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Word Count: 2497

Introduction

Mission Statement

End food waste--locally.

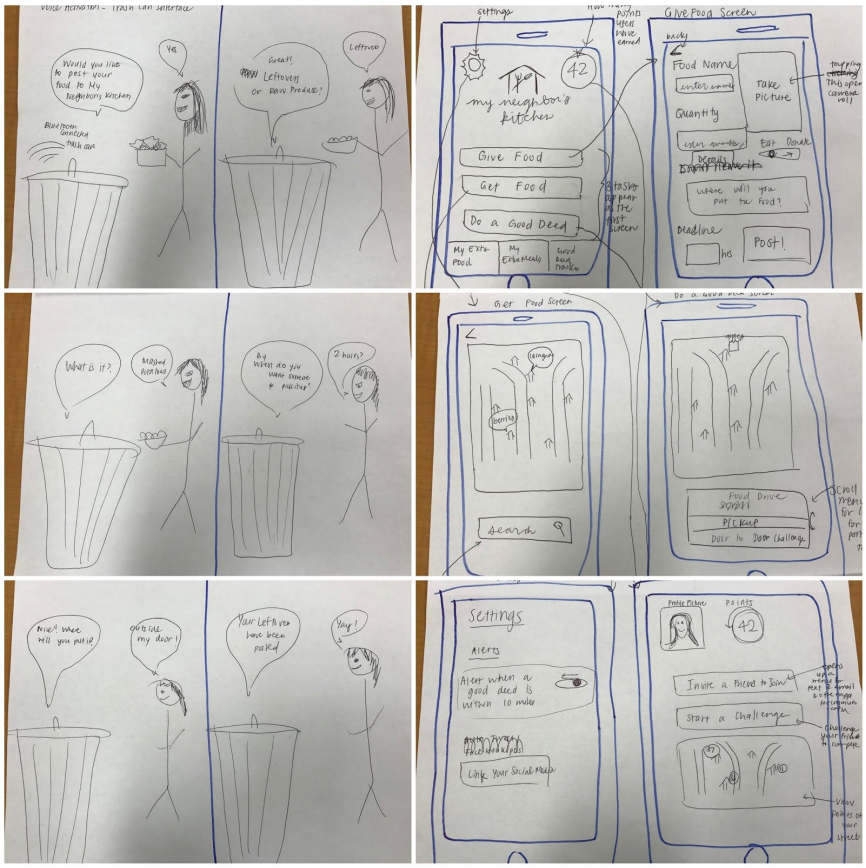
Problem/Solution Overview

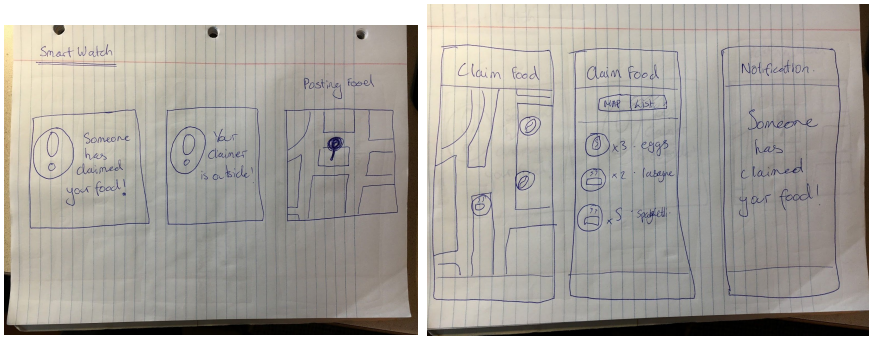
40% of all food grown in America is wasted, while 1 in 7 Americans are food insecure. While there exist solutions designed to track and minimize food waste in industrial and corporate settings, there is no such equivalent for the basic unit of society - the household. My Neighbor's Kitchen tackles this problem of domestic food waste on the scale of the local community. Instead of throwing out excess food, we want you to make it available for others around you, and instead of going hungry, we want you to leverage the resource you have just a few feet away - the kitchen next door. The ultimate goal of our solution is to reduce food waste in households by normalizing food sharing, and to a build a sense of community while doing so.

Sketches

Initial Sketches

To begin the design process, we made a few initial sketches, experimenting with different modalities: two mobile phone apps, a smartwatch interface, and a smart "trash can" interface designed to intervene when the problem (wasting food) occurs.

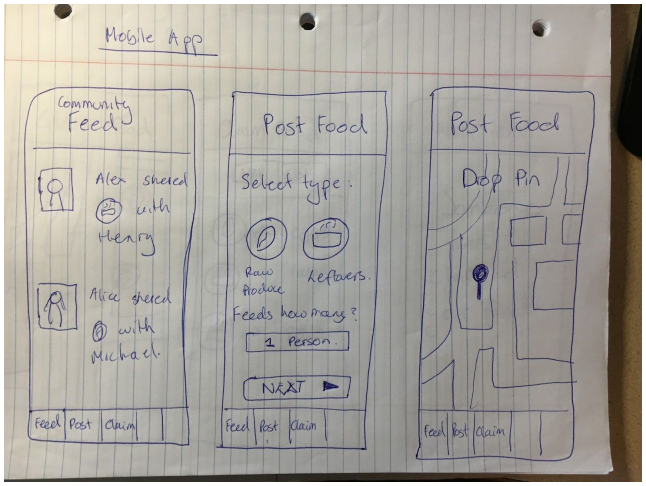




Top Two Design - More Detailed Storyboards

For our top two designs, we chose the two mobile apps because they provided diverse user interfaces while allowing for the flexibility and depth of functionality we aimed for. Here are the two mobile apps storyboarded in more detail:

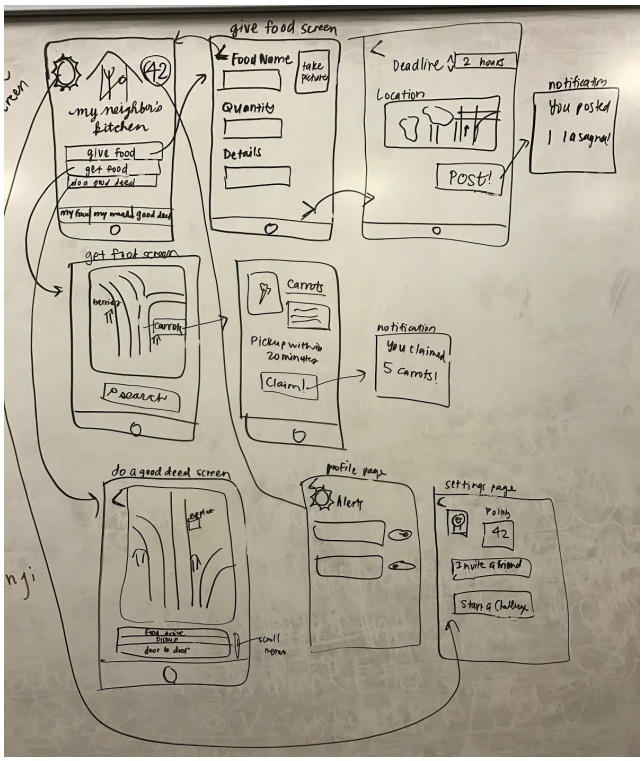
Top Choice #1: Mobile App



Features:

Tab-like structure that corresponds with the main functions of the app. This means a person is never confused when they want to do something, they know they simple have to select a new tab. The tabs are “post”, “pickup”, “run”, “community” etc. Allows people to drop food with a pin on a map. Loading screen is a community feed of all the recent shares of food within the community. Posting food is done within 3 button pushes, doesn’t require a lot of information.

Top Choice #2: Mobile App



Features: A home screen that clearly leads to every main affordance of the app, a screen to enter details about the food while posting, another screen to pinpoint the location and add details about the food, a map to browse available food, detailed descriptions of the food available for claiming, a map with a toggle menu to see visual representations of available good deeds, profile picture, a settings page to customize alerts, points tracking, and ability to invite a friend.

Designing the Selected Interface

Storyboarding The Tasks

The images below show how we storyboarded our three tasks: posting that you have available food, picking up food, and creating a community food donation competition.

Reasoning for our Selection

We ultimately chose a combination of combination of our top two designs because we thought there were valuable components in each that we wanted to incorporate. For a full table of the pros and cons of each feature of the two designs, please see the table in the appendix.

Pros:

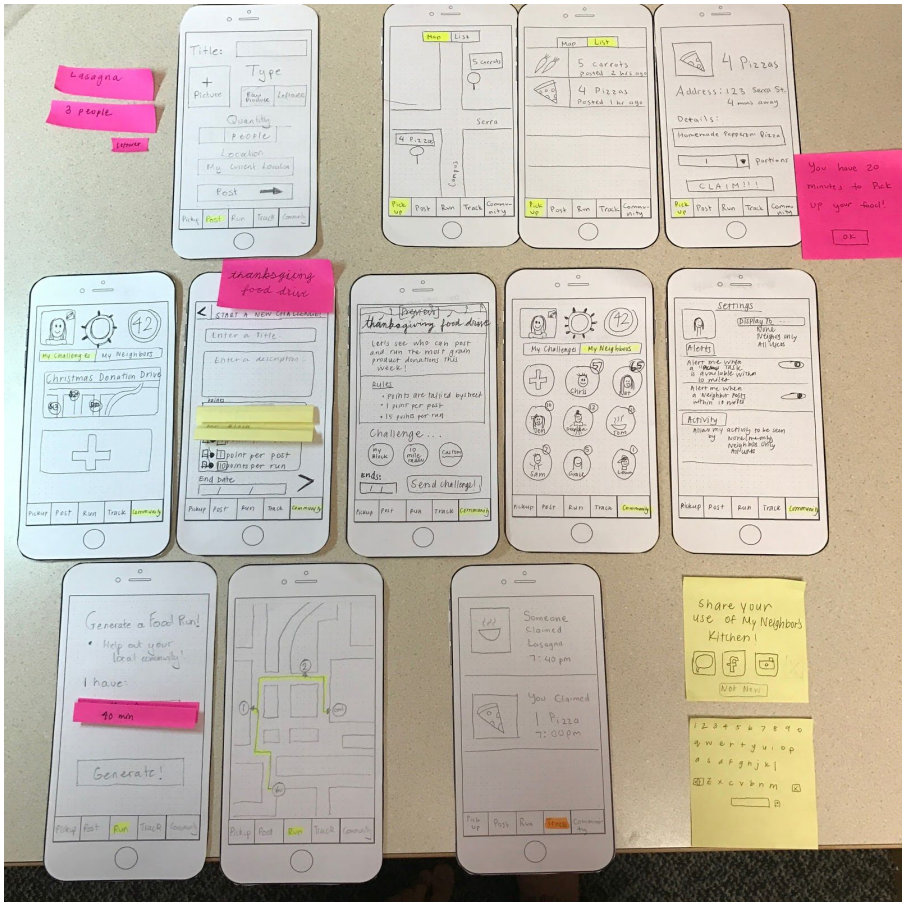
- A map for the home screen is intuitive and visually appealing. It also makes picking up food easy because it is the first screen when you open the map
- Our “post” tab has only a few questions and allows users to take pictures of their food

- “Community” tab allows users to interact with their neighbors/block in food drive challenges
- Gives users the ability to track their orders and see what they have claimed and posted

Cons:

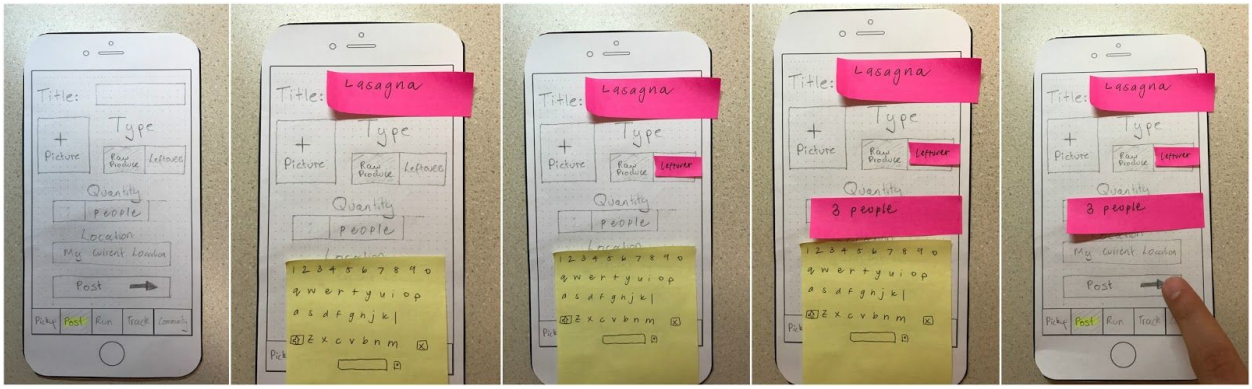
- “Community” tab is crowded and can be confused because of how many functions there are
- There is no news feed to see how much your neighbors have donated
- There is no map to see how many points/ how much your neighbors have reduced food waste

Low-Fi Prototype Description

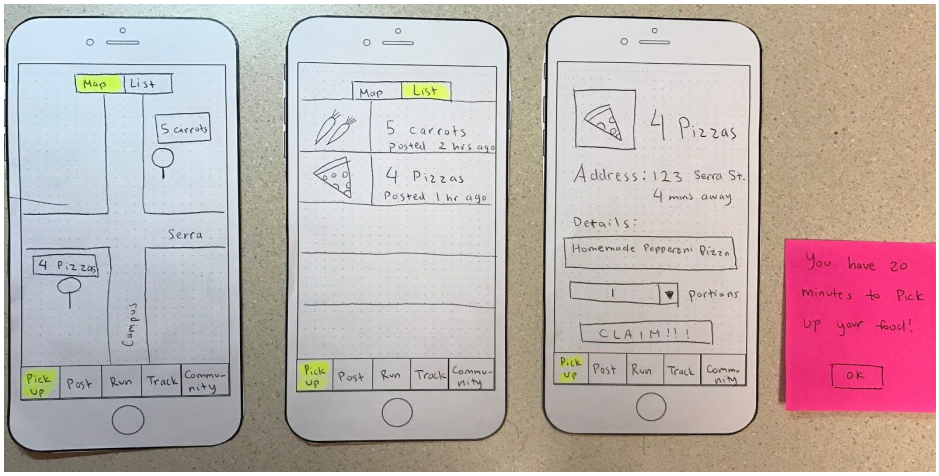


To make our low-fi prototype, we used iPhone wireframes on which we sketched 12 screens. We used post-it notes to model input keyboards, pop-ups, alerts, and pull down-menus, and we used highlighting to demonstrate which button was clicked at the time. Participants interacted with the prototype via touch input to move through screens, and we also filled in text boxes with pencils in real time to account for their taps of certain buttons.

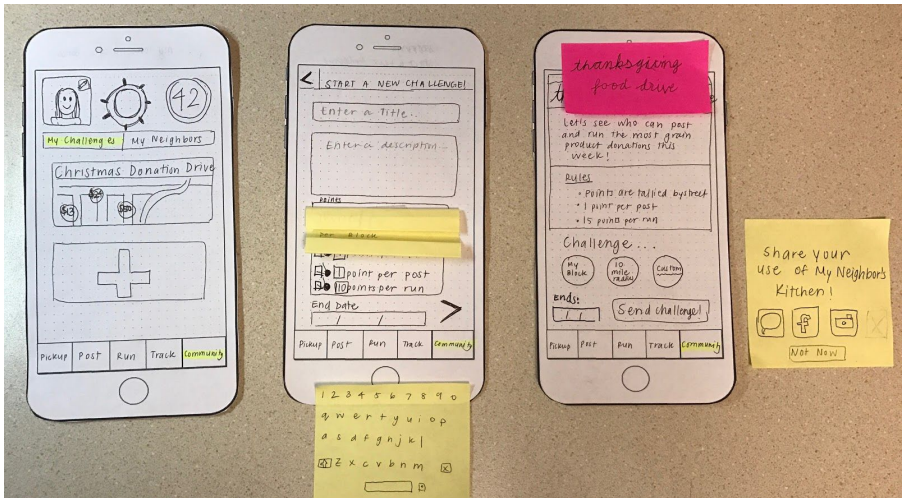
For Task 1, the participant used the following screens and workflow to post some leftover lasagna to the app.



For Task 2, the participant used the following screens to browse available food and clain 4 slices of pizza:



For Task 3, the participant used the following workflow to create a new Thanksgiving Food Drive donation challenge and share it with a block of neighbors:



Method

a. Participants

Our app is targeted towards households in a neighborhood. For our participants we recruited three resident fellows from Stanford University because they are households that generate food waste and live within the Stanford community. We recruited our participants through email and we did not compensate them. (See consent form in appendix for more details).

b. Environment

Most target users would use this app at home, after they have cooked a meal or if they are looking for food. Therefore, we tested our prototype on our participants in their homes because we believed this would best recreate the environment in which the participants would use the app. We also conducted our interviews before and after dinner, which is when target users would most likely use the app.

c. Tasks

We chose three tasks that would showcase the primary use cases of our app, and provided a short narrative before them to recreate apt situations as follows:

1. You have three servings of lasagna left from tonight's dinner. You don't want to throw it away. Post your leftover lasagna so your neighbor's can claim the food. (simple)
2. You are coming home late from work. You open the fridge to find that it is empty and that there is no food left anywhere in the house. Use the app to find food as quickly as possible to feed yourself. (moderate)
3. Thanksgiving is coming up and you want to compete with the rest of your block to see which street can donate the most food and make the most food runs to the food bank. Create a new week-long challenge called the Thanksgiving Food Drive and send it out to your block. (complex)

d. Procedure

We drew our prototypes on printed wireframes of an iPhone screen. We laid out the screens on the table and as the participant clicked buttons, the computer presented the participant with the appropriate screen or pop-ups. Grace was the observer, Devangi was the computer, and Lewin was the facilitator. The participant was also asked to verbalize his/her thought process when interacting with the prototype so that we could better understand his/her opinions.

e. Test Measures

Our main priorities in creating the user interface for our prototype were usability and clarity. We wanted to make sure that users were able to interact with the app without

confusion and needing help. Therefore, we looked for three things in particular during our tests:

Pain Points: Whenever the user asked us for help or was confused about how to use a certain button, we knew that this was a pain point for the participant. Our goal is to make our UI as easy to use as possible with little instruction, even for new users.

Time spent on a screen/doing a task: An important priority for us and our users is being able to quickly post and pick up food. Most households are very busy and have little time to spare. Therefore, we want to make it as easy and quick as possible for users to share food, otherwise they would be discouraged from using the app.

Unexpected behavior: We designed the app based on our intuition of how households would use it and their workflow for each task. Therefore, we wanted to pay particular attention to differences in how we thought users were going to use the app versus how they actually used the app.

Results*

Participant 1:

When asked to post food for the first task, Participant 1 **immediately knew which tab to go to since it was clearly labeled "post"**. This first task was simple and he completed it very quickly, showing that the UI flow for posting food was clear to use. When asked to do the second task, Participant 1 went to the "pick up" tab and zoomed in on the map interface. The most surprising behavior was that he wanted to pick up all of the food rather than an appropriate portion of it. He said, "It feels weird picking up a slice of pizza when there's four." This revealed a miscommunication - while we had intended the number to count by portion size (i.e. 4 pizza slices) he assumed that we meant 4 pizzas, despite the illustration of a slice. The third task was the most difficult because the options for designing the challenge were not clear. For example, he assumed that the "customize" button was used for customizing the distance range of the challenge, not who you could send the challenge to.

Participant 2:

This participant started out by looking for a home button, but could not find one since we had designed the app to open to the "pickup" screen to give users an overview of available food. He was able to successfully post food, but wondered what would happen to his food containers, asking for the ability to specify when to return it. He also wanted a button at this stage to determine who the food would be posted to - everyone in the app of just friends. For the second task, he was able to easily claim the food; however, he did have the same confusion about

portion sizes for the pizza as Participant 1. Finally, in Task 3, he was able to successfully create the challenge but did not understand the scoring system and how to manipulate it. After the testing, he suggested that there be some sort of displayed give-to-take ratio to ensure that families are not just on one end of the spectrum. We discuss this idea further in the Discussion section.

Participant 3:

This participant start off the experience by trying to zoom in and out on the map, an indicator that this was a good first loading screen. She was able to find the 'post' tab quite easily and go through the process, although she did mention that she would prefer to click on the "my current address" tab to confirm that it had the right location, meaning we should have a screen ready for this. She also mentioned that she would like somewhere on the page to enter information about special dietary restrictions, such as nut allergies or gluten free tags. When picking up food, she also asked how to directly message the poster of the food and ask about how the food was prepared etc. Finally she liked the community challenges, but was a little confused over the scoring.

*Please see the raw data tables in the Appendix for the observational notes of positive and negative remarks by each participant, from which we drew these insights.

8. Discussion

Our participants were generally positive about the app, and truly seemed to support the idea of sharing food within the community. A couple of the resident fellows described that they did something similar already by putting out extra food for the residents of the dorm, and they enjoyed an app to implement this on a neighborhood scale, which shows that the idea holds strong. They found the interface usable, and the issues generally arose at the sub-task level, during details of the task flow. The way the participants interacted with the interface was revealing. For example, a consistent theme we noticed was that all three of our participants wanted to zoom in and out of the maps; even though they knew this was a paper prototype, their instinct upon seeing the maps was to want to zoom to truly browse all the available options. Although the participants seemed to like the community feature, they had the most trouble with understanding how challenges and competitions worked, and thought that a more guided walkthrough of that in the app would be useful - something that we might implement in the form of an information button next to the relevant menus, for example. All of them also had some confusion around portion sizes, which we explicitly or visually need to display.

The feedback from our participants demonstrated that we need to implement some additional and modified functionality in order for the tasks to feel complete. One example was the suggestion of a feature for families to alert when a family emergency had occurred and they were unable to cook for an extended period of time. In addition, another theme that arose during the interviews was wanting a more clear line of communication between people posting and picking up food. While one participant was concerned about getting his food containers back,

another wanted to describe exactly where the food would be left outside, how the person who picked it up liked the food, and how better to track the status of the pickup and consumption of the food. Based on our needfinding, we decided to initially only allow users to interact with their friends and friends of friends (using Facebook data) but we realized that this was not well-communicated in the app. Participants also wanted more reminders about picking up the food within the allotted time limit. All of these suggestions will lead us to expanding the functionality of the tracking feature of the app in a future iteration, allowing for more nuanced communication and instructional affordances. Another theme was that participants wanted more details about the quality and content of the food; we will experiment with adding badges for number of meals posted as a parameter of food quality, and tags for important food allergens.

Another area of insight revealed the need for further thought about the implications of the goals of the app. One of the participants expressed that after using the app, the goal seemed to be “potlatch” - the idea that “if I catch a fish, I owe it to the entire community to share it.” He seemed concerned that the use of the app might be one-way in that one household might always be on the receiving end, and this led us to think deeper about what usage patterns of the app we want to morally encourage, and how to design for those. For example, would we be alright with a few food insecure families constantly picking up food (i.e. undermining the larger community aspect)? If not, should we implement a pickup-to-provided ratio to display the ratio between various contributions by families? But how would we do so without revealing which families are food insecure? Finally, how do we balance between encouraging food runs (donating all the available food within a radius to a food bank) and food pickup (supporting the local food insecure families directly)? These are questions we will tackle and resolve in our next prototype.

Appendix

Consent Form

Consent Form

The [TEAM NAME HERE] application is being produced as part of the coursework for Computer Science course CS 147 at Stanford University. Participants in experimental evaluation of the application provide data that is used to evaluate and modify the interface of [TEAM NAME HERE]. Data will be collected by interview, observation and questionnaire.

Participation in this experiment is voluntary. Participants may withdraw themselves and their data at any time without fear of consequences. Concerns about the experiment may be discussed with the researchers ([TEAM MEMBERS NAMES HERE]) or with Professor James Landay, the instructor of CS 147:

James A. Landay
CS Department
Stanford University
650-498-8215
landay at cs.stanford.edu

Participant anonymity will be provided by the separate storage of names from data. Data will only be identified by participant number. No identifying information about the participants will be available to anyone except the studentresearchers and their supervisors/teaching staff.

I hereby acknowledge that I have been given an opportunity to ask questions about the nature of the experiment and my participation in it. I give my consent to have data collected on my behavior and opinions in relation to the [TEAM NAME HERE] experiment. I also give permission for images/video of me using the application to be used in presentations or publications as long as I am not personally identifiable in the images/video. I understand I may withdraw my permission at any time

Name _____

Participant Number _____

Date _____

Signature_____

Witness name _____

Witness signature_____

Raw Data

During the testing, the observer noted the positive and negative remarks made by the participants during each task.

Participant 1:

Positives	Negatives
-easy to post -ui is intuitive Buttons are easy	- no camera -wanted to zoom in on the map right away
-map is easy to use and click -claim food	-weird picking up a slice of pizza when there's 4. Just get everything from them. Thought that 4 pizzas referred to 4 whole pizzas rather than pizza slices
-buttons are clear -easy transition between screens -no complaints in terms of the interface	-short description -one point per dollar one point person post-took a long time to understand. "Can't tell if they are options or not" -looks like i can design the contest but not clear how -"no idea why theres a dollar amount there" - points per post-clear and run clear -took a long time for the preview page -i see that i can customize the radius -"is this a different date than the date i was going to do over there?" -"so if i can customize i can see a map or something" -"then i can click on the people?" -" i thought the customize was going to be area" -track button is for challenges? Other: "was the 20 minute limit because the person set the timer?"

Participant 2:

Positives	Negatives
Task 1: -Automatically put location based on GPS -Was able to walk through the process of entering-I might not want to take a photo the relevant information quite easily -"I might not want to take a photo" - recognizes that this is optional	Task 1: -"I'm looking for the home button but there isn't one" -What happens to your container? -I want to be able to enter instructions for how to get the container back. -Want a button that discerns who it goes to - is it available to everyone in the app or just friends?
Task 2: -although he tried clicking on the community tab first, quickly switched to pickup tab -claimed it easily -remarked that he assumed he's claiming all 4 pizzas in that scenario, and that the resulting food waste would be his problem	Task 2: -mentions that he might try the community tab, and tries that first -what if there is nothing that I like?
Task 3: -Although he said that it was unclear, he hit the challenges tab correctly -Understood that he can change the parameters of the game	Task 3: -remarked "unclear" -Confused by buttons for points - "Didn't I already put in the date?"

Participant 3:

Positives	Negatives
Task 1: -Overall flow very clear -Normally would put information top down, but instead here would take a photo first (recognised that order is unimportant)	Task 1: -"How do I know about allergy information?"
Task 2: -Overall flow very clear	Task 2: -"how do I message the the poster of the food to ask questions?" -Some sort of tracking of the person coming. An I've picked this up button,.

	-Cool to have a way to give feedback on the food “Thanks for the food Gail!” -Concerned about the safety of the food. Somehow a certified rating – a badge, “100 posts, 0 sick”.
Task 3: -Understood that challenges would be under Community tab -Liked the idea	Task 3: -If first time doing it, would have liked some sort of “now choose how you’re going to score the challenge”. -Confusion about the per street category -Would want a popup calendar where you could put the date.

More Detailed Pros and Cons

Here is a more detailed table comparing each of the features of our two mobile apps. This helped us merge these designs to make our final choice for which design to prototype.

Mobile App Prototype 1

Pros	Cons
Home Screen: There’s a community feed of people donating Quick and easy to post food	Home Screen: can’t see history of donated food can’t initiate a “good deed” easily
Giving Food: Dropping a pin on the location minimizes errors Clear distinction between choosing to give raw food and leftovers (Ways of thinking/doing) Workflow is not cramped (next button takes you to a new screen for the map)	Giving Food: Doesn’t capture enough information (time constraints) No pictures of food
Getting Food: Map overlayed with icons of raw produce vs prepared meals gives a visual display of what’s around Ordered list in terms of location Toggle menus between map and list allows	Getting Food: Would have to click on each icon to see the details of the food available and could get annoying

you to search how you prefer	Numbers next to the food are confusing - unclear that they're portions
Notification: Exists: tells you within the app if someone picked up your food	Notification: Takes up the full screen Must have the app open to see it

Prototype 2

Pros	Cons
Home Screen: All tasks in one location, main tasks you want to do there when you open the app.	Home Screen: Workflow difficulties/might be difficult to get back to the homescreen to utilize the main functions of the app
Giving Food: Ability to add photos -collects more information (time constraint, word description of where the food will be)	Giving Food: -too many tasks to do -UI too crowded -differently sized boxes are not aesthetic
Getting Food: -Being able to search for specific foods -one screen with map and search bar -picture/text of available food overlayed on map gives clear indication	Getting Food: - Hard to see your options in an area (no scrollable list) -
Doing a Good Deed: -easy to initiate a good deed -similar UI to getting food -allows you to	Doing a Good Deed: -how to 'complete' a good deed? (particular scenario) -need more descriptions of what each general category of good deed entails
Settings: -customize your alerts -link your social media -add friends/neighbors	Settings: -more uniform display needed (toggle menus vs. logins for social media)
Community Connect: -Allows you to compare your points with others, start challenges -profile picture makes it personalized	Community Connect: -hard to navigate to -need a centralized location for the community tasks

Method

Script:
Hi! Our names are Lewin, Grace and Devangi and we are part of a team coming out of CS147 that is researching new methods of food distribution to lessen domestic food wastage. The concept involves households being able to 'post' and 'pickup' leftover food from the surrounding houses in the local community, and in general aims to help establish a community within a neighbourhood around sharing food.

Now we are going to show you a quick prototype of our app. We want you to interact with these papers as if this were a real iPhone, so you can click, scroll, switch to different screens of the app).

Demo Food Run (how the paper works, speak out loud thought process during).

Tasks:

4. You have cooked lasagne for your family of 5 tonight, and have just found out that all of you children are out for the night and eating at their friends' houses. You have leftover lasagne that could feed about 3 people. Use the app to post this food as available to your neighbors.
5. You are coming home late from work the next week. The rest of your family are away visiting your wife's parents. You open the fridge to find that it is empty and that there is no food left anywhere in the house, and you're getting pretty hungry. Use the app to find food as quickly as possible to feed yourself.
6. Thanksgiving is coming up and you want to compete with the rest of your block to see which street can donate the most food and money, and make the most food runs to the food bank. Create a new week-long challenge called the Thanksgiving food drive and send it out to your block.