

WastePlacer

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Problem and Solution Overview

In this project, we are tackling the problem of food-related waste generated by individuals. We found that individuals often do not sort their food and food packaging correctly, which wastes the natural resources used to produce the food item in the first place, and, in the case of recycling, could potentially contaminate the entire recycling bin. This has a harmful environmental impact because those natural resources cannot be replenished. We also found that individuals do not realize the sheer amount of disposable, single use packaging they buy and throw away every day. Our solution will tackle the problems of incorrect sorting and apathy to packaging by helping people sort and track their different types of waste through a mobile app. The app will scan a person's waste and identify which bin to throw it in. The person may sort correctly for extra points, or the answer can be revealed if they do not know. The amount of items in each category is tracked over weeks and months, and visualized in several ways (graphs, a tree, etc.). The person may also set goals for themselves each month to reduce their waste. The app can connect to other people's apps to make friendly competition over the amount of points and encourage better waste habits.

Design Research Goals, Stakeholders, and Participants

For our design research, we decided we would have our participants track, in a diary study, every item that they purchase and throw away over the span of three days. We initially wanted each participant to take a photo of each item before they throw it away, but several participants stated that they would rather just write down each item. With our design research, we also included a contextual inquiry study with a few of our participants. In this study we would be in the participant's home and observe them when they clean out their fridge or pantry. By asking them to think aloud we could more easily observe the way they were thinking as well. Before and after both the diary studies and contextual inquiry, we had a list of questions to ask the participants to get an understanding of their how their current waste and consumption habits were.

In total we had eleven participants that conducted either the diary studies and/or the contextual inquiry. The participants were categorized into two types of groups; individual consumers, more specifically young adults that are currently college students, and family homes where there is more than one person contributing to the waste. The college students typically buy for themselves and dispose of their own waste into communal garbage bins that include all 3 types of waste. The family households were different as some further suburbs did not have composting bins. All the participants believed their waste habits were normal or even a bit better than most other people.

We decided to use a diary study because we believed this would result in the total data that we can get by having documented everything someone throws out giving us the best data to build ideas off of. The contextual inquiry was used to try to understand the way people think while actively cleaning out and throwing away old food items in their own homes to not make them change their habits. The college student participants we chose because we have access to many friends or friends of friends that were willing to help. They also are at an age where they are creating habits and are more likely to adopt more environmentally-friendly waste habits. We also had the group of participants from the family homes which we believed would be helpful as they tend to buy more and have more food or products that will need to be disposed of.

Design Research Results and Themes

The results of our research lead us understand how our two groups of participants think about disposing of their waste. In the family home participants one participant actively practices proper waste habits and even knows of a recology store to take hazardous materials such as styrofoam, batteries, and lightbulbs. Another participant didn't have compost bins in their neighborhood so all the waste that would be composted ended up in the trash. This identifies the issue of waste management systems and processes in different areas, as Seattle has to compost while the suburb or rural area might not even have a way compost or recycle.

The most prevalent theme that came up in our research was understanding of correctly sorting waste items. In both groups there was common understanding that the default bin to dispose of their waste was the garbage bin. Logic would be used to determine what they believed to be the best choice in bin to throw an item in when they did not really know the correct bin. This can result in error as there could be materials that don't belong in certain waste bins. Only a few knew that one item can contaminate waste that could be composted or recycled resulting in a waste of opportunity to reuse materials. We learned that people don't want to spend more than a few seconds when determining where to dispose of something.

Another topic that was interesting to explore and incorporate was the perspective on each participants impact. Everyone knows they do things that are not eco-friendly but when comparing to everyone else our participants believed their actions might be justified just because they are better than the average consumer. There is no clear external incentives that occur when people correctly disposes of their waste. We realized we wanted to create a positive feedback response when helping identify the correct bins for waste as well as when someone correctly disposes of their waste. This will build an understanding to help people learn what types of materials and encourage them to correctly dispose of their waste. Thus, we will build a greater understanding of the correct system of disposing waste to help reduce our impact on improper and unconservative waste habits.

Answers to Task Analysis Questions

Who is going to use the design?

This design essentially targets everybody who produces waste and purchases products from the store, which is most anybody. However, we have chosen specific groups to emphasize. The main people who will use the design are the same as the participants we found for our research: individuals who are heads of families and students. Students are more open and adept with technology. They are also in a position where it is easier to change their waste management habits, since they shop and cook for themselves. Our second main targets are heads of families because they manage meals and purchases, which produce a substantial amount of food and plastic waste.

What tasks do they now perform?

Everyone produces waste and constantly has to throw away the waste they produce. However, the way people dispose of their waste varies. For most items, it is easiest to dispose of it in the trash, especially when there is uncertainty. Most areas and people do have access to recycling of plastics and glass, yet some of plastics do not belong in the recycling. While trash and recycling is a normal part of most waste habits, composting is another story. From our data collection, only places that are in Seattle or individuals that are environmentally conscious compost organic material. If compost or recycle bins are not conveniently located, there is an issue of only throwing away waste into the trash.

What tasks are desired?

It is desired that individuals 1) reduce their consumption of items that end up becoming non-environmentally friendly waste such as plastic packaging or food scraps, and 2) become more cognizant of how they are sorting their waste. Participants see being environmentally friendly as a good thing. So, while the tasks aforementioned are specific, our overarching goal is to help participants become more aware of how their daily habits are impacting the environment. We want people to constantly push themselves to make more eco-friendly decisions instead of opting for what is most convenient.

How are the tasks learned?

These tasks will hopefully be learned through a combination of tracking, information-sharing and physical sorting. The correct sorting of different types of waste only solves part of the overall problem. The actual actions of consumers cannot undergo significant change unless the mindset is changed. This can be done through tracking an individual's waste habits and providing physical numbers, as well as providing a context in which to view this data - such as how it compares to their friends, and how much progress they have made to reduce their waste.

Where are the tasks performed?

Disposing of waste is done in a variety of locations, both inside and outside of the home. Inside the home is typically done in kitchens or in bathrooms, while outside the home is often in restaurants, classrooms, or elsewhere.

What is the relationship between the person and data?

Everyone disposes of some items, making them have things that they can track. The data is what each person disposes--what it is, and how much of it. The kind of packaging people use is also data, as there are several different buying habits such as using reusable bags, buying less individually packaged items, or even making sure not to waste purchased goods.

What other tools does the person have?

If someone wants to find out which receptacle their waste belongs in, they may look at the receptacle itself, which often has pictures of things that should be disposed of there. Additionally, a person can use the internet or physically call the waste disposal providers of where an item should be disposed of.

How do people communicate with each other?

In general, disposing of waste is not a social activity, so there is not much interpersonal communication. Sorting waste is done based on the individual's existing knowledge and rarely do they ask others how to sort waste. Often people feel that it is not their place to tell others how to correctly sort, even if they notice something wrong.

How often are the tasks performed?

Disposing of waste is done multiple times a day. Typically it is done after consuming a meal, and then at other random points. People could use our design everytime they dispose of something, when they have a lack of knowledge about where to sort, and when they want to review their waste habits.

What are the time constraints on the tasks?

People tend to be in a hurry, and when it comes to disposing of waste, it is no different. Nobody wants to have to sit in front of a trash can trying to figure out the correct bin to put things in. Our design must take this into account, by either only using a couple seconds of the persons time, or none of their time at all. Our design must also be fast to use when tracking each item.

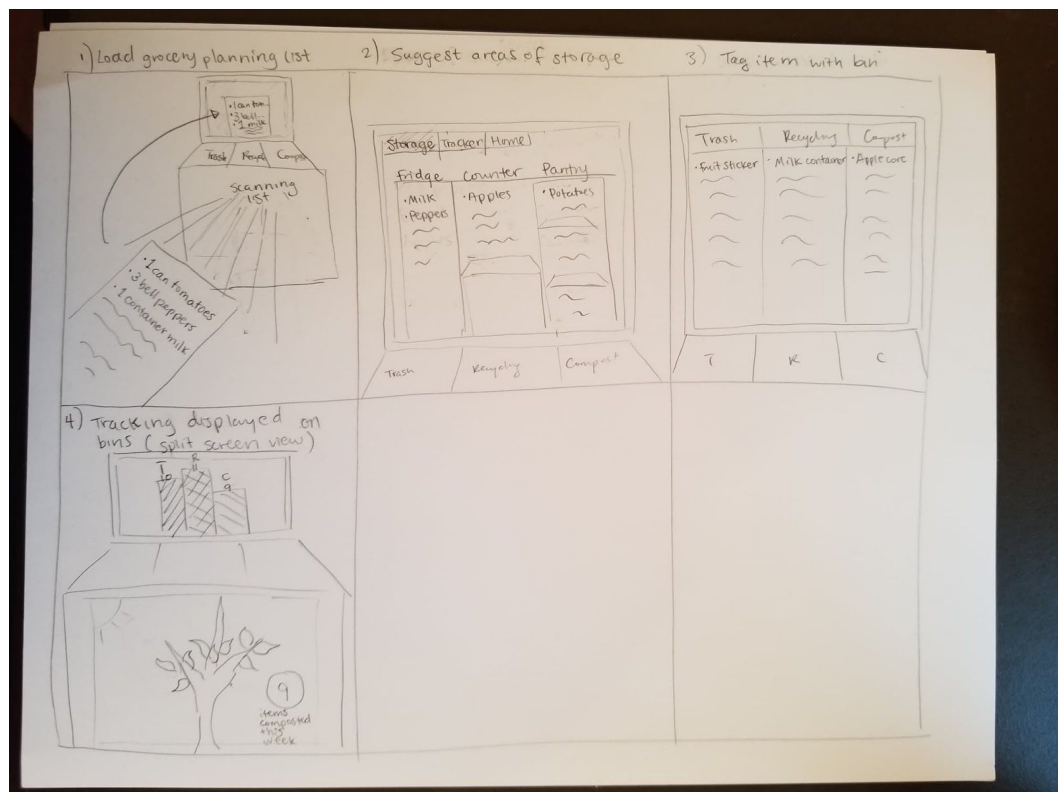
What happens when things go wrong?

Mistakes happen when people incorrectly sort their waste due to 1) not knowing where to sort it and defaulting to trash, 2) incorrectly recycling food-soiled containers, which contaminates the whole bin, and 3) realizing they sorted it wrong but thinking "it's too late" and are opposed to reaching back into the container to re-sort it. Sorting waste incorrectly ultimately leads to more things that could have been composted/recycled going into the trash. Furthermore, throwing contaminated items in the recycle causes the entire load to be thrown in the landfill. This can include throwing unclean recyclable items as well, not just trash or compost.

Proposed Design Sketches

Design 1: Smart Bins

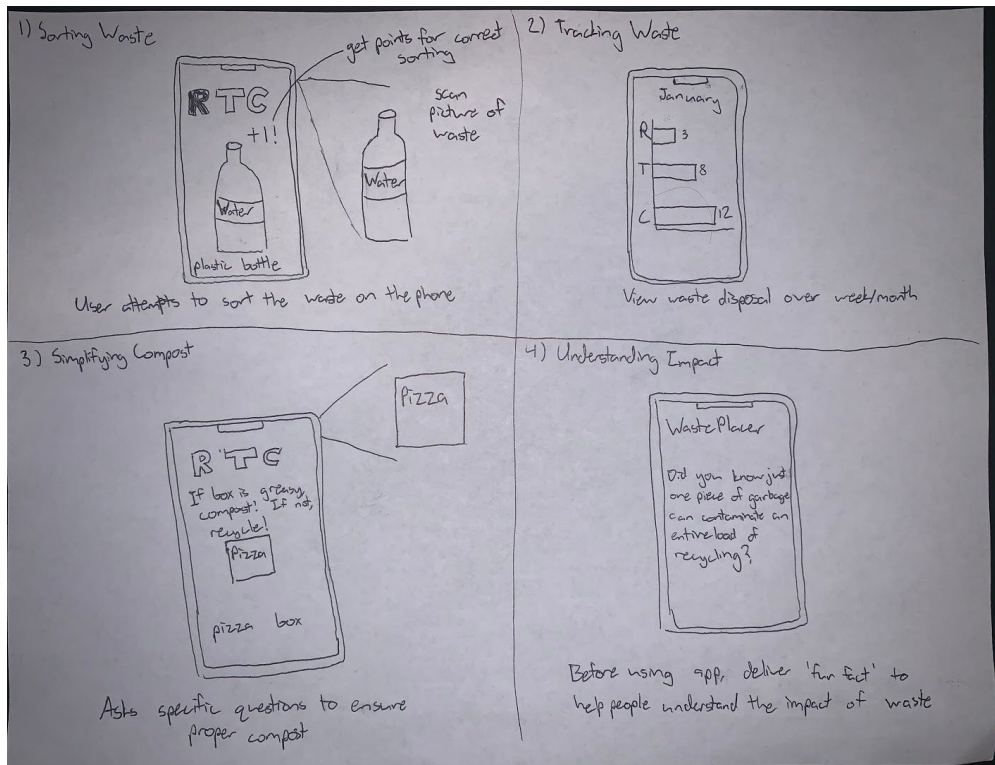
This design consists of a smart bin separated into trash, recycling, and compost receptacles; and a single screen connected to the bins. It load someone's grocery haul for the week, suggest the best places (such as the counter, fridge, and pantry) to store each item (Figure 1, panels 1 and 2), automatically tag and display each item with the correct bin it should be thrown into once used up (Figure 1, panel 3), and both track the number of items disposed of in each receptacle and make the information available to someone's friends (Figure 1, panel 4). Assuming the user also has a smart fridge, the grocery-arrangement information could also be passed onto the fridge, where the fridge could also keep track of what foods are going bad.



(Figure 1, Smart Bins sketch)

Design 2: WastePlacer

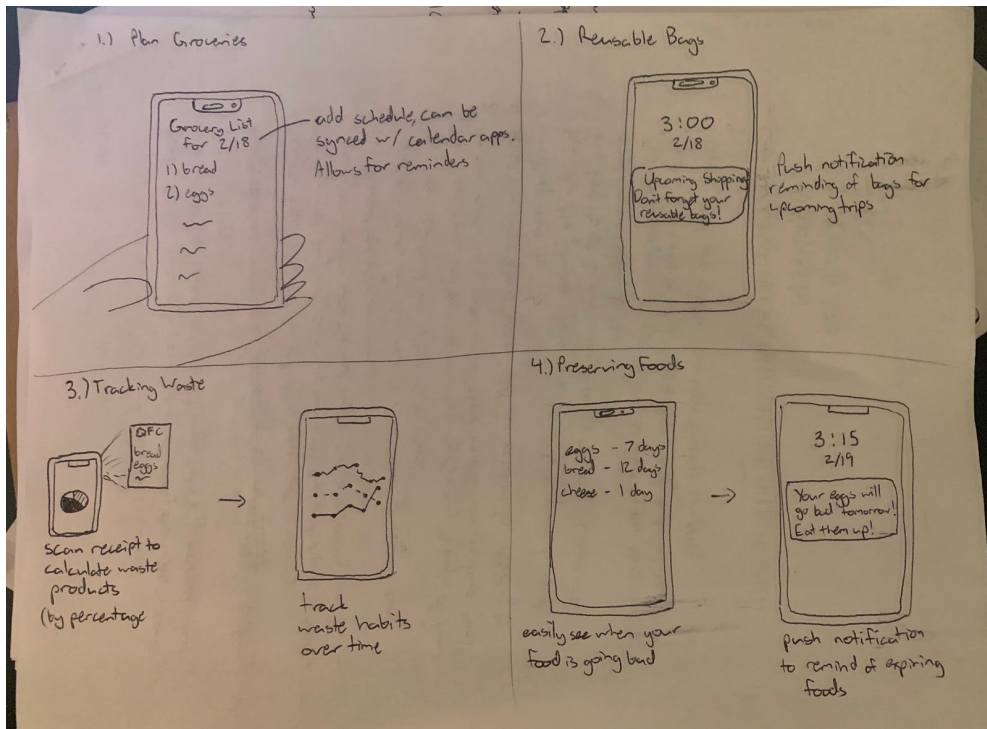
This design focuses on not just making sure that waste is sorted, but also educating people on how to properly sort waste, and why. The main feature of this design uses the phone camera, to scan multiple items of waste. A user can then attempt to match the item with the correct method of disposal. If they are correct, the app will give them points (Figure 2 panel 1). As a user uses the app over time, they are able to track their waste, based on the number of items thrown away in each container (Figure 2 panel 2). The app is intelligent enough to ask clarifying questions on common items, such as a pizza box, which determine the correct container. An example is "Is the pizza box greasy?" (Figure 2 panel 3). After each use, WastePlacer sends a "fun" fact that helps people understand the true impact of waste (Figure 2 panel 4).



(Figure 2 WastePlacer sketch)

Design 3: Smart Shopping List

This design focuses on more of a “smart shopping list” that helps to keep you mindful of what you are buying and how to store your items. It is specifically intended to target the task of planning groceries (Figure 3, panel 1), because what you buy has a large impact on what you throw away. In addition to just being a shopping list, the app will send you a reminder (Figure 3, panel 2) in order to make sure that you bring your reusable shopping bags. The app allows you to scan your receipts from the store, and it will both catalog the waste type of each product (Figure 3, panel 3), and also tell you where to store the product for maximum preservation (Figure 3, panel 4).



(Figure 3 Smart Shopping List sketch)

Design Choice

In the end, we decided to go with our second choice, the WastePlacer phone application. Specifically, we want to focus on the tasks of tracking waste and sorting waste. We decided to use this instead of the smart bins, because we believe that it is very important to not just have the waste sorted, but make people understand how to sort, and furthermore, the importance of sorting. Everyone's habits have an impact, and we want to be able to make people mindful of them. We believe that by gamifying the application with a point system, people will be inclined to use the application.

Written Scenarios

Scenario for Sorting:

Julia has just finished lunch at By George. She has some food scraps, a greasy cardboard box and a plastic water bottle. She goes to throw them away but realizes she doesn't know where to throw what.

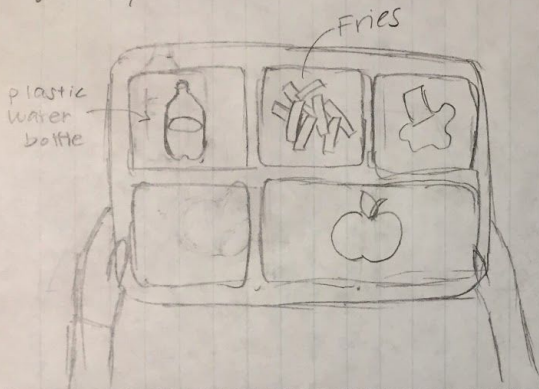
1. Julia spreads out the items and scans them with her iPhone, capturing multiple items at once (Panel 1-4 of Storyboard)
2. Detailed options are provided, such as if the item is greasy.
3. Julia marks the apple and plastic water bottle as compostable. She clicks the verify button. (Panel 5,6 of Storyboard)
4. The app informs Julia that the apple is indeed compostable, adding points to her score. However, second item is not. The app labels the remainder of the items with the correct disposal bin (Compost, Recycling, Trash) and its estimated weight. (Panel 7, 8 of Storyboard)
5. Julia disposes of the items accordingly, marking them as disposed. (Panel 9 of Storyboard)

Scenario for Tracking:

At the end of the month, Julia wants to see how much she's thrown away throughout the past month, and if she has met the waste goals she set for herself last month.

1. Julia scans and disposes of an orange peel, marking it as disposed. The app adds it to the appropriate category, compost, for tracking purposes. (Panel 1)
2. Julia navigates to the tracking page, where it displays trends for Compost, Recycling, and Trash (and more detailed breakdowns) over time. (Panel 2,3)
3. Julia sees that she has met her composting goal for the month of composting at least 50% of her waste. Panel (4)
4. Julia sets a new goal for the month of reducing her trash by 30%. (Panel 5,6)

1) Tray of waste



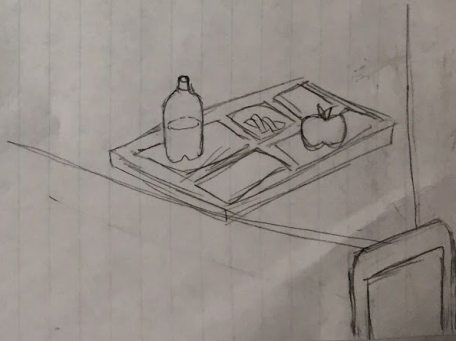
2) Doesn't know where to throw what



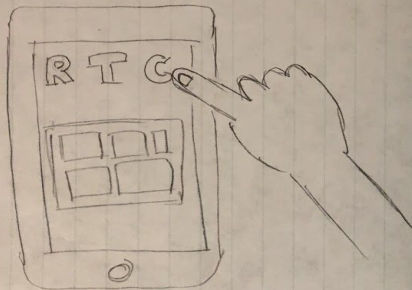
3) Pulls out app



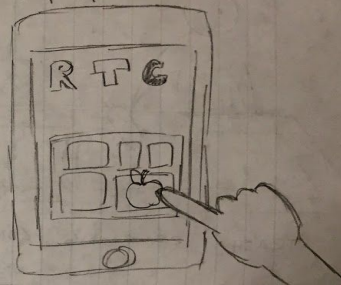
4) scans items with app



5) selects compost



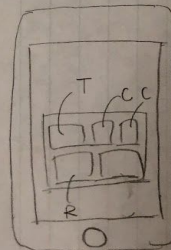
6) selects items that belong in compost

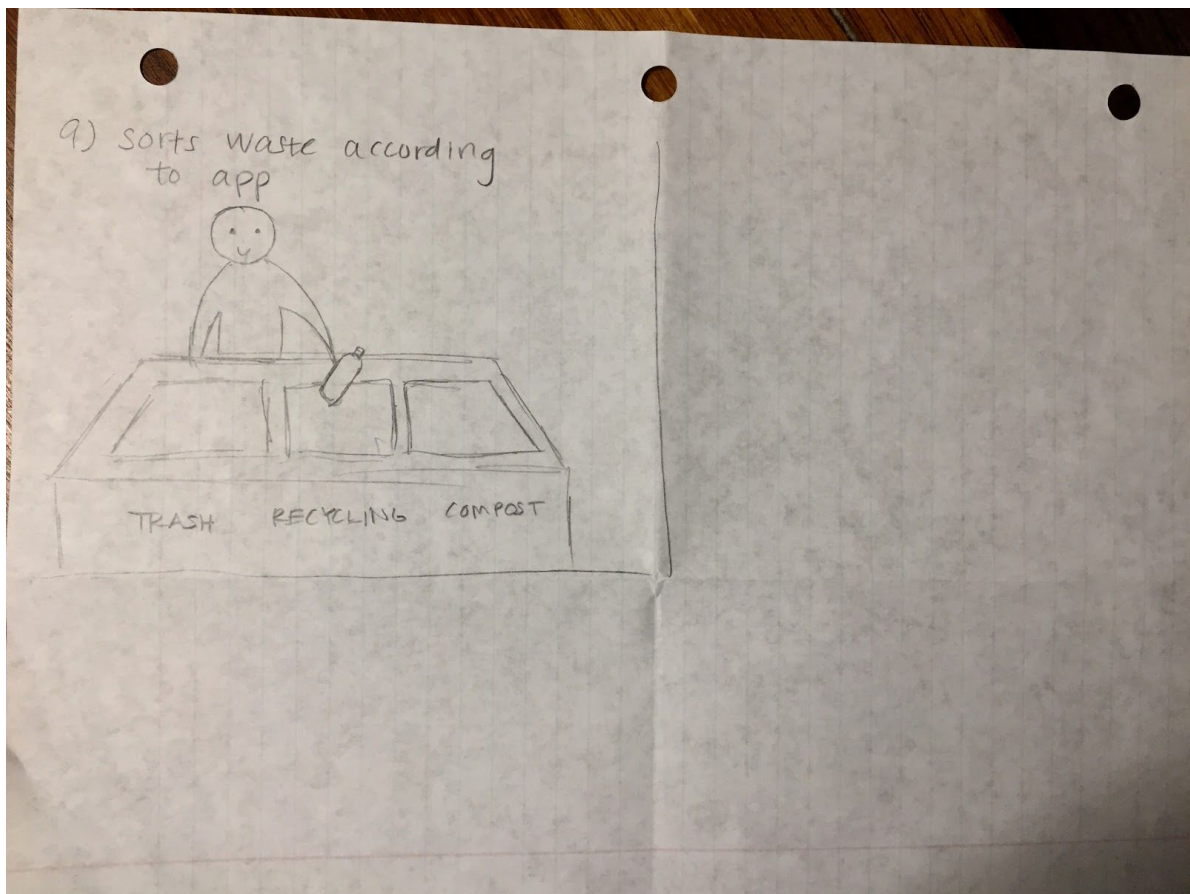


7) Receives points for correct identification

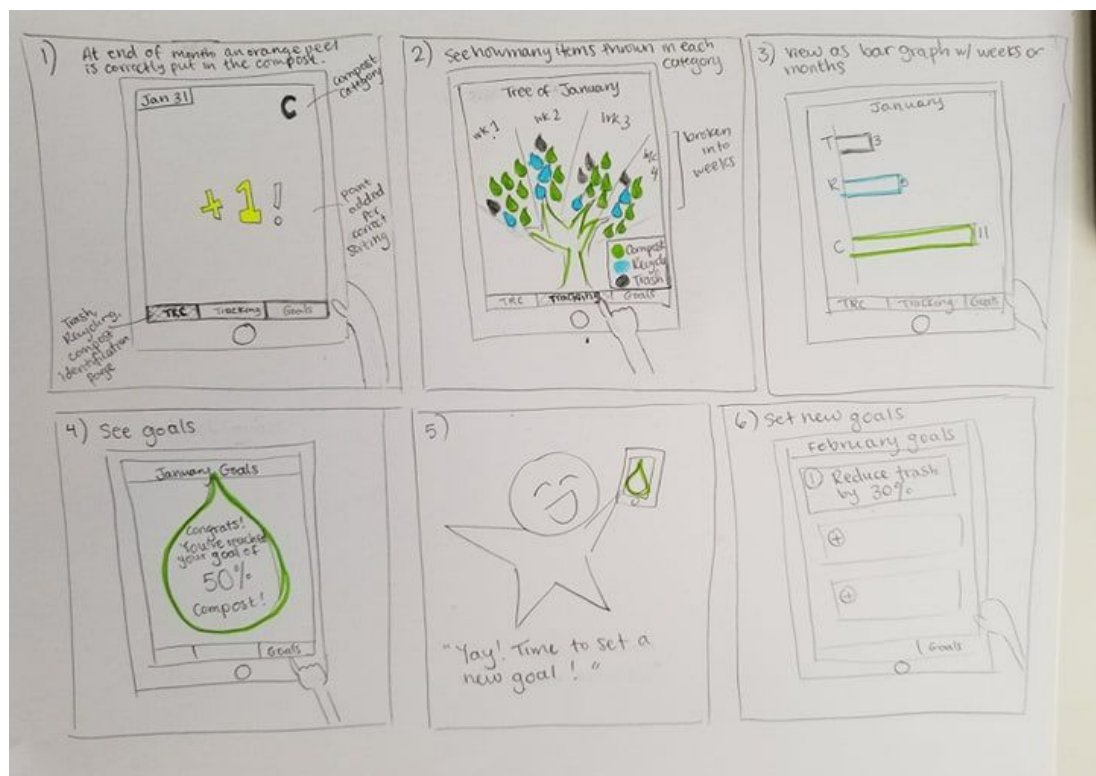


8) App labels ^{remaining} items with proper disposal bin





(Figure 4, storyboard for sorting)



(Figure 5, storyboard for tracking)

Contribution Statement:

Alex: question 4 + 5

Anne: question 8 + eventually 9

Christine: started the document, did question 6 by editing the previous answer, did question 3, did tracking storyboard

Matt: put the document in report form, edited one of our 3x4 tasks to our current design