

Pro Shopper

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Roles:

Huy: Paper prototype creation
Priya: User studies and evaluation
Roy: Interactive prototype and website

Problem/Solution:

Being an effective shopper is a time consuming task. Before you even get to the store you need to compile a shopping list and many opt to assemble relevant coupons as well. Once at the store, it can be difficult to locate the products that you need and identify the best deal once you do. These problems plagues novice and experienced shoppers alike.

Pro Shopper is a mobile application that endeavors to minimize the time that you spend shopping. By offering smart location and product comparison tools, Pro Shopper allows you to make the necessary decisions and spend less time finding the information you need.

Paper Prototype Description:

The main app screen shows the list of groceries the customer has added to their list for the week. Typically shoppers use this to frame their shopping trip, so starting the app with the list makes it easy for them to refer to it while shopping.

From the main list view, customers can easily tab to seeing the map layout through the store. The Map layout has way points or markers for where items in the customer's list appear in the store. As the customer progresses through the path highlighted through the store, when they come near a way point, the app notifies the customer of what items on their list are in vicinity.

There is a final view to search for an item not on the customer's list. This is through a search box.

From the main list view, users can tap on any of the items to be taken to a detailed list of all products that match that item. For example, if the customer had bread on their shopping list, tapping on bread will show them a list of all bread products available in the store sorted by price.

Customers were willing to pay a bit more if the ingredients were healthier, organic, sourced locally, etc. These set of criteria we termed "Quality bar" as they reflected individual preferences. We pre-set some of the criteria, but customers can change these in the settings pane.

Locating the product on a shelf is done by holding the phone's camera up to the shelf where the products are arranged, the app can overlay information on screen to help the user find the product they are interested in.

The search page from the main screen helps users quickly find products and jump directly to this feature to locate it within the store. The list of results is the same as the list of products shown when the user selects an item from the grocery list. The list of products are marked up to also indicate whether each product meets the quality bar specified by the user.

The quality bar checks each product for a set of ingredients and matches it to the criteria specified by the user. These criteria can be simple checks like No MSG or Corn syrup in the ingredients list. If the customer has a nut allergy, they can indicate this so products containing nuts are marked up.

From any of these detailed views, the user can press back to get back to the main view containing the grocery list. All of the mentioned views can be seen in figures 1 and 2.

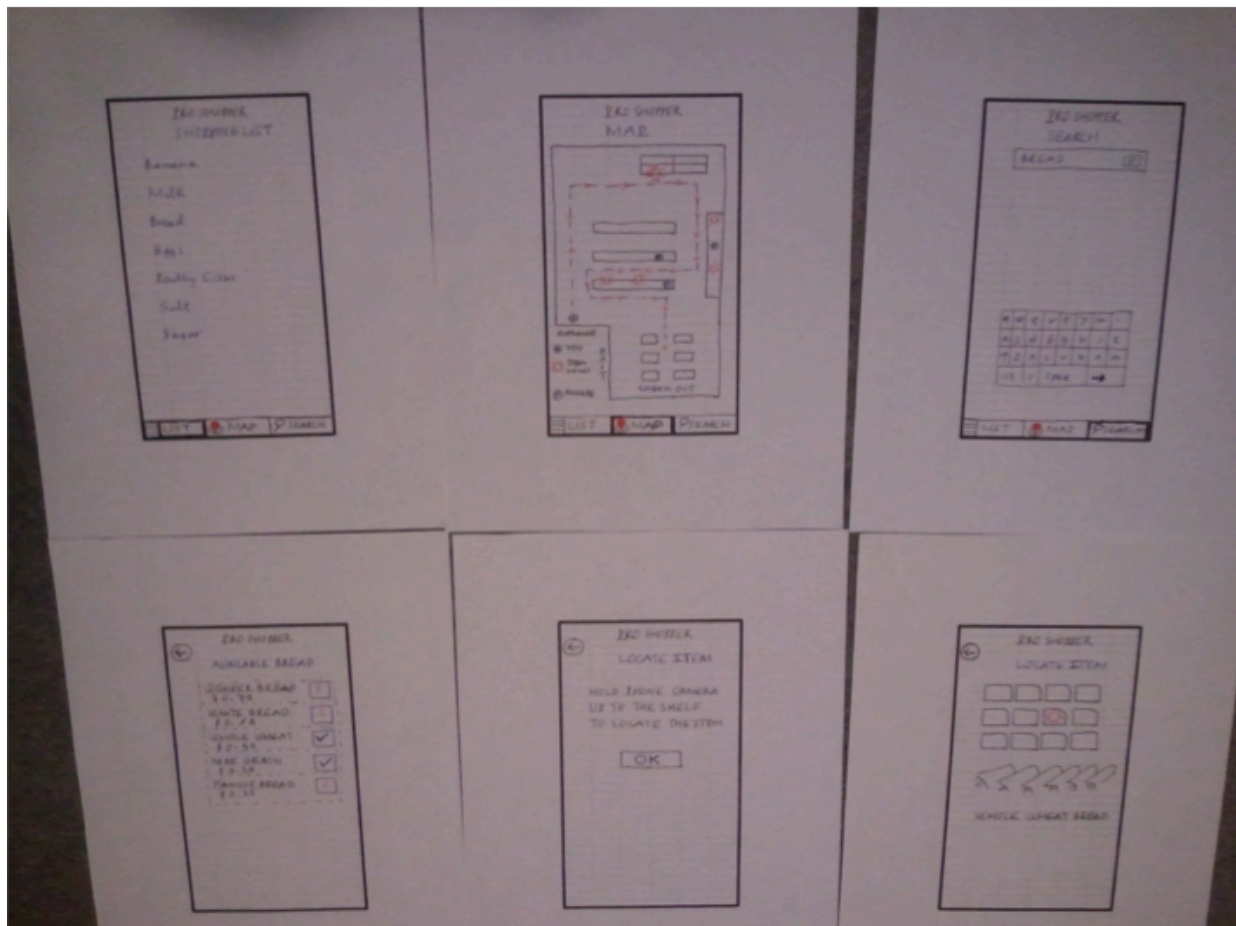


Figure 1

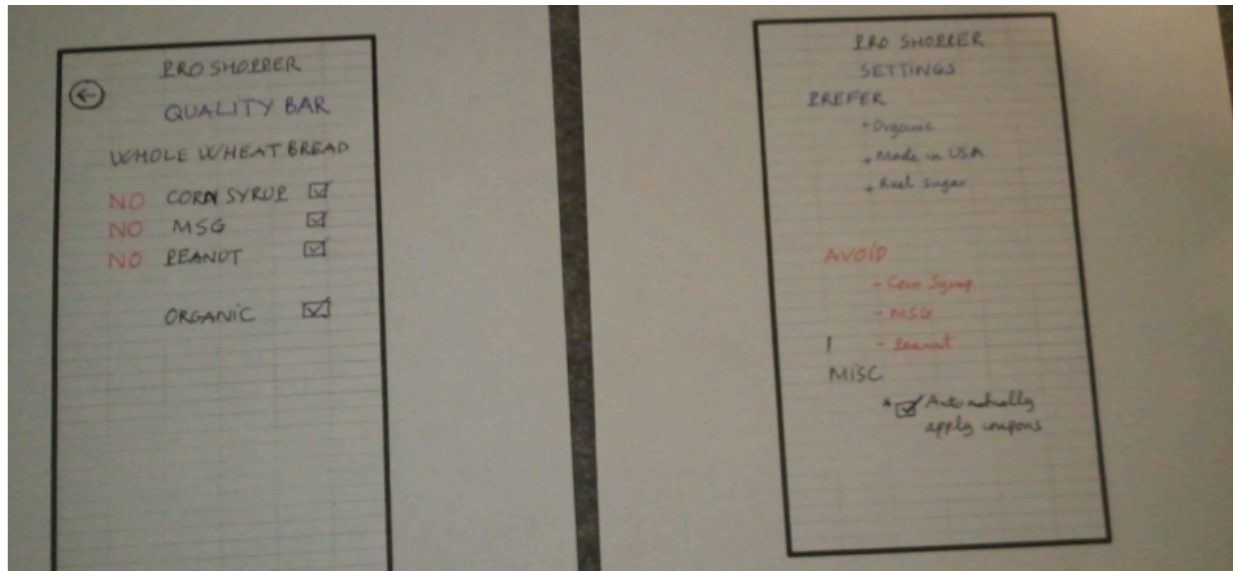


Figure 2

Testing Method:

Participants:

Shankar Sundaram:

Shankar is an independent consultant in his mid 30s. He was used to a hectic travel schedule, always living out of a suitcase in a different city every week as a consultant for Accenture. He recently quit his job at Accenture to start his own business to be able to spend more time at home with his young daughter and wife. He remembers often struggling to find basic items in a store while traveling to new cities and thought the concept of a shopping assistant would have helped him while on the go.

Pritha Chaudhuri:

Pritha is a busy mom who is juggling a hectic work schedule at a small startup and young toddler at home. At work she is the head of operations for a family owned logistics and shipping business, so her forte is in planning and organizing for efficiency. When it comes to shopping, she often aims to be quick and efficient so she can get in and out of the store before her toddler starts fussing.

Ramya Vaidyanathan:

Ramya recently graduated from college and moved to the Seattle area to start a new job. Since she is new to town she finds that she is still exploring different neighborhoods and stores to find a place that she can feel comfortable in and call home. She moved from California where she was used to shopping in the same grocery store since elementary school. While she admits that much of the large chain grocery stores are roughly structured the same, the subtle differences in Seattle still causes her to take a long time to find things in a grocery store.

Environment :

Ideally, our participants would have been able to test our paper prototype while in the grocery store however it would have become unwieldy for us to run the study with several sheets of paper for the study while in a store.

To modify and accommodate for this, the priming conditions for the study included framing for what the interface would be used for. All participants were informed of the following:

- The interface we would like your help in evaluating is going to be used for shopping in grocery stores.
- Participants will be asked to explain or give a quick overview of their grocery shopping habits, what they take with them, how frequently they shop, etc.
- The interface we are going to show you is for a mobile app. This app can be used to track your shopping list and help you find the best price for an item, locate it within a store, etc.
- The participants are then shown the first screen of the app UI which is the shopping list and inform them that this is a shopping list they created at home and is now ready for them to refer to while at the store.

Tasks :

The tasks were broken down into Easy, Medium and Difficult to span the variety of tasks we expected the participants to be able to accomplish.

We decided that tasks were easy if their solution was easily discernible from the user interface and fell naturally into usual shopping habits. Medium tasks required the user to be able to modify their typical shopping habits and rely on the interface to help complete their task. Hard tasks required the user to be able to determine that complex tasks could be easily accomplished within the interface. This required a deeper level of understanding that the user hopefully surmised from the problem statement or from previous tasks.

Easy:

- For an item in the shopping list, find the product that is the best priced to buy.
- Given the list of items in your shopping list find a way to get around the store efficiently
- Find an item not already on your shopping list

Moderate:

- For an item in the shopping list, find where the specific product you wish to buy is located in the store/shelf

Difficult:

- For an item in the shopping list, find the product that is the best priced and doesn't contain certain ingredients you are allergic to (example: Nuts, Gluten, etc)

Procedure:

To prevent bias while running the study, one person created the paper prototype while keeping the tasks in mind. Another person ran the study using the paper prototype with the participants. This way, any preconceived notions or implied designs weren't accidentally introduced to the participants.

Participants were first given the priming conditions outlined in the environment section. Following this, they were led into their first task.

Participants were asked to point or touch/tap using their fingers on the interface, and talk out loud their impressions or thoughts. The person running the study captured notes and later collated/synthesized the raw notes.

Test Measures:

The core measures we looked for during usability testing were:

1. Could the user complete the task via the user interface
2. Would they start or refer to the interface without being prompted by the person running the study
3. Would they comment on how they would use the interface for other shopping tasks
4. How often they would get into an error state and have to press back to get out.

We learned that most participants were familiar with smartphone interaction models and easily knew that tapping/pressing on an item would reveal details. This led them to quickly accomplish the easy tasks with no prompting

For the medium tasks, 2 of the participants had to be prompted to use the interface to locate a product on the shelf. For the hard task, 2 participants had already discussed the markup/annotation to indicate quality bar on the products list and had good feedback on making the mark up more intuitive

All 3 participants were able to comment on how they would adapt the interface or add more detail to clarify and make it intuitive.

None of the participants hit an error state or got stuck and needed prompting on how to proceed.

Testing Results:

Below are some of the major themes we learned from studying three participants run the tasks on our paper prototype:

- Price was not always the primary consideration when making a purchase
 - Participants would often choose products like nine grain and whole wheat bread based on name because it was healthier than pure white bread.
 - All three commented on wanting the ability to see all ingredients for a

- product
 - Some interesting suggestions from participants included pulling the quality products sorted by price to the top of the list, and then having the rest of the products that didn't meet the quality bar follow after
- Maps view is a great route planning overview of the path through the store, though it wouldn't be used for regular quick grocery runs that entailed less than 5 items (Bread, Milk, etc)
- Participants wouldn't think to use their phone to complete the task of locating an item on the shelf
 - Though one participant mentioned it would be super cool to have this, she only realized after looking at the interface that she could achieve this behavior. Most of the participants usually defaulted to scanning the shelf

Participants were most confused by:

- The quality bar mark next to the products list for an item. Some participants thought that it meant the product was not available
- The list of products shown by brand and price didn't indicate that this was an inventory of products in the current store. Once participants were made aware of this, they immediately started seeing value in the list.
 - Without that knowledge, one participant wondered why she would want to see a list of products for all items available online
- The search interface to find a list of products didn't flow into their natural pattern for how they would find this in the store
 - One participant mentioned that having a voice command to add items to the list so he could have his route adapt to the growing items on his list would be useful
 - One other participant mentioned that making a list was not her method of shopping. She would only do this if she was making a new recipe or was looking for something in a specialty store she didn't frequent often.

Participants found the following aspects of the interface desirable:

- When talking through having their previous list automatically maintained in the shopping list, most participants were enthusiastic since it helped them use it as a reminder to pick of essentials on a weekly basis
- When talking through the waypoints on the map altering them to sales and deals on their favorite items, this was received enthusiastically by one participant
- The concept of finding products on the shelf via a camera felt less useful in the grocery store, however one participant called out that this would be really useful in small displays and shelves like cosmetics.
 - When participants want something very specific, the locate on shelf flow was useful, however many didn't anticipate having to use it often

Interface Revisions:

The biggest change that we made in the UI was the elimination of the search tab in favor of a button for adding an item to your shopping list. This can be seen in figure 3. We found that the separation between comparing products for an item on your list, and searching the store for an item you may pick up, was not intuitive. Instead users wanted to add items to their list on the fly and then navigate through the list like usual to compare products. The new add button simply adds an item to the list. The new item can

be clicked like the others to bring up a product comparison page. In addition, an update to the shopping list would trigger an update in the store route.

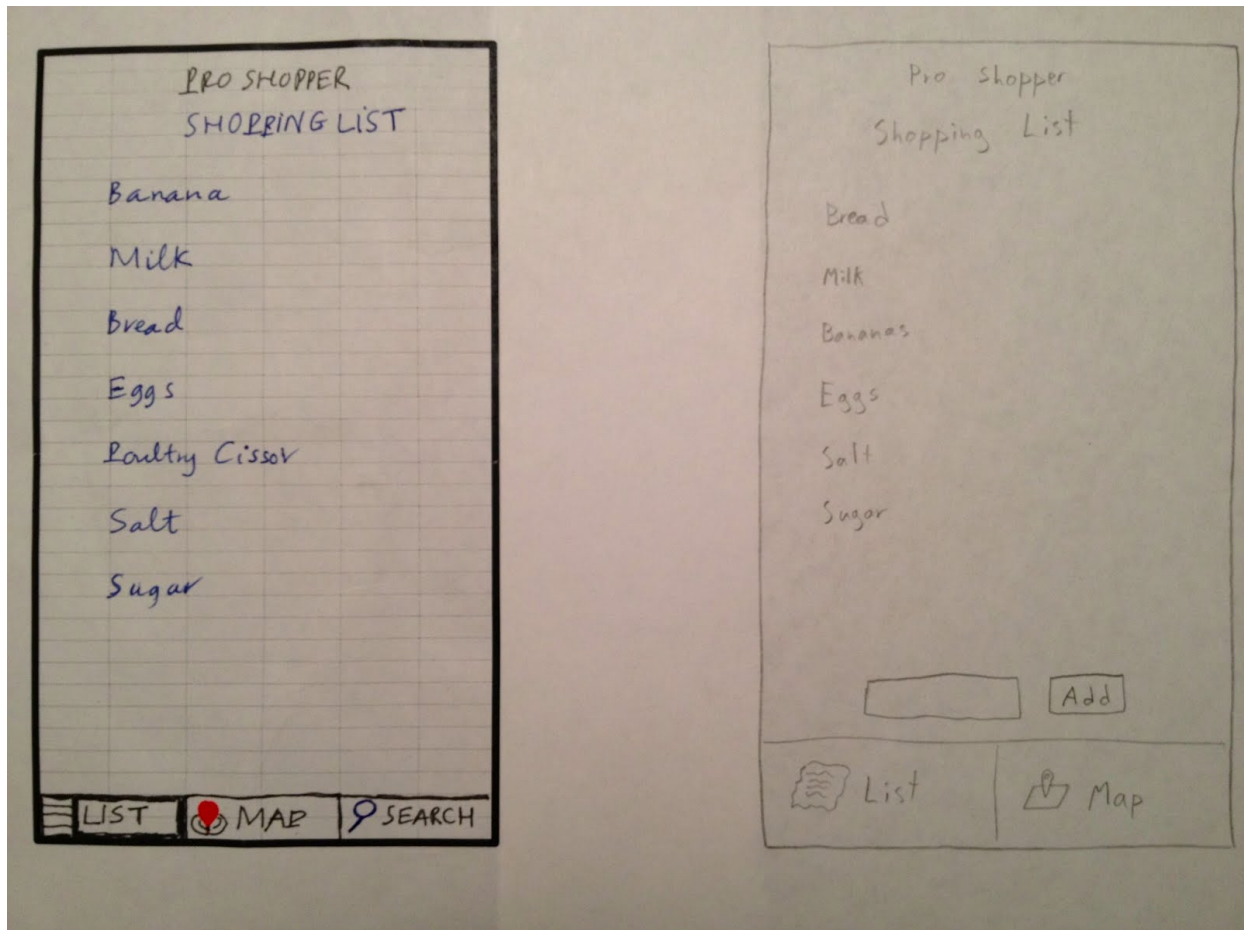


Figure 3: Revised version on the right.

User study participants mentioned that it would be helpful to sort comparable products first by quality bar status and then on price. The revised UI for the product list page does exactly this. In addition, it addresses the confusion with the static quality bar image by replacing it with any number of images for each of the quality bar identifiers. For instance, in the first iteration, any number of quality bar attributes would be represented with a single image to the right of the product, now they are represented with separate images. If too many images are needed, the user would have to tap the product to see a more in depth description, but in practice we do not believe that many products will have this issue. These changes can be easily seen in figure 4.

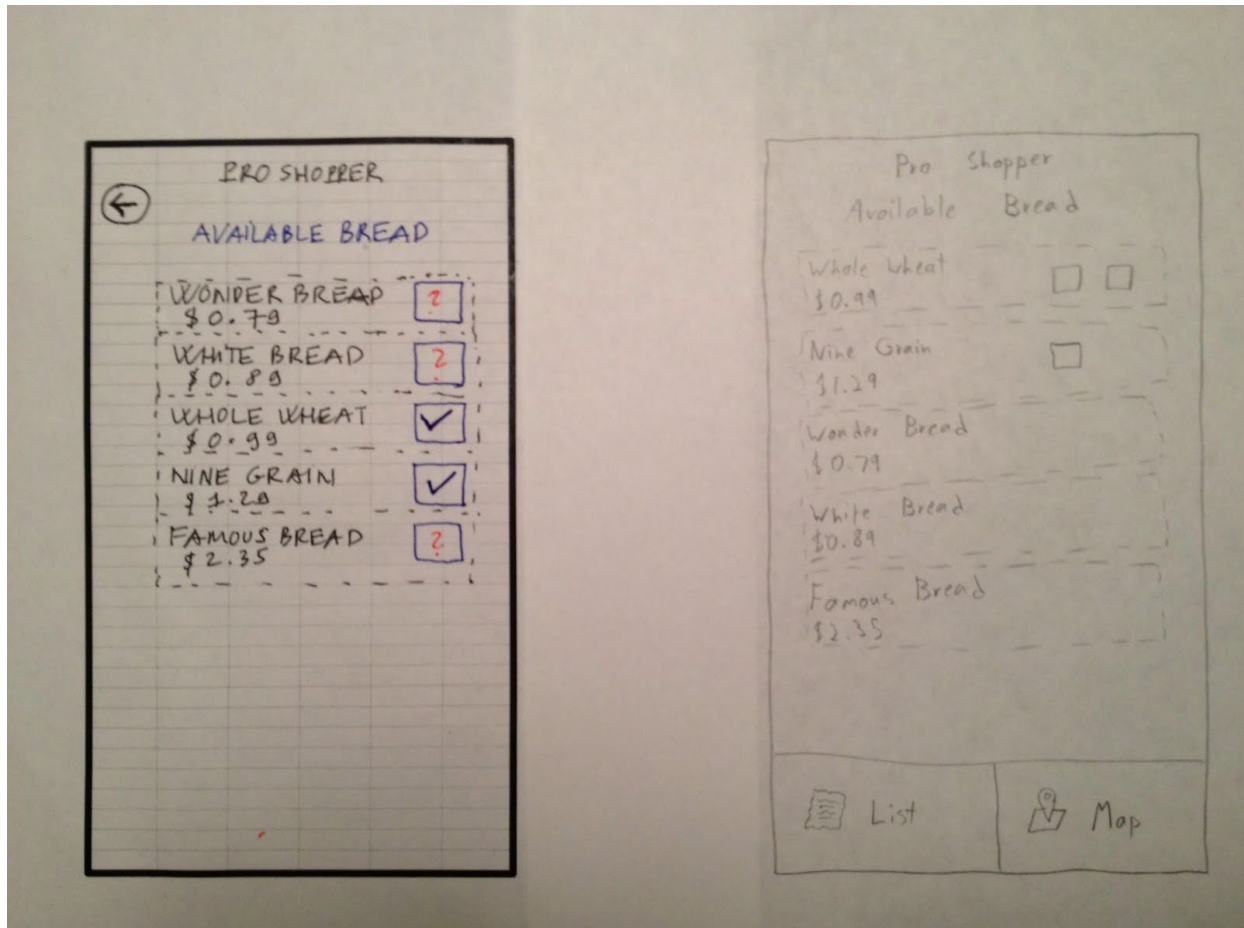


Figure 4: Revised interface on right.

Figure 5 shows the last of our changes. Participants mentioned that they would like to see more details about the products, in particular, a list of ingredients. This information as well as a larger view of the quality bar icons for the product are accessible as another page. One can navigate to by tapping a product in the product list page from Figure 4. This page replaces the quality bar page from the first iteration. In addition to providing ingredients information, this page also contains a button that bring you to the on shelf locator tool. Based on participant feedback, this tool was not as frequently used as we expected, so we buried it a little deeper in the UI so that it does not detract from other features.

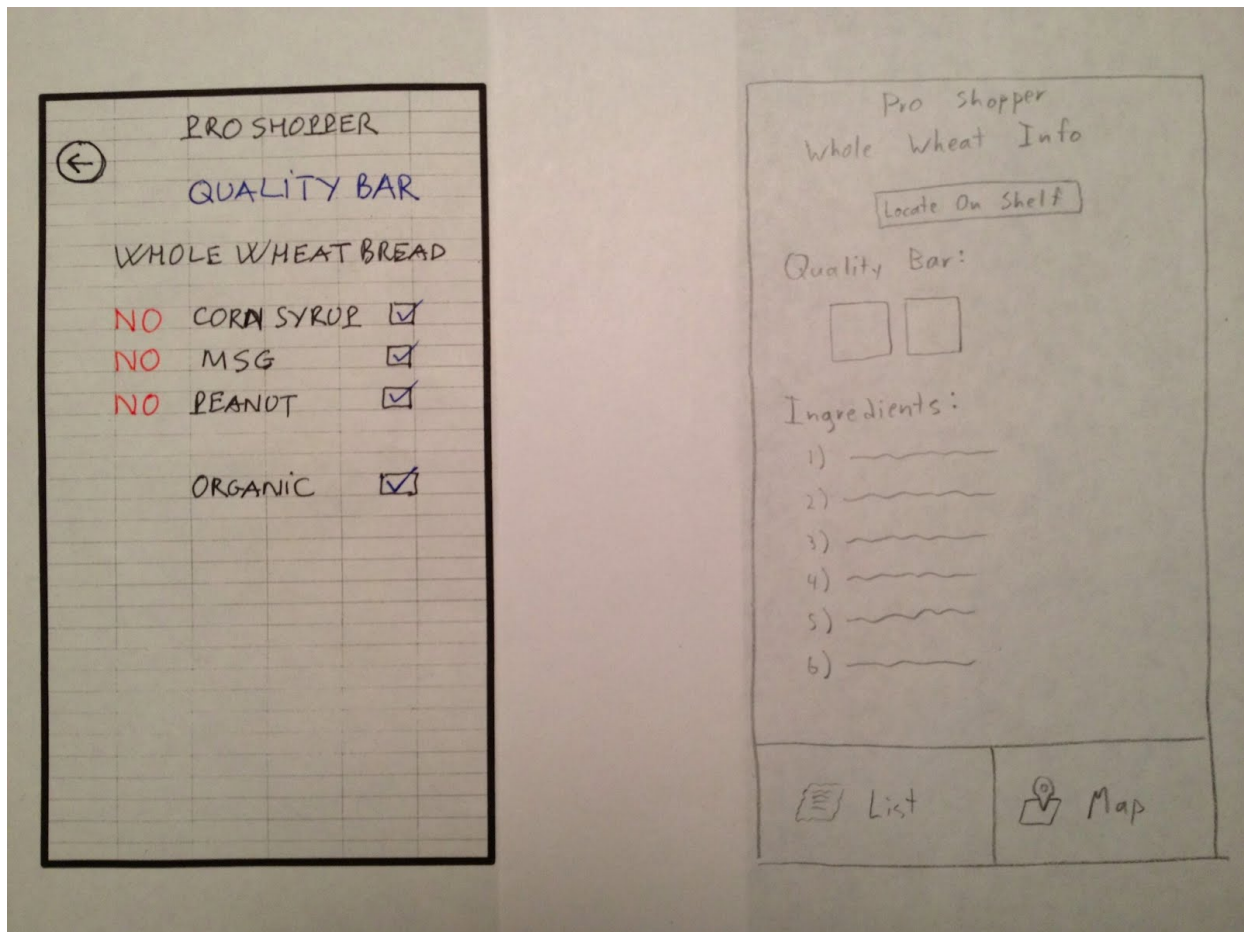


Figure 5: Revised interface on right.

Interactive Prototype Overview:

Description:

Our interactive demo is implemented as a single HTML5 web page. When the user clicks the start button on the page, the interactive demo launches inside of an iPhone image that is the same size as a real iPhone. Any clickable object in the demo produces the pointer cursor when hovered on. Any clickable object whose applicable data was not included in the implemented will warn the user of this and produce no results. There are 5 screens total including the shopping list, product list, product details, on shelf location and map pages, each of which is visible in figure 6. A user can go back a screen using the back button in the upper left, however clicking the list or map tab buttons erases the history. The demo provides just enough fake static data to allow the user to get through the suggested tasks. A description of these tasks is listed on the page when you start the demo and is also listed below as our scenarios.



Figure 6: Interactive prototype screens.

Scenarios:

The interactive demo is sufficiently implemented to guide you through the following scenarios which are based on the tasks given to the participants of our user study. These scenarios build from easy to hard.

1. Bread is on your shopping list. Using Pro Shopper, determine which bread product that the store offers is least expensive.
2. Pretend you are in the bread aisle, but you just don't see the product you just decided on. Locate it on the shelf using Pro Shopper.
3. You are craving some chocolate, but you are lactose intolerant. Use Pro Shopper to find the least expensive dairy-free chocolate the store offers.

Completing these scenarios can be done as follows. The screen we refer to here are in order from left to right in figure 6. Larger versions are also explicitly labeled in the appendix.

1. From screen 1 the user must click the break list item, which directs them to screen 2. Now the user must compare the price of the first quality item with the price of the first non-quality item. You will find that Wonder Bread is the cheapest, clicking it will bring you to screen 3 where you can view more details about Wonder Bread.
2. Completing this scenario is simple if you start from where you left off in the first scenario. From screen 3 the user need only click the "Find on Shelf" button to be directed to screen 4. Alternatively, the user click the map button at the bottom of any screen to be directed to screen 5. From here, the user would click the red waypoint that is closest to the blue waypoint (you). This brings you to screen 2. Clicking the same product you selected in scenario 1 brings you to screen 3 and here you are again presented with the "Find on Shelf" button.
3. Chocolate is not initially on your list so you must first add it using the button at the bottom of screen 1. Once chocolate is on your list, the user must tap it which brings them to screen 2 for chocolate. The user must now examine the quality icons and find that Ghirardelli is the item they seek.

Tools Used:

Our interactive prototype uses standard Javascript, CSS, HTML web development technologies. The webpage is simple HTML and CSS, while the interactive demo is implemented with a single Javascript file. We used jQuery and less.js to help ease the Javascript complexity and CSS complexity respectively. Less.js helped me nicely write CSS for each of the demo page views in a clean way and jQuery helped me write a lot of the code in a clean way. None of the tools used hindered us in any noticeable way.

Unimplemented Features:

There are two major features that we left fully unimplemented. We did not implement the preferences pane, which provides the user the ability to refine the importance of quality bar identifiers as well as whether to factor coupons into product prices. We also did not implement the on-shelf location tool, and instead filled the page with placeholder text. These features were not needed to perform our scenarios and would have introduced significant implementation complexity. These features were however present in the paper prototype and are visible in figures 1 and 2.

We were also unable to represent aspects of the application like including recurring items in your shopping list. This feature is very data driven and doesn't have a clear representation in a prototype. However, this aspect of the application was not needed to perform the scenarios, so we left it out.

We would have liked to make the waypoints on the map throb, but the implementation complexity of doing so was too great. In a working app, the waypoints would throb and your location waypoint would track your current location.

Project Summary:

Roy:

The project was great. I think that it was just complex enough that we were able to focus on the user facing issues, yet simplistic enough that we were not bogged down with app specific details. Even though the project went very well, I thought the problem we were trying to tackle may have been too broad to allow us to satisfy our customers. People have such different shopping styles and concerns that I think it may have made thinking about the problem space easier if we had narrowed it down.

Huy:

The project idea was simple enough for all involved participants to understand and explain to others quickly. It was also complex enough in terms of technology adoption, allowing us to incorporate recent technologies. We were able to practice and learn from different techniques of HCI. I could see clear project progression from when we started with a concept to the final prototype that took into account of the user study feedbacks. In my opinion, the most interesting part about the project was seeing how different project ideas and designs come together in our final design. I could see myself applying the same process for my future projects at work.

Priya:

The concept of helping users efficiently navigate a grocery store was initially sparked by the IDEO video on improving the shopping cart. While a lot of our initial focus was on trying to leverage sensors to help users efficiently complete their shopping tasks, our contextual inquiry quickly led us to realize that some of those concepts were too broad and had to be narrowed to fit specific scenarios. While we only observed 3 participants for our Contextual inquiry, I think we needed a larger sample set of participants and perhaps spread across several different locations to see what patterns and themes emerged. Our learnings from the usability study on the paper prototype helped us further refine our thinking and thought process for how tasks should be presented. Overall, the process of contextual inquiry, paper prototyping, usability study helped us refine our thought process in a systematic manner.

Appendices:

Raw Notes:

Participant 1: Shankar Sundaram

For task 1 the participant would have picked wheat bread.
Wants filters to only have participants.

Participant thought that the question marks next to the items (quality bar marking) meant that there was no data for it.

Price in the case of the bread shopping task was one consideration, but the health aspect of the choice in bread was an equally important consideration.

The second task relatively easy to accomplish for the participant.
The first comment on the screen with the list of the bread
Participant commented that it was not super obvious that pushing the question mark would lead them to see the metadata/quality of the ingredients next to the item

They thought each line item was one hit target

The third task:
The participant couldn't understand from the UI that the quality bar UI was indicating specific filters

Didn't understand where to set filters for the quality bar
Paper prototype didn't completely draw this out and caused confusion for the participant.

Participant wanted to understand if the prices were for the current store they were in.
The quality marker next to the items continued to be a problem point

Perhaps sorting by price on the items with checks first and then the items that were not meeting the criteria

Would be useful if the items purchased were newer items where I needed to do a lot of comparison. Bread is something I purchase all the time and I have a go to brand...may not refer to the list.

The maps UI was easy to access
The concept of favorites was introduced first in the maps and got confusing

Maps was found to be useful. Would use this all the time. Always takes me to the frequent things I buy and I can pick it up, no need to compare items.

Would like to be able to use voice to add things

Searching for and adding an item that is not on the list takes the participant directly to

the search results and doesn't add it to the list.

Want it on the list so it can be mapped as part of the route.

Mentioned that frequently purchased items would be great to have already populated on the list.

Feels that the concept of showing favorites on the map feels like information overload because sometimes I don't want to be aware of it

When explained that favorites indicate that you frequently purchased item is on sale, the feedback was that the icon for f was too confusing. Preferred star.

Participant 2: Pritha Chaudhuri

When talking about taking a smartphone into the store, she mentioned that she uses it to keep her toddler distracted while shopping.

She might have to fight her son to get the phone back to use the app while shopping.

Task 1: Shopping for bread. She indicated she would look for the item on the shelf

When asked if she could do it via the interface, she admitted that she could, but called out the natural way she would find the product first.

From the list of breads, she thought it was the list of all breads available at any store. When she learned that it was the list of inventory in the current store, that was pretty cool.

Immediately scanned down and went to the whole wheat and whole grain bread. Rather than price for bread she wanted healthier bread instead of pure carbs

Task 2 - finding an optimal path through the store...she thought this was cool to have when she had weeks with non standard grocery items on her list because of a party or guests

Wouldn't use it for simple/quick runs like Milk and bread

Find an item not on the shopping list - the participant first called out she would go to the aisle where the product she wanted would be

When asked how she would work through it in the interface, she tried to map her existing pattern for navigating the store to the UI. She wanted to find a way to see the list of aisles so she could see products by aisle.

When prompted if there was another way, she thought for a moment and then finally settled on search. When asked about what she thought here, she was clearly conflicted. Her reaction was the searching via the interface for an item felt less direct than just finding it in the store.

She mentioned if it was easier to locate the product via the interface, she would ofcourse change her habit to save herself some time of wandering between aisles

For quality bar ingredients list she wanted to see a more comprehensive list of filters and options that would allow her to specify constraints to ensure products were safe for her kid. She was conscious of healthy as well as nutritious snacks.

She mentioned liking to have some information on alternative products to consider that people would have recommended for her kid. She says she is still learning to shop for her toddler's diet while balancing meal planning for the family.

Participant 3: Ramya Vaidyanathan

Found that the UI was sorted by price was useful.

Found the mix between name brand and generic bread types in here

Felt there were some missing breads

When the participant found out that the list of items was filtered based on their current location.

Would like the app to track the history of my purchases.

Inform me that the brand I buy is far away and is current available in my store, I would like to know about it

Example: specialty items like quinoa, bulgur, sprouted bread

Would use the camera based identifier for hard to find items. Wouldn't use it for items purchased daily like milk and bread. Would use it for specific type of salsa by one manufacturer and one flavor, would find this functionality useful

Would find this useful for beauty products

These are smaller and easier to miss

Example: the specific eyeliner you are looking for and its hard to find it. Would find the picture based identifier

Would like to know what the items on list marker by tapping on icon

Would use the map feature to navigate efficiently

May use it on occasion if I have some item on my list that I don't normally or frequently buy

Would use it the first few times in a new store

Might use it in a major rush....if I knew the store well, I would know how to be efficient/

Quality bar - people want to see ingredients list. Want to see the full list, a sub section of quality items is not enough

The quality bar UI was pretty confusing - really wanted full list and the check boxes were throwing off the decision making process.

No MSG with check mark make it seem kidish and not adult friendly

Organic has lots of different levels of organic and want to see what level of organic the

product. Need to see the logo for organic certification so it lends to authenticity of the data.

Interactive Prototype Screens:

Screen 1 (left) and Screen 2 (right):



Screen 3 (left) and Screen 4 (right):



Screen 5:

