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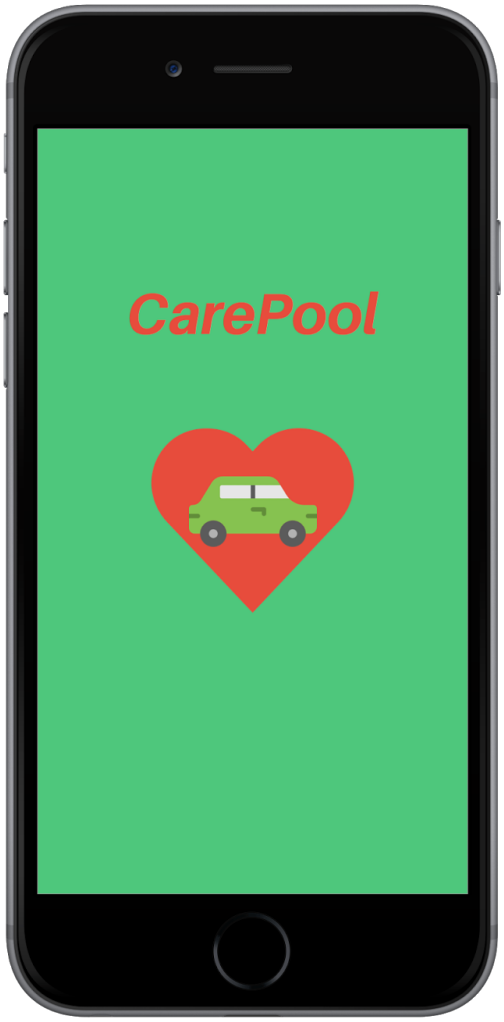

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Problem and Solution Overview:

The problem we are tackling is the poor air quality in Salt Lake City, Utah. Our proposed solution, is a carpooling app, which makes the process of carpooling simple and intuitive for people who regularly drive to similar locations. We propose that carpooling is something that many people already do, or would do because of the benefits it affords to those carpooling. Those benefits are: saving money, reducing mileage, social/fun aspect, and reducing carbon emissions.

Contextual Inquiry Target, Stakeholders, and Participants:

Contextual Inquiry 1:

Background: Our first participant, who we'll call Stephen originally considered himself environmentally aware. He is a student who walks to campus instead of driving and uses a coffee thermos instead of using paper cups. The CI was performed in the Undergrad Lab in the WEB on the U of U campus. Stephen uses public transportation frequently, and carpools with friends when attending social events. We chose Stephen because we originally thought that he was very environmentally aware, and that this would lead us to understand people who also want to solve the problem of poor air quality.
Inquiry: This contextual inquiry was a learning experience in that we had not decided on the solution of carpooling, and it was difficult to observe Stephen performing a task having to do with improving the environment. The inquiry was more of an interview, with hypothetical questions. We learned that Stephen does not carpool for environmental reasons, but does it for the social aspect, and usually only to go to social events with friends. Stephen said that the only thing that stops him from carpooling with friends is if there is a schedule conflict of some kind. He also said that the only way he would carpool with strangers, is if there was some kind of incentive. Although we learned that Stephen would not carpool solely for environmental reasons, this interview helped us look into carpooling more, and the social aspect of it as well.

Contextual Inquiry 2:

Background: Our participant, John, is a recent college graduate who works a full time job, and has been married for about one year. John is very active and social, and loves to travel. John would not consider himself as someone actively trying to improve the environment. John owns a car, specifically a 2010 Subaru Impreza. He owns an iPhone, and uses Apple maps when he needs navigational assistance. The environment under which this contextual inquiry occurred was remotely via messaging, during the planning process of a carpool trip, at his house, and actually performing the carpool trip, both to a destination, and back. I chose John because he was a friend of mine, and he messaged me to carpool on a trip we were going on together with

some other friends. Since i would be carpooling with him, it was a perfect opportunity to observe the task of planning, coordinating, and executing a carpool trip.
Inquiry: John utilized his iOS messaging app to start a group message with everyone who would be carpooling together, and then coordinated with the group via the group message. The biggest take away from the process was that John (who was the one driving his car) was the one doing most of the work in coordinating everything since he had to know who he was picking up, what time, and where. This process was the most difficult and clearly had the most room for improvement. We also learned that the choice of who is driving is important depending on the terrain and weather, as it was raining heavily, and luckily John's car was all wheel drive.

Contextual Inquiry 3:

Background: Our third participant, Mr. Smith has an MBA and works as a paralegal. Before working as a paralegal, he was a manager at an ice plant and a restaurant supply store. Although he has a lot of experience from college and the workplace, he doesn't have a smart-phone. The reason we chose Mr. Smith, was because it would be interesting to see the process of planning a route/trip, without a smartphone.
Inquiry: The first thing Mr. Smith did when I asked him to find a particular restaurant was go to MapQuest. He typed his home address into the origin field until he saw it wouldn't come up in the autocomplete. This gave him the impression that his address wasn't on MapQuest. He promptly went to Google Maps. When asked why he didn't go to Google Maps first he said he used MapQuest first so he was more familiar with it. Mr. Smith knew Google Maps was better,, but he used MapQuest because he was more familiar with it. This contextual inquiry helped us realize that to make our design intuitive, we should make our interface as familiar as possible.

Results and Themes:

The design should be Intuitive and Familiar

While doing the contextual inquiry with Mr. Smith we realized that a completely new design might hinder people from using our design. He used MapQuest because it is what he already knew. He used it even though he knew that Google Maps had better data. Obviously using MapQuest is something not many people do, but we used this data to create a design which would have a familiar interface to most users who use google maps.

Outside factors matter

Before we started our contextual inquiries we didn't think that weather or the type of car someone drove would affect your ability to carpool. We learned different during the contextual inquiry with John. If the car John used didn't have four wheel drive, the trip might not have been as safe.

Another factor that is somewhat unrelated to carpooling is the number of seats you have available in your car. During cold weather, some people might decide they want to drive in a car with heated seats.

Keep environmental awareness within your comfort zone

During our contextual inquiry with Stephen, we learned that people might not want to go out of their comfort zone to improve the environment. Even though he did small things to improve the environment, he didn't want to carpool with strangers unless he had a bigger incentive. We learned that although some people say that they consider themselves environmentally aware, it doesn't really mean what we personally want it to mean. To someone like Stephen, being environmentally aware didn't mean that he was willing to carpool with strangers, or even carpool for environmental reasons. This CI helped us realize that creating solution for the poor air quality in Salt Lake, might not be as direct as we hoped. We needed to cater to a larger population, which may not actively be trying to improve the environment. A larger population which wants to carpool for social reasons, and sometimes to save money, could help the environment by carpooling.

Recurring Themes and Problems:

Some of the recurring themes which we observed, were that people don't like stepping out of their comfort zone. Whether it was Mr.Smith wanting to stick to MapQuest instead of Google Maps, or Stephen not wanting to carpool with strangers, the users we spoke with, want to stay within the bounds of comfort they had set. Another recurring theme was that most people do not actively think about improving the environment. Although they might say or think that they do care about the environment, it is not something which influences their day to day tasks or choices. The main problem we ran into was initially thinking of a way to perform a CI in which we could observe tasks being performed which had to do with the problem space we were working with. It was difficult for us to think of carpooling as a potential task at first, until we had our first CI with Stephen. Other problems revolved around us stepping out of our preconceived notions of what we expected to be designing in the future, instead of simply focusing on the problem, and letting the problem and CI shape the design. It took time, but we feel that we learned from these problems and were able to effectively create a design which was shaped by the observations made in our CIs.

Answers to Task Analysis Questions

Who is going to use the design?

Our design is going to be used by anyone who maintains a regular schedule of transportation to certain locations, such as students, or co-workers. Initially the design was intended to be used by anyone who wanted to help the environment but our CIs helped us realize that the problem

had a much better chance of being solved if we opened it up to a wider audience of carpoolers. Then, through the sketching process, we decided to refine the design and narrow the audience to people who have a routine schedule of transportation.

What tasks do they now perform?

First let us discuss the tasks students now perform: A student who drives to school will create a driving routine dependent upon their schedule. They will then drive to and from school.

Co-Workers: Workers currently need to make sure that they keep a regimented schedule in order to get to work on time. They will simply drive to and from work.

If a student or worker decides to carpool somewhere, they will start a group message of some sort, and coordinate the carpooling process through the messaging app. Things like ‘time of departure’, ‘meeting location’, and the ‘route’, will all usually be manually created by the person driving. The only room for automation through this process currently, is using an app like Google Maps to create a route, but even this task requires inputting an address, and the user deciding which addresses to go to in order to pick fellow carpoolers up.

What tasks are desired?

The desired tasks are: Find people to carpool with, determine whose turn it is to drive, select a carpool vehicle/driver, coordinate a time/place to carpool, split the cost of gas, and track carbon footprint, and actually driving to the destination together.

How are the tasks learned?

The process of learning these tasks should be very simple and intuitive. The goal is to make sure that the UI of the design will be familiar and simple enough that the users will not need to manually perform most of the tasks, but that the tasks will be performed by the application itself. Finding people to carpool with for instance, is a task that the user will not have to directly learn. The user will only need to input their schedule, and routine destination, and the app will find people with similar schedules and destinations in order to help coworkers and peers carpool together.

Where are the tasks performed?

All of the tasks except the one of actually driving, can be performed anywhere. The application will automate the processes as long as the user is correctly inputting the data into the

application. The task of driving to either pick people up, be picked up, or drive to the final destination will all be performed on the provided route.

What is the relationship between the person and data?

The data which the person inputs into the application, such as their address, destination, and schedule, will relate to the person because it will tailor fit and automate the entire carpooling process. All of this data will be used to simplify the process, and provide incentive for a user to carpool with coworkers or fellow students, or any other group of routine travellers.

What other tools does the person have?

The other tool that the person has is navigator applications in the smart-phone. Apps like Google Maps, Waze, Uber, are other tools that the person has. Also facebook, or messaging in order to find people to carpool with.

How do people communicate with each other?

In most case, people communicate with each other by using text messaging. For example, IOS users would use IMessage to communicate with other people. In carpooling cases, a group message is established in order to coordinate and plan. In our design, people will not necessarily need to communicate with each other but if a user decided to offer up their phone number in the app, they can easily be contacted through the app utilizing whatever system they are on, either iOS or Android for example.

How often are the tasks performed?

The frequency of the tasks are performed depends on the user's schedule. If they are coworkers who work 9-5 for example, the tasks performed will be daily. Whereas if it is a group of students who go to campus on M, W, F, then the tasks will be performed 3 days a week.

What are the time constraints on the tasks?

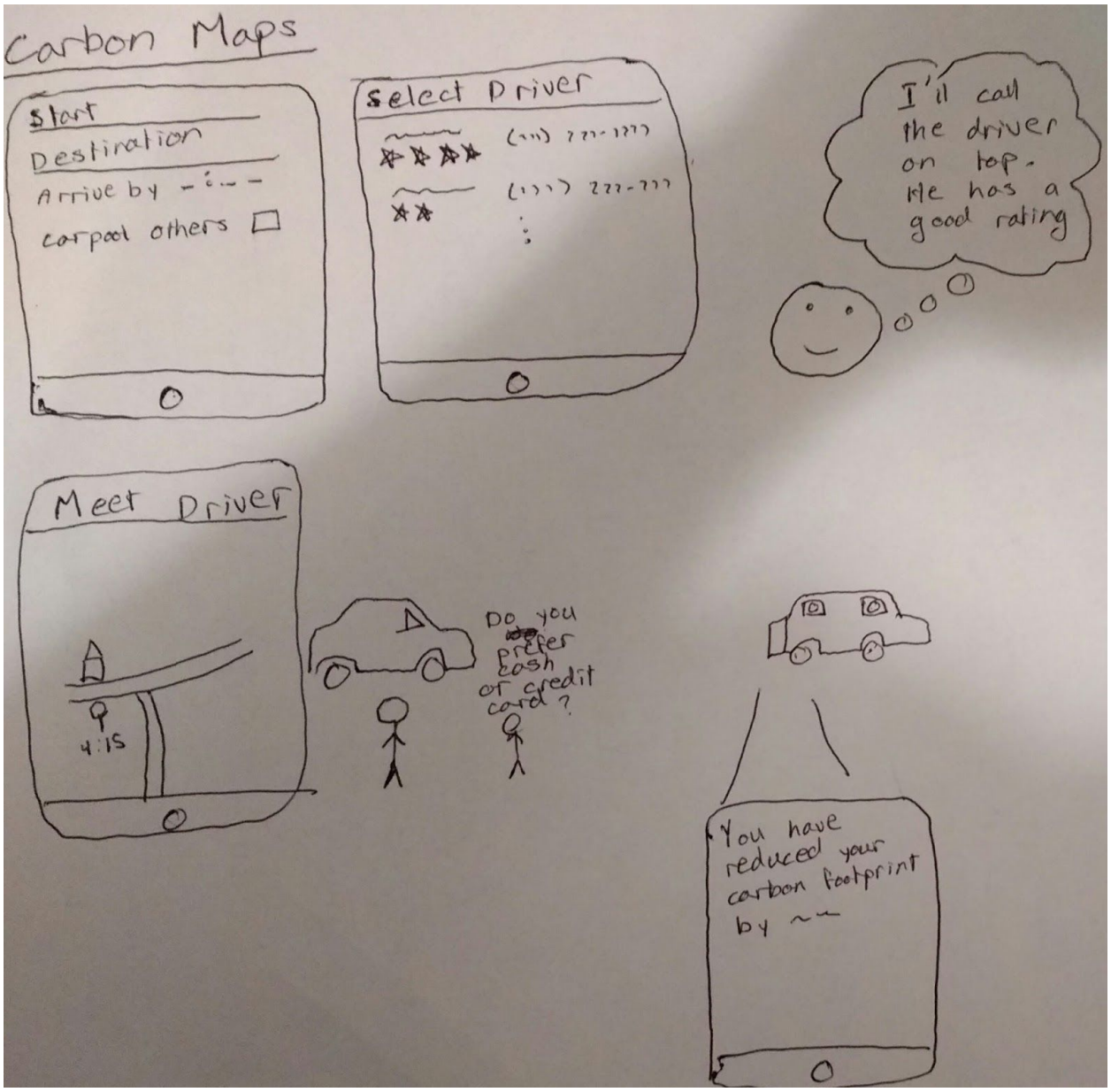
The time constraints on the tasks are completely centered on the schedules of the users. They must perform the setup process in advance of their trip in order to be matched with a carpool group.

What happens when things go wrong?

If the users do not input correct information in the app, then they will not be matched with an ideal carpooling group. If something goes wrong within the app itself, then many things can go wrong. The route might not be optimized, the data output for gas saved, and carbon footprint might not be accurate, etc.

Proposed Design Sketches

Sketch 1 - A Design similar to Google Maps

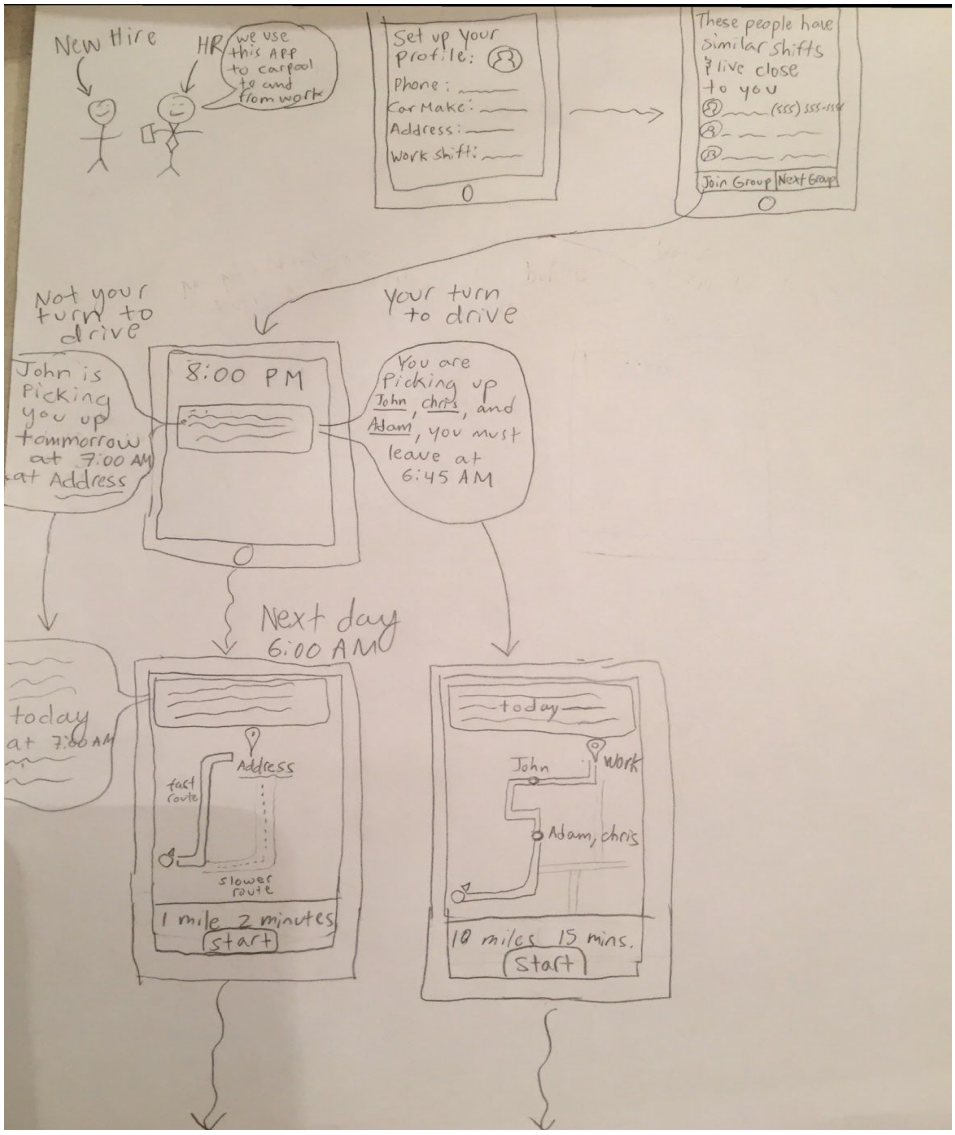


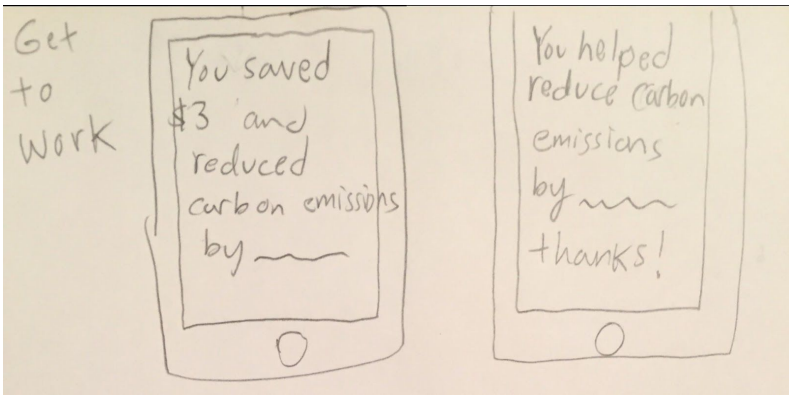
Description: We made our first sketch as similar to Google Maps as possible. It was intended as simple and easy to grasp for someone who hasn't carpooled before. Potential carpoolers would find people to carpool with by first entering the origin and destination of their trip. They would be shown a list of people, along with their phone number and rating, who were taking a trip. They would call one of the drivers to coordinate a time and place to be picked up. The design would then calculate how much they should pay to split the cost of gas. They would pay

either with cash or the in-app with a credit card. After their trip was started the app would show them how much money they save and how much they reduced their carbon footprint.

Tasks: finding people to carpool with, coordinating a time and place to meet, splitting the cost of gas, and tracking your carbon footprint.

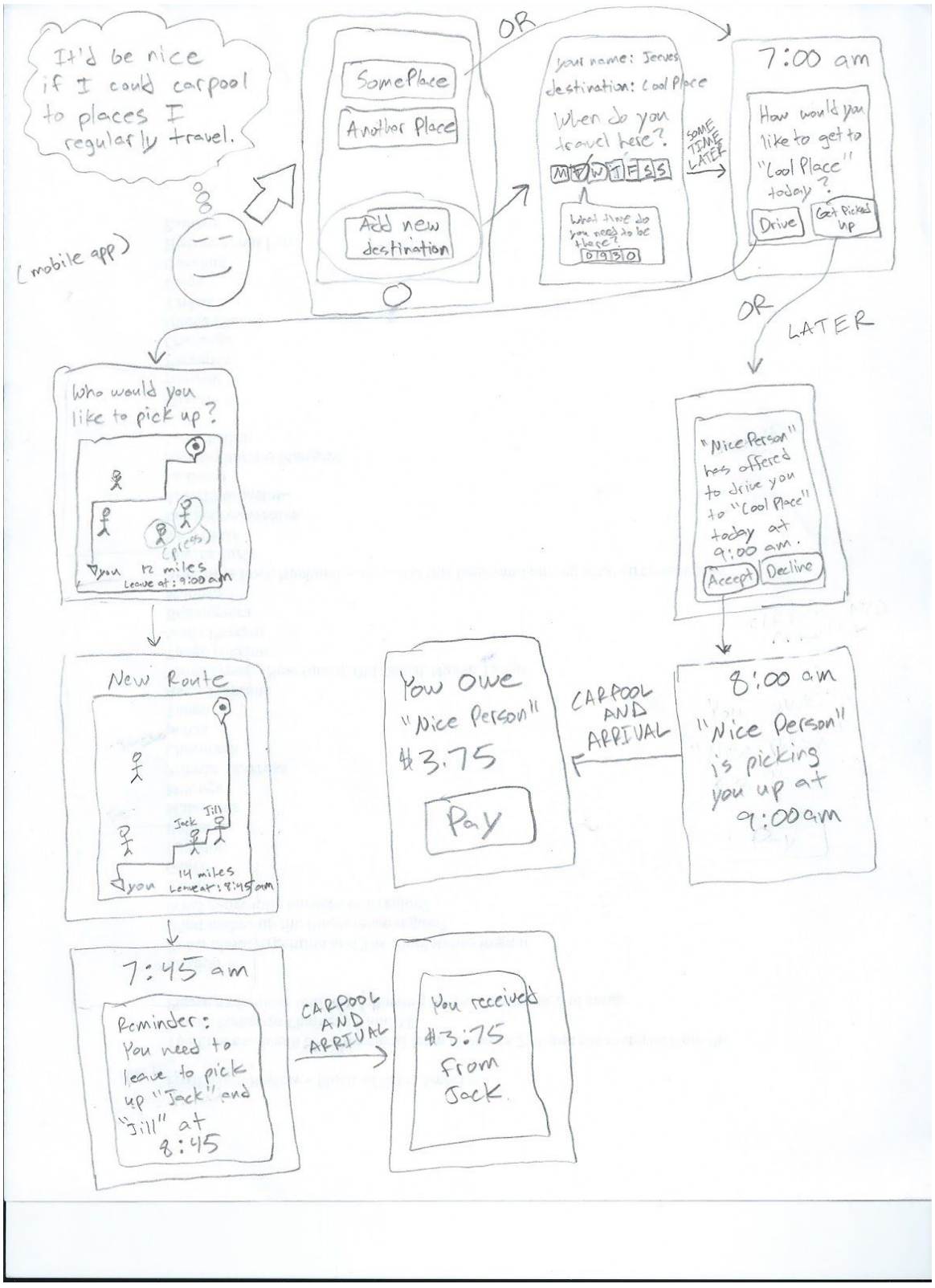
Sketch 2 - Carpooling with Coworkers





Description: Our second sketch was designed around coworkers or other people who worked in in a close area. When a user first used the app, they would input the time they arrived at work and the time they left to go home. The app would help them find other people to carpool with by showing them other people who lived in a similar area and work during similar hours. People in a carpool group would generally take turns driving unless the app told them that a particular vehicle would be better suited for the weather that day. The app would help coordinate a time and place to carpool by sending everyone a notification the night before of where and when they needed to meet. Each day they during the carpool trip, they would be shown how much money they saved and how much of an impact they made on the environment.
Tasks: find people to carpool with, determine whose turn it is to drive/select a carpool vehicle, coordinate a time and place to carpool, and track your carbon footprint

Sketch 3 - The driver decides who to pick up



Description: The goal for our third sketch was to make carpooling as easy for the driver as possible. Carpoolers who weren't a driver could put themselves on the map and wait for a notification that a driver was coming to pick them up. This way, it would be very easy for a driver to find people to carpool with. The user would determine whose turn it was to drive when they decided whether they wanted to wait for a driver or whether they wanted to be the driver. Following in the spirit of making carpooling easy for the driver, the driver wouldn't need to do any work to coordinate a time and place to carpool because he would pick people up when it is convenient for him and he would only pick people up if the place they were on the map was convenient for him. After taking a rider to his destination, the app would show how much the rider owed to split the cost of gas.
Tasks: finding people to carpool with, determining whose turn it is to drive, coordinating a time and place to carpool, and splitting the cost of gas.

Our Solution: Sketch 2 - Carpooling with Coworkers

Going forward, we decided to improve on sketch 2 to help solve the pollution in Salt Lake City. The tasks we want to accomplish are finding people to carpool with and determining whose turn it is to drive. We chose this design because we feel that the people who carpool on a regular basis will have a greater impact on the environment and receive a greater benefit from a carpooling app. We also chose this design because there is far less fear about carpooling with coworkers or peers, than with strangers, as we learned through one of our contextual inquiries.

Written Scenarios:

Finding people to carpool with:

First, a user would enter their origin and destination addresses and when they wanted to leave. This is shown in the first storyboard. An HR employee has shown the app to an employee and then the employee is entering his information in. The app would show them a list of people with a similar route and their contact information. After contacting someone on the list to discuss carpooling options they could invite them to a carpool group and set up recurring carpool trips.

Determining whose turn it is to drive:

After a recurring carpool is set up, the app would place each person in a queue to keep the number of times each person drove even. The system would be flexible enough to schedule someone to drive later if they couldn't drive on a particular day. The driver would be notified the night before of the time and place they needed to pick up the other people in their carpool group. Similarly, the other people in the carpool group would be notified of the time and place they needed to be to get picked up.

These tasks are shown in the second storyboard. First the user receives a reminder notification to pick up his three friends in the morning. The next scene in the storyboard shows him picking up his friends. The third scene in the storyboard shows him receiving a notification that tells him when and where he will be picked up in the morning.

Storyboards of the Selected Design

Finding people to carpool with

Determining whose turn it is to drive