◦ Solution: more feedback when users click on the list/star icons (pop-up blurb that says 'Added to shopping list!' or 'Added to favourites!') • Comments <ul style="list-style-type: none"> ◦ What happens if favourites list
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	<p>is massive—e.g. 100 things on favourites, need to scroll?</p> <ul style="list-style-type: none"> ○ Acknowledged this might be a user problem as opposed to the system problem ○ Note: we could consider grouping mechanisms in Favourites, filtering, alphabetising, etc.
<p>Task 3: Map/Route</p> <ul style="list-style-type: none"> ● Immediately knew to click the route button—clear ● Info easy to find (but slightly difficult to navigate, see below) <ul style="list-style-type: none"> ○ Further product details were useful (e.g. price per kilo) ● However, confusing that there's another 'i' in the product details page, seemed like it was another clickable button ● Potential lack of feedback when user clicks on info button ● Visibility issue of slider menu <ul style="list-style-type: none"> ○ Solution: Make further product details appear as pop-up rather than integrated in the bottom menu ● Found checking off items easier than navigating product details/information buttons ● Note limitations of prototype and lack of swiping motions on the desktop computer (vs. mobile app) 	<p>Task 4: Receipt</p> <ul style="list-style-type: none"> ● First went to account tab (error) ● Found '\$' tab and 'Scan New Receipt' button soon after (corrected mistake) ● Physical component: took multiple pictures ● Receipt storage a bit hard to find—consider giving more feedback after user confirms a new receipt ● '\$' icon not exactly clear that it refers to expenditure tracking <ul style="list-style-type: none"> ○ Seems like it would be for paying or something ○ Potential solution: Maybe use a wallet icon instead? Or a receipt icon?

Discussion

- Discussed how he currently keeps a shopping list
 - Notes on phone or recipes
 - Suggested importing ingredients from recipe to shopping list
- Navigation was favourite feature of app
 - Often hard to locate items in store
 - Walks back and forth and misses items
- 4-likely to use app, depends if he'd make it into a habit
- Three dots menu—clarify options, maybe separate them and make them clearly visible on the top bar

- Info display on map screen confused him the most

Participant 4: RL

<p>Task 1: Favourites</p> <ul style="list-style-type: none"> • Clicked 'Add to list from favourites' button to add items to favourites (error) • Starred items to add to favourites (correct) • Removal: initially wanted to click milk panel at the beginning, but eventually found the three dots button <ul style="list-style-type: none"> ◦ After finding three dots menu, took correct actions to remove milk • Comments <ul style="list-style-type: none"> ◦ Hard to begin, but easy to remember ◦ Difficult at first but straightforward afterward ◦ Suggested we should include pictures on the categories page, use images <i>and</i> text, not just text (e.g. overlay 'Fruits & Vegetables' text on top of a picture of produce) • Note: Evaluator explained the difference between Favourites and Shopping List 	<p>Task 2: Shopping List</p> <ul style="list-style-type: none"> • Clicked 'Search new' <ul style="list-style-type: none"> ◦ Didn't use favourites to add to list (kind of an error because didn't understand purpose of favourites list) • Slight confusion when adding items to list: wasn't sure that clicking the list icon would <ul style="list-style-type: none"> ◦ Solution: more feedback after clicking the list icon (e.g. pop-up blurbs that say 'Added to shopping list!' for list icon or 'Added to favourites!' for star icon) • Comments <ul style="list-style-type: none"> ◦ Suggested we should take into account different stores and different item names at each store
<p>Task 3: Map/Route</p> <ul style="list-style-type: none"> • Correctly checked off apples after subtask prompt • Comments <ul style="list-style-type: none"> ◦ Maybe annoying to tick off everything if there is a long list 	<p>Task 4: Receipt</p> <ul style="list-style-type: none"> • Correctly went to '\$' tab in navbar and immediately located the 'Scan New Receipt' button • Physical component: took one picture of bottom of receipt (barcode) • Comments <ul style="list-style-type: none"> ◦ Acknowledged verbally that he might have to take multiple pictures • Difficulty (1-very hard, 5-very easy): 3-neutral <ul style="list-style-type: none"> ◦ Unclear which part of receipt to take picture of

Discussion

- How likely would you be to use this application while shopping or before shopping?
(1-not likely, 5-very likely)
 - 1-not likely: wouldn't use this application ever
 - Shops once every 1-2 weeks
 - Can't be bothered using application in addition to having to carry everything else
 - Hassle
- Understands category menu
 - Suggestion: add pictures instead of just words on categories page
- Understands intention behind favourites
 - Favourites very useful
 - Always buy same items

Participant 5: SM

<p>Task 1: Favourites</p> <ul style="list-style-type: none"> • Lingered on '+' > 'Add to list from favourites' • Took a while to recognise the star icon as means to favourite something <ul style="list-style-type: none"> ○ Confused by list icon, initi ○ Potential solution: more feedback via 'Added to favourites!' pop-up when someone clicks the star icon and 'Added to shopping list!' when someone clicks the list icon • Removal: tried to click on milk panel first (error) <ul style="list-style-type: none"> ○ Figured it out, went to three dots menu > edit • Difficulty (1-very hard, 5-very easy): 4-easy • Comments <ul style="list-style-type: none"> ○ Initially struggled to use star icon ○ Suggested hovering action would display 'Favourites' (note: hovering not possible for mobile app) ○ New user: first time difficult but probably easier afterward 	<p>Task 2: Shopping List</p> <ul style="list-style-type: none"> • Did not understand he could use Favourites to build Shopping List <ul style="list-style-type: none"> ○ Built Shopping List from scratch (chose 'Search new' under '+' dropdown menu) ○ Confused by 'Add to list from favourites' option in the dropdown menu ○ Potential solutions: (1) re-word the menu options, (2) 'Add to list from favourites' -> 'Add to Shopping List from Favourites', (3) make some menu options inaccessible depending which tab you are on • Knew to click list icon to add items to shopping list
<p>Task 3: Map/Route</p> <ul style="list-style-type: none"> • Checked off apples <ul style="list-style-type: none"> ○ Slight confusion - maybe first 	<p>Task 4: Receipt</p> <ul style="list-style-type: none"> • Went directly to '\$' tab in navbar and immediately located 'Scan New

<p>wanted to click the location pin to check it off</p> <ul style="list-style-type: none"> • Info button to remind of bread details was obvious and clear to him <ul style="list-style-type: none"> ◦ However, did not like presentation of the product details • Overall, confused by map and did not seem to like the map screen • Comments <ul style="list-style-type: none"> ◦ Static page makes it harder to understand—fully functional, dynamic map might be different ◦ Suggested 'x' button to close the information button, maybe have a pop-up with product details instead of 2 pages in the swipeable menu • Difficulty (1-very hard, 5-very easy): 1-very hard or 2-hard 	<p>Receipt' button</p> <ul style="list-style-type: none"> • Physical component: took single picture of barcode <ul style="list-style-type: none"> ◦ Makes most sense to him because thinks barcode is unique • Comments <ul style="list-style-type: none"> ◦ Suggested if this is an independent app (not tied to any particular store)—can have users take picture of store address and total amount listed on receipt • Difficulty (1-very hard, 5-very easy): 4-easy <ul style="list-style-type: none"> ◦ Taking picture might be confusing, there's little direction to guide the user ◦ Solution: give user explicit directions on how to take the picture, and what part of the receipt to take the picture of
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Discussion

- 4-likely to use the app but doesn't feel the need to use his phone while shopping
 - Would be 5-very likely to use the app if he was more actively
 - Note: Might need to disregard this response as he kind of contradicted himself when answering the question
- Navigation very useful
- \$ tab and list building was clear to him
- Did not like how the info part of the map screen was set up/presented

13. Eye-Tracking Data

Table 13.1 - Menu Navigation

Searching for “Helga’s Bread”	Searching for “Royal Gala Apples”	Searching for “Tip Top Bread”
