



Snapily

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Abstract

For most people, grocery shopping is an everyday, mundane task. For low-income Americans, however, accessing fresh, healthy, and affordable food is significantly more challenging. Snapily aims to alleviate this social disparity.

Snapily is a mobile grocery shopping application offering low-income Americans the opportunity to pick up their groceries within a short walking distance from their home. It also allows for payment processing with SNAP and WIC benefits.

Over the course of this project, we researched, designed, and iteratively developed the implementation of this app in order to successfully address the needs of its users. Through successful user interface interaction and subsequent operational services, Snapily aims to improve low-income populations' access to nutritious, affordable food.

Introduction

THE PROBLEM

Grocery shopping can be a tedious, unpleasant experience for many low-income Americans. The USDA estimates that \$13.5 million low-income Americans currently live in “food deserts” where at least 500 people and/or 33% of the population live more than one mile from a supermarket (USDA). For these residents, especially those without a car, accessing supermarkets that offer a selection of fruits, vegetables, and whole grains can be very difficult.

In the absence of supermarkets, residents in low-income, urban areas are surrounded by a higher volume of corner stores and fast food restaurants than what is normally found in higher income areas (Walker & Keane). Although convenient, these corner stores and fast food restaurants offer mainly cheap, nutrient-poor food options. Even when some healthier fresh food is available in these locations, the freshness quality is often so poor that these items are unappealing to customers.

Not only are nutrient-poor foods more readily available in these neighborhoods but they also are more cost advantageous. Healthy food is often more expensive than nutrient-poor food (FRAC). In addition, convenience stores often charge higher prices on all products, thereby further limiting residents ability to afford healthy food. According to Food Research and Action Center, this inaccessibility of healthy food options, both in terms of geography and costs, has serious consequences. The poor nutrition diets of low-income residents resulting from these environmental factors increases the population’s vulnerability to health risks such as obesity and contributes to national health disparities.

Given this negative health impact, a program which overcomes the distance separating low income residents and supermarkets would seem to offer considerable benefits to the health and well-being of low income populations. So why haven’t any notable organizations or businesses worked on this idea before?

BARRIERS TO ENTRY

SNAP

One potential barrier to entry for grocery delivery services in low income neighborhoods may be the inadequate technology behind the most popular government program tackling this issue - SNAP.

SNAP, or the Supplemental Nutrition Assistance Program, is a federal aid program administered by the US Department of Agriculture. SNAP was created in 1939 (then known as the Food Stamps Program) as a way to fight widespread hunger during the Great Depression by providing those in need with additional funding for groceries

Today federal SNAP benefits total more than \$74.1 billion (fiscal year 2014) and approximately 46.5 million Americans receive an average of \$125.35 in monthly benefits. According to California Department of Social Services, approximately 4.4 million people (2.2 million households) are enrolled in the California SNAP program, also known as CalFresh. According to the same source, the number of participants in Feb. 2015 has nearly doubled since 2009. Since its implementation, it has had a significant positive impact on addressing food insecurity and malnutrition. In 2012, an estimated 4.9 million people were pulled out of poverty thanks to the program (FRAC).

In order to use their benefits, participants receive an Electronic Benefits Transfer (EBT) card which allows them to authorize the transfer of their government benefits from a program created bank account to a retailer's account. Each SNAP participant has a secure PIN code, akin to a debit card pin, which they can use to verify their identity when authorizing a transaction.

One notable difference between EBT cards and other cards that follow a debit model, is that EBT cards are handled by payment processing vendors (E.g. Xerox) and not securitized against fraud by major credit card companies. Because of this, online transactions are problematic and users can only use them in person when they are able to type in their PIN. This requirement has therefore understandably limited the ability of delivery services to process EBT payments online.

WIC

Another potential barrier to entry for grocery delivery companies in low income communities may be the similarly complicated payment and product requirements of the WIC program.

The Special Supplemental Nutrition Program for Women, Infants, and

Children (WIC) program is a federal assistance program administered by the Food and Nutrition Services of the USDA. The program provides federal grants to states to help cover supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk.

According to the USDA WIC Program, more than half of all infants in the US benefit from the WIC program. In 2013, the number of monthly program participants receiving WIC benefits exceeded 8.6 million. Of these, 4.6 million were children, 2.0 million were infants, and 2.0 million were women. To cover all costs, Congress appropriated \$6.5 billion for WIC in 2013. In California in particular, 84 separate WIC agencies provide services locally to over 1.45 million monthly active participants.

In most WIC state agencies, participants receive paper checks or vouchers to help purchase food classified as nutritious. This archaic paper system therefore requires participants to personally bring checks to the store or authorize another individual to do that for them. The requirements surrounding which products qualify for the items printed on the checks are not obvious. Often, WIC participants have to use printed materials to look up what items do or do not qualify for WIC. If participants accidentally select an item that does not qualify for a check they must hold up the checkout line while they replace the item. The need to authorize the paper checks against the participant's signature as well as the need to sort and check all products manually against the checks causes significant delays in checkout lines. These delays cause the WIC participants significant embarrassment and often result in unpleasant interactions between cashiers and WIC users. Overall, the WIC checkout experience is complicated and unpleasant for everyone involved.

Given the complicated nature of these WIC transactions with paper checks and in-person cashiers, again it is not surprising that grocery delivery services would not be interested in serving low income populations.

EMERGING OPPORTUNITIES

Technology

Fortunately, recent innovations in debit card PIN processing have broadened the possibility for EBT online payments. One company, Acculynk, located in Atlanta, GA, has recently introduced technology that allows consumers to pay for online purchases with their debit card. Users securely enter their PIN using a graphical interface whose entry is scrambled and transmitted using geoplain coordinates rather than the actual PIN digit transmission. This proprietary technology is called PaySecure and has been awarded a patent.

Another innovative payment process is Payline. This company has developed the capability to handle EBT payments via usage of APIs. In combination with Acculynk's PaySecure, Payline's EBT payment processing could allow for a complete online payment processing solution.

In addition, well-established optical character recognition technologies now make it possible for WIC checks to be transmitted to digital formats. Though the checks still cannot be processed online, they at least can now be read for contents. This step enables online platforms to then crosslist the check requirements with the resources on what items are WIC eligible to only show WIC eligible items.

Political

In addition to technological opportunities, political opportunities have recently increased the possibility of a grocery delivery service for low income populations. As we have learned from interviews with various program stakeholders, the USDA is currently in the process of awarding two states with a grant to launch a SNAP online grocery delivery service pilot. Retailers that would like to be selected have to follow a list of guidelines that, among other things, require them to outline how they are going to serve food desert and low socioeconomic areas. California is currently in the process of applying to the USDA to pilot this program. Thus there is considerable local political interest in the idea.

Business

Finally, there is also a wealth of business and mobile grocery shopping innovation from services like Instacart, Google Express and Amazon Fresh. Each of these businesses have established successful models for mobile grocery ordering and associated business operations to support fulfillment of delivery. Despite their success, each of these solutions caters primarily to middle class and wealthier clientele, not having designed technology and business solutions to serve lower income shoppers. A market is still open for a low income customer population.

OUR SOLUTION

In light of these developments on the technology, political, and business fronts, our team saw significant potential in developing a grocery order and delivery mobile app for low income users, which we named Snapily. Snapily helps low income families have better access to healthier and more nutritious food. Users can pay for their order using any combination of EBT, WIC or regular debit/credit cards. There is no comparable solution currently available to SNAP and WIC participants.

On a more personal note, we also set out to tackle a social issue such as

this under the shared belief that technology can and should be used to address social injustices. In future professional endeavors we may not have the opportunity to do this, so we wanted to take advantage of our time, creative freedom and available resources as graduate students to work on building a technology for social good.

Thus, we set out with this project to develop this application as a proactive step to address the needs of SNAP and WIC program participants living in food deserts.

Generative Research Systems

In order to first decide on the functionalities and scope of our project, we began by understanding the existing systems, technologies, and user population. Our goals with this initial research were to answer the following questions:

- How do the existing SNAP and WIC programs operate?
- How do existing grocery delivery businesses operate?
- How should we define our target user population?

METHODS

To best answer these initial questions we used a variety of methods including contextual interviews, user interviews, observations, competitive analysis, and demographic research.

Contextual Interviews with Experts: To better understand the SNAP and WIC programs, we conducted 12 interviews with an array of policy experts from Bay Area food banks, San Francisco and Alameda social services offices, Code for America, a Board of Supervisors office, and local nonprofits.

Competitive Analysis: To better understand the operations of delivery businesses currently in the market, we performed a competitive analysis. We examined 18 dimensions across 7 businesses, including Instacart, Safeway, Google Express, WalMart To Go, Blue Apron, Amazon Fresh, and FarmFreshToYou. (Appendix 1)

Demographics Research: For our first analysis of user demographics, we focused on collecting research online. We relied heavily on the Healthy Food Access Portal - a data tool recently released in a joint effort by the PolicyLink, The Food Trust, and The Reinvestment Fund.

SNAP User Interviews: We conducted a series of 8 interviews with San Francisco SNAP users to help us gain an initial, top-level understanding of users' opinions of the SNAP program. These were brief 10 minute interviews conducted while the participants were waiting to be seen in the San Francisco Human Services Agency Office.

Contextual Interviews with Peers: We also conducted 3 interviews with fellow UC Berkeley I School graduate students on related topics. Each

interview lasted 30 minutes. The interviews focused on technology use in government services, online grocery ordering, and in-person grocery shopping behaviors.

Observations: Finally, we conducted five user observations of sites relevant to our users' program and shopping experiences. For these observations, we visited a corner grocery store (Ashby Supermarket), a Costco store in the city of Richmond, the Alameda County Food Bank Super Clinic, the San Francisco Alemany Farmers' Market, and the San Francisco Civic Center Farmers' Market.

FINDINGS

The aforementioned methods resulted in the following findings:

SNAP Experiences Severe Enrollment Issues: California has a lower enrollment rate than most other states. Most users we interviewed found the enrollment process fairly straightforward, but there are many who are entirely left out of the system due to complex paperwork, interview requirements, language barriers, government distrust, lack of access to social services facilities and more.

County SNAP Programs are Disjointed: Since the programs are run on a county level, however, there are differences in enrollment and program experiences amongst Bay Area participants. This county level governance also makes it difficult for counties to share information and resources. Any changes to these state programs as a whole take an extremely long time given the disconnect between counties.

Competitor Services Have Complex Pricing and Logistics Operations: By analyzing several existing mobile grocery ordering apps as part of our competitive analysis we learned that most services achieve profitability through a combination of repricing items higher than in store and receiving discounted order pricing and processing through B2B partnerships with stores. These high sales margins were necessary in order to power relatively complex technology stacks and logistics operations, which require the building of a variety of standalone internal applications.

Low Income Populations are Accessible Via Smartphones: According to research conducted by the Pew Research Center in 2013, 43% of individuals with a household income of less than \$30,000 year own a smartphone. This percentage jumps to 77% amongst 18-29 year olds and 47% amongst 30-49 year olds in this demographic. Of all low-income smartphone users, 45% said they mostly use their phone to go online. Thus, a considerable number of low income individuals are accessible through smartphone technology.

Android is the Preferred Platform in Low Income Populations:

According to the same 2013 Pew research, 28% of cell owners in households with incomes less than \$30,000 say their phone is an Android compared to 13% who say it is an iPhone.

West Oakland Suffers Food Desert Problems: When looking at the Food Access Portal's map of Limited Supermarket Access scores, the West Oakland neighborhood suffers some of the worst access problems in the Bay Area with all scores in the area exceeding 40 (out of 100). In addition, the USDA measure of low income, low access tract clearly labels these same West Oakland blocks with high inaccessibility rates. Other areas with low income and low scores in the Bay Area include East Oakland, Richmond, and San Jose. (Appendix 2)

IMPLICATIONS

Based on this initial generative research on the existing systems, we came to the following conclusions as pertains to our project:

Snapily Will Operate as a Separate Entity: Given the complexity of the government programs, we cannot hope that any dramatic changes to the program will happen anytime soon. For this same reason, working together with a government body for this project is unrealistic given the amount of time we have for this project and the slow pace of interaction with government offices. For these reasons, we will assume Snapily operates separately, not jointly, with government programs like SNAP and WIC.

Snapily Will Target Users in West Oakland: Since research indicates low income users do have access to smartphones, the basic proposition of using an app to connect low income users to supermarkets still seems viable. Given that West Oakland suffers high food desert rates and is located nearby, we are targeting users in this population for further research.

Snapily Will be an Android Application: With higher Android use rates than iPhone in low income populations, Snapily will be designed and built as an Android app.

Generative Research

Users

Once we verified the potential of Snapily's operations and target population, we next dove in to better understanding what our users' needs were and how Snapily's business model could best serve those needs. Our goal with this next stage of research was to answer the following questions:

- What is the current shopping experience of our users?
- What is the ideal shopping experience of our users?
- What would be the best grocery delivery method for our users?

METHODS

User Interviews: To better understand both the current and ideal shopping experience of our users, we conducted a series of user interviews. We recruited these users from Craigslist posts and in-person solicitation at the California Hotel low income housing unit, located in West Oakland. We ultimately interviewed nine people, each interview lasting about 30 minutes to 1 hour. Eight of the nine interviewees were women. All were residents of Oakland from the neighborhoods of West Oakland, San Antonio, Emeryville, and North Oakland. Seven of the nine were participants in the SNAP program. Participants ranged from 22 to 50 years old.

Mapping Activity: To draw out more personal details from the interviewees and explore a different tactic for soliciting information, we also conducted mapping activities. We asked all nine of the same interviewees to draw for us a map of how they get to the grocery store. We asked them to draw what the best and the worst parts of the journey were.

Surveys: We conducted two rounds of surveys to collect more quantitative details on a larger user group. This generative tactic sought to help us understand patterns, behaviors, and opinions in the user population at large.

Our first survey was 30 questions long and included questions on demographics, technology usage, SNAP benefits, and order and delivery services. (Appendix 5) We distributed the surveys at a Richmond health clinic and the West Oakland California Hotel low income housing unit and received 28 responses.

Our second survey consisted of 20 questions covering demographics, technology use, shopping behaviors, and the possible logistics of delivery services. (Appendix 6) We distributed the surveys at the Alameda County Social Services waiting room and collected 13 responses.

Affinity Diagram: To merge and synthesize the results from our user research, we employed an affinity diagram. We wrote out the key findings from our interviews, mapping activities, and surveys on Post-It notes and then grouped them into themes.

FINDINGS

Shopping Behaviors Vary With Time of Month: SNAP benefits are distributed in the first week of the month. At this time users usually indulge in buying “treats” they didn’t usually get and bulk buy the staples (especially meat) that they need throughout the month. They freeze these goods and slowly use them throughout the month. They often run out of SNAP funds towards the end of the month and will then do the best job they can to stretch their dollars with canned and packaged food left in the cupboards. This behavior variation especially came to light in user interviews.

Prices Are a Crucial Factor in Decision Making: Although our team predicted beforehand that price would be an important part of grocery shopping for our users, our research indicated that we underestimated how important that factor really is. Low prices and bargains, more than cooking need, are the biggest determinants of what products users buy, as indicated by interviews and surveys. Users are willing to shop at a variety of stores for the best bargains possible and engage in cost-saving tactics like coupon clipping, deal searching, “rainchecking”, and more. No single tactic was a consistent primary option for all users.

Low Income Populations Strongly Value Community: Although our users faced many personal and collective obstacles as low income residents of food desert communities, we noticed a particularly strong sense of community and mutual care. Users we interviewed described taking care of other elderly residents in the building. Others described how a neighbor would cook food for them to meet their diabetic needs. Many of the users we interviewed seemed to be part of an active, caring community.

Users Varied in their Degree of Strategic Shopping: Some users were extremely methodical. They would review the weekly deal pamphlets, then come up with meals for the week, and then develop a shopping list. Some users carefully maintained lists of what items to buy at which stores in order to get the best deals possible. Others kept shopping lists on their phones. Others did not use lists at all and simply decided in the

cided in the store what items to buy based on looking at the deal publications or price labels.

It's Difficult for Users to Get to and from Supermarkets: Users described a range of obstacles encountered while getting to supermarkets, including verbal harassment, early store closure hours, the temptation of unhealthy closer liquor stores, unpleasant buses, and difficulty carrying the groceries.

Users Felt Shopping in Stores Offered Both Benefits and Drawbacks: Users appreciated that physically visiting a supermarket offered them plenty of visual cues to remind them of what items they may be missing. They also appreciated the ability to inspect their items. For example, they like being able to touch and feel produce for ripeness. However, they did not like how the inventory of some supermarkets like Grocery Outlet was unpredictable and how they were more likely to make impulse buys based on store displays.

SNAP Checkout Stigma Depended on Store: Although we had heard beforehand that checking out with SNAP was often embarrassing for participants, we were surprised to find most of the people we talked to felt no embarrassment at the lower-priced supermarkets. Several users, however, commented that they were more embarrassed when they occasionally shopped at stores with more affluent customers, such as Whole Foods, Berkeley Bowl, Safeway, or farmers' markets.

WIC Checkout Stigma is Significant: Given the strict nutrition guidelines and archaic paper check system of WIC, checkouts for WIC users are extremely time-consuming, frustrating, and embarrassing.

Users Had Mixed Opinions on Pick Up Versus Delivery: Some preferred the idea of a pickup model where they would walk a short distance to pick up their order. One user explained that many low income users suffer mental health problems and it was beneficial for them to get out of their homes. Another liked the idea of being able to pick up groceries at off-hours when supermarkets were closed. Yet another thought pick up was superior to a door delivery model since it was quite likely door-to-door deliverers may be robbed. Still, many participants preferred a delivery model for the convenience and privacy. Some of these suggested a pickup model could elevate stigma issues since all those visiting the pickup location could then be publically known as SNAP/WIC participants.

Many Users in West Oakland Have Free Government Phones Without Internet Access: A surprising number of the West Oakland residents we interviewed were not suitable users for Snapily because they used cell phones without internet access given to them by the government through programs like Lifeline, which allowed for limited data usage.

IMPLICATIONS

Based on these findings from interviews, mapping activities, and surveys, we came to the following conclusions about our emerging Snapily app:

Snapily would have significant difficulty accessing its ideal target

users: As we discovered by the end of our interviews, the users we were able to find and interview through a Craigslist ad did not fully reflect the diversity of our ideal user group. For one, most of those who had the time and interest in meeting up with us were unemployed. In addition, the fact that they replied to the ad suggested they felt less embarrassed to be identified as a SNAP or WIC participant than others. Thus, although we were able to come relatively close to finding our target users, we would need more time, funding, and connections to successfully find our ideal, diverse user group.

Snapily should offer WIC users a simplified checkout process: Although we had not originally planned to incorporate WIC users in our target user population, interviews revealed this group suffered significantly and it would be worthwhile to include them in our project.

Snapily should offer a pick up model instead of a door-to-door delivery: Given our users' concerns that deliverers might be at risk of robbery and that community interaction was an important aspect of shopping to our users, Snapily would be more successful using a pickup instead of delivery model. From a business point of view, this would also allow us to save costs by minimizing transportation costs with bundled orders. Given the strong sense of community, these pickup locations should be located at community locations, such as schools, churches, libraries, etc.

Snapily should target users in the broader Oakland community: Although initial demographic research indicated low income areas such as West Oakland would have adequate smartphone usage to access Snapily, the concentration of free government phones without Internet access in West Oakland reduces the potential. Thus, moving forward we decided to broaden our geographic focus to Oakland overall, particularly by serving San Antonio residents.

UX Design

To build the idea and goal of Snapily, we completed several iterative rounds of design and user testing. We started by relying on existing designs but gradually altered our design to best fit our users' unique needs.

ITERATIONS

User Personas: Before beginning our design work, we created three user personas based on our user research findings. These personas helped us to keep in mind the diversity of needs and perspectives in our user base while designing.

Safeway Usability Tests: Before designing our own grocery shopping app, we decided to examine the strengths and weaknesses of an existing one. This would help us learn from other grocery shopping apps and predict potential problems that could arise in our own designs. We conducted three usability tests with the existing Safeway delivery iPhone app. All three participants were UC Berkeley graduate students. 2 were men and 1 was a woman. (Appendix 7)

Paper Usability Tests: Our first prototype was on paper. The handmade quality of this version encouraged users to more freely give feedback.

Our design initially largely borrowed from Instacart's to help us determine how their popular design did or did not match our users' needs. We supplemented this design with a user flow for shopping with WIC checks, a shopping cart with EBT and WIC categorization, and a pickup location setting user flow.

We conducted two usability tests using this paper prototype with participants at the Alameda County Food Bank Superclinic. Both were women from Oakland and new participants in the SNAP program. Both were African American. One was in her 40s and the other was in her 60s.

Interactive Usability Test - Round 1: Our next prototype was constructed in Proto.io prototyping software. For this iteration, we made the following changes:

Simplified navigation to make it easier to quickly switch between aisles

Redesigned the user flow for shopping by WIC to make it more discoverable

Reduced amount of information displayed by using icons instead of real products and technical terms

Placed more emphasis on prices and deals by adding a deals subcategory to each aisle, sorting product results by price, and labeling the cheapest product.

Displayed more specific information about the product on the product screen, including price change and expiration date assurance

Added a Tinder-style gamified way to sort through deals individually

We performed usability tests on this prototype with four users. All four were women SNAP participants living in Oakland. Two of them had prior experience with WIC.

Interactive Usability Test - Round 2: The next prototype was also constructed in Proto.io. For this prototype, we decided to test out some alternatives to our previous design with the following changes:

Added the ability to fulfill WIC items with multiple items and progress bar

Listed the product results in a more straightforward list view rather than the card view

Added the ability to mark some products as favorites

Removed the Tinder-style deal swiping idea

Showed product results in the aisle screen rather than the subcategory screen

Offered a top-level side-swiping navigation for subcategories

Collected payment information in the checkout flow before selecting a pickup location instead of after

To test this prototype, we conducted two usability tests. Both were women residents of Oakland who had been enrolled in the WIC program in the past and were currently enrolled in SNAP.

FINDINGS

Based on these four rounds of usability tests, we came to the following findings:

Prices Need to Be More Obvious: Perhaps our biggest lesson in usability testing was underestimating how much to visually showcase prices. Several users wanted the prices more prominently displayed when showing product results. Even when we did sort the product results by price, users did not recognize this sorting. The prices and the ordering of results by produce needed to be overt.

Users Are Extremely Price Sensitive: Given that users are constantly shopping for the best bargains possible, they are much better educated consumers relative to others with regard prices. Even when showing them mock data in our prototype, they would recall the actual average price of the shown item from memory. Any price markups would be obvious to our users given this expertise. Our users were also far more concerned about measurement units than we expected. For example, if a price for an apple was given per lb and the add to cart button had the number 1, they all questioned whether the 1 referred to lbs or apples.

Product Data Needs to be Presented Collectively and Transparently: Users do not want to see deals presented individually because they cannot then compare them to others products available. Users also do not like how stores choose to showcase items as deals that are actually regularly priced (“Everyday Deal”). They would prefer to see all the product data displayed collectively so that they can assess for themselves what is a better bargain, regardless of what’s on sale.

Yet Users Still Want to Follow Some Store Conventions: Users do not want to entirely ignore store deals though in case there is an opportunity for a discounted treat. For example, one user explained that she loves almonds but usually cannot afford them. But if they were on sale, she would buy them. Also, even though displaying results in price per unit would be the most logical way to show the cheapest prices, users were not familiar with this pricing and preferred to see the pricing conventions used in stores.

Users Want Personal Preferences Added: Even though price was the biggest determinant of what products users selected, they still wanted to be able to factor in their personal preferences when selecting between products.

Content Needs to be Simplified and Reduced: Perhaps because our users do not use many other apps to shop for numerous goods, they seemed unfamiliar with some of the conventions of shopping apps. For example, several users did not know what a button with the word “Filter” would do. They preferred to just click on the information rather than filtering. They also did not like the idea of having to select substitutions for products, as is common practice with other services like Instacart. They found this step confusing and tedious, even though many shopping apps require this and their user population accept it.

No Comparable Model for Pickup Idea: Similarly, since our users do not use other apps with pickup models, they had many questions during the checkout flow. They were particularly concerned about what to do if they missed their pickup slot.

Shopping by WIC Needs to be Highly Discoverable: Since it’s easy for a user to mistakenly try to shop for WIC items by going through the aisles rather than the WIC flow, it is important for the shop by WIC functionality to be highly discoverable from the home screen.

The WIC Flow Needs to Allow for Multiple Items and Produce Checks: As we did more usability tests, we learned from our users about more of the precise details of the WIC program. For example, we learned that users could select multiple products to satisfy one line item on a WIC check. We also were reminded that WIC produce checks do have a price cap and thus need a different design.

Users Need Flexible Payment Options: Given that users often live paycheck to paycheck they need the ability to use different payment options to cover their bill. Users wanted, for example, to split payments up between credit cards, cash, and checks.

IMPLICATIONS

Snapily should display store data in a straightforward manner. It should not simply display the data the store gives it since users do not trust this data (e.g. store-defined “deals”). Instead, it should present the product data in a manner that matches its users shopping behaviors with data displayed collectively and comparatively with clearly marked prices.

Snapily should allow users to shop with different variables in mind. They should be able to discover items through price, personal preferences, shopping behaviors and discounts.

Snapily also needs to create a simple user flow. We need a streamlined mobile shopping experience compared to other apps since

our users are not familiar with some of the conventions of shopping apps and Snapily is often their first such experience.

Snapily needs to do more research: We need to ensure the details of the checkout and shopping experience match the specific logistics and fulfill all requirements of the SNAP and WIC programs.

SNAPILY - FINAL DESIGN

In considering the feedback and insights we received through user research, we converged on several features that make Snapily unique compared to other grocery delivery services, and are ultimately critical in making grocery delivery accessible to our users.

FEATURES

SNAP account balances

Not surprisingly, we found that knowledge of a user's SNAP account balance is quite important and greatly impacts what they shop for. Many users try to max out their SNAP balances without going over, so as to avoid any out of pocket expenses. However, currently it is non-trivial to gain access to an account balance. Options include calling an automated phone number or waiting until getting a receipt upon checkout. The former still requires users to make on-the-fly mental calculations to estimate their shopping cart balance and subtract that from their SNAP balance. Snapily allows users to view their SNAP account balance through the side bar menu and also within the shopping cart. By presenting this information in the shopping cart interface users are able to quickly see how much they have in their cart and how much more they can purchase.

Making WIC shopping a seamless experience

Scannable checks: By using Optical Character Recognition (OCR) technology, we allow users to snap a photo of their WIC check, which we then convert into structured data. We present the user with a list of the voucher items that were scanned in from the check, and they are able to shop for each item one by one.

WIC flow: Users are presented with only eligible items. A common complaint that we heard was that users are often unsure as to which products actually qualify as eligible. By comparing against a database of eligible products, we filter the products that a user can select so that everything presented to them is eligible for that particular voucher item.

Allowing for multiple product purchases for each voucher item:

Because some voucher items are fulfilled by accumulating the quantity of goods instead of a price limit, sometimes more than one product can be

purchased per item on the check. As an example, if the voucher is good for thirty-two ounces of breakfast cereal, a user may use this allotment by grabbing multiple boxes of cereal, as long as they add up to thirty-two ounces or less. Our system allows for this affordance. We dynamically filter the products presented to the user based on the current unexpended quantity of that item. So if they have twelve ounces left, they are only presented with products that are twelve ounces or smaller.

Make product size prominent rather than price: When it comes to shopping with a WIC check, the price of a product is irrelevant. The currency of goods in the WIC program is product size. For this reason, we omit any reference to price and display size. Similarly, instead of sorting by cost as we do by default outside of the WIC flow, we sort by size.

Demystifying the checkout process

Online EBT processing: As of now, no other online commerce applications process EBT transactions.

Automatically sorted shopping cart: Shopping with WIC or SNAP alone can create a complicated checkout process. But when combining WIC and SNAP, along with goods that are ineligible for either program, this process can quickly get out of hand. At the very least this relies on three separate transactions, requiring items to be separated so that they can be allocated to the proper transaction. This is where most users feel the pressure and stigma from impatient shoppers in line behind them. Snapily automatically assigns products to the appropriate payment medium, creating three separate shopping carts in one.

Pay with multiple methods: When items are ineligible for either program, or when these benefits are maxed out, users have to pay the remaining balance out of pocket. When paying these additional expenses, we offer flexible payment options. A user can opt to put the full amount on one card or specify the amount and add another payment option for the remaining balance.

Enabling strategic bargain shopping

Flexible granularity when sorting by cost: Being highly strategic shoppers, our users require much more flexibility when shopping for good deals. If a user can't find a satisfactory price for a particular product, they are much more willing to expand their search outside of a category of goods. A case we came across several times when speaking with users is flexibility with meats. If even the cheapest beef option is still a bit too pricey, a cheaper chicken option becomes much more desirable. Enabling browsing by cost with varying degrees of category granularity allows them to make these comparisons.

Check #269534015

1 (Gallon) Milk, Whole ✓

1 (16 oz) Whole Grains ✓

36 oz Breakfast Cereal >

12 oz remain



36 oz Breakfast Cereal 12 oz remain

General Mills Total Whole Grain 12 oz



Kellogs Corn Flakes 12 oz



Quaker Life 12 oz



Safeway Crispy Rice 12 oz



Special K 12 oz



General Mills Cheerios 8.9 oz



Favorites and recommendations: However, the previous category granularity flexibility is siloed by top-level category, or aisle. Favorites, and recommendations based on these favorites as well as purchase behavior, provide users with a point of comparison across top-level categories.

On Sale items: Not every purchase decision made is based solely on price. Percent of markdown, even if still not the cheapest product, can influence purchasing behavior. Users may have a perceived value of a good, where if the price drops below this value they are willing to buy it. These items may get lost in an organization scheme based only on price. Additionally, users express a satisfaction gained when they discover a steeply discounted item. We support browsing by sales items at the aisle level of our hierarchy.

INFORMATION ARCHITECTURE

Components

To best support the complex and diverse needs of our users, we provide several methods for finding items within the application interface:

Search: This is perhaps the best way for users to find a specific item, also known as known-item seeking (Morville & Rosenfeld, 2008). This could be a particular product that they already know they want, they just need to find it, hopefully quickly and efficiently if their name matches the name in the product database.

Navigation: Browsing through items via a navigation system allows users to explore and compare. A user may have an idea of what they want but aren't exactly sure. Alternatively, if they do know what they want, they may not be able to articulate it in a search. Most notably however, for our users, the top use case is to find the cheapest item in a particular category at varying degrees of granularity. They may initially be searching for the cheapest chicken breast, but upon learning its price they may think this is too expensive and decide to expand their search to the cheapest chicken of any cut, or any type of meat. This highlights the importance of enabling iterative and integrative browsing navigation. The user is looking to learn something from this search process and then integrate this new information into another iteration.

Order History: This will be the primary method for repeat purchases of items. It can be considered a special kind of known-item seeking. There are some items that users will want to include in their orders on a regular basis. For these repeat purchases order history will be the most efficient

path to selection.

Favorites: This allows for a personalized selection of items, which will complement Order History in supporting re-finding. By explicitly tagging an item as a “favorite”, a user will more easily be able to follow any price fluctuations of an item.

ORGANIZING SYSTEM

Existing Taxonomies

Brick and mortar grocery stores have well established taxonomies for the products they carry. However, constraints imposed by the physical arrangement of items, coupled with multiple use cases for organizing, often lead to a less-than-perfect unintuitive taxonomy for finding items. In addition to making items discoverable, stores organize them to serve their sales goals and potentially provide a more sensory experience.

Getting customers to buy more products is achieved through collocating items that are frequently purchased together, placing impulse buys by the registers, and placing staple items near the back of the store in order to force people to walk by other stuff. Storing physical products efficiently has a huge impact on categorization. For example, frozen goods may not have anything else in common besides the fact that they are frozen, but are nonetheless organized together for efficiency reasons. Additionally, less consistent organization is introduced to serve the purpose of creating a more pleasant sensory experience. Products that invoke pastoral imagery are placed near the entrance of the store, such as produce and flowers. The result of these physical storage constraints and conflicting purposes for organizing has led to an inconsistent use of organizing principles. Some categories are organized by the physical properties of the items, such as produce and dairy, while others are organized by package or storage properties, like frozen foods and bulk goods (Glushko, 2013).

Design Considerations

The Aisle Metaphor: Qualitative data from usability testing and interviews suggested users made a strong connection to already established product categories used in grocery stores. This is particularly true at the top level of the hierarchy, where users have already learned which items are categorized into which aisles. Therefore although categorization improvements could be made at this top hierarchy, we decided that it would be more confusing for users to have to learn a new organizing scheme. For this reason, we deviated very little from top level store aisle categories in our taxonomy.

Broad and Shallow Hierarchy: With cost as a main user concern when searching for items, we decided on a two-level hierarchy. An expansive breadth of second level subcategories allows users to quickly find the cheapest item in a specific subcategory, which by default is organized by cost. For example, the top level “Produce” category lists all types of fruits and vegetables organized alphabetically as subcategories. A user can then navigate to see apples, where the cheapest apple is presented first. We found that users were more willing to scroll through a list of subcategories than they were to click through multiple levels of a hierarchy. For categories that have a particularly large amount of subcategories (e.g. Produce has 125), we enable additional filtering through an intermediate level in the hierarchy (e.g. Fruit).

VISUAL DESIGN

In order to decide on the visual design of our app, we spent considerable time studying the visual design both of the bargain supermarkets our customers frequented as well as other grocery delivery mobile apps. There was a remarkable difference between the two. While the bargain supermarkets usually use bright reds and yellows with heavy typefaces and plenty of pictures, the grocery delivery apps usually used more natural greens and whites with light typefaces and plenty of whitespace. Given these two norms, we found it challenging to decide which aesthetic to follow. Since the aesthetic of the supermarkets was much harder to read on mobile devices, we ultimately decided to go with a lighter aesthetic closer to the existing grocery delivery apps on the market. For our final design we also chose to use Google’s Material Design guidelines in hopes of improving the readability of our app and making it as simple and familiar as possible for our users with respect to other apps they already use.

Systems Design

OBJECTIVE

As our team progressed through needs assessment, user experience and design iterations, it became increasingly important to answer business and system design questions. This section seeks to answer these questions in seven different sections. Three sections focus on the business by providing an overview of a potential business model, revenue and the customer journey. The remaining four sections articulate a system design model in order to explain how the front-end, back-end and service operations combine into a single solution.

The information visualized in this section was created using diagrams in Microsoft Visio software. It does not aim to be extensive and intentionally avoids specifics regarding the technical implementation, in order to more cleanly explain how Snapily may potentially operate. Though the service design is an abstraction without technical details, it is based on semester-long guidance and mentorship that our team had from engineers at three established software companies.

BUSINESS MODEL OVERVIEW

Although building a robust model has not been a focus for us due to the prioritization of understanding the needs of our users and iteratively designing a solution that serves them, a general overview of Snapily's potential operations is useful as a lead into the system and interface design.

We envision Snapily operating as an independent 3rd party business, not within the operations and services of a major grocery retailer. Among the different ways to establish legally, we see a for-profit social impact business as the most suitable option. Snapily would focus on social impact as it aims to deliver high value for price shopping to its users rather than focusing on maximizing margins. It would, however, still need to operate as a business rather than a nonprofit due to the need for operational efficiency, competitive technology, and profitability, in order to persist as a dependable solution for SNAP and WIC users.

Broadly, the business can be built on three components: a front-end customer mobile application, a combination of back-end services and databases, and personnel and logistic service operations. Customers interact with the business by ordering groceries from a high-value-for-

price brick-and-mortar grocery retailer whose inventory is delivered through the Snapily application via APIs. Customers are able to pay using SNAP EBT debit, WIC paper checks (via OCR images) and traditional debit/credit cards, processed through vendor partnerships. Following consistent logistics rules we establish, an operations team fulfills orders beginning at 12 hours prior to delivery and transports them to a pick up site near the user's residence, using a refrigerated food truck. The truck can be stationed for a four hour pick up period during which customers can stop by at any time to collect their order.

Delivering groceries via food trucks rather than door-to-door is a creative approach which our team looks to employ as it offers several advantages. Foremost among these is that the truck vehicle allows us to bundle multiple deliveries into one trip, helping us drastically reduce the business costs and thereby potentially not having to charge customers for delivery. Based on our team's field work and demographic data from the SNAP and WIC programs, we feel that delivery bundling is a highly viable option since our service enjoys high population densities of customers, as most SNAP and WIC program users live in public housing and other low-income communities where a single truck stationed outside a multi-tenant building can fulfill many deliveries in one trip. Additional advantages of the food truck model include the larger capacity of orders that it can transport, a refrigeration service that can preserve perishable goods longer, and a high level of visibility when stationed in public, leading to a potential free marketing opportunity for prospective customers.

COSTS AND REVENUE

In order to operate sustainably, Snapily will need to focus on reducing operational costs and raising revenue through business-to-business partnerships. Operational costs can be minimized thanks to unique efficiencies in the business model, such as delivering multiple deliveries in one trip. Revenue on the other hand, must primarily come from business partnerships with grocery retailers and government programs, rather than added service costs for the customers.

While our competitive analysis taught us that other similar grocery delivery services like Instacart achieve profitability mainly by repricing the brick and mortar stores inventory and charging the customers a higher price for the convenience, our user research clearly showed that repricing was not an option for Snapily. Because they have limited or no income and feed their entire household on SNAP and WIC benefits of less than \$200 each month, our potential customers are hyper cost-conscious, very educated consumers, and not trusting when it comes to the prices they see on a new grocery service like Snapily. Through prototype testing, we learned that upon their first interaction they would closely scrutinize whether the prices match those they would see in person at the store. If

they do not, they are likely to abandon our service permanently. On the positive side, our user testing taught us that SNAP and WIC shoppers share many similarities that can help drive the operational cost of our service. When it comes to deliveries, they all live close together allowing us to use food trucks. When it comes to the selection of items they purchase, they share the same behavioral focus on value for price, meaning most customers want similar lower cost items in a given week, allowing us to more efficiently prepare their orders, since we have to gather smaller variety of items across all orders.

Put together, all of these lessons lead us toward a B2B revenue generation model where our team can seek a percentage of sales share from grocery store partners, in exchange for bringing them access to customers who they would otherwise not have as they live far away in food deserts. As an example, if Snapily partners with a grocery store like Safeway or Walmart and requires a 2% share of sales, serving 60,000 SNAP and WIC users in the East Bay area could result in approximately \$3 million in revenue in a calendar year, for an average weekly order of \$50.

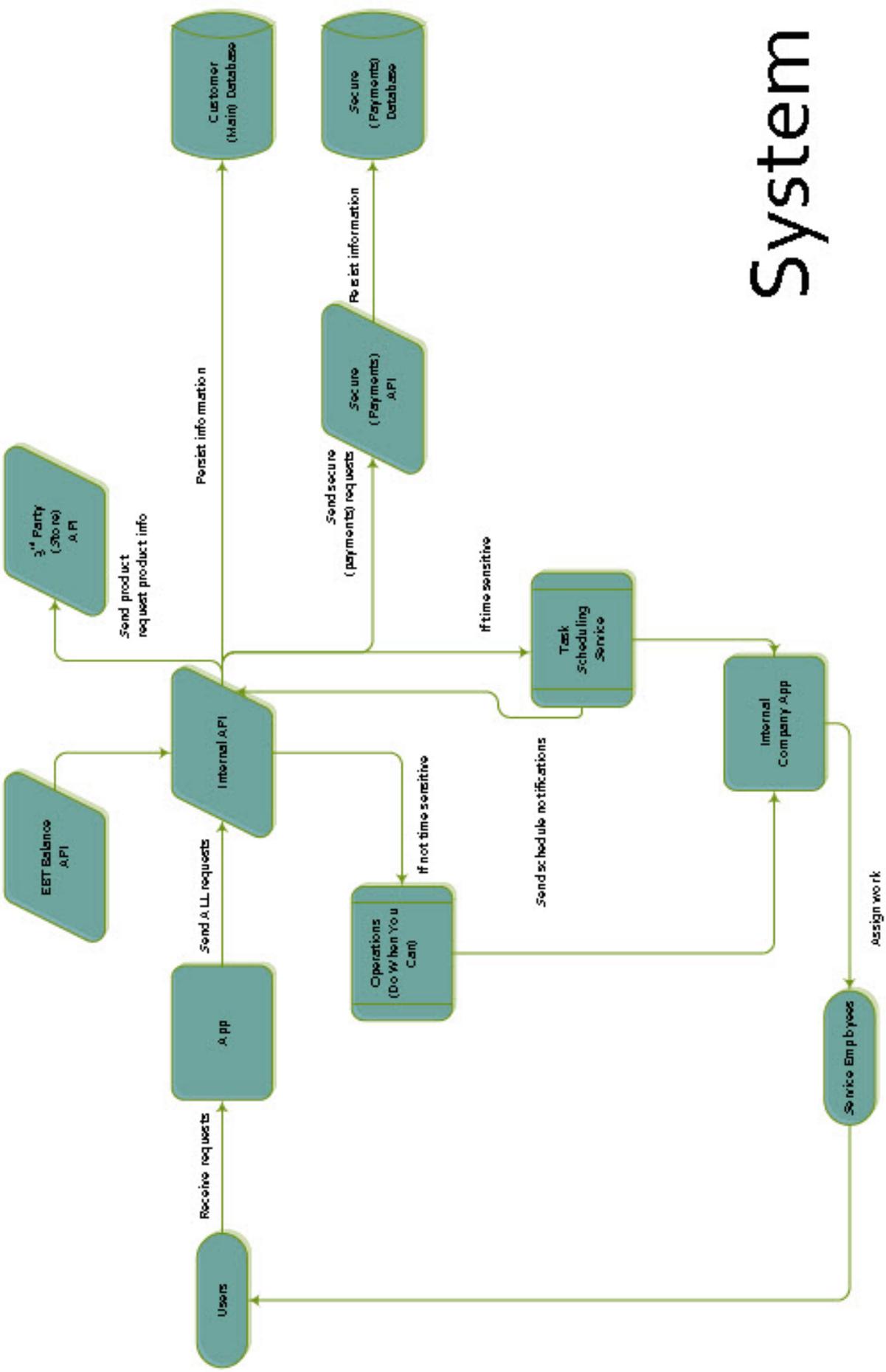
$\$50/\text{order} \times 60,000 \text{ households} \times 52 \text{ weeks/year} \times 2\% = \$3,120,000$
annual revenue

One additional possible source of revenue could come from WIC customers. Since the program functions by granting users effectively “blank” checks which they can get to a store and receive the stated amount of food (E.g. 1 gallon of milk), participating retailers often have the opportunity to charge prices higher than average, as the cost is paid for by the WIC program. While this practice is abusive and subject to legal action if exceeding accepted thresholds, it could potentially serve as an opportunity for Snapily to offset some of its delivery service costs. Though it is not our team’s intention to mark up prices as high as possible, billing the WIC program for a higher price than the brick-and-mortar store, could be extremely helpful in helping cover operating costs and thereby building a sustainable business model.

SYSTEMS DESIGN

In order to validate a service model showing how Snapily technology and operations can bring food to customers, we began by creating a top level System Design diagram. Based on feedback from several Systems Engineers professionals, we iteratively reduced the model we had until we achieved a simple and clear abstraction of system components that focused on the back end operations which feed out of our mobile application.

Central in our system is the use of an internal API, which serves as a routing hub for all requests made by Snapily app users. While shopping



System

is in progress, the internal API routes calls to an external API that allows users to check their SNAP balance (once registered with Snapily). More commonly, the user interactions when viewing products in the application result in calls to a Store API, which sends back product inventory information for what users are able to add to their cart.

Although we used the term Store API as an abstraction, we researched various options to understand performance and data availability issues. This led us to the important conclusion that Snapily would want to focus on partnering exclusively with one retailer rather than several in order to establish a closer business partnership and secure more robust product data. A direct partnership allows for the retrieval of valuable additional data about products, most notably whether they are In-stock at a given store, eliminating the need for having users define substitution preferences, which they identified as a frustration with other services like Instacart. To ensure the viability of this strategy, we compared direct APIs (e.g. Walmart) and API services (e.g. Supermarket API) and validated our assumption that working directly with the store provides more robust data.

Once orders are placed, our system utilizes two main databases. The first of these is our primary Customer database, which stores all order history, customer account information and preferences. The second is a separate Payments database, which runs separately with a more secure configuration, following established online payment processing requirements. Though much smaller in volume, data for the Payment database is fed in a far more complex manner, using a variety of payment processors Snapily must employ in order to process both SNAP EBT and credit card payments. While on the credit card side, simple do-it-all vendors like Stripe are available, our team made an extensive effort to research solutions on the EBT side, leading us to a unique combination of vendors Payline (for card processing via API) and Acculynk (for PIN processing). Putting these established vendors together successfully would make Snapily the first-ever service to successfully process EBT payments online.

In the bottom half of our system design we included two abstractions in order to convey operational services that are handled in a time sensitive and non-time sensitive manner respectively. For time sensitive tasks, we created a Task Scheduler, which automatically sorts, prioritizes and groups all order fulfillment services that must be completed at a specified time. For all other remaining tasks which do not have to be done at an exact time (e.g. customer support inquiries that we want to respond to within 24 hrs) we created an operations scheduler where work is completed on a "do when you can" basis by our team. This operations engine also incorporates our staff management and resource management (e.g. delivery vehicles). Finally, combining the operations and task scheduling

service components, we lead into an internal application tool, which matches scheduled work with operational resources in order to optimize delivery fulfillment and routing in order to make sure that staff supports only the processing and transportation and not the coordination. Putting all of its components together, our system design model strives to build a framework to allow for operational efficiency, data security and scope out technology necessary to deliver the desired grocery delivery service to our customers.

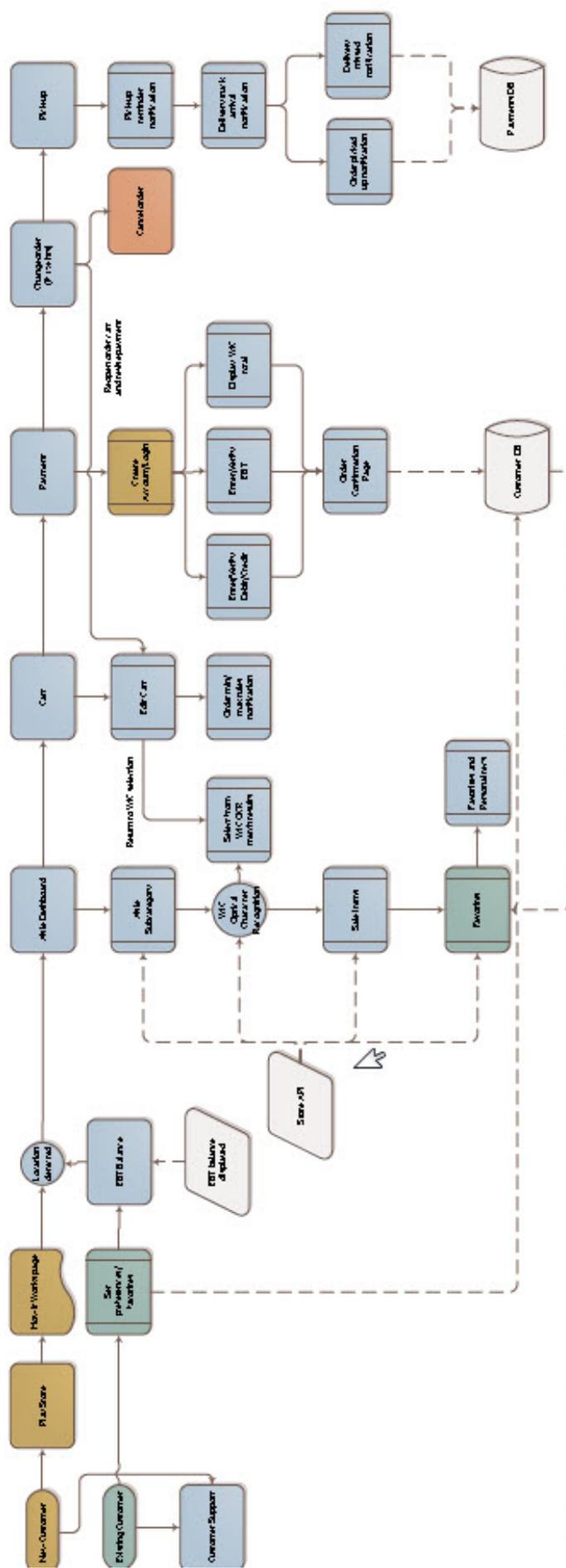
USER FLOW

The user flow system design diagram demonstrates how users progress through different screens and steps in the Snapily application interface. Although this diagram is the most complex visualization of our system design, we will not elaborate on all of its components here as the necessary interactions are already covered in other sections. It is instead better to highlight how the User Flow diagram was valuable in helping build out system modeling.

While our design was still evolving, the User Flow diagramming was valuable in helping us define goals for interactions we wanted to make available to our users. These included the ability to provide them with information about their SNAP account balance, storing their order history and Favorites and utilizing a machine learning approach in order to give them recommendations for similar products they may want to consider. As our design and user testing progressed, the User Flow diagramming became particularly useful in making valuable changes in where we wanted to place key interactions. For example, through guidance on growth hacking and user acquisition from our Engineering mentors, we learned that new users shopping for the first time should not be prompted to create an account until they have spent the time filling their cart and are ready to checkout. Since having them create an account at checkout is then drastically more likely to reduce first-time shopper abandonment, we moved the account creation step to the end rather than the beginning.

ORDER STATES

Though it initially seemed redundant, we eventually saw value in creating an Order States diagram as part of our system design. It allowed us to specify when inventory is checked, how orders can be revised after initial submission, and how processing of multiple orders can be grouped. The Order States diagram also helped us think through the seemingly simple matter of how an order can be cancelled, leading us to determine that rules are needed for how close to delivery time this can be permitted. We settled on cancellation up until 12 hours prior to scheduled delivery. Lastly, the Order States diagram proved very valuable in helping us



User Flow

consider how inventory is tracked and modified, between the stages of starting an order, processing it and potentially restocking it if the customer does not pick up as scheduled for any reason.

INTERNAL APP FLOW

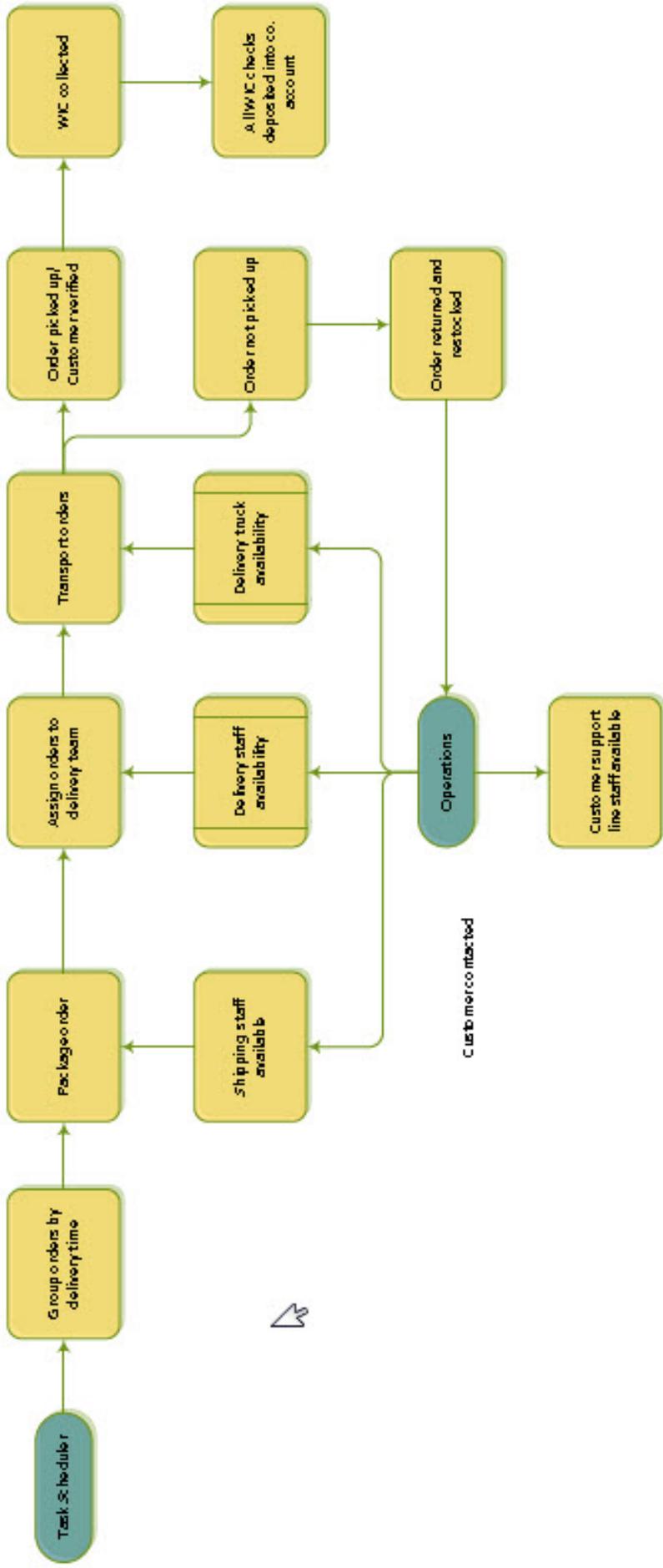
Seeing the added value of the Order States diagram also brought attention to the complexity of the logistical service operations that must run smoothly in order for orders to be fulfilled. This led us to research service management of competitors like Instacart and discover that they have built entirely separate internal applications for coordination and communication among their staff. To address this, we built an additional Internal App Flow diagram for Snapily, to help explore what a potential similar aspect of our service design would accomplish.

We viewed the Internal Application primarily as a tool that allows for the resolution of requests from the Task Scheduler and Operations engines in our main System diagram. On the task scheduling side, the main value of the Internal Application service design was that it led us to better sequence the order fulfillment process, as we realized the efficiency of first grouping orders by same destination (on same food truck) and then preparing them collectively (e.g. need 30 apples for 5 orders in 1 truck) rather than preparing each order individually then loading it for transport. On the operations side, the Internal App flow was useful in helping us itemize the different resource needs that Snapily's service would require. Even as a minimum product, we would need to fill needs for order packing staff, driver staff, support requests staff and match these with limited number of transportation vehicles. Last but not least, we acknowledged thanks to the User Flow and Order States diagrams that accommodating payments from WIC program participants would require us to collect their paper checks as a form of payment. These in turn would require operational attention in order to be deposited in person into a bank account, leading to a time delay between order fulfillment and payment received, making us conscious of potential challenges with cash flow and accounting.

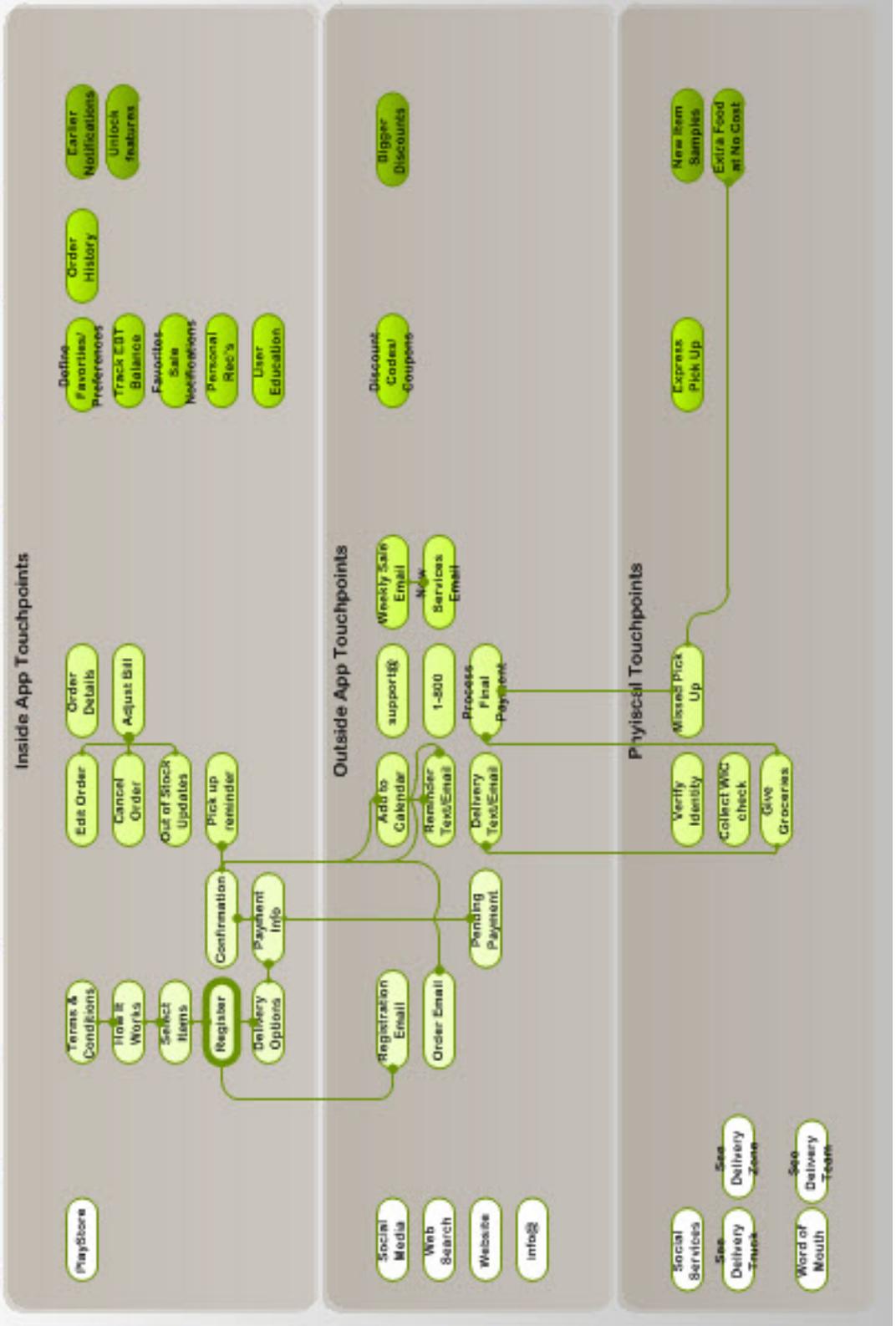
CUSTOMER JOURNEY MAP

As a final step to help us tie together our business model and service design, we created a Customer Journey Map). The Customer Journey Map helped us consider how we can interact with our customers from the moment of them discovering Snapily through their first order, repeat orders and then evolving into product evangelists.

The map was valuable in helping us think outside the box in terms of our focus on the on-time service fulfillment and interaction design. By thinking long-term about the customer experience and considering all



Internal App Flow



of the possible touch points that occur along the way, we were able to spot many missing gaps which we had not yet considered. We realized there are many different ways that prospective customers can learn about Snapily, from discovering the Android mobile app on the Google Play Store, to being referred by social service agents, and even just seeing our delivery team on the street, thanks to our large truck vehicles and highly visible teal-based color pallet. On the other end of the journey, we dealt with the much more important question of what gets users to come back to Snapily. For repeat users, this included increased convenience of storing payment information and favorite grocery items, without sacrificing security. For evangelists, we realized that we would need to create additional value in order to foster their loyalty. This may include earlier notifications about store sales, loyalty based discounts and more personalized service.

SYSTEM DESIGN LESSONS LEARNED

The process of designing a system and drafting a business model taught us the complexity of deploying a technology service with associated physical products, inventory management and logistics. This complexity was particularly acute when it came to the implementation of a back-end system to link a software interface and logistic operations. Addressing this complexity, required the continuous splitting out of databases, task scheduling, multitudes of APIs and vendor partnerships.

On the positive side, this aspect of the project helped us arrive at a viable business model that aligned with our core values, since we developed a plan to help us draw revenue by taking a percentage of sales from retail partners, rather than passing through our operational costs to our low-income customers and burdening them further. Altogether, this phase of the project helped us transition into thinking about user interactions with Snapily as a business rather than just a technology interface.

FUTURE WORK

Should our team continue work on with this project, our next steps would be to conduct more fine-tuned user research, expand our design, conduct additional usability testing, refine logistics, build partnerships, implement a full stack technology solution, build out a more sustainable business model, and examine the possibility of scaling geographically.

REFINING USER RESEARCH

We initially decided on our target users mostly by relying on research demographics about the population in our target geographic location of West Oakland, as well as our own surveys. This data however, only sampled a small fraction of the entire program's population across California. If we had access to more detailed demographic information on technology use, occupation, family status, and program experience, we may be able to better hone our user personas. For example, if we had more data on smartphone users in Oakland we may be able to cross check that with food desert data to pinpoint the exact users who would be likely to use the Snapily app.

In addition, we would be interested in conducting further user research, particularly with male participants. For reasons we could not identify, almost all respondents to our Craigslist ads for users research were female. As one of our female interviewees pointed out, it is possible men may be more interested in our product than women, since they may be more reluctant to take on shopping responsibilities than women. This theory seems worth investigating with a more gender-balanced user research group.

DESIGN EXPANSION

In the time we had to pursue this project, we decided to focus on the three most important user flows for our target users - regular aisle grocery shopping, WIC shopping, and checkout. Given additional time, we would want to focus on building some of the less crucial user flows. For example, the flow for shopping with a WIC check would presumably be quite similar to the current WIC flow but would need slight modifications since there is a price cap on these checks.

CONDUCT ADDITIONAL USABILITY TESTING

Usability testing was particularly helpful for us in determining how best to develop our design to serve our users' needs. If we had more time and funding, our design and possibly our business model would benefit enormously from additional usability testing, especially if our refined user research helped us better narrow the ideal type of users to test with.

REFINE LOGISTICS

The logistics is perhaps the most complicated aspect of our product. With more time, we would need to work on deciding what delivery model fits our users' needs the best. Through additional user research and some A/B testing when the product is actually launched, we would hope to answer a series of questions including but not limited to:

Can users stay accountable for a pick up model?
What exactly are the optimal time slots and locations for pick-ups?
Would it be possible for users to send friends, family, or neighbors to pick up their orders for them?

BUILD PARTNERSHIPS

Perhaps one of the biggest unanswered questions we have at this point in our development is partnerships. We are confident that we have a product that serves the needs of its users. Next, we need to find partners to align with our objective and progressively solve our business needs. Which supermarket would be most interested in pursuing this project with us? We have already received initial interest on our work from contacts at Safeway and Walmart. Is it strategically sensible to pursue these opportunities further? What would be these partners' needs in terms of design and logistics?

We also would need partnerships with a number of payment processing companies, in order to execute our service. Would the EBT processing companies, such as Acculynk or Paylink, be interested in working with us? Would their solutions serve our system needs effectively?

Finally, should we also consider the possibility of partnerships on the logistics end of our product? Would it be best to hire another partner to entirely deal with the coordination of the pickups? Many such "last-mile" B2B and P2P platforms have gained traction and may drastically reduce our human resource needs. Alternatively, can we negotiate to have our grocery store partner handle the delivery logistics on its own? Or does it

make sense to maintain control and work with our users directly based on our advanced understanding of their needs?

DEVELOP A FULL STACK

At this stage, our project is primarily a well researched, front-end design with a starting plan for a systems design. The next step once the design has been honed by research, additional user flows, and the input of partners would be to actually implement the full stack technology necessary to execute our systems design.

DEVELOP A LONG TERM BUSINESS MODEL

We are confident that we could initially garner a meaningful amount of financial investments from interested parties, possibly including grocery retailers, federal and state governments, and large corporate sponsors. This financial injection however would only provide growth and development capital. In the long term, we will need to rely on a sustainable business model and profitable operations. At this stage, the business model with the most potential we've explored is the idea of charging a percentage fee to our partner supermarket company for every transaction completed through Snapily. This model would be similar to that of a credit card company but would likely have a lower rate due to the slim grocery retailer margins.

RESEARCH SCALABILITY

Once we have established our product in a target launch market with a single, reliable store partnership, our next step would be to determine the scalability of our product. Would it be possible to work with more than one store for goods? Would it be possible to expand to other cities? What about rural areas? What is the growth potential of our product in the long run? The lessons learned and challenges faced during our early operational experience after launching, would likely help answer many of these important questions.

CONCLUSION

Over the course of a few months, we have conducted extensive research in order to conceive and design a mobile shopping app that could address the unique needs of low-income Oakland residents. The overarching aim of creating an app like Snapily is to help low-income Americans access healthy, fresh, affordable food.

Should Snapily be successful, it could have dramatic positive impact on the lives of low-income Americans. The adage “it’s expensive to be poor” may no longer have to be true. By significantly improving access to healthier food options, Snapily can drastically improve the health of the communities it serves. With easier access to fresh food, users could begin cooking more and eating processed food less, leading to better health, productivity and life expectancy. On a more immediate basis, reducing the time, stress and additional costs of getting food a, could unchain our users from everyday challenges and allow them to focus on family, education and careers, so they could lift themselves out of poverty.

The development of Snapily is merely in its nascency. Much work still needs to be done to ensure the operations and technology could be implemented. But the clear understanding of the problems that users face, combined with the opportunity to build a technology solution that unquestionably helps solve real problems of ordinary people, and in its path creates value for citizens, businesses and government, can propel Snapily forward.

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APPENDIX

- 1: Competitive Analysis
- 2: Maps of Oakland Food Data
- 3: User Reserach Protocols
- 4: Select Mapping Activity Results
- 5: Survey 1 Questions
- 6: Survey 2 Questions
- 7: Usability Test Protocols
- 8: Shopping User Flow
- 9: WIC User Flow
- 10: Checkout User Flow

APPENDIX 1

Competitive Analysis

	Instacart	Safeway	Google Express	Walmart To Go	Blue Apron	Amazon Fresh	FarmFreshToYou
Target Audience	Busy Gen X and Yers who are product driven and price sensitive, willing to pay for convenience.	Families, time-conscious busy people	Busy Gen X and Y people and families	not sure yet as they just started	Gen X and Y, busy ppl, families	Cost conscious shoppers who order consumable items in advance. Amazon loyalists.	People too busy to make it to a farmers market. CSA supporters
Pricing & Costs	First delivery free, after that \$4 for two hour subscription for 2hr delivery and 14 day free trial	First Delivery Free; \$9.95 on purchases of \$150 or more (excluding applicable tax, delivery fee, fuel surcharge, bonus and \$12.95 under \$150. A fuel surcharge is equal to 10¢ for every 10¢ of gas you purchase. The longer your waiting window is the larger discount you get.	3 months for free (limited to 10 items). Minimum \$10 per month, \$85 a year. All orders less than \$15 (before taxes) delivered with an additional service fee of \$3.	known brand among low-income consumers. Amazon is in almost all states	3 months free, free if order is more than \$125	shipping is free; 2 types of plans: 1) Two-person a week, 3 meals a week; 2) 1 person a week, 4 persons) 2 times a week, \$68 a week). You can skip weeks.	30 Day Free Trial. Free delivery over \$35. Sale items available.
Competitive Advantag	Fast delivery, large store selection, do a better hand-picking of the product	known brand, relatively cheaper in comparison with Amazon and Instacart	can deliver from multiple stores (Costco, WholeFoods stores). Brand name delivery.	just started, not sure	great UI, easy to use, innovative model; busy people love it	Free shipping. Lower cost of items. Brand promise.	Economies of density (from CA farm to other states). Knowledge of farm - business is the farm
Marketing Strategy	Online ads, in store visibility (Instacart area), startup press coverage	Online ads, inside store advertising (?)	Google ads, Google Express and bright attractive name	only 5 cities, but will be expanding	Ads; word of mouth, social media	online Ads, Amazon shopper recommendations, bright green delivery trucks	Online ads and farmers market ads. No subscription commitment.
Market Share	Network of screened and trained personal shoppers managed using separate app	18 states, 1300 stores	8 large metropolitan areas, mostly cities, growing fast	hired drivers	1 million meals per month	Seattle, NorCal, SoCal - must check address to be sure	top produce box delivery service
Distribution Channels	Option to choose different stores. Fast delivery. Saved order history and lists. Relationship with store chains. Good items received higher and delivery fee. Cant use coupon discounts because of repricing. Stores available vary by location. Delivery from the other store, it will be replaced by the same item from the other store, BUT difference in price will not be communicated with the customer.	According to some sources, they are the largest in the country, no need to build warehouses	Large selection of stores, the same day delivery, brand	Brand, low prices, large set of warehouses so better outreach delivery pickup (according to survey 55% off ppl like it as they get things as they forgot to place in the order)	offers complete recipes, counting calories; all the items delivered; fresher than supermarket; meals prepared by chefs based on the dietary preferences	Delivery network of trucks like UPS	Knowledge of farm. Ease of cancelling, drop off. Customization of box. Variety.
Weaknesses				Quality may be questionable (my personal opinion); available only in 6 cities	limited amount of recipes; cannot buy separate items without a recipe; not flexible time, once a week	Wait time. Limited local shops. Returns is hard (ask them for labels, wait for returned 5 days). 1hr delivery window is small if labor stop drop off not ok.	Limited selection (only 60 CA grown items). Delivery is not available in some ZIP. Though easy to cancel, still need to subscribe.
Price per Avocado	\$1.19	\$1.70	Selling a bag (6) of avocados for \$6.79	\$0.68	N/A	Not available individually	
Works on Phone/Tablet	yes	yes	yes	no	yes	yes	no
Works on Desktop	yes	yes	yes	yes	yes	yes	yes
Registration Required	yes	yes	yes	yes	yes	Amazon account	yes
Delivery Window	1 hr	1, 2, 4 hour windows with the delivery the next day or later	3 delivery windows: morning (9AM-1PM), afternoon (1PM-5PM), and evening (6PM-10PM) the same day	2-4 hour, the same or next day	pre-planned 1-2 weeks in advance	about 12 hrs (order by 10am for dinner, order by 10am for breakfast) but up to 24 hrs	Weekday or monthly weekday. Daytime
Work Hours	9am to midnight	9am - 10pm 7 days a week	9am - 9pm	7 AM to 11 PM	\$8.74 per person, 2 persons minimum	24 hrs	Daytime
Minimum Purchase Am	\$35	Club Card can be used for savings as low when you shop at the store	\$0.01	any		\$35	\$26/month (small box for 1-2 people)
Savings	Pricing is Instacart's. No store sales but does have Instacart's own sales					Sale items and Amazon item savings.	promo codes
Delivery Order for som	yes	yes	yes	yes		yes	not unless subscription
Website		http://shop.safeway.com/ecom/home	http://delivery.walmart.com/us-eastore/home.jsp				

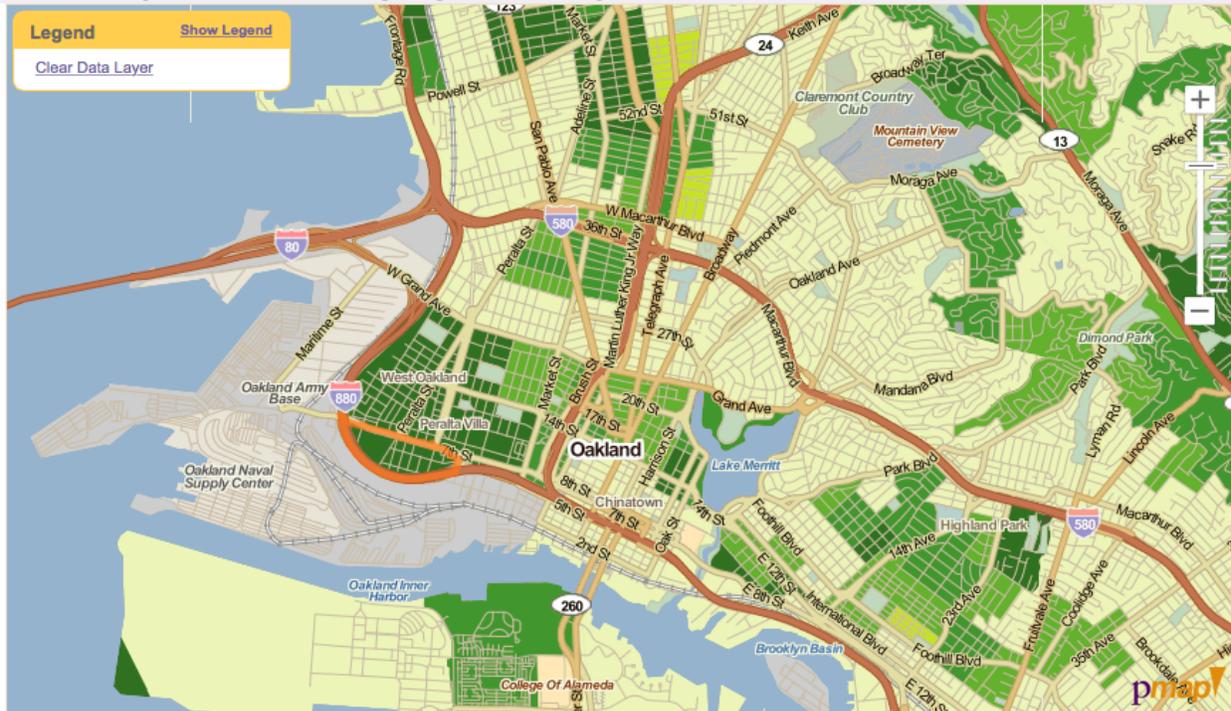
APPENDIX 2

Oakland Food Desert Maps - Healthy Food Access Portal

Low Income and Low Access tracts, as of 2010. [details](#)



Limited Supermarket Access (LSA) Block Group Score as of 2014. [details](#)



APPENDIX 3

Protocols of Research Methods

A - Competitive Analysis Protocol:

For the competitive analysis Safeway usability tests, we used the following collection of tasks:

1. Add to your cart the ingredients you'd need to make a quesadilla
2. Find a Safeway bargain you'd be particularly interested in
3. Add to your cart the cheapest gallon of whole milk available
4. Place an order for the cheapest delivery price possible
 - a. (At end) Now you decide you want to add another X to your order. How would you do that?

B - User Interviews:

Before conducting the interviews, we created the following interview guide to help us outline some of the key topics we wanted to touch upon:

- Can you tell me about the people in your household?
- Who does the grocery shopping?
- Could you walk me through the last time you went grocery shopping?
 - What were you doing before and after?
 - How did you decide which store to go to? (location, items, amount of time)
 - How many days worth of food did you get? Is this average for you?
- Do you use a grocery list? Who helps make the list?
 - How do you feel about this list? (both when making and using)
- How many items do you end up purchasing that were not on your list?
- Have you heard of any grocery delivery services (Instacart, Amazon Fresh)?
 - For what reasons would you not want to use one of these services?
- What proportion of items that you typically buy are not EBT eligible?
- How do you know which items are EBT eligible? Does this affect what you purchase?
- How do you feel about the checkout process? (both using EBT in general and splitting items between cards)

Our interviews generally followed these questions well. However, after conducting several initial interviews we began to include additional questions such as the following:

- Do you feel like you have enough time in your day to shop for groceries?
- What kind of phone do you have? How often do you use it?
- How do you access the Internet?
- How do you distribute your food stamps budget throughout the month? Do you buy more at the beginning of the month, evenly distribute it, not keep track?
- Have you ever been enrolled in the WIC program? Describe what shopping what WIC was like.
- Would you prefer a pickup or delivery service for groceries?

In all, we were able to conduct 9 interviews, lasting about 30 minutes - 1 hour. Each of these interviews was recorded (with user consent) using QuickVoice.

C - Mapping Activity:

Instructions for this activity were as follows:

“Draw for me a map of your usual experience getting to the grocery store. What stores do you shop at? Where are they relative to your home? How do you get there? What do you encounter along the way? What are the best parts of that journey? What are the worst?”

If participants expressed uncertainty or hesitation, we also offered to show examples of other participants' maps. We also assured them that we did not care about artistic skills. After they completed the map, we asked them to describe the map to us.

APPENDIX 4

Select Mapping Activity Results

Figure A

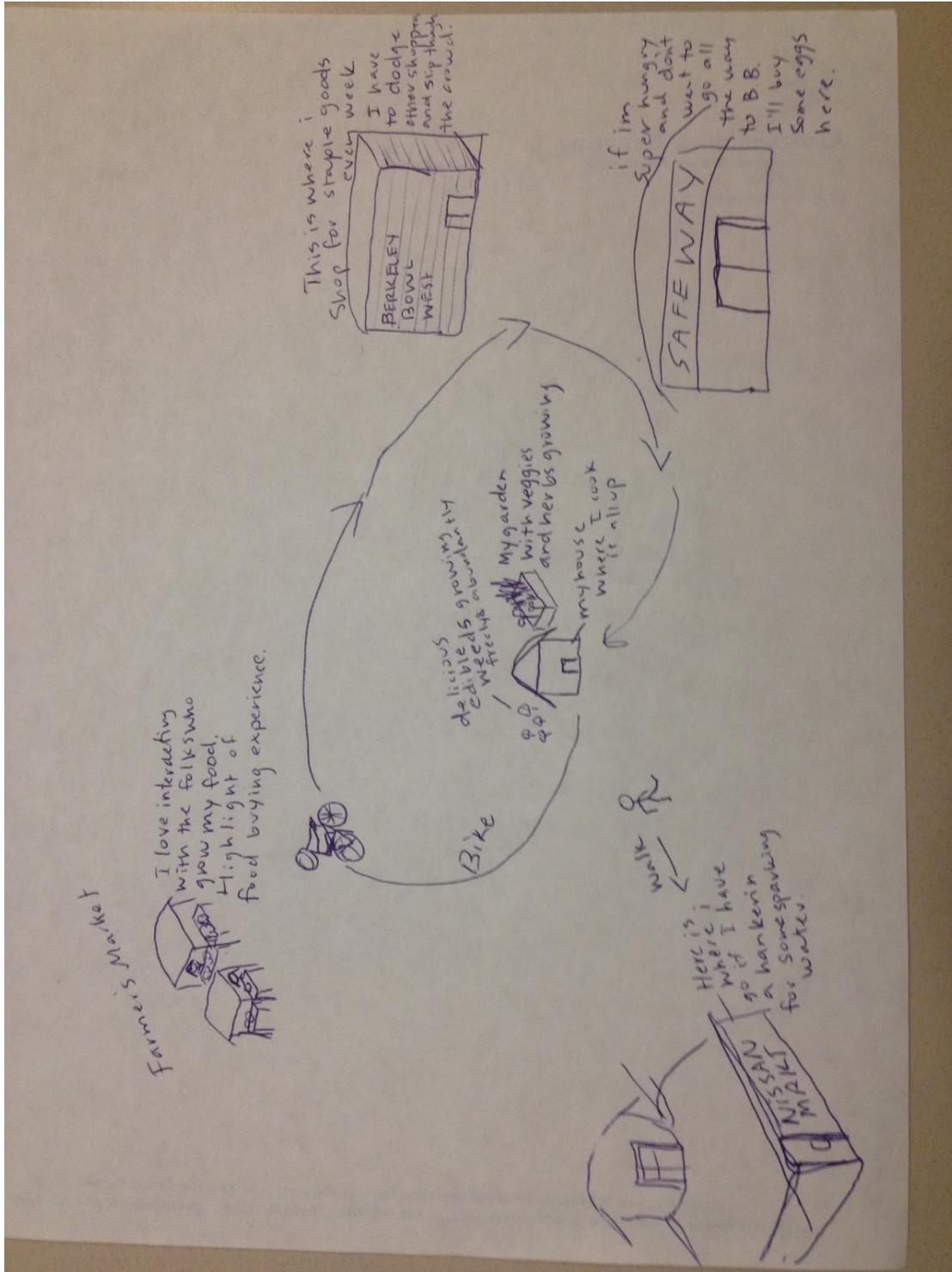


Figure B

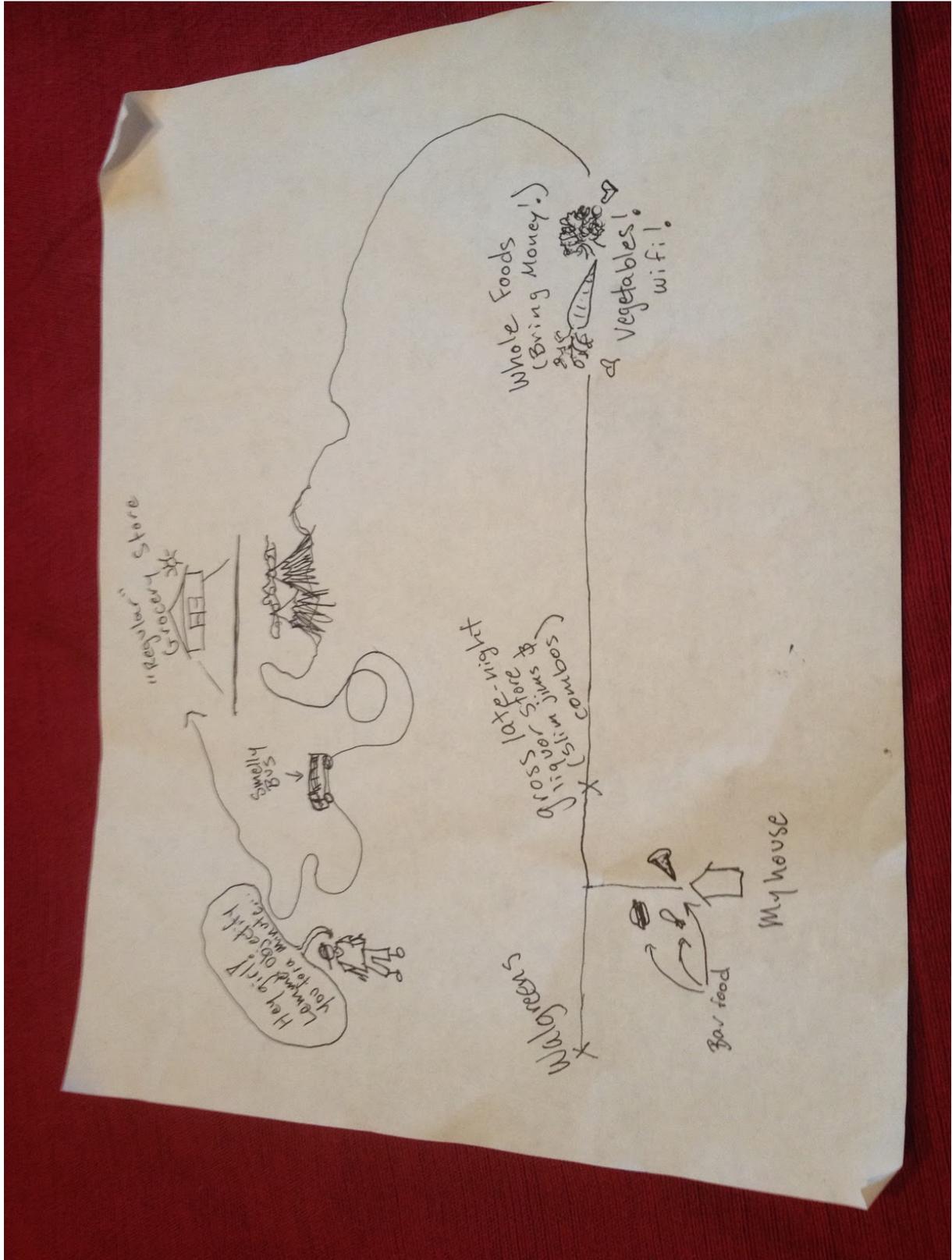
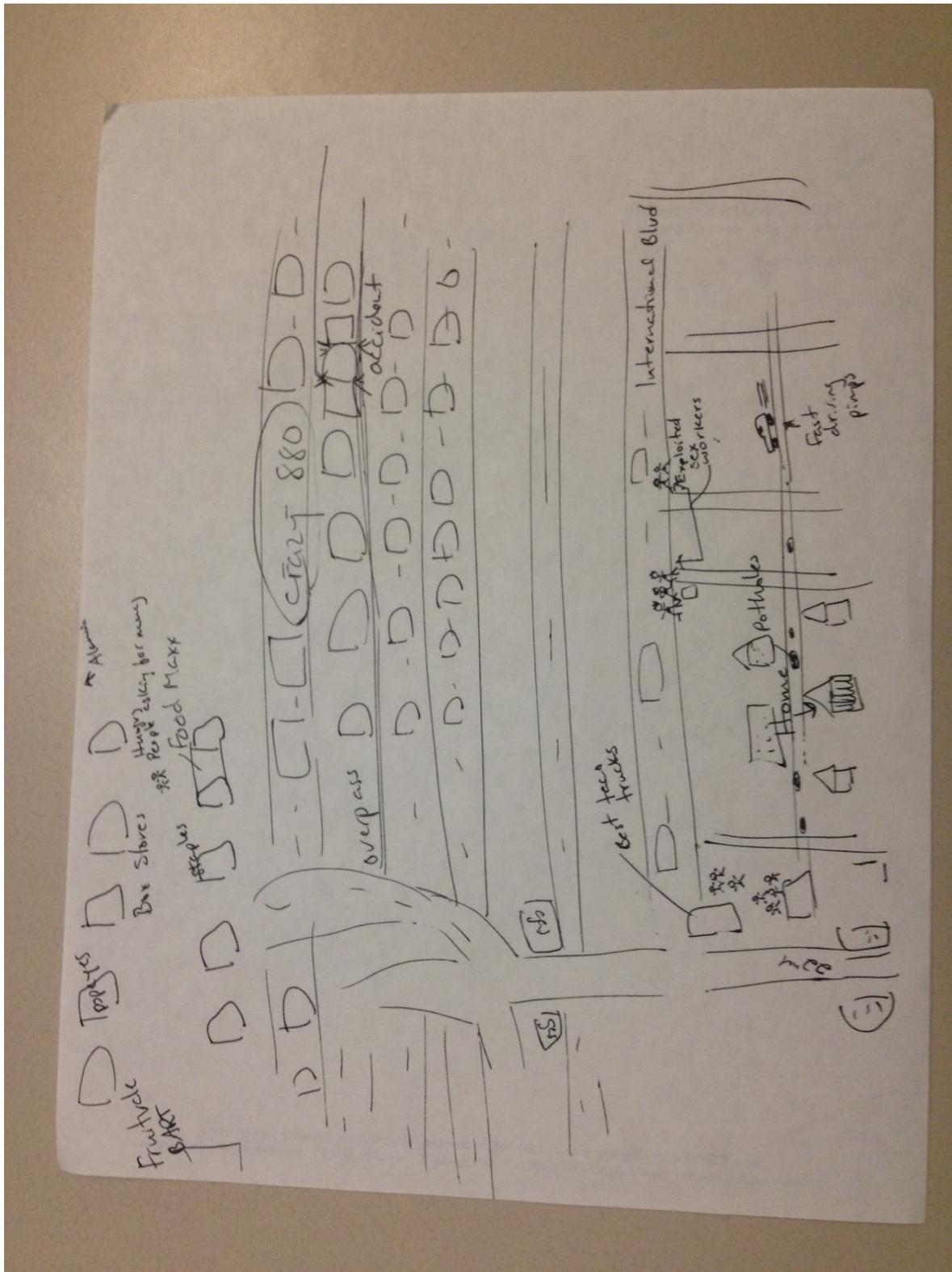


Figure C



APPENDIX 5

Survey One Questions

CalFresh User Survey

Thank you for taking the time to complete this survey. Your responses to this survey are anonymous and confidential. Under no circumstances will your identity be revealed. The responses will be combined from all participants and used to work on improvements to the program as a whole.

Demographics

Instructions: please circle the answer which is most appropriate for you.

Your age:

under 21 21-30 31-40 41-50 51-60 61+

Gender:

Female Male

Marital status:

Single Married Divorced Widowed

Do you have any children?

None 1, 2, 3 more than 3

In which county do you currently live?

Alameda Contra Costa Marin San Francisco Other: _____

Please provide the city and neighborhood/area you live in?

City: _____

Neighborhood: _____

What is the combined income for your entire household?

Under \$25,000 \$25,000-\$35,000 \$35,000-45,000, \$45,000-\$55,000 \$55,000+

Which race/ethnicity do you identify with most closely?

African American Asian Caucasian Hispanic/Latino Native American Other

Other than English, do you speak any other languages at home?

None Chinese Spanish Tagalog Other: _____

Technology Usage:

How frequently do you use the Internet? Please select the option that most applies to you

Never Once a week or less Once a day More than once a day

If you access the internet, how do you usually do it? *Please RANK by order of frequency*
Home computer_____ Work computer_____ Phone_____ Don't access _____

What kind of mobile phone do you use? Please provide the brand and model.
Brand(ex: Samsung):_____ Model(ex: Galaxy 4)_____

If you use a phone that has access to Internet, what is the total amount of time that you have used Internet on a phone?
Less than 1 year 1-2 years 2-5 years More than 5 years

If your phone has apps, how many do you estimate you have installed?
Less than 10 10-20 20 to 30 More than 30

If you have apps, what is your favorite app? Favorite app: _____

If you use apps, do you have any for banking (ex: Chase) or using payment(ex: Amazon)?
Please list any such apps:_____

CalFresh Benefits

What is your CalFresh benefits status?
Current user No longer use but have used in past Never used

What is the total amount of time you have used CalFresh benefits?
Less than 1 month 1-6 months 6mo-1yr 1-3 years 3+ years

How many times per month do you shop with a CalFresh card before your balance runs out?
Once 2-5 5-10 10+ times

How do you find places that accept CalFresh card? Please select all that apply.
Check on Internet Ask friends Ask in person at the store

How often do you look for new places that accept CalFresh?
Weekly Monthly 1-2 year Never (only shop at once you know)

How do you usually get to the store to buy your groceries?
Walk Drive Public transportation Bike

At which of the following do you use your CalFresh benefits on a monthly basis? Please select all that apply.
Corner stores Costco Safeway Trader Joes
farmers markets Other (please specify): _____

What type of food items do you primarily buy with your CalFresh card? Please rank according to amount of CalFresh funds you spend
Beverages (nonalcoholic)_____ Beverages (alcoholic)_____

Dairy (milk/cheese) _____
Meat _____
Ethnic foods _____

Grains(bread, etc) _____
Sweets _____
Other _____ (please specify): _____

What do you feel are the most important improvements to make to the CalFresh program?

Order and Delivery Services:

Do you use any of the following order services? Please select ALL that apply. If none apply, please leave blank.

Order food by phone order food on Internet order groceries on Internet
Shop on Internet(Amazon, etc) Other: _____

If you use any such services, what is your preferred way to get your items? (If you do not order, please leave blank.)

Pick them up myself Deliver to my house Deliver somewhere else (work, etc)

If you shop on Internet, how many times per month do you order on average?

Less than 1 month 1-3 per month 4-10 per month 10 or more

Are you familiar with any of the following Internet grocery delivery services? Please select ALL that apply. If none apply, please leave blank.

Amazon Fresh InstaCart Safeway delivery Other: _____

On a scale of 0-10, how likely are you to use an Internet-based grocery delivery service that allows you to use your Calfresh benefits?

0 1 2 3 4 5 6 7 8 9 10

Please elaborate on your answer to the previous question. How do you feel about a Calfresh Internet delivery service for groceries for your home? What do you like about it? What concerns do you have?

APPENDIX 6

Survey Two Questions

GROCERY SHOPPING SURVEY

UC Berkeley School of Information

Your responses to this survey are anonymous and confidential. Under no circumstances will your identity be revealed. The responses will be combined from all participants and used to work on improvements to the program as a whole.



DEMOGRAPHICS

1. What year were you born? _____

2. Gender:

Female

Male

3. Do you have any children?

None 1 2 3 4+

4. What city & neighborhood do you live in?

City: _____

Neighborhood: _____

5. What is the highest level of education you have completed?

- No schooling completed
- Kindergarten to 8th grade
- 9th - 12th grade, no diploma
- High school graduate - high school diploma or equivalent
- Some college credit, no degree
- Associate degrees
- Bachelor's degree
- Master's, Professional, or Doctorate degree

6. What is your current employment status?

- Employed for wages
- Self-employed
- Out of work, looking for work
- Out of work, not currently looking for work
- A homemaker
- A student
- Retired
- Unable to work

7. What is the combined income for your household?

- Less than \$10,000
- \$10,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 to \$79,999
- \$80,000 or more

8. What race or ethnicities do you identify most closely? *Check all that apply*

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic or Latino
- Native Hawaiian or Other Pacific Islander
- White
- Other: _____

TECHNOLOGY

9. About how often do you use a cell phone to access the Internet?

- 1-3 times per week
- 1-3 times per day
- Hourly
- Have cell phone w/ Internet, but don't use
- Do not have cell phone w/ Internet access

10. What kind of cell phone(s) do you use (brand and model, ex: iPhone 4S), if any?

SHOPPING

11. What store(s) do you shop at the most?

And why do you shop there the most?

12. How do you usually get to these stores? *Check up to 3*

- Walk
- Bike
- Drive
- Bus
- BART

13. What do you care about the most when picking which items to buy? *Check up to 2*

- Price
- Brand
- Nutrition
- Necessary recipe ingredients
- Other:

14. Which, if any, of the following bargain hunting tactics do you use? *Check all that apply*

- Coupon clipping before shopping
- Browsing deal publication at store
- Rainchecking
- Looking at sale displays in store
- Other: _____

15. Have you been or are you currently enrolled in the following programs? *Check all that apply*

- WIC
- Food Stamps (aka CalFresh, SNAP, EBT)
- Never been enrolled in either program

GROCERY SERVICE

16. If you could have groceries brought to you, how would you prefer to receive them? *Check up to 2*

- Pick up at a community location (ex: a church) near my **house**
- Pick up at a community location near my **work**
- Deliver to my home when I **am** there
- Deliver to my doorstep when I **am not** home
- Other:

- None of the above

17. What time of day would you be most likely able to pick up or receive a delivery of groceries? *Check up to 2*

- 5 AM - 10 AM
- 10 AM - 2 PM
- 2 PM - 5 PM
- 5 PM - 8 PM
- 8 PM - 12 AM
- 12 AM - 5 AM
- N/A

18. What kind of housing do you live in?

- Apartment with shared entrance
- Apartment with private entrance
- House with shared entrance
- House with private entrance
- Do not currently have housing

APPENDIX 7

Usability Tests Protocols

Round 1 - Paper Prototype: For our first round of usability tests on the paper prototype, we asked users to complete the following tasks:

1. Add tortillas and cheese to your shopping cart
2. Add to your shopping cart the items you'd like to get with this WIC check (mock check given to user)
3. Checkout with your shopping cart and arrange for a delivery near your home

Round 2 - Proto.io: For our second round of usability tests with the Proto.io prototype, we asked users to complete the following tasks:

1. From the homepage, find the cheapest apples and add them to your shopping cart.
2. From the apples page, sort them alphabetically from A to Z.
3. From the homepage, navigate to the area that lets you browse all the deals within produce.
4. From the homepage, find the "Shop by WIC" feature and add Cheerios to your cart.
5. Complete the checkout process.

Round 3 - Proto.io Comparison: For our third round of usability tests with both the first and the second Proto.io prototype, we asked users to complete the following tasks:

1. From the version 2 homepage, find the cheapest apples and add them to your shopping cart
 - a. Repeat this step in version 1
2. From the version 2 homepage, find the "Shop by WIC" feature and add Cheerios to your cart.
 - a. Repeat this step in version 1
3. Complete the checkout process.
 - a. Repeat this step in version 1

Check #269534015

1 (Gallon) Milk, Whole ✓

1 (16 oz) Whole Grains ✓

36 oz Breakfast Cereal >

12 oz remain



36 oz Breakfast Cereal 12 oz remain

General Mills Total Whole Grain 12 oz



Kellogs Corn Flakes 12 oz



Quaker Life 12 oz



Safeway Crispy Rice 12 oz



Special K 12 oz



General Mills Cheerios 8.9 oz

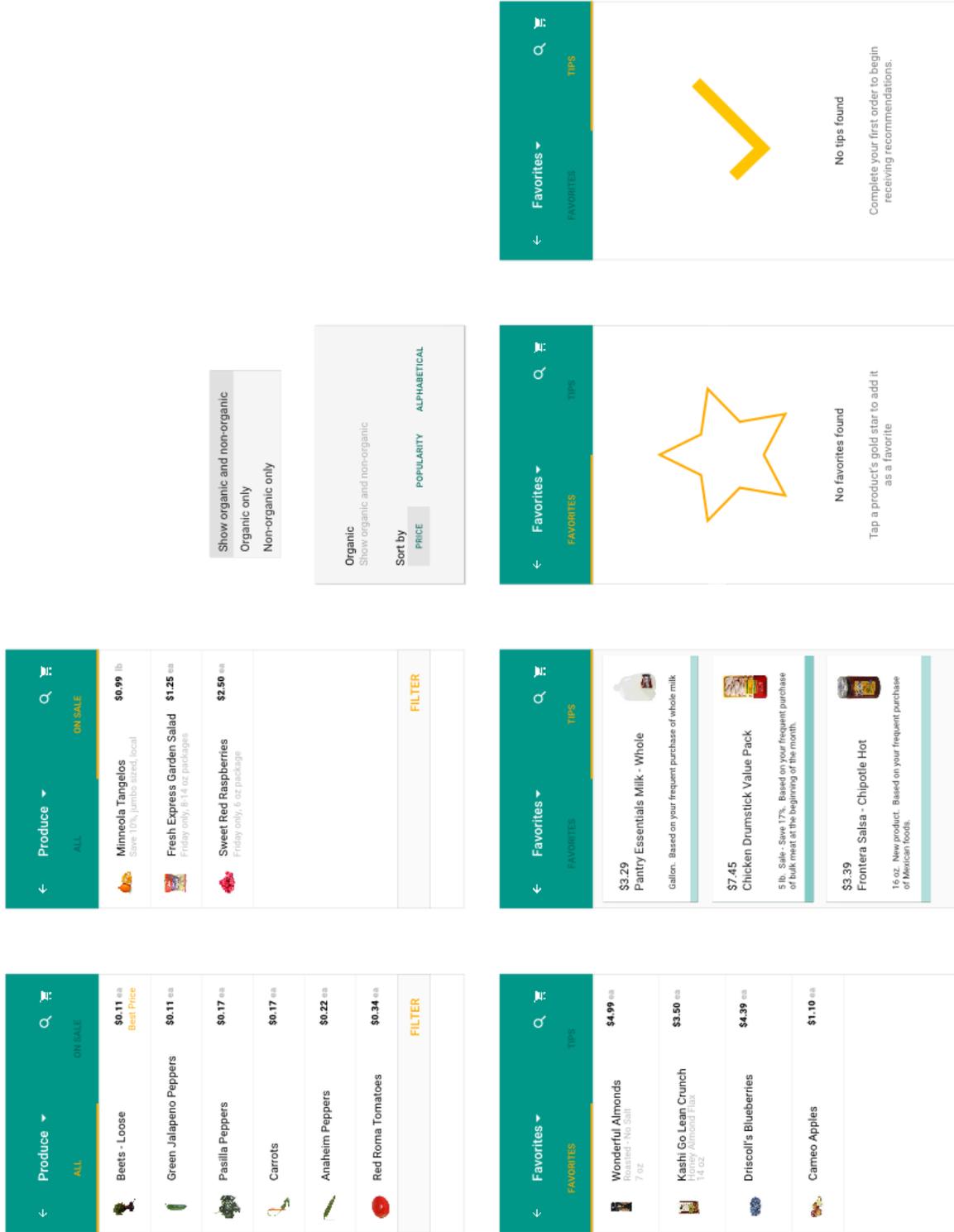


APPENDIX 8

Figure A: Shopping User Flow - Aisles



Figure B: Shopping User Flow - Deals and Favorites



APPENDIX 9

Figure A: WIC User Flow - Items 1 and 2

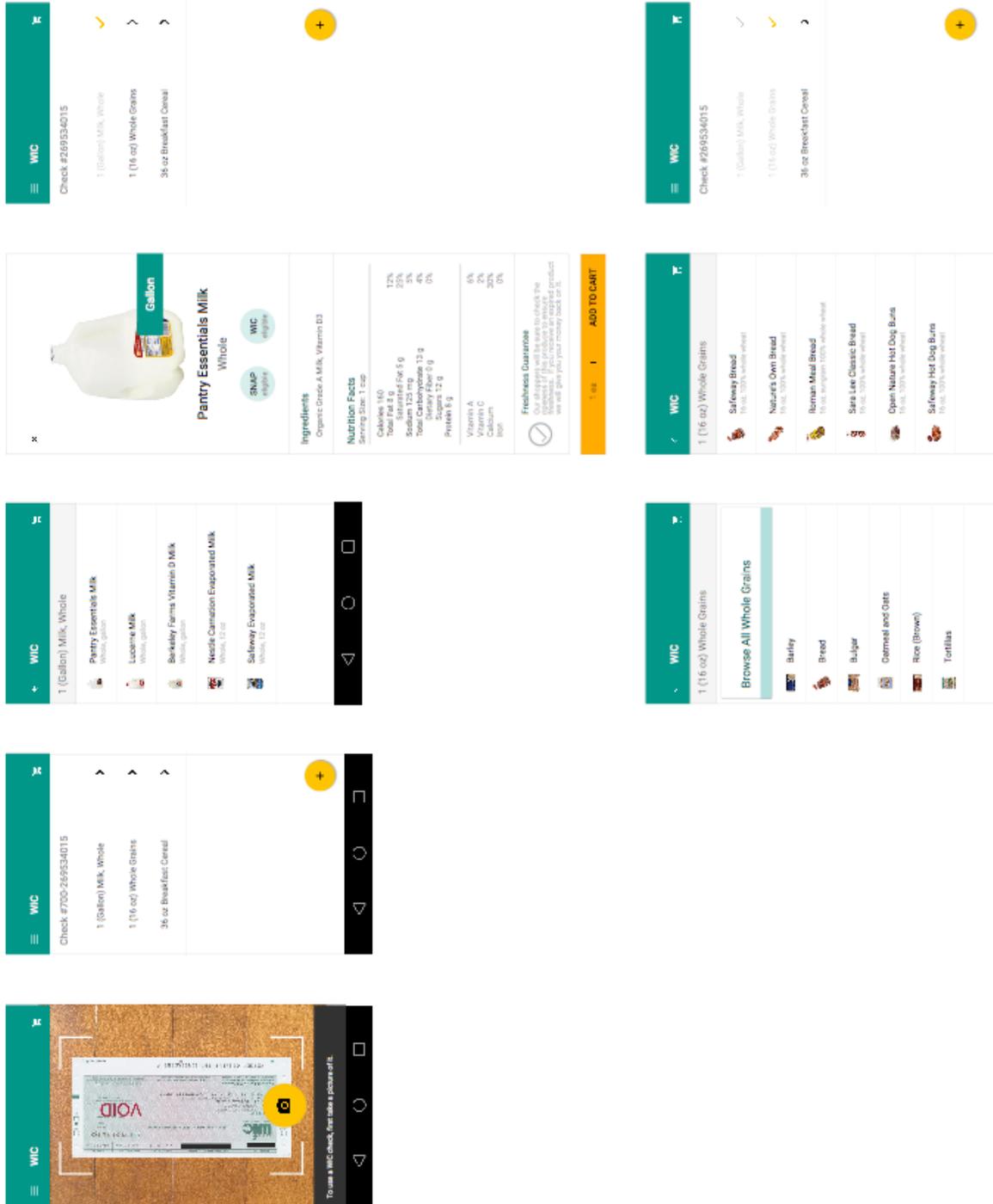
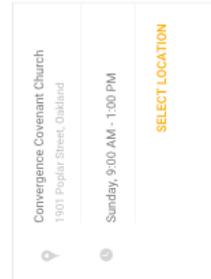
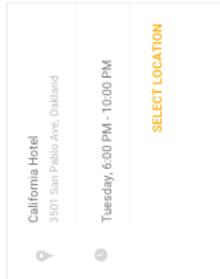
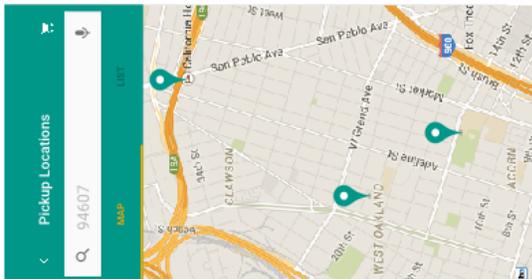
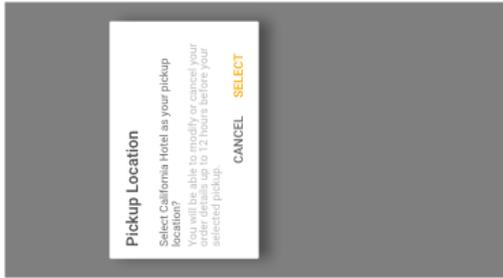
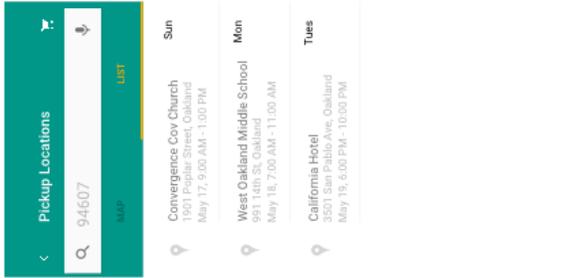
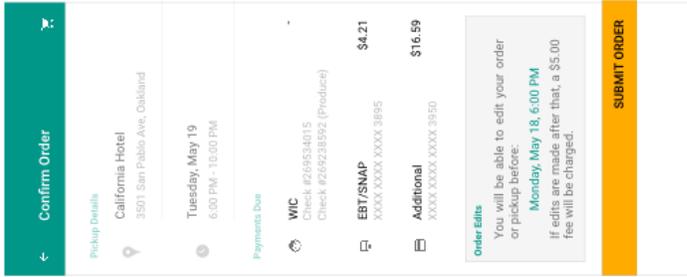
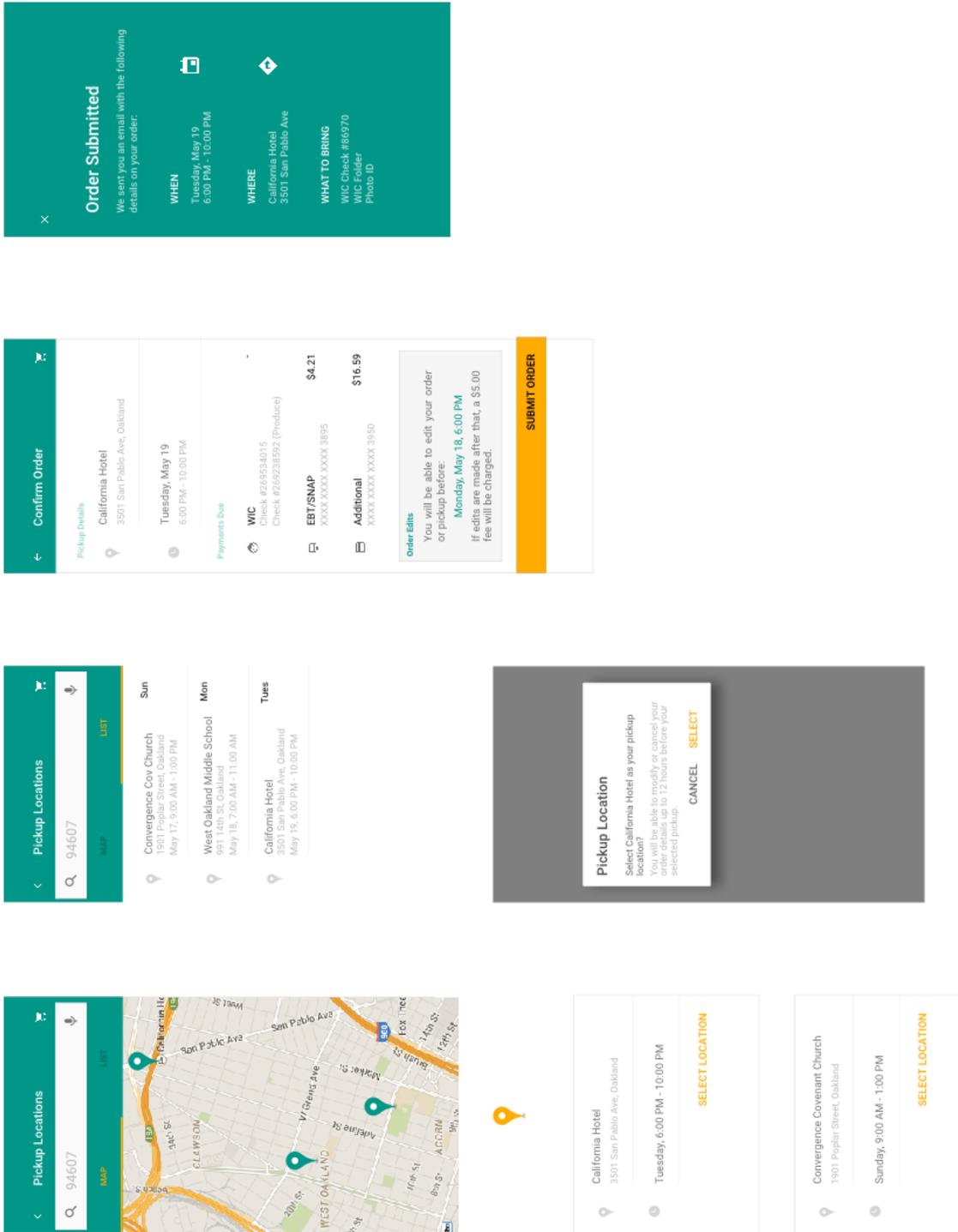


Figure B: Checkout User Flow - Pickup Location



...and they lived happily ever after...