MetroX: An app to help you use Austin's CapMetro bus services

Professor: Dr. Jacek Gwizdka
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Group 4
Yoomi Cha
Chung-Yu Ho
Sukanya Moudgalya
Zequn Ye

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1 Concept statement

The new redesigned 'version 2.0' of the CapMetro app (called MetroX) will provide better service to users compared to previous application. It will offer easy accessibility and intuitive interface to achieve user goals of using public transportation. The new service will not only embrace the previous functions, such as trip planning, online ticketing, and real-time arrival information, but also improve user-focused functions like favorite stops, better location identifiers and navigation links (information architecture).

In addition, MetroX will extend the scope of the current app by helping commuters integrate bus schedules with their work schedules. We also plan to address emotional perspectives by providing certain functions. For instance, bus safety and bus stop security concerns will be addressed. Incentives to use public transportation will also be provided by the app. Moreover, navigation (map navigation) to bus stops and finding 'present' location of bus will be made easier, so that users will not have to switch between using multiple apps like Google Maps and MetroX.

1.1 Topic Selection

The project aims to redesign the CapMetro app and give it a revamped user experience. Many Austin residents and UT students use the Capital Metro public transportation frequently. Thus, having a user centered CapMetro app will be important to many Austin residents.

1.2 Client Selection

The official CapMetro App is maintained by Captial Metro Austin. In this project, they are our clients.

1.3 Concept Statement

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1.4 Descriptive Summary

The official CapMetro App is an important tool for Austin residents as it provides important task features to make trip planning and online ticketing easy. It also has features

such as real-time arrival information that makes riding public transport an accessible experience.

CapMetro app's latest version on iOS AppStore and Google Play, however, got only 2 or 3 stars rating. Its important features are essentially restrained by its poor usability. A lot could be learned from the reviews on the official app store. In particular, users seemed to have failed to achieve their goals while interacting with functions like the location based information, the real time tracking system and the ticket payment system. Therefore, we will redesign a better task-driven navigation system with an intuitive usage flow and improved layouts. In our initial phase, we will focus on only iOS app. We will later consider the Android version as well.

There will also be three new user-centered tasks added to the app. The first 'integrate schedule function' will enable users to enter their work/class schedule in the app and later match it and integrate it with the available bus schedules. This will especially help students not miss those early morning classes! The second 'bus transfer function' will make it an easier experience to use multiple buses to reach a destination. Users will know when to catch a bus so that their waiting time for catching the next bus is reduced. Thus, the app will be able to match schedules of two different buses at a particular spot. These two task features will enable users to have a hassle free travel planning. They will not have to switch between using a Map app, like Google Maps, and a public transport app. The third function is targeted mainly at tourists. Due to the recent ban of car services such as Uber and Lyft, tourists need a reliable and easy-to-use transportation in the city. Using CapMetro Bus services without schedules and other related information can be a little non-intuitive. Thus, the new app will help tourists use CapMetro Bus services. It will also aid them in using trip planning and schedule feature to see famous landmarks around Austin. The task flow will be made intuitive by using images and maps so that tourists, who are usually first time users of the app, will find it easy to use.

2 Contextual Inquiry and Analysis

Our next steps are to interact with our users, observe the settings in which they operate, find useful information about their goals, and so on. We also analyze these raw data to find themes and patterns that will inform design requirements.

2.1 Contextual Inquiry

In this stage, we used observation and interviews to conduct our contextual inquiries. The preparation for our inquiry and our interview questions are written below.

2.1.1 Tailoring the scope

People who need to find information related to CapMetro transportation services are ones who use actually their public transportation services. Therefore, our interview questions are designed for the people who take buses now, have took buses before, or might take buses in the future. In addition, people who take buses could have different information needs and different ways to get information they need. So we did not just ask the questions directly related to *just* the CapMetro's current app. After several discussions, our tailored scope and purpose at this stage are to know more about the way people

use CapMetro, experiences they have, and how they receive relevant information. This helped us generate the materials required for next stage of design.

2.1.2 Contextual Inquiry Preparation

Each contextual inquiry method has pros and cons, and we decided to use interview and observation due to the resources limitation and the scope.

We decided to conduct observations on the bus stops and inside buses. These settings were considered important to gather information about user behavior and needs for the public transportation system.

We came up with the drafted interview questions for pilot interview based on our own experiences and what we would like to know. It is important to use resources available to us on the correctly, so we used the group collaboration feature in the Canvas extensively. For instance, we used it to post questions that might be useful in the interview. Then, we voted the questions we liked using the 'like' button. This helped us decide what should be covered in the interview. Firstly, we decided on having a 'screener' question to identify the users that used CapMetro transportation and thus fit our scope. We also desired to know their demographic information, including the area they live and the places they often go. In addition, we thought knowing the frequency with which they use CapMetro's services and their schedules was important. Besides this, we also wanted to know user behavior and thoughts before, during, and after using the Capmetro's services. In particular, we focused on what information they needed to use CapMetro transportation. We wanted a 'user demonstration' to walk us through the process of how they get that information.

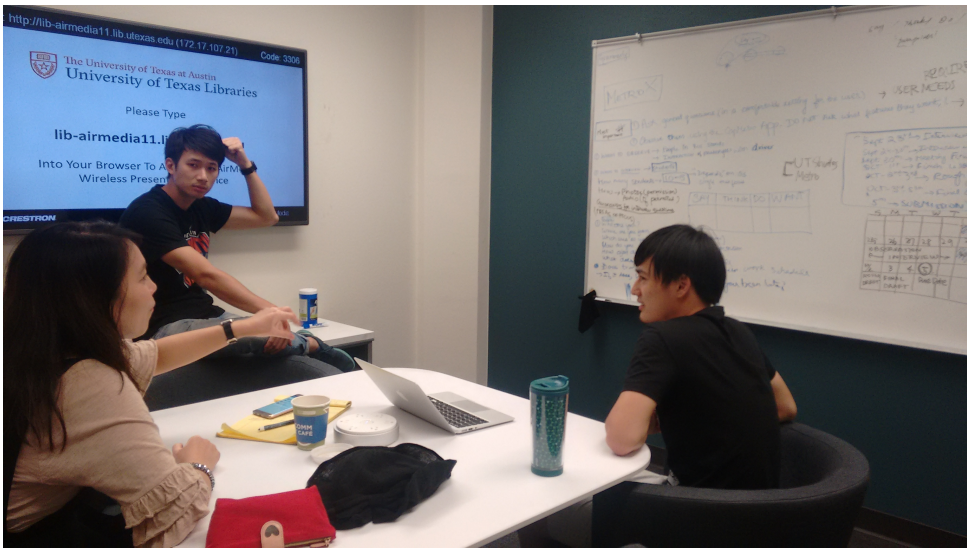


Figure 1: Working out schedule and interview questions

2.1.3 User Representatives

This section tells the users we approached who fit our scope of 'users of CapMetro'. We further added some criteria. See the sections below for more detailed information.

User Representative Decision

We divided users into two groups as students and non-students. UT students, UT staff

and UT faculty are provided fare-free bus service. Non-UT affiliates, who include Austin residents and tourists, pay for using the bus services. However, we mainly focused on UT students, because most users of bus services are UT students according to CapMetro and UT Austin Parking and Transportation Services ridership information.

Ridership Information

- Ridership information from CapMetro. Click here.
- Ridership information from UT Austin Parking and Transportation Services. Click here.

Interviewees Detailed Information

We interviewed sixteen users in total. They use CapMetro's services five or more days in a week. Some live in university accommodations and some live in other parts of UT area, such as the Hyde Park area, South Austin, etc. The places they go by buses are usually the University, for shopping, church, social events, etc.

1. User 1 (Female, 27, Graduate Student): University Apartments. Uses CapMetro Shuttle services for traveling to UT Austin. Uses it on weekdays. Owns a car to travel to other places.
2. User 2 (Female, 27, Graduate Student): South Austin. Uses CapMetro Buses for traveling to UT in the weekdays. Requests friends to help reach places in the weekends using their cars.
3. User 3 (Female, 22, Graduate Student): North Austin/Hyde Park. Uses CapMetro Bus services for traveling to UT in the weekdays. Also uses it for Grocery shopping.
4. User 4 (Female, 24, Graduate Student): North Austin/Hyde Park. Uses CapMetro Bus services for traveling to UT in the weekdays. Also uses it for Grocery shopping, going downtown, restaurants, etc in the weekends. Plans to buy a car soon.
5. User 5 (Female, 23, Graduate Student): North East of campus cross I-35. Go to campus, church and grocery. Transfer of buses required.
6. User 6 (Female, 23, Graduate Student): North East of campus cross I-35. Go to campus and grocery. Transfer of buses required.
7. User 7 (Female, 22, Graduate Student): Far west. Goes to campus. Always transfers buses.
8. User 8 (Male, 24, Graduate Student): Far west. Go to campus by bus everyday, grocery and shopping(Walmart/Domain) sometimes.
9. User 9 (Female, 22, Graduate Student): University Estates at Austin. Go to campus in weekdays, not often travel in weekends.
10. User 10 (Female, 23, Graduate Student, not working): University Estate at Austin. Go to campus by bus almost everyday.

11. User 11 (Female, 27, Graduate Student): East Austin, Rarely go to campus by bus
12. User 12 (Female, 29, Graduate Student): Lake Austin, Often go to campus by bus
13. User 13 (Female, 23, Graduate Student): Austin, TX, Go to campus by bus when she has a class, she uses both web and app
14. User 14 (Male, 22, Graduate Student): Riverside, Go to campus by bus almost everyday, He tried to use CapMetro app, but he gave up, instead he uses Google map.
15. User 15 (Male, 28, Graduate Student): Far-west, Go to campus by bus except weekends, He has a car, but because of traffic and parking problem, when he goes to the school, he takes a bus. He only uses Next Departure function from CapMetro App.
16. User 16 (Male, 34, Graduate Student): Far-west, Twice a week, He uses only web version CapMetro. He didnt check bus schedule. Just go to the bus stop and wait a bus till bus is coming.

2.1.4 Interview questions

The interview questions mostly acted as a guideline. We decided to include more questions and/or change the order of the questions asked depending on the way the interview progressed.

- Frame 1. Demographic information
    1. How many times do you use bus (cap metro's service) in a week?
       (a) never (b) 1 to 2 (c) 3 to 4 (d) 5 to 6 (e) everyday
    2. Tell me about yourself (Demographics info: age, place/country of origin, graduate/undergraduate/working, etc)
- Frame 2. Behavior pattern information
    1. Where do you currently live?
    2. How do you travel around Austin?
    3. What does your schedule look like, in general. You can tell me weekday/weekend separately if you wish to.
    4. Have you ever been late to an appointment due to public transportation or had other bad experiences? Why?
    5. Have you had good experiences while using public transportation? (Describe)
    6. Do you have classes in the morning? Would you like to describe the last experience you take buses for your morning class?
    7. How easy or difficult do you find it to travel/use public transportation?
    8. Describe to me the steps you take to use a public transportation. (Here, we can expect to find what apps/websites/text message services they use)
- Frame 3. System
    1. Are there any particular apps or tools that you are using for your public transportation?
    2. Which device are you using (iOS or Android)
    3. Would you mind demonstrating how you use the app/website/text message services? (if they mention that they are using app, only then)

2.2 Contextual analysis

After we got the raw data, we constructed a WAAD. This process also helped us come up with the flow diagram.

2.2.1 Raw Data

Our main sources of information were our interview notes and observational notes. In addition, we also took pictures, audio files and videos during the observation and interviews. Media recordings were done with the approval of the people involved. When our interviewees were not comfortable with being recorded, we simply took notes.

They say that pictures can speak a thousand words, so given below are some images that describe some of the raw data we collected.

1. **From observations**

   Observations were conducted on the bus stops and inside buses. Notes were made on paper and photographs were taken with the help of phone cameras.

Figure 2: Most people were with their phones

Figure 3: QR codes on bus stops

Figure 4: Artifact paper pasted on bus stop

Figure 5: People keep ID along with the phones

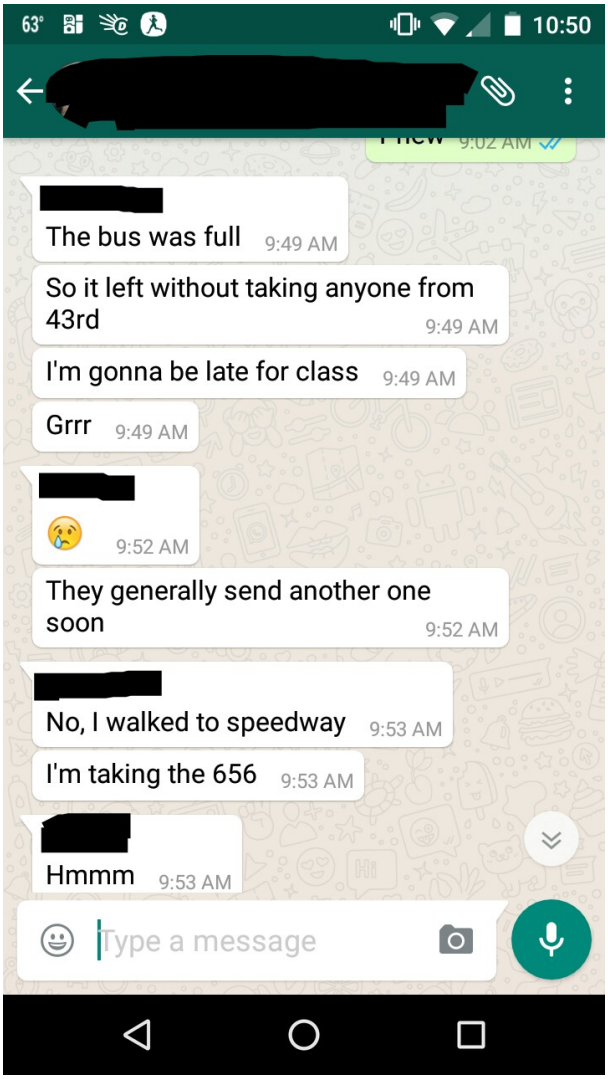


Figure 6: From text message: this was not a part of interview and came as an unexpected observation.

2. **From interview**

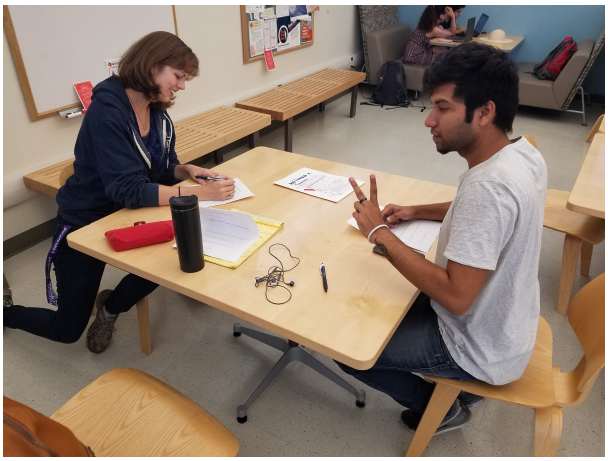


Figure 7: Interviewing users

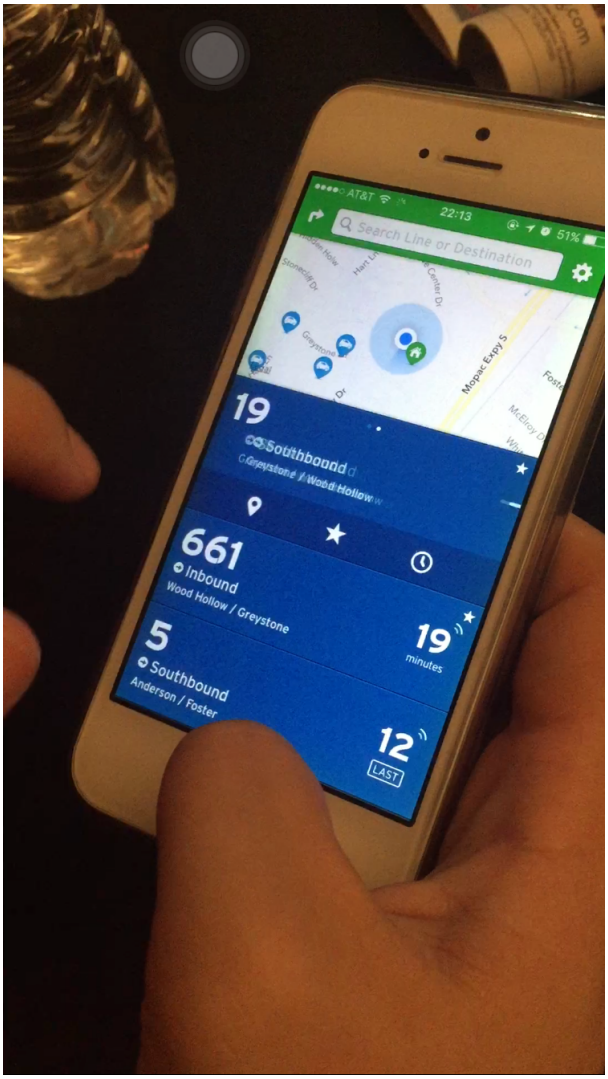


Figure 8: Observing usage during interview (people demonstrate the way they use app)

3. **Quotes (during interview)**
   "I know that bus will take longer than expectation. I reach as early as I can. Always 30 minutes earlier than appointments."

   "Worst case is that there is a stop where the northbound and southbound went by at the same stop nearby the highland mall, and there is no way we can figure out the coming bus is going to northbound or southbound, you can distinguish that by viewing the destination or start in the stop. However, in the app or LED in the front of bus sometimes the names are too long so we cannot find out."

4. **Conclusions**
   We drew the following general conclusions from the raw data.

   - Demographic information: Most respondents are students and they live not far from UT Austin. The respondents age and nation varied. Everyone CapMetro's service more than once a week.
   - Behavior pattern information: Two types of users exist. They are (1) Planned users and (2) Unplanned users. Planned users search external information to go to their destination. Planned users can also be divided further into three groups as (1) Who never use CapMetro web or app (2) Who use it but not often (3) Who use it often. Reasons for not using CapMetro web/app are generally because of inconvenience and reputation.
   - System information: Either Android or iOS, Use CapMetro Web, CapMetro WebApp, CapMetro app, Google Map, Transit.

2.2.2 Work Activity Affinity Diagram

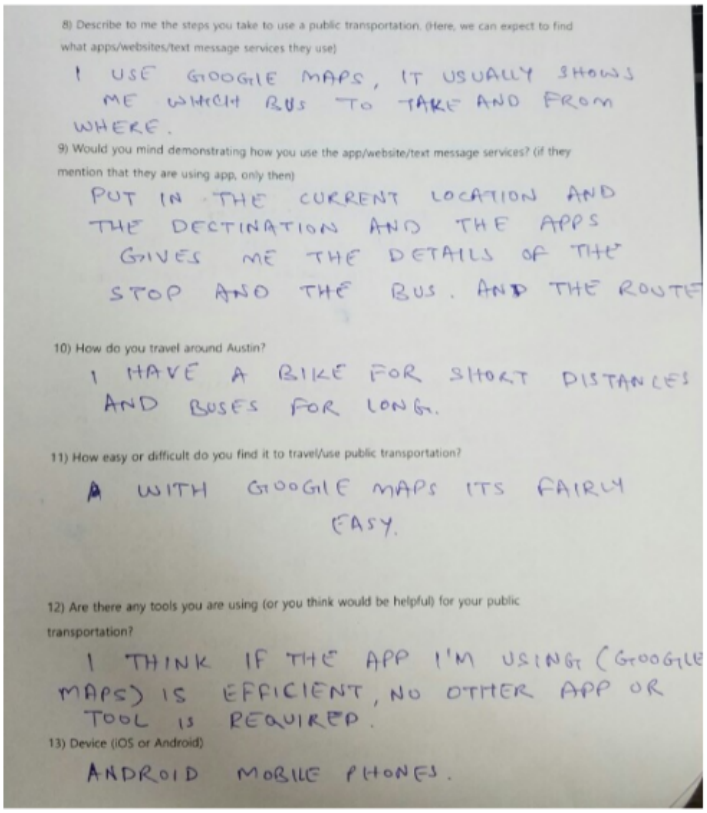
To construct the Work Affinity Activity Diagram, we booked a room in PCL. This room had a whiteboard and computer display.

During our meeting, we used information from our notes and wrote each piece of critical information on a single post-it note.

We then arranged, re-arranged and re-grouped it according emerging themes. We assigned category names to each cluster of notes. We tried to use categories that were user task oriented. For instance, we used a category called "What I use to make appointments and plan trips" (Here, making appointments refers to 'making it on time']). There were 13 categories in all.

In each category, the pink note referred to the category name, blue note to information from interview, yellow notes for information from observations.

Please see the images to get an idea of the process involved.


8) Describe to me the steps you take to use a public transportation. (Here, we can expect to find what apps/websites/text message services they use)

I USE GOOGLE MAPS, IT USUALLY SHOWS ME WHICH BUS TO TAKE AND FROM WHERE.

9) Would you mind demonstrating how you use the app/website/text message services? (if they mention that they are using app, only then)

PUT IN THE CURRENT LOCATION AND THE DESTINATION AND THE APPS GIVES ME THE DETAILS OF THE STOP AND THE BUS. AND THE ROUTE

10) How do you travel around Austin?

I HAVE A BIKE FOR SHORT DISTANCES AND BUSES FOR LONG.

11) How easy or difficult do you find it to travel/use public transportation?

A WITH GOOGLE MAPS ITS FAIRLY EASY.

12) Are there any tools you are using (or you think would be helpful) for your public transportation?

I THINK IF THE APP I'M USING (GOOGLE MAPS) IS EFFICIENT, NO OTHER APP OR TOOL IS REQUIRED.

13) Device (iOS or Android)

ANDROID MOBILE PHONES.

Figure 9: Raw notes

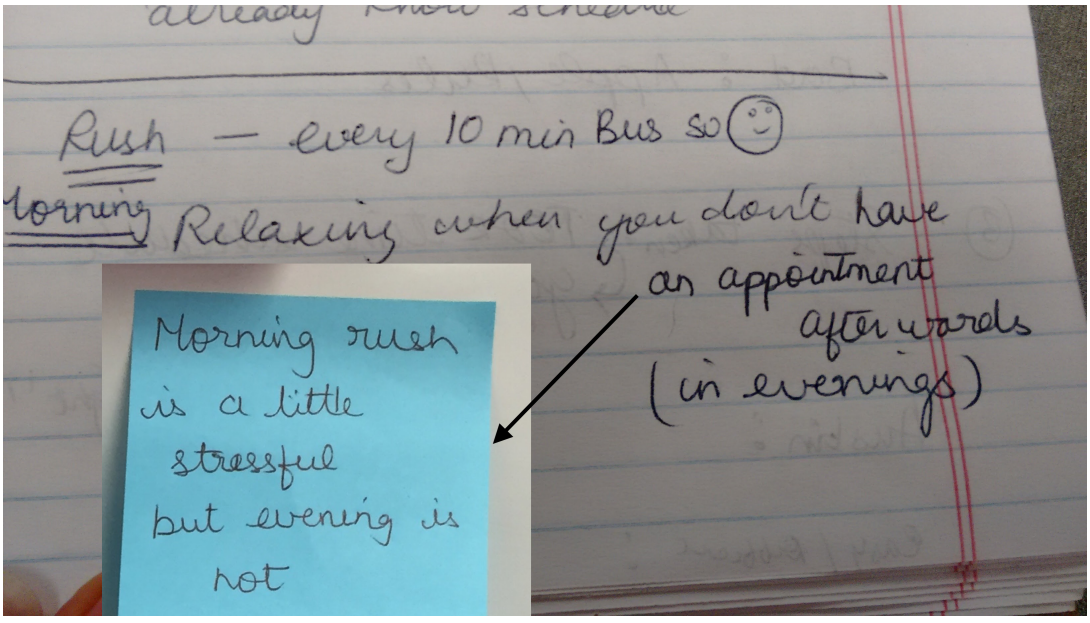


Figure 10: Raw notes to Post-it notes

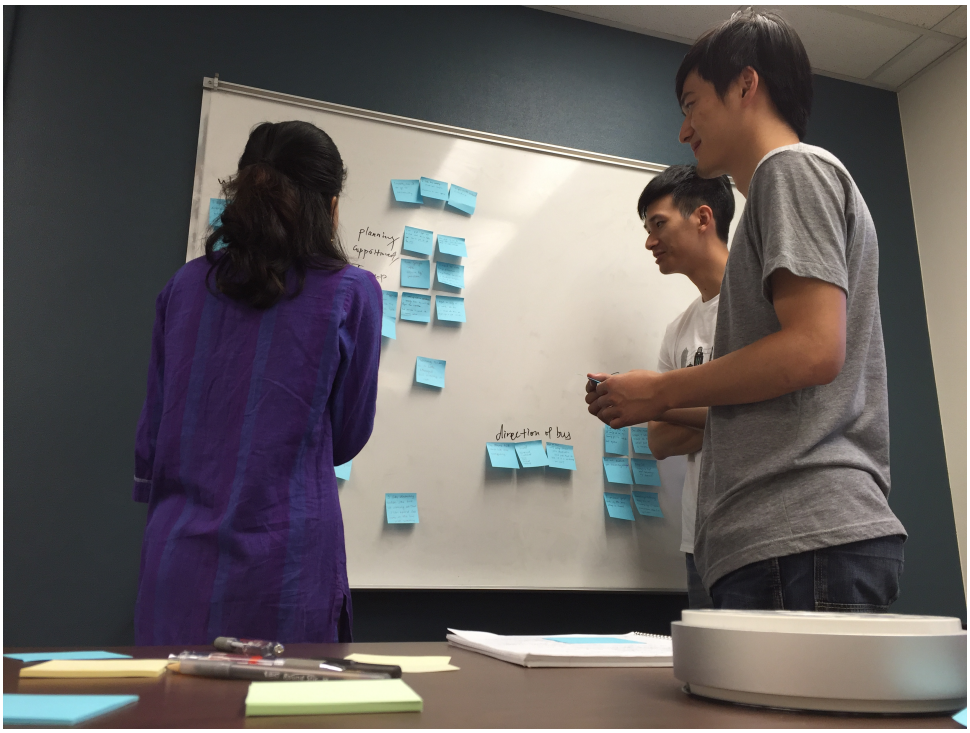


Figure 11: Grouping post-it notes and thinking of categories. Using a whiteboard helped us write and rewrite category names

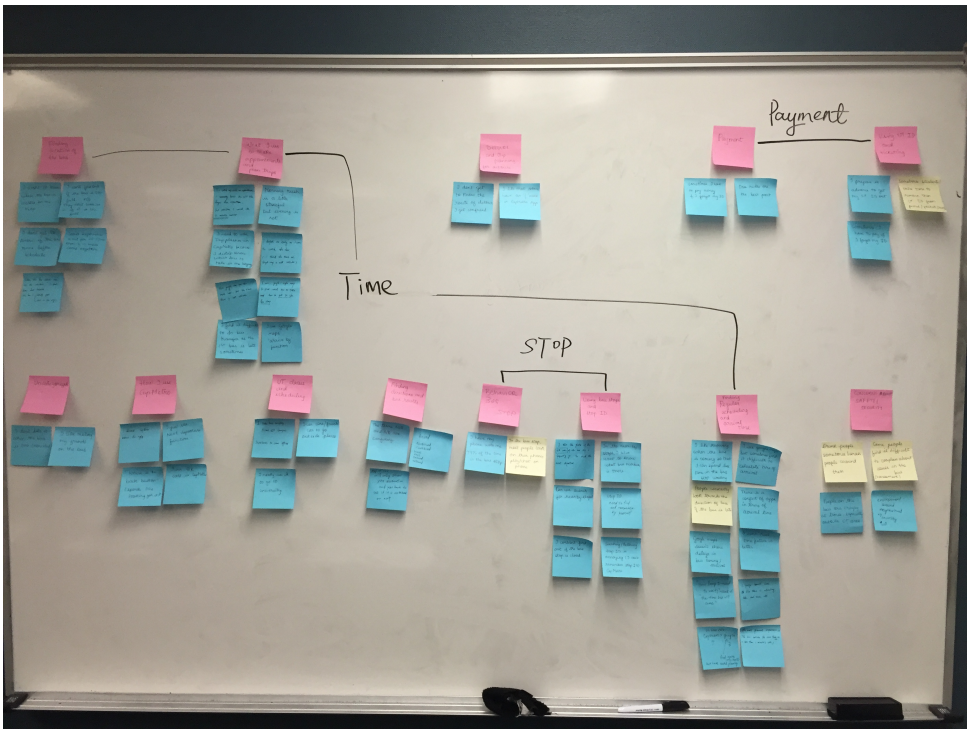
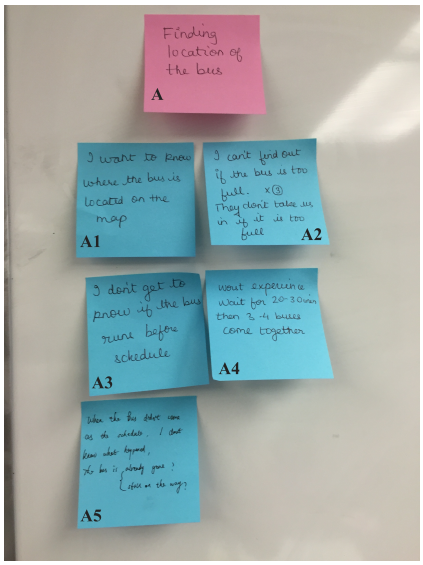
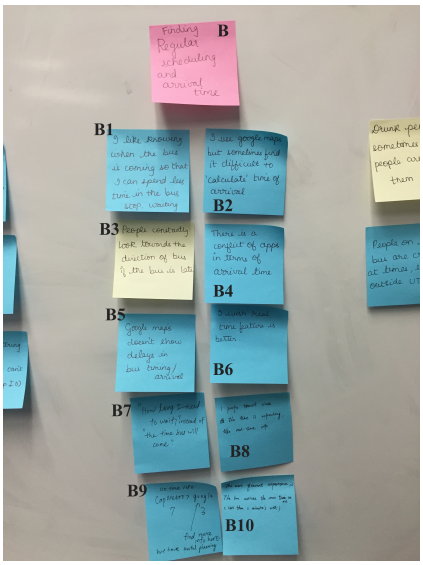


Figure 12: Final WAAD

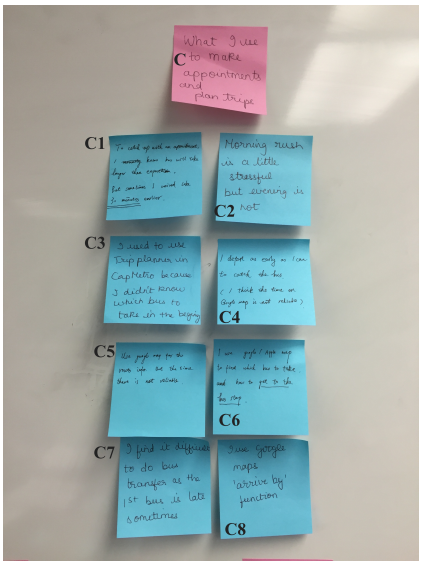
Figure 13: Categories in WAAD



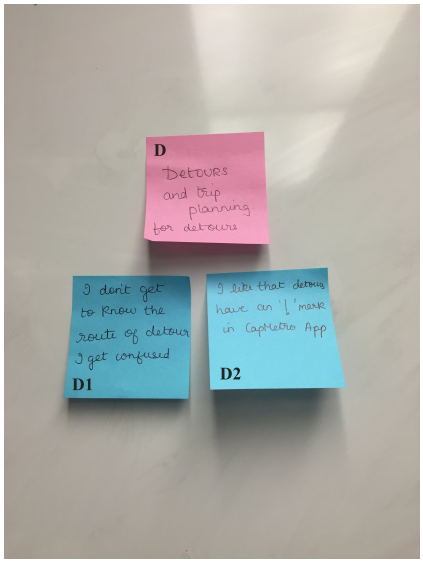
(a) Location of bus



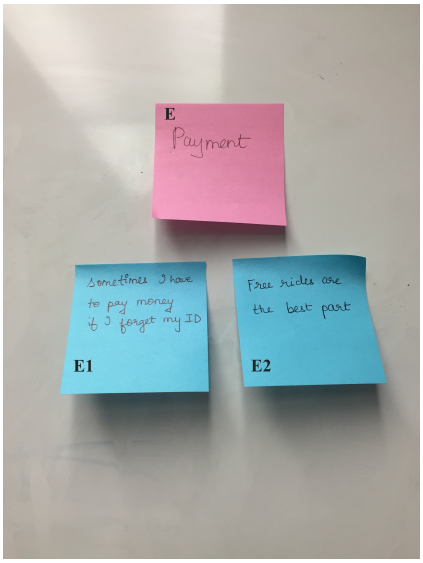
(b) Bus scheduling



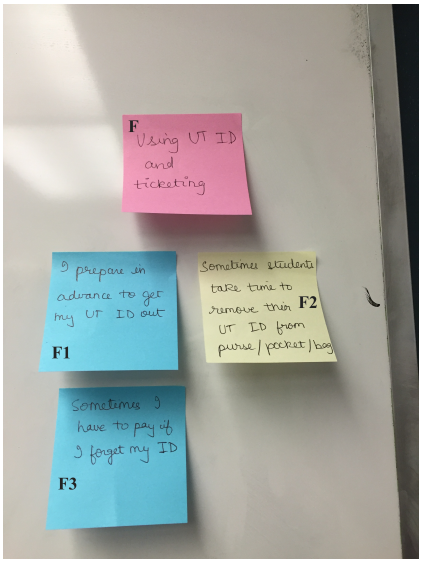
(c) User appointments



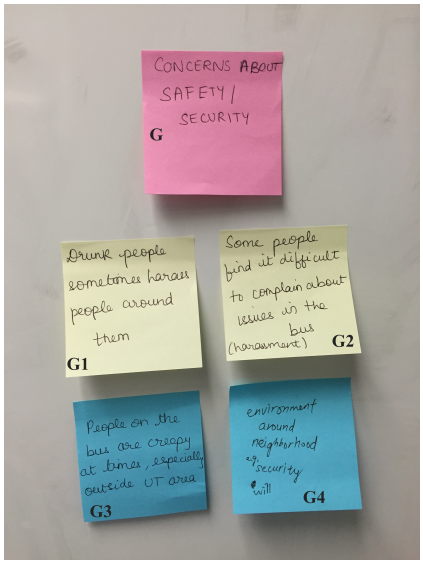
(d) Detours



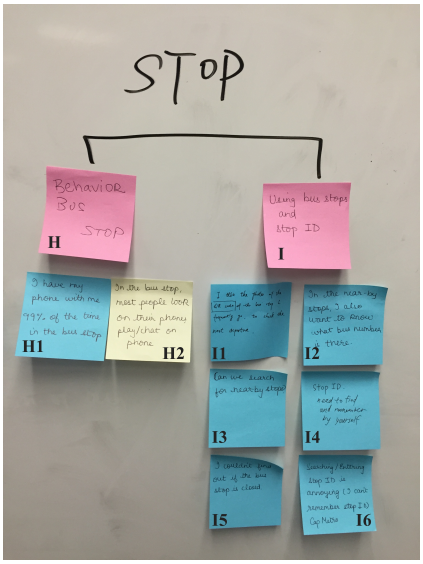
(e) Payments



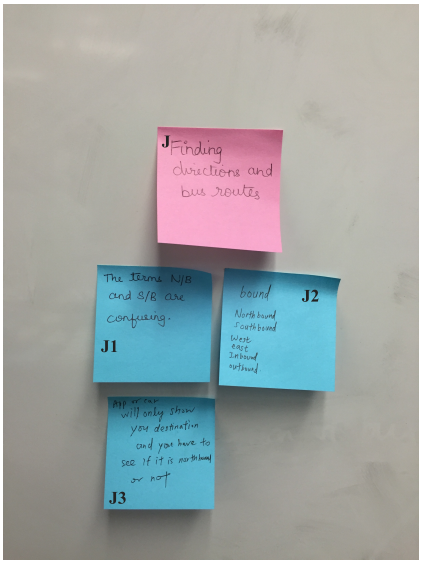
(f) UT ID



(g) Safety

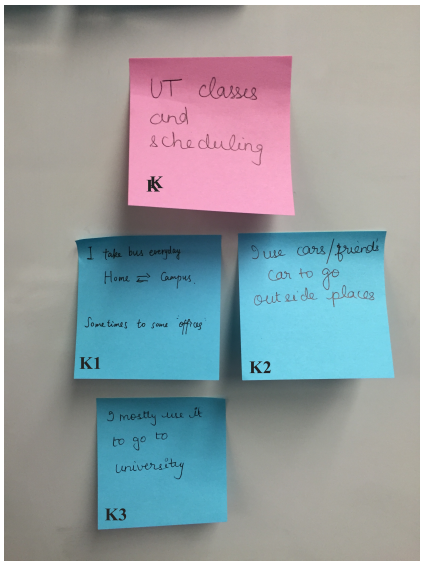


(h) Bus Stop behavior+stop ID

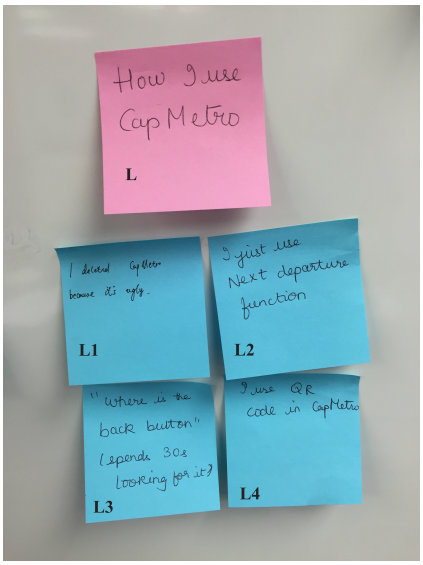


(i) Bus directions

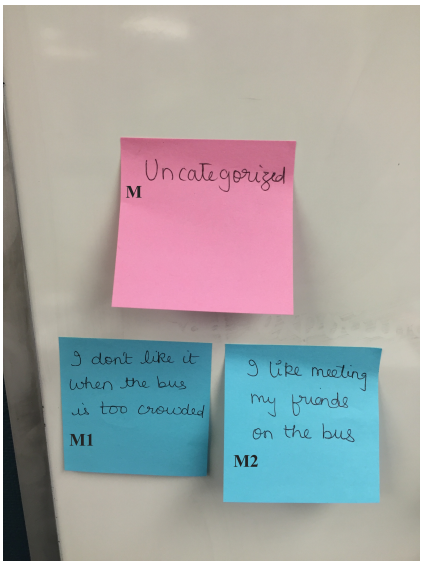
Figure 14: Categories in WAAD continued



(j) UT Classes



(k) CapMetro App



(l) Uncategorized

2.2.3 Work Roles, Sub Roles and Machine Roles

The analysis helped us come up with work roles, sub roles and machine roles.

1. **Work Roles**:
   (a) Passengers - People use bus service and use web or app to get proper destination
      - **Sub Role 1**: Commuters(free): Who take buses frequently, without payment. Like UT students
      - **Sub Role 2**: Commuters(tickets): Who take buses frequently, should buy tickets. Like work professionals in Austin without cars
      - **Sub Role 3**: Occasional bus users: Who take buses occasionally, Like travelers to Austin or people with cars,

   (b) Fellow Passengers - Friends, Strangers, Passengers who can cause trouble
   (c) Bus Driver - Drivers the CapMetro Buses
   (d) Bus Schedule Manager - Creates and manages bus schedules
2. **Machine/System Roles**:
   (a) Ticket Machine in the bus - Students can take a bus free only by swiping a student ID card. Other travelers can take a bus by buying a bus ticket from a ticket machine or app.
   (b) Bus GPS (System inside the bus that helps track the bus location)
   (c) Bus Stop (Also a location role)
   (d) CapMetro Web/App (App used to extract information about CapMetro Bus services)
   (e) Personal Phone GPS (To track user location)
   (f) CapMetro Database (Keeps a record of CapMetro information)

2.2.4 Workflow Diagram

We created a workflow diagram that connected our work roles to our machine and system roles. These roles acted as the nodes in our system. There are around eleven tasks or relationships between these roles. These are described in our initial flow diagram.

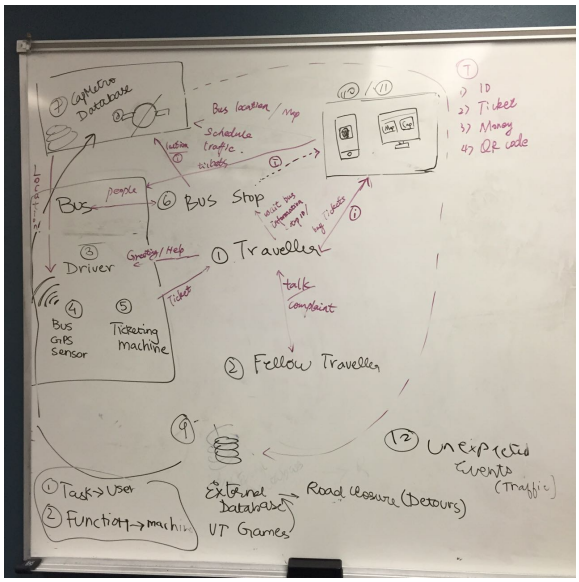


Figure 15: Sketch of Flow Diagram

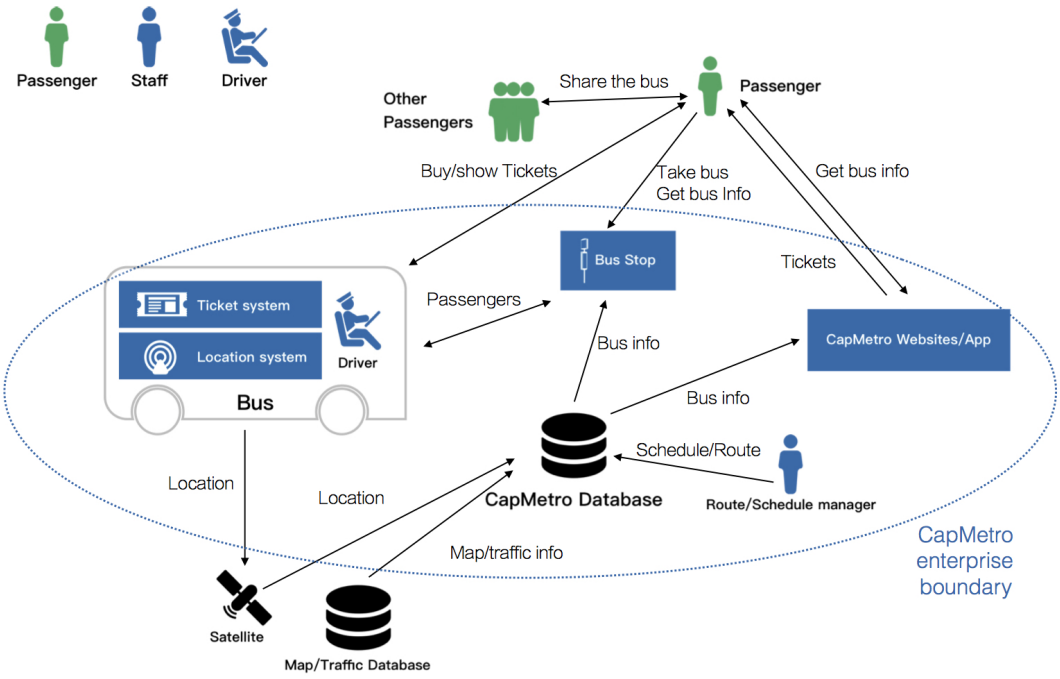


Figure 16: Initial Flow Diagram

3 Interaction Design Requirements

To help the users carry out their tasks and have a great user experience while doing so, we need to incorporate certain design elements in our App. Creating the WAAD helps us extract the requirements that will inform the design of our final product. In this section of the design process, we use the the notes in WAAD to help specify requirements.

Given below are some requirements that we extracted. The 'pink' categories or headings in our WAAD helped us create the top-level category. Further requirements specifications were done with the help of the blue notes in the WAAD.

3.1 Tailoring the scope

There were points in several notes which were mentioned multiple times in the interview. For example, 'using a navigation app like Google Maps to go to a new stop' was mentioned by several people. A lot of notes reflected 'essential' activities for using CapMetro. These notes were given priority given the time scope of this project. Notes, such as 'I like to run into my friends on the bus' were not given priority.

3.2 Extracted Requirements

We extracted 12 requirements in total. The first level heading gives information about the major feature. The second level heading gives information about secondary feature under (a part of) the major feature. Then comes the requirement statement along with the source note (The notes code are mentioned in Figure 13). In the end, we made notes to ourselves to aid the design process. We also wrote the rationale for each requirement.

1. **Bus stop information**
Searching for nearby bus stops
Users shall be able to search nearby stops [I3].
Note: In design, include an option to search nearby stops using maps and GPS location. Consider both map and list options.
Rationale: Looking for nearby stops already exists, but some users cannot find it.

2. **Bus stop information**
Bus routes information, for a particular stop
When searching for 'nearby' stops, users will know what bus routes are associated with those stops [I2].
Note: In design, include options to look up bus routes in nearby stops. Consider both map and list options.
Rationale: This option exists in iOS, but not android. Users cannot find it intuitively.

3. **Bus stop information**
Accessing frequently used stops easier
Users will be able set their own nicknames or codes for bus stop. Users may make a list of frequently used stops [I6].
Note: This code will sync with the actual bus stop id when searching for information.
Rationale: 4 digit stop IDs are difficult to remember for a bus stop.

4. **Bus stop location information**
Navigate to the bus stop
Users will be able to use the app to navigate to the bus stop they are going to use [C6].
Note: Make navigation more pedestrian friendly than car friendly. That is, show options for going through side-streets and alleys, in addition to only main streets.
Rationale: Users are now switching between two-three apps for navigation and schedule/bus stop information.

5. **Bus and bus stop direction**
Finding the direction (northbound/southbound) of the bus
Users will be able to know which bus goes in which direction at a particular stop [J1, J2].
Note: Consider making an arrow or indicator showing which direction the bus is moving towards. Make it icon-oriented, reduce jargon and phrasing
Rationale: The terms are confusing. Direction along with destination information may be needed.

6. **Bus schedule and timing**
Changes to fixed bus schedule
Users will be able to see the fixed bus schedule and also any changes, such as delays, detours or cancels to the bus schedule [B5].
Note: Consider idea from Google flights, 'Generally 15min late'
Rationale: Delays, detours or cancellations may have patterns around rush hour, UT game days, Austin City Limits, SXSW, etc.

7. **Bus schedule and timing**
Waiting time for bus arrival
Users will be able to see the time till bus arrival and location of bus on map [B1, B7].
Note: Refreshed time + real-time bus location information in map to let users feel everything under control.
Rationale: This feature exists, but inadequate real-time info makes users feel it doesn't work.

8. **Condition of bus (before ride)**
Crowd and available seats
While waiting, users will be able to know how many seats are available before taking the bus [A2].
Note: Apps in Korea. Use tickets/digital tickets to calculate people inflow, outflow and thus number of people on bus.
Rationale: People wait for bus and then realize it cannot take in more people.

9. **Payment information**
Digital ticketing and information
Users will be able to find ticketing information and use digital ticket or student ID to pay [F3].
Note: Customize the digital ticket/id so that it fits buses with digital ticket reader and bus with just driver.
Rationale: Most people have phone with them in bus stops. Digital ticket saves paper, helps people if they forget ticket/student ID, etc.

10. **Condition of bus (during ride)**
Safety condition of bus
Users will be able to complain or notify the driver anonymously in case they have a problem like drunk people [G1, G3].
Note: Make this feature accessible easily
Rationale: If the bus is crowded people cannot reach the driver (physical reach him/her) easily.

11. **Destination bus stop information**
When and where to get off
Users will be able to know how long it will take on the bus and where to get off [A1].
Note: Consider having a notification alert, like alarm, once a person enters destination information
Rationale: People look at Google maps to see the 'current location of bus', when they are *inside* the bus.

12. **Bus stop safety**
Safety, neighborhood and environment conditions of bus stop
Users can check to see in what kind of neighborhood where the starting and destination bus stop are [G4].
Note: Crime rate heat map and crowd sourcing may work well here.
Rationale: Women, especially, consider this while traveling.

4 Design Informing Models

The design informing models help us inform the design. They bridge the gap between our analyses and design. For instance user models help us see different stakeholders involved in the system. Usage models help us better understand the flow and interactions within our system.

4.1 Tailoring the scope: choosing models

We decided to use five models. The four main ones were user models and the other three belong to usage models. They are: (1) Work Roles Model (2) Flow Model (3) Hierarchical Task Inventory (4) Task Interaction Model. We chose to do (1) User Models (Work Roles) as it helps us see the target audience of our application. It will also aid in the creation of personas. We also chose (2) Flow Model as that helps us better understand the interactions between user roles and machine roles. It also informs a little about the various possible sequences of user tasks. In addition, this tells us various barriers (⚡) users may face in the tasks flow. (3) Hierarchical Task Inventory helps us group and categorize tasks in various hierarchies. This may later inform information architecture of our design. (4) Task Interaction Model helps us envision various scenarios where the application will be used. It contextualizes the usage of the app and helps us understand how it will be used in a real world scenario. In addition, we understand how user tasks and system function should interact with each other for a good user experience. We can also see whether barriers (⚡) can be overcome and what specific barriers are addressed in each interaction with our app.

We chose to do an additional ‘ physical’ model, which is a work environment model. Using CapMetro buses require a lot of physical movement and transition. Thus, we thought this model would be good to have. We did not choose to do social models. In most cases, users can complete their tasks without direct social connections with other people.

4.2 User Model: Work Roles and Mediated work roles

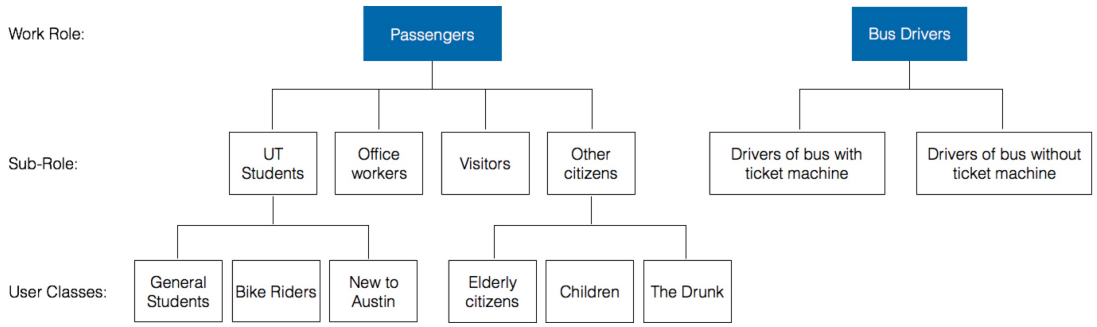


Figure 17: Work Roles Model

This image above describes the users that will be involved in the CapMetro system. Specific roles and behavior are also described in detail below.

1. **Work Roles:** Passengers - Who use bus service in Austin.
    - **Sub-Role:** UT students - Who take buses frequently, without payments.
        - **User classes:** General students: Who has a regular class schedule, and go to school by bus almost every weekday.
        - **User classes:** Bike Riders: Who take buses with their bikes, and go to bus stops by bike.
        - **User classes:** New to Austin Students: Not familiar with bus information or map of Austin.
    - **Sub-Role:** Office workers - Who commute to work by bus regularly, with payments.
    - **Sub-Role:** Visitors - Who are not familiar with Austin, and take buses to visit around Austin
    - **Sub-Role:** Other citizens- Who may use the bus less regularly (no fixed schedule, don't use it for work) than others.
        - **User classes:** Drunk/Disorderly: Have no regular routes. May cause problems due to disorderly behavior.
        - **User classes:** Elderly citizens: Who may have troubles in using Apps or websites to get access to bus information
        - **User classes:** Children: Who may only take buses along with their parents.
2. **Work Roles:** Bus Drivers - Who drive buses and operate bus control system, sometimes also play a role of checking tickets.
    - **Sub-Role:** Drivers of bus without ticket machine - Who drive bus and operate bus control system.
    - **Sub-Role:** Drivers of bus with ticket machine - Who play an additional role of checking passengers tickets, IDs and assisting them using the ticket machine.

Mediated work roles

1. Routes and schedule managers: Who set up and change schedules and routes of buses.
2. Notification managers: Who use capmetro notification system to send notification about schedule changes, detours.

4.3 Work Environment Model: Physical Model

This model describes the physical environment around which the placement and paths of users are situated.

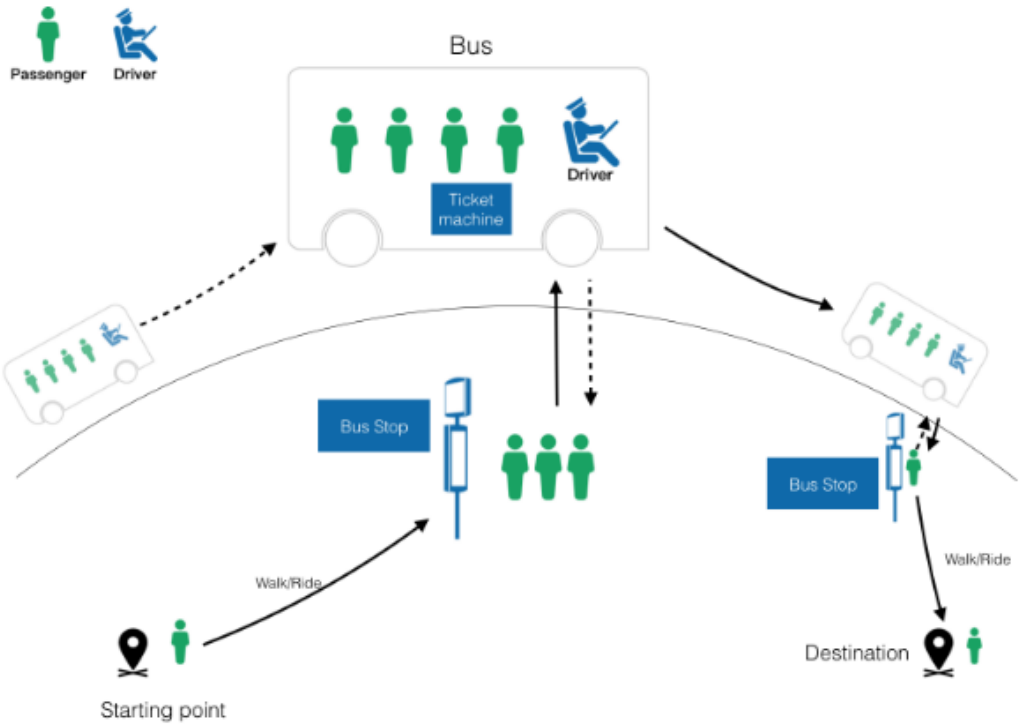


Figure 18: Physical Model

4.4 Usage Model: Flow Model

This model describes the relationship between user roles and machine roles. Interaction elements are described as well. The major addition over the initial flow model is the addition of potential barriers. These barriers were known with the help of WAAD and requirements analysis.

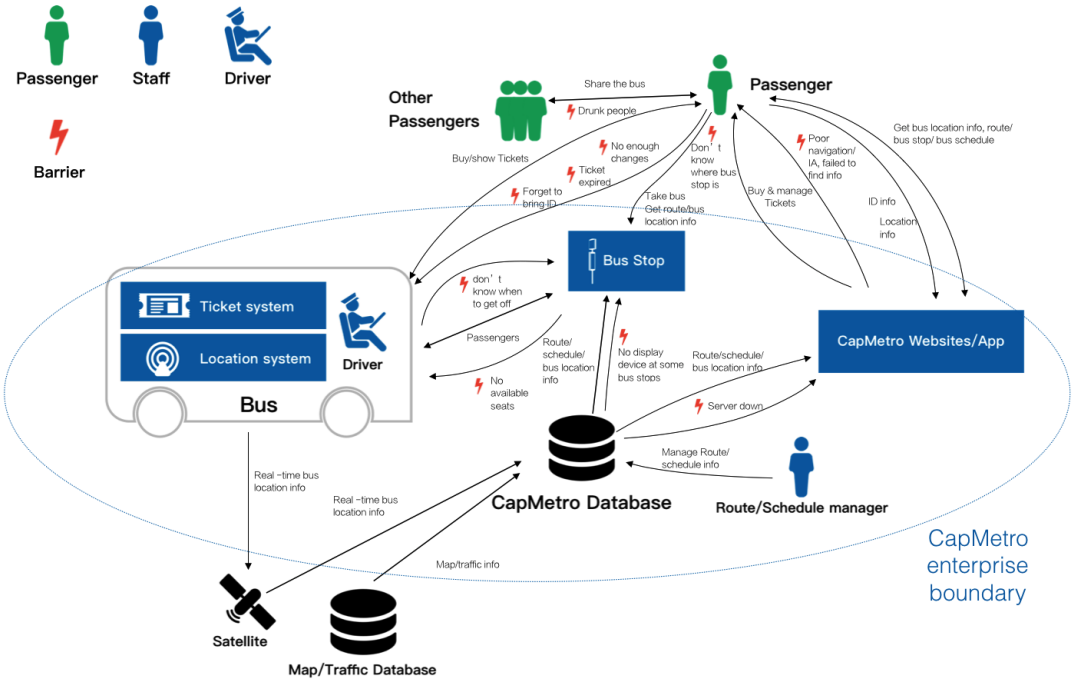


Figure 19: Updated Flow Model

Please see the list of potential barriers to the flow diagram. We try to address some of these barriers (ϟ) in the task-interaction model.

1. Don't know where bus stop is
2. Drunk people
3. Ticket expired
4. Forget to bring ID
5. Not enough quarters (money, change)
6. No available seats
7. Don't know when to get off
8. No display device at some bus stops
9. Poor navigation/IA of apps, failed to find information
10. Server down

4.5 Usage Model: Hierarchical Task Inventory

This model helped us break down users tasks required at different points of CapMetro Bus usage. It also helped us group sub-tasks under main tasks. For instance, 'planning' would involved looking at schedule, finding bus stop and bus routes, and navigating to bus stop. While 'waiting for the bus', users could see bus location, bus condition, etc.

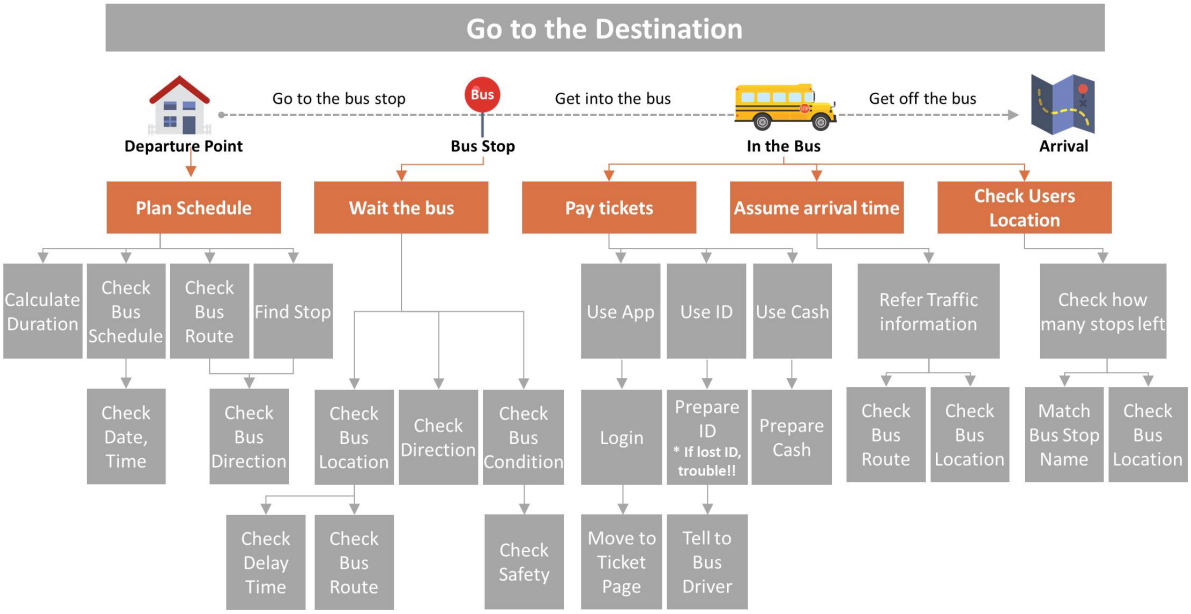


Figure 20: Hierarchical Task Inventory

4.6 Usage Model: Task Interaction Model

Usage scenarios or users and task-function interactions are described below. These scenarios are imaginary help us see how the app could be used in different situations. We have also described how some of these interactions would offer solutions to the potential barriers in the flow diagram.

Usage Scenarios:

1. **Scenario 1: Seeking bus stop information and planning**
Instead of using public transportation, Annie usually drives her car. One day her car breaks down, so she inputs her starting address and the destination. She wants to check out the stops nearby her house and stops nearby her office. She wants to see the path information between them and then see what route would work best for her. The app tells her the best route, including walking time to bus stop and transfer information. She decides to go to the relevant bus stop.

2. **Scenario 2: Ticket managing**
Annie wishes to find payment information for the bus. She uses the app and figures out the payment information, including the price and ways to pay before getting on the bus. She decides to buy the weekly pass and store the digital ticket in her cell phone (If she does not do this, she figures out that she would have to carry quarters or physical ticket). She uses the digital ticket right after getting on the bus by showing it to the driver (or using the ticket machine if present).

3. **Scenario 3: Destination notification/alarm setting**
Time management matters to Charlie. Hence, he always checks the bus schedule before heading to the bus stop. He does not want to spend too much time at the stop waiting for the bus. He uses the alarm that tells him if the bus is approaching the stop and he goes to the stop once the bus is certain stops away or certain minutes away. Also, as time is very precious to him, he takes a nap on the bus (There are not too many things to do on the bus anyway and using cellphone or reading on the bus makes him dizzy). He wishes order to avoid the a situation that he does not wake up on time and passes his destination stop. So, he uses the alarm to wake him up when he is close to his stop.

Step-by-step task interaction model:

Scenario 1

Task Name: Information seeking and planning
Task Goal: Find stop information and the best route information/schedule
Task Trigger: Public transportation is the top priority choice of users
Barriers (⚡) addressed: 'Don't know where bus stop is'

Step goal: Find stop and route information

User	**System**
Input current location	
	Show the stops nearby and show routes that go by each stop
Choose a stop	
	Show more information of routes that go by that stop
Choose a route	
	Show more information of the route like road-map and schedule
Decide the route	

Step goal: Planning

User	**System**
Input current location and destination	
	Show all possible plans including the walking time and transfer information
Choose the plan that matches the schedule	
	Show more detailed information about that plan
Choose a route	
	Show more information of the route like roadmap and schedule
Make decision and take action	

Scenario 2

Task Name: Ticket managing
Task Goal: Buy and use the ticket
Task Trigger: Must pay to take the bus
Barriers (↯) addressed: No enough quarters, ticket expired

Step goal: Buy ticket

User	**System**
Open app	
	Show first page
Choose ticket page	
	Show ticket page
Choose buy a ticket	
	Show all available ticket options
Choose desired ticket option and checkout	
	Show payment options
Finish payment	
	Payment completed and show ticket

Step goal: Use ticket

User	**System**
Open app	
	Show first page
Choose ticket page	
	Show ticket page
Choose use ticket	
	Show ticket interface
Use ticket by showing to driver/ticket machine	

Scenario 3

Task Name: Alarm setting
Task Goal: Get informed by the app when the bus is approaching to certain stop
Task Trigger: Save time and avoid the situations that waste time
Barriers (↯) addressed: Don't know when to get off

Step goal: Set alarm reminder

User	**System**
Open app	
	Show first page
Search routes	
	Show results
Choose route	
	Show schedule and bus location
See how long will the bus arrive and set the alarm when the bus is approaching OR set alarm when bus will arrive at destination	
	Show alarm setting
Set	

5 Design

Once we scoped out the design requirements and finalized models that will inform our design, we found it easier to concentrate on a more focused target population. This target group ended being students who have high 'schedule' needs and are well planned while using CapMetro transportation.

The design informing models also helped us get a sense of how the overall interaction flow will look like. In addition, it helped us bridge the gap between users' mental model and our (designer's) mental model.

Keeping all of this in our minds, we could brainstorm and think of design ideas that will fit user needs. We could also place these designed elements in scenarios (stories) to see how they would be utilized by our users.

5.1 Tailoring the scope

As a group, we put emphasis on using the most 'basic requirements' to guide the creation of our persona, design, ideation and story-boarding. By basic requirements, we mean traveling to university (UT Austin campus) and issues pertaining to it were given priority. In addition, we decided that our persona should be the main character in our storyboards. We also kept her in mind while doing sketching and ideation.

5.2 Persona

Several personas were built after the contextual inquiry and analysis. Some of the personas we considered were 'Health enthusiast' (He bikes a lot, but at times also travels on the Bus with his bike), 'The party animal' (An undergraduate student who uses transportation to travel to downtown Austin late at nights) and 'The Planner' (Serious student, mostly works around University on weekdays, depends almost solely on public transportation). We decided that 'The Planner' persona will be used as primary persona since many interviewees were students concerned about school and doing well. We made sure that the needs of the primary will be fulfilled while other personas will not be unsatisfied. In the image below, you can see how our persona, Katie, looks like. Katie' goals shows what really matters to her. The dislike section presents what her concerns, challenges, and frustrations are. Keeping her in mind helped us during ideation, conceptual design and storyboarding. We decided to present her in an infographic format you that one can get to know her in one glance.

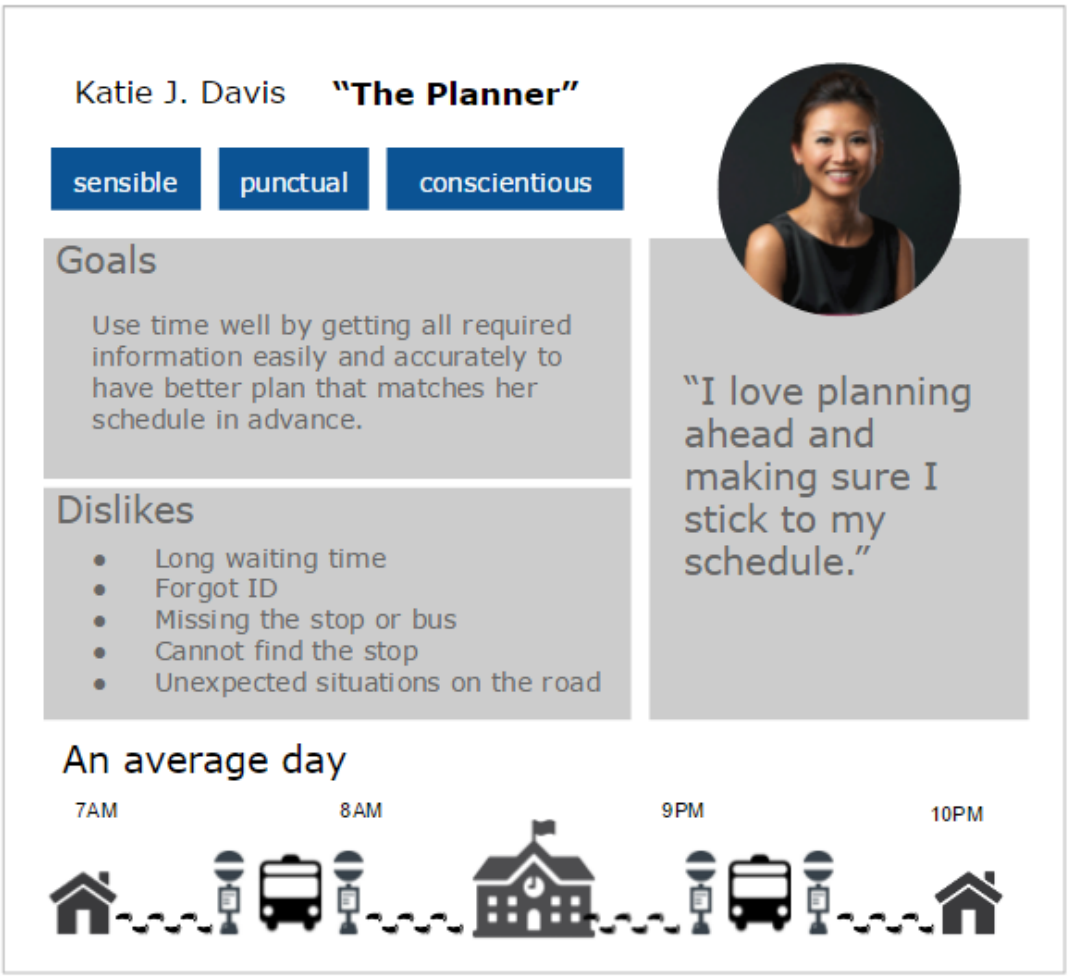


Figure 21: Meet our persona, Katie

5.3 Ideation and Sketching

For this part of the design process, we booked a room in the PCL library for 4 hours. During ideation and sketching, we followed the following process: (1) Generally discuss where we are at and what we are thinking (2) Brainstorm independently with sketching (3) Discuss and critique the brainstormed ideas/sketches (4) Work on idea(s) independently or collaboratively depending on the situation.

We made sure to keep critiquing and brainstorming as separate elements. What worked well for us here was to set 'time bounds'. We also realized that since we have been immersed in this project for more than a month now, we were generally on the same page when critiquing overall ideas.

This process has worked well for us even in the past. We continued to brainstorm ideas and discuss them using Google docs and email. This is so that we are not limited by the time we can meet in person.

Work space and materials: The room we used in PCL was in the graduate study lounge and was thus a quiet space away from distractions. We mostly used individual sheets of paper to sketch out our ideas. We also used the whiteboard when *explaining* ideas that had been well formed in our minds.

Please see some photos below to see how this process worked out.

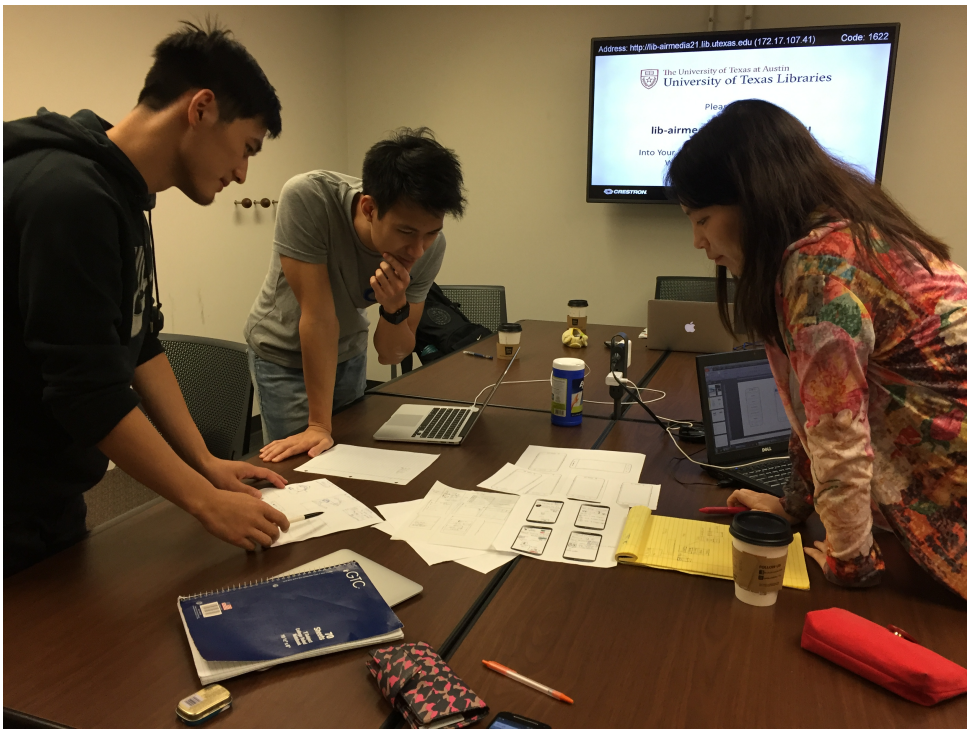


Figure 22: At work. Discussion stage.

We also have some pictures of the sketches we made during the ideation process. After the process, we categorized the ideas into the three perspectives: ecological, interaction and also emotional. We also used many icons as **metaphors** in our sketches and decided to include this in the emotional perspective.

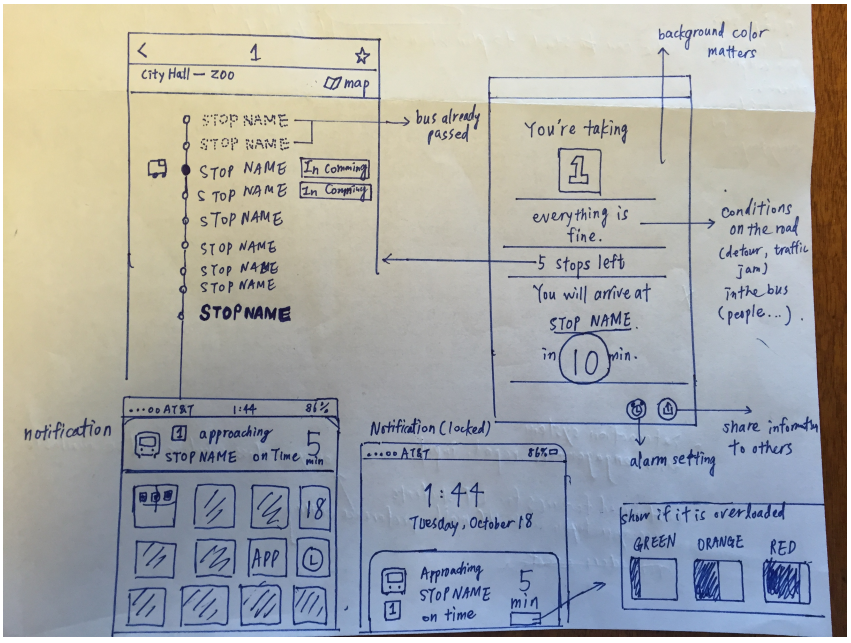
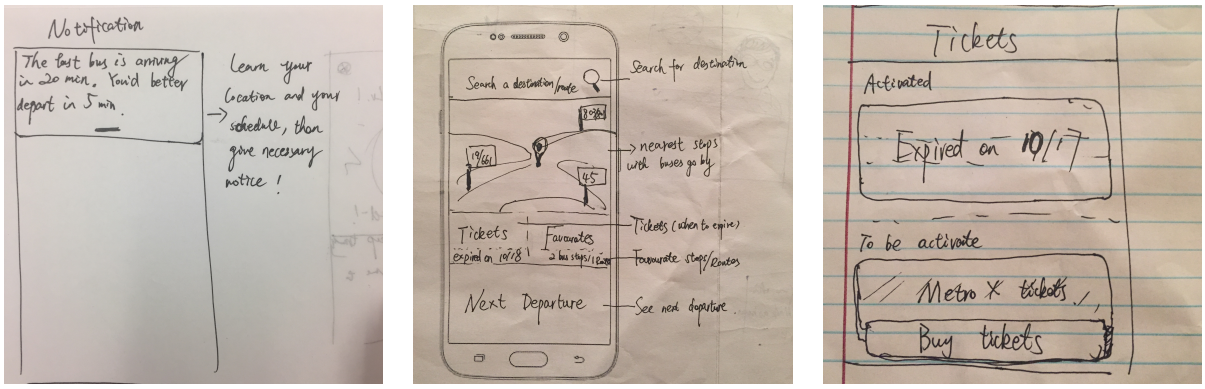


Figure 23: Interaction Perspective: How the tasks flow while waiting for the bus and while waiting to get off at destination.



(a) Notification (b) Searching routes (c) Displaying digital ticket

Figure 24: More examples of Interaction Perspective

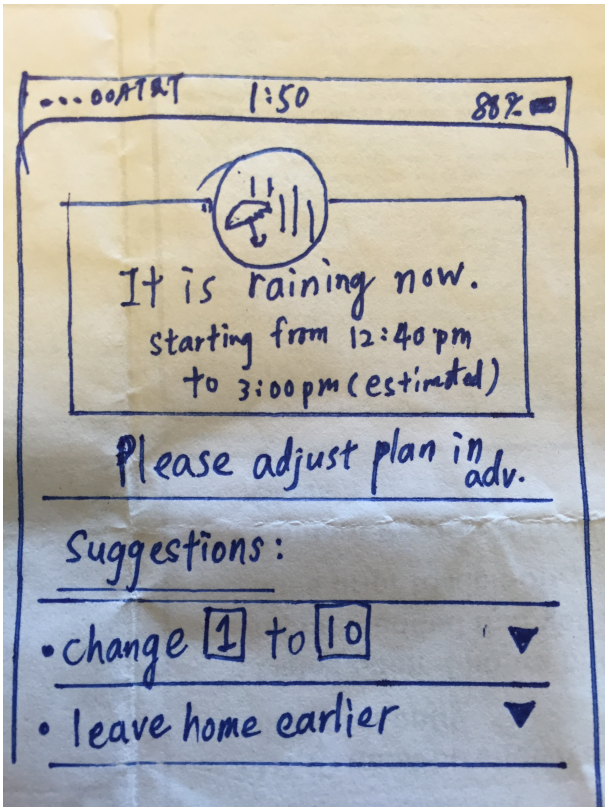


Figure 25: Ecological Perspective: Rain and scheduling issues

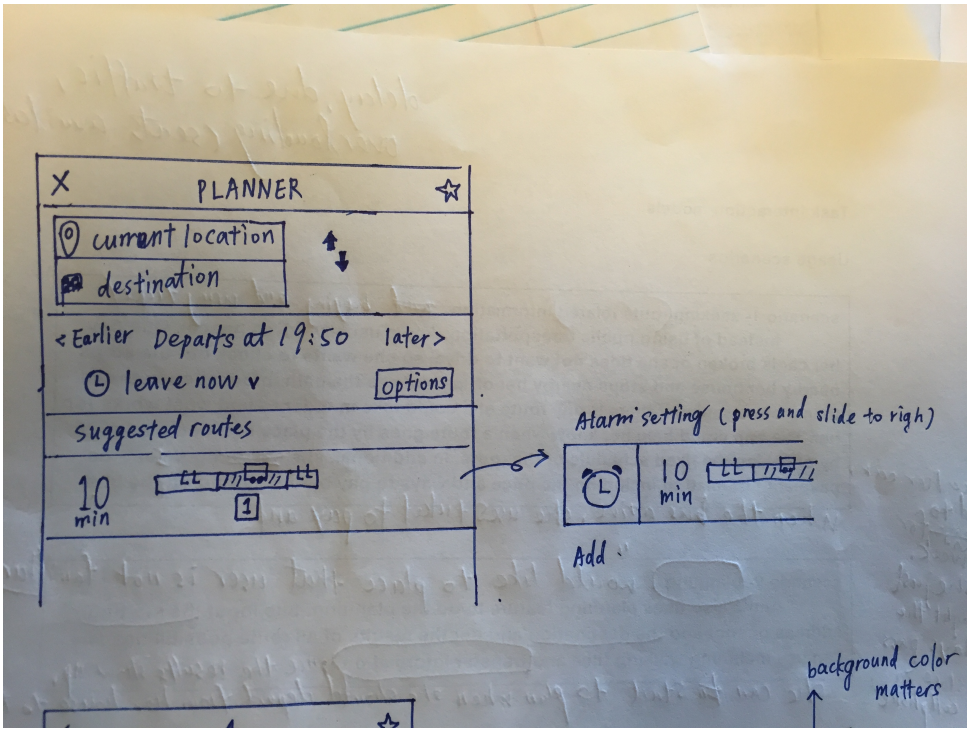


Figure 26: Ecological Perspective: Scheduling and trip planning

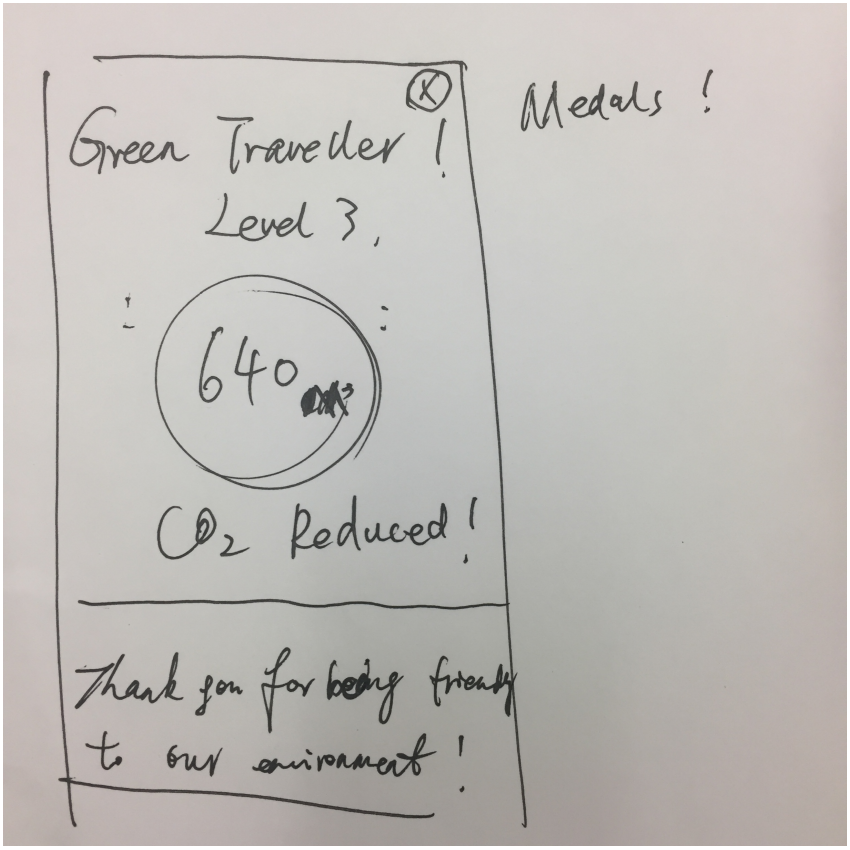
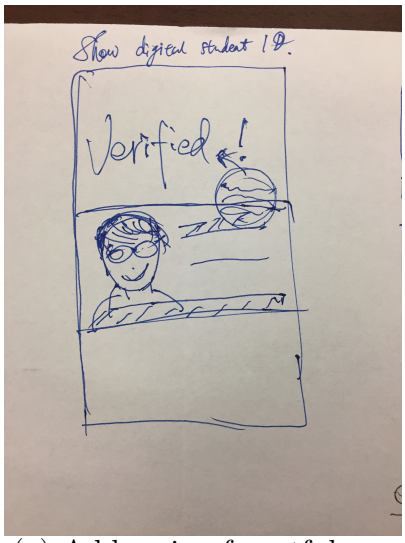
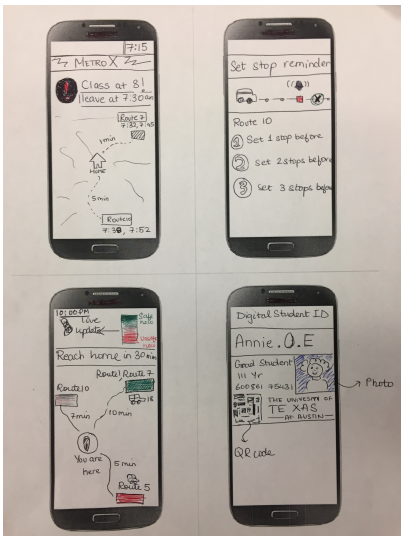


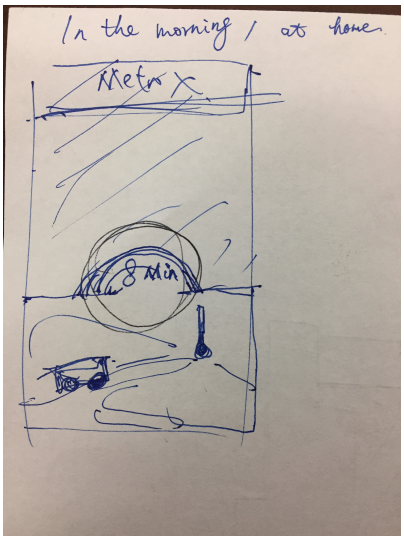
Figure 27: Emotional Perspective: Incentives for public transportation



(a) Addressing forgetfulness and associated feelings



(b) Icons as metaphors for alert



(c) Morning greeting

Figure 28: Examples of Emotional Perspective

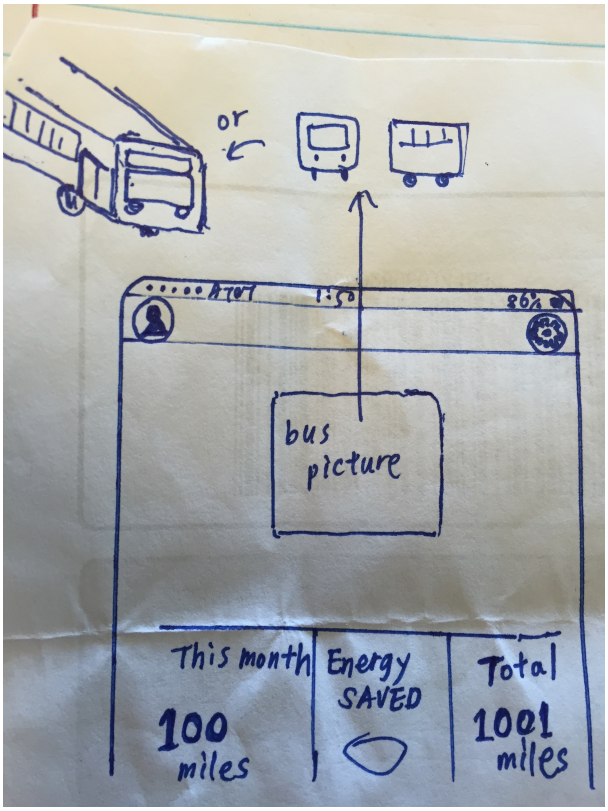


Figure 29: Emotional Perspective with saving energy

Along with our ideation and sketching, the overall interaction flow come in our mind gradually. We tried to capture the main part of it, as it is where our designer's mental model stands on. This flow contains most high level tasks in our task hierarchy model like 'plan a schedule', 'check bus information' and 'make a payment', to give us an overall view of how users interact with our application in different cases.

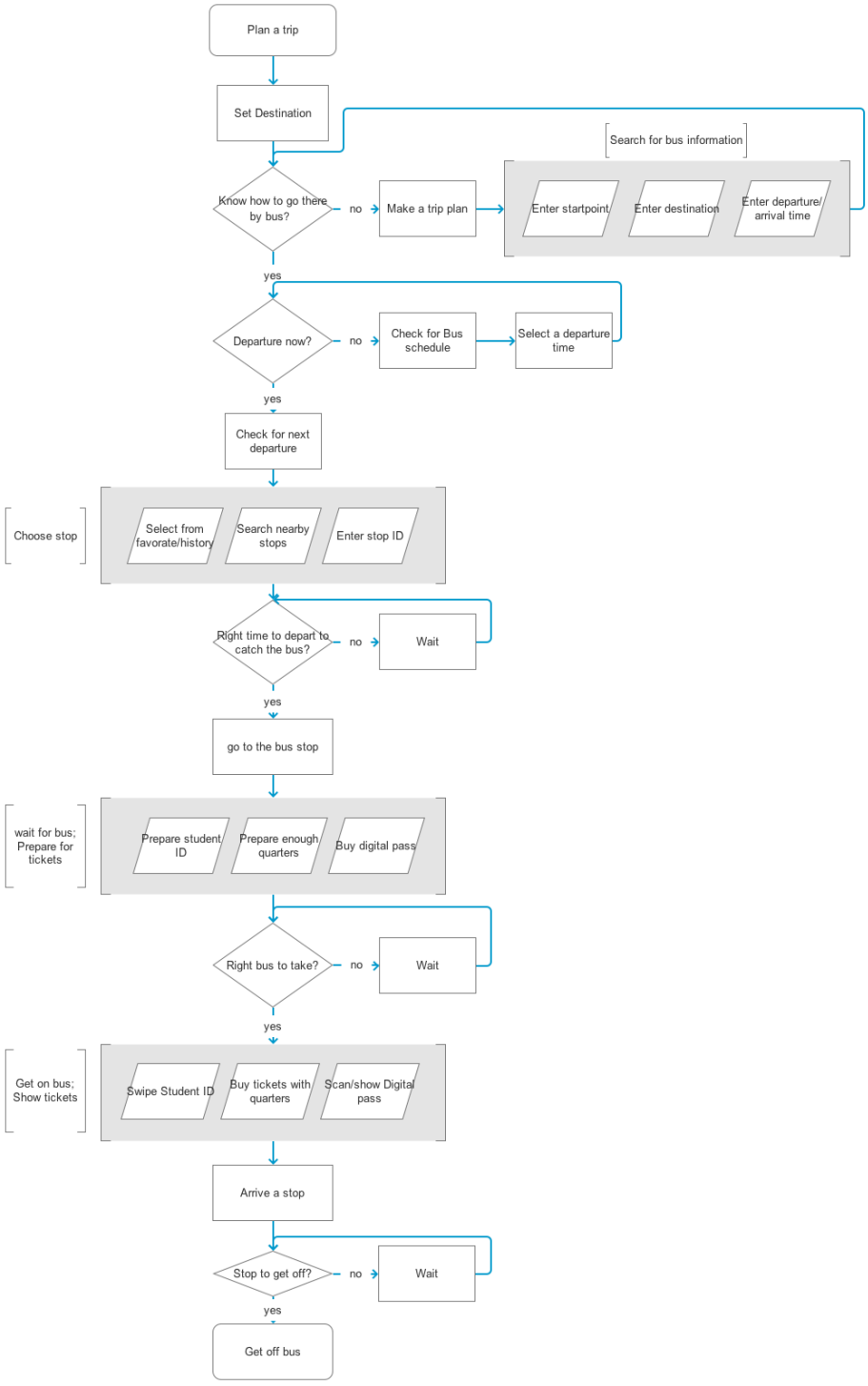


Figure 30: Overall interaction flow

5.4 Mental Models

Thinking of mental models help us understand our own conception of design (designer's mental model). It also helps us connect it with the users' mental model, using a bridging 'conceptual design'. The ideation process helped us a lot while creating these models.

5.4.1 Designer's mental model

As designers, we considered all three perspectives, ecological, emotional and interaction.

When viewing from the **ecological perspective**, we consider MetroX to be a piece in the 'ecological system' of the user's entire daily transportation routine. This routine consists of location, bus stops, buses and people like bus drivers and passengers. We felt that user behaviors between each entity, like moving between home and school, home and stops, and the relationship between buses' schedule and their schedule should be considered while designing the app. Thus within this larger system, MetroX should fit into the role of helping the users plan and manage their schedule of their movement between place to place. It should help users by (1) providing information to support their plans beforehand (2) keeping track of any unexpected changes in real-time (so that users can think of solutions to avoid wasting precious time) and (3) receiving suggestions or information from other users to adjust their plans and strategies.

As we mentioned, the MetroX would help provide a personal journey plan that suggests users precise route and accurate time to get to their destinations. So, when users wish to go somewhere, they will use MetroX to plan their trip. Thus, when we consider the **interaction perspective**, MetroX should have an intuitive interaction flow so that the users can plan their journey well ahead of time. Keeping the sequential flow in mind, we have to first make sure that users can reach a bus stop without hassles. Users would also use MetroX in the bus stop, as it would live information of a bus's location, waiting time and environmental safety of the bus stop. When users get into the transportation, the application should take up the role of a ticket. In the bus, users would want to estimate arrival time and to know traffic information in the route. MetroX should assist users to find this information. Therefore, the MetroX application helps users plan journey schedule, check correct routes, save time, pay transportation fee and estimate arrival time. Keeping this sequence in mind will help us with interaction design and information architecture.

Though MetroX would primarily be a tool to help users get access to bus information conveniently, it should also enable users to have a delightful user experience. This is important when considering the **emotional perspective**. So, in our redesign, MetroX should be 'considerate' and provide users help in a smart way. We wish to be able to cater to users, especially students, so that they do not miss the last bus if they study til late in the evenings at school. Also, we wish to let commuters feel welcomed. So when they open MetroX in the morning, they would see next departure of the bus they usually take immediately. To make users a feel sense of achievement, MetroX could offer medals of 'green travelers' or show energy savings due to their use of public transportation.

5.4.2 Users' mental model

Our understanding of a user's mental model is very crucial to the design of our system. A user's model helps us understand what they think the system would behave like. A lot

of our users' perceptions and expectations could be gleaned from interviews with them. Contextual analysis further helped us understand in depth some of the users concerns.

Our primary target audience are students. Their main expectations from the application is that it helps them carry about their daily UT related transportation with ease. Time taken to use the app is an important deciding factor for many students. Thus anything that is efficient and has an intuitive navigational flow, with a small learning curve, will be beneficial. Trust and reliability perceptions are also important issues from the students' point of view. Also, many users are already used to the color scheme and styling of the app. Any drastic changes to such elements may result in some cognitive conflict for the users.

In addition to these basic or minimum requirements, users wish for some additional benefits. They wish to not use multiple apps for transportation management, have information about schedule changes, have information on safety and condition of the bus.

All in all, users expect a system that will integrate seamlessly with their daily routine and help them stay on track with school and other activities.

5.5 Conceptual Design

According to what we have from our contextual inquiry and taking both designer's mental model and users' mental model into consideration, we found that the core (shared) belief between the models is to design a system as useful as possible. Based on the results of previous user study, it is evident that the target users do not have a strong trust in the information that cap metro provides. In this sense, a trustworthy system will increase users' positive emotions and improve their user experience. In addition, to address the day to day schedule of users and for them to be able to use their time well, the system will be deliberately designed to have some customized function specific for UT students. For instance, users can login to application with their UT student account, and their identity will be authorized by the system, which means that they no longer need to use student ID when getting on the bus. To achieve such goals, it is expected that the functions can be matched the workflow of the users. By incorporating users mental model into our designer's mental model, the supportive application could be built aiming at providing completed information to users and make their live easier.

The following part is the brief description of the concept overview:

- Providing error prevention to lower the possibilities of errors that come from wrong interpretation.
- Minimal design make sure that the most important information will be delivered to users successfully.
- Keep the display of information consistent to decrease users' cognitive loading.
- Favorite functions to shorten users' workflow.

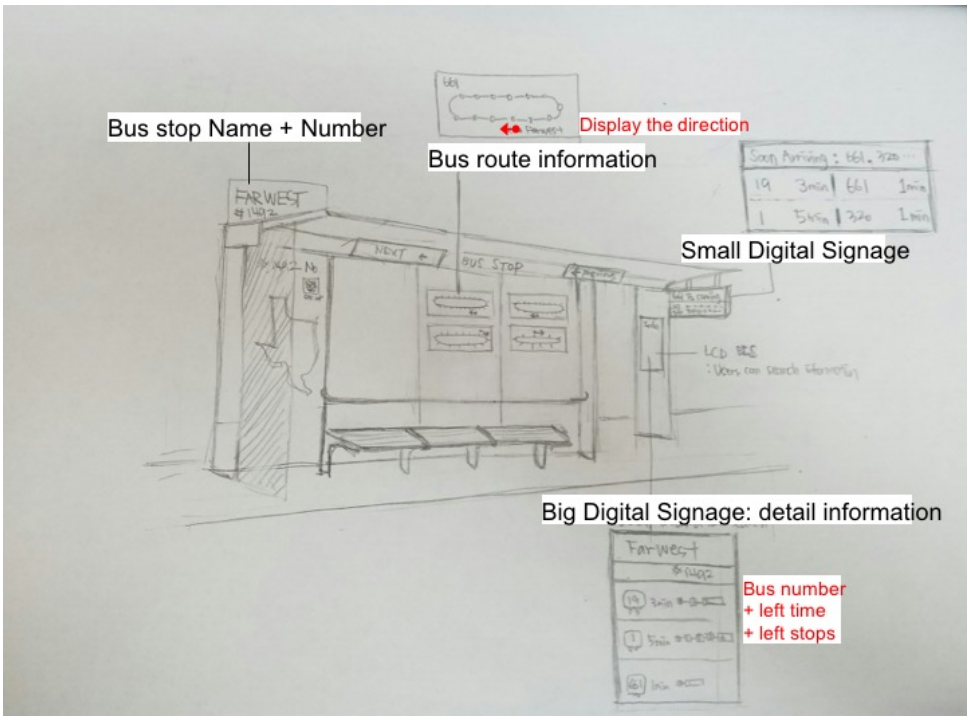


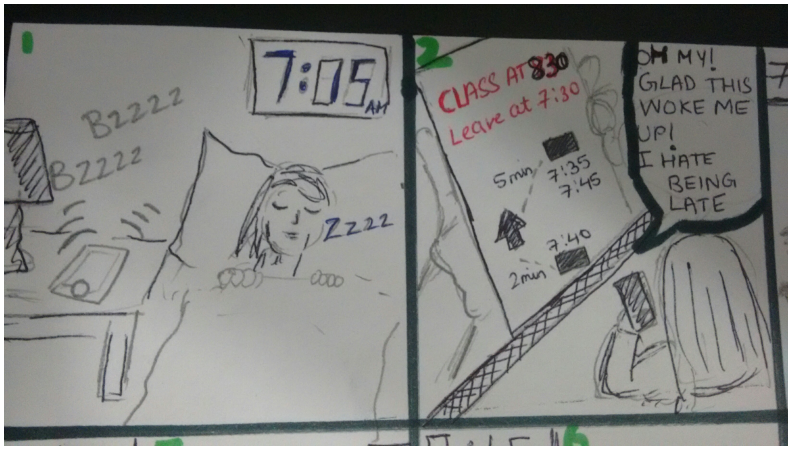
Figure 31: Physical and ecological space of app usage

5.6 Story-boarding

Story-boarding helps us situate our design in the everyday lives of our persona/user, see how it plays a role in their lives and how much it helps them. We incorporated elements from our requirements and ideation process, such as digital ID, into the story.

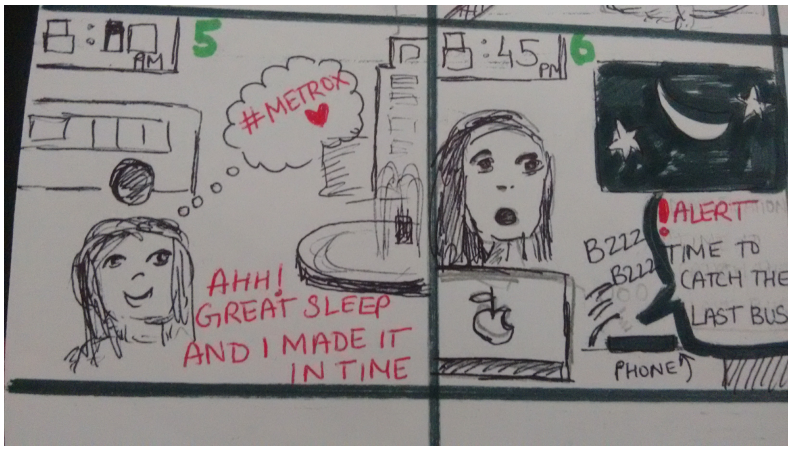
5.6.1 Story 1: An unusual weekday

Katie has a late night submission and she has pulled an all nighter. She wakes up later than expected due to this. But fortunately MetroX helps her catch her bus on time. It also helps her stay on schedule throughout the day, even when she forgets her student ID at her lab. She is happy because she had a stress-free day and now she can get back to her normal, well planned routine.

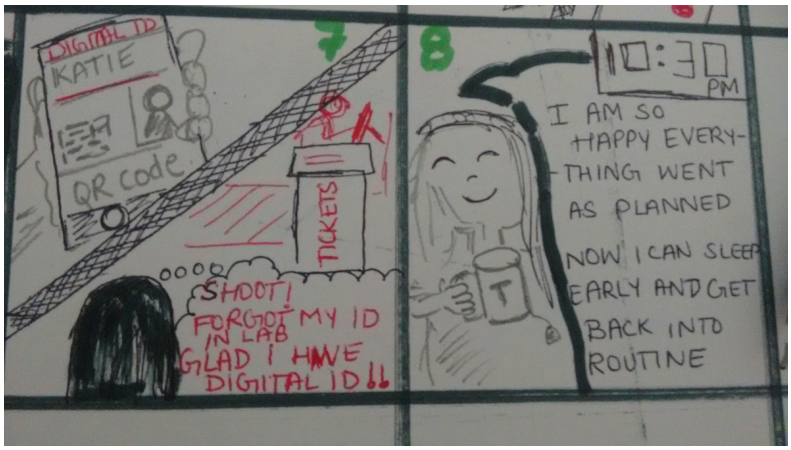


Frame 1: Katie wakes up due to the notification setting in MetroX. Usually she wakes up earlier. She might have woken up a little too late if MetroX hadn't woken her up!
Frame 2: MetroX displays the time she should leave home so that she arrives at her classes in time. MetroX also displays the possible bus stops she can use, the time it takes to reach those stops and the time of buses from the stops.

Frame 3: She chooses the stop that will take only 2 min to reach. She arrives just in time to catch the bus.
Frame 4: She wishes to get a little more sleep. So she sets the alarm in her phone to notify her before her stop comes.



Frame 5: She arrives at UT. The extra bit of sleep/power nap she got in the bus makes her happy.
Frame 6: It's late at night and she is working in her lab. Suddenly, her phone buzzes. MetroX reminds her (notification) that it is the time to take the last bus.

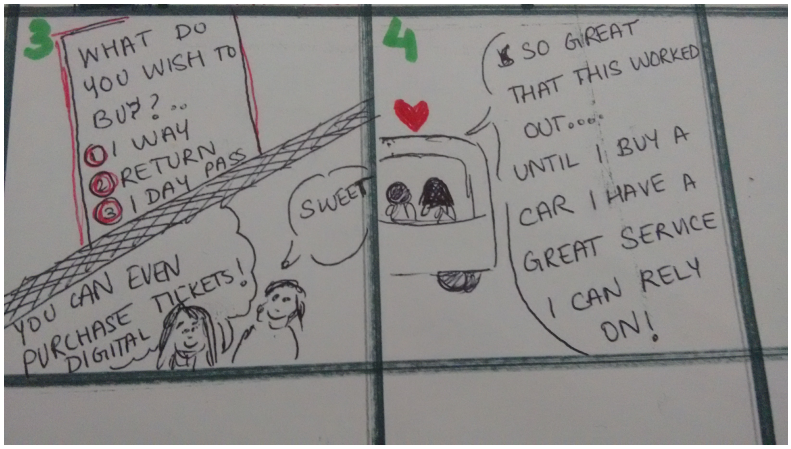


Frame 7: She forgets her ID in her lab. Fortunately MetroX has a digital ID system that will help her in situations where she forgets her ID.
Frame 8: A satisfied customer of the app!

5.6.2 Story 2: Keeping up with a weekend plan

Katie's boyfriend visits her from Boston. Unfortunately he doesn't know that Austin doesn't have Uber. Being an international student living in a crowded place like Boston, he doesn't have a Zipcar account or any need to drive a car. He relies a lot on Uber for transportation. Fortunately, Katie is able to use MetroX so that they can plan a trip and have a great dinner. She also feels that MetroX and CapMetro Bus services help her carry out her routine, even though she doesn't have a car.

Frame 1: Katie's boyfriend, Sam, has come to visit her from outside Austin. He tries to book an Uber, but finds out that Uber doesn't work in Austin.
Frame 2: Katie and Sam look for possible routes to the place they are going. This is a new place that they are trying out, so they are glad they could find a possible route through MetroX.



Frame 3: They also buy a digital ticket for Sam so that he doesn't have to use quarters/change.
Frame 4: A satisfied customer of the app!

6 Prototyping

Prototypes help designers and users get a sense of look-feel of how the final app will function. Prototypes are often low-fidelity and done quickly. This is important, as it gives designers time and lowers the cost to redesign features or functions that are not very helpful for users. For the scope of this project, we decided to use Balsamiq and InVision to do the protoryping. These software helped us create low/medium fidelity prototypes.

6.1 Tailoring the scope

In this phase of the project, we had to narrow down the scope so that we can effectively build a prototype with major task flows. Given the time available, we decided to not

include common functions like settings, payment with credit card, signing up page, etc. In terms of logic flows, we restricted ourselves to most common flows. We did not account for the logic flows of unforeseeable events like lost data connection. Of the task flows we extracted from our requirements, we decided to do the most essential tasks for MetroX. These are: 1) trip planning, 2) finding next departures from stops, 3) looking at bus schedules, 4) searching for bus stops, bus routes and route destinations 5) ticketing. We had two tasks that were novel to MetroX. These are: 1) Settings alarm reminders 2) Sharing safety information 3) Using a 'panic button' for help inside buses. We also decided to display as features, not tasks, our idea of 1) Nicknames for stops 2) Crowded nature of bus.

6.2 Process of prototyping

We started our discussions for the prototype during our session with the guest speakers from projeck202. With their instruction, guidance, and help, we were able to have proper scope and specifics of what we wanted our prototype to achieve. For instance, in the first activity they conducted, we had to ask three major user questions that we wanted MetroX to answer. We then could find appropriate tasks that MetroX should have that will answer these questions. These tasks are elaborated in the sections below.

The first thing our group talked about was how to prioritize and arrange the tasks that we narrowed down. We decided to take help of our hierarchical task information model and also our storyboards. We drew a rough information architecture map of how the different features and tasks should be connected. This was low fidelity, on paper and used descriptive words to determine the content. We then moved on to InVision. We then created blank pages in InVision, titled them appropriately, and just made connections and logical flows between them. This project was shared with all of us.

Meanwhile, the functions of the app were divided amongst the four of us. We individually thought about app features and functions that will help users carry out their tasks. We created these features on Balsamiq. We uploaded the pages each of us created in our shared project in InVision. (That is, we uploaded a finished page into the previously blank page)

After this, we did a mini internal peer review to ensure the consistency and prepared the questions we would like to ask the participants during the pilot testing. This process was done during our class session with projekt202. After we conducted our pilots, we had further refinements to the functions, app features and metaphors. This process is also elaborated in the sections below.

Finally, we went through the entire flow of the app and made sure that the logic is intuitive for the users. We placed ourselves in different scenarios and thought about the potential usage of the app- a little bit like mental storyboarding. We made a note of the changes from the original version, reworked everything in Balsamiq, and then created appropriate new linkages in InVision.

6.3 Initial Prototype

This section describes the interactions in our initial prototype. We found many changes to make after out pilot tests. Hence we are going describe the flow only briefly. We have described the task flows of the revised prototype in greater detail.

In our initial prototype, the Homepage and the Profile page acted as our base level, or first level of interaction. From the Homepage, we had four interactions: Ticketing, Searching, Planning and Looking up bus schedules. Homepage also linked to the profile page. The profile page gave energy savings of a person. It also linked to notifications (alarm notifications), alerts, ticketing, favorites, settings and help center.

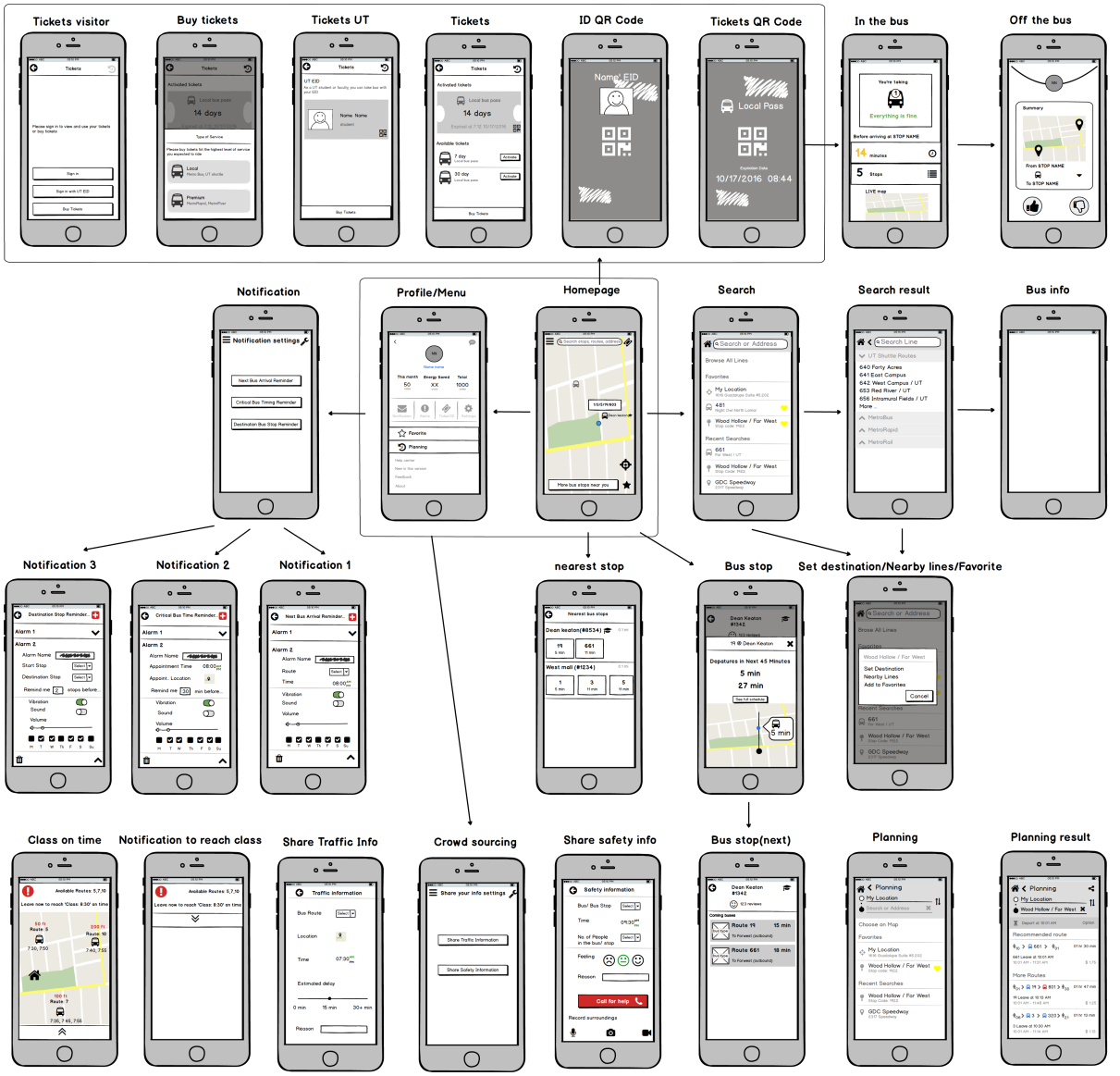


Figure 32: Initial Prototype Logical Flows

6.4 Pilot testing and changed prototype

After we created our initial prototype, we conducted pilot tests to see if users could use our app to finish their tasks. We wanted to see how well our app/prototype could help users. The pilot tests were small scale and were conducted mostly to give initial feedback and insights. Users used our prototype to finish certain tasks that we specified. We later modified the prototype based on the results of the pilot test. Later on, we hope to conduct proper evaluation for more critical feedback about the prototype.

6.4.1 Pilot testing: process and findings

Each of us was responsible for different task flows or features. We independently conducted pilot testing studies. We had a list of tasks and questions we wanted to ask the users. We also made a mental note of things to be keenly observed, such as hesitation, long pauses, facial expressions of users, and so on, while they finish their tasks. The tasks that we tested for are described below, along with the findings. In addition to tasks, we also tested the features and functionality of static pages and information.

1. **Task 1: Explore the homepage**
   Instructions given: When you open MetroX, you will see this page. Please explore this page a little while, and tell us what information you can get from this page.

   Findings: The user found just the map view to be confusing. He wanted more direct information about the possible tasks that can be done through the homepage.

   (This was the major change we made, so we are including it here as before and after images)

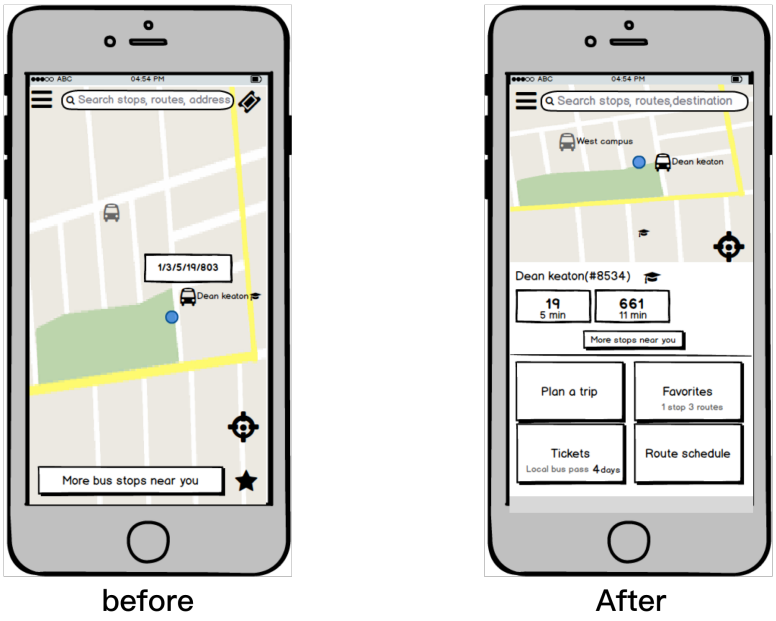


Figure 33: Changes to the Home Page

2. **Task 2: Planning a trip to class**
   Instructions given: Imagine you are a freshman. You have been here only one week. Please use MetroX, find the shortest route to get to the school. Imagine that you have to reach your class by noon today.

   Findings: From homepage, users could not find the planning function icon easily. Users gave a positive feedback about that default setting of departure as a current location. They also responded that setting a destination is not difficult. In the page of planning result, users said that they want to add share function. They want trip option function to be provided in the before the results are displayed in

the planning page. In addition, they said that calculating duration time is little bit hard.

3. **Task 3: Search function to reach home**
   Instructions given: Imagine you have finished your classes. You wish to go back to home. Using your home address, find the way to get to your house. Search for the bus route stop near your house, the bus route that will take you there and bus schedule for the bus route.

   Findings: After users typed in search page, they were confused about what they should do next. However, once they came across the 'option' popup, they got used to using the function. Users prefered to have divided search results categories (that is routes, stops are separated from each other is results list) rather than one listing of results. Thus, we decided to change the way the search results are displayed and connected.

   (This was also a major change we made, so we are including it here as before and after images)

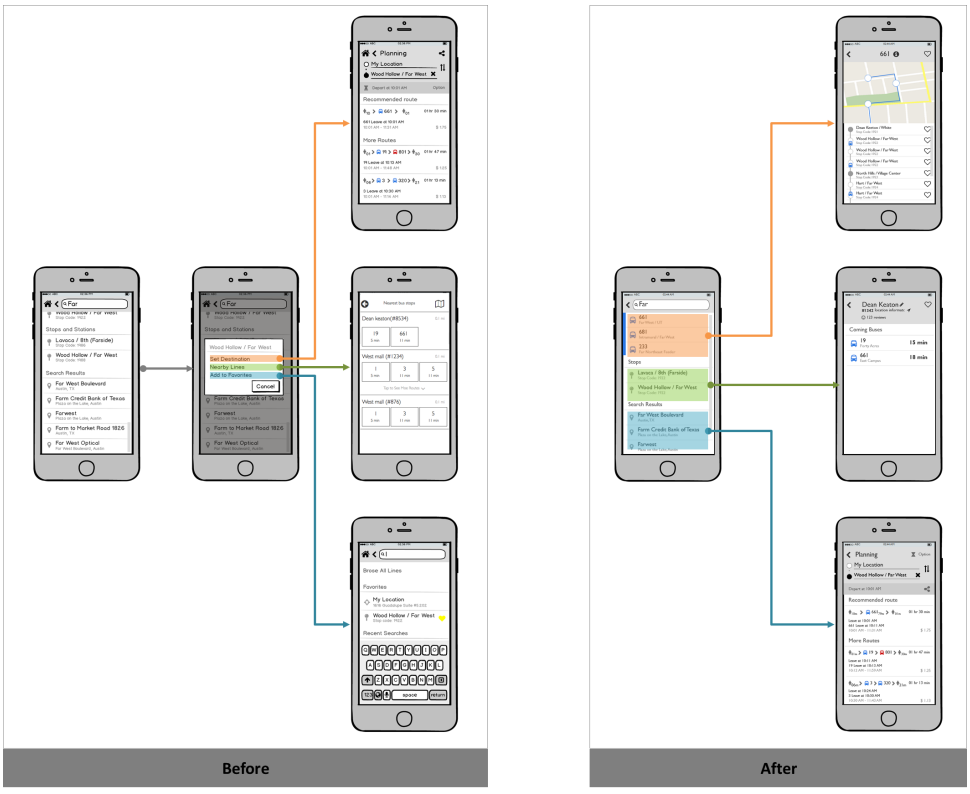


Figure 34: Changes to the Search Page

4. **Task 4: Finding a Bus stop near you and checking the next bus arrival**
   Instructions given: Imagine that you are at home and you are told that 661 will take you from your apartment to school. Please try to find how to get to the stop and when will the next 661 bus will arrive.

   Findings: The user found bus stops and information about the coming bus easily. There was minimal pause and hesitation while the user was permorming this task.

5. **Task 5: Buying and using tickets**
   Instructions given: Imagine your friend come to Austin, and you want to buy a ticket for him. What will you do?

   Findings: The user could find the buy ticket page, but found it hard to choose what kind of tickets to buy.

6. **Task 6: Set Critical Bus Timing Alert**
   Instructions given: In MetroX, we have added a feature by which you can remind yourself about important bus timings. This will help prevent missing the bus to classes/work, or the last bus home. Can you please set an alarm so that you can be reminded go to class on time?

   Findings: The user could easily navigate to the appropriate feature and complete the task. They expected feedback from the alarm after it had been set. They spent a few seconds looking for a confirmation of some kind.

7. **Task 7: Share details about bus stop safety**
   Instructions given: In MetroX, we have added a feature by which you can share the safety of a bus stop. We know that at certain times bus stops can get uncomfortable. By sharing the safety information, we will have a crowd sourced data which will show you safety of all the bus stops. You can use this data to judge the safety of the bus stops that you are using. Can you please share with everyone the safety information of a bus stop where you are now at?

   Findings: The user found it difficult to find the appropriate navigation to reach the sharing data page. They perhaps found the icon used for this task flow to be confusing. When asked, they said they expected a chat feature associated with that icon and not a sharing feature.

8. **Page Feature: Profile page**
   There are several section will appear in the profile page including user photo, the distance they have travelled, ticket management, information about the app, notifications and the alerts.

   Findings: After conducting the pilot testing, it seemed like there is too much information in the profile page, which is not required or is not used very frequently. What we needed to do from this finding was to decide whether the information function and other features should be placed in the profile page. Hiding some sections or moving them to a more proper place seemed to be helpful.

9. **Page Feature: "In the bus" and "Off the bus" page:**
   These two pages will be shown once the users get on the bus and as soon as they get off the bus. The "in the bus page" includes information like the condition of the traffic and the time estimated for travel and the numbers of stop before the destination. The "off the bus page" provide summary information and aims at asking for feedback in order to make improvements and notice problems.

   Findings: There is a limitation in the pilot testing we conducted: we did not actually conduct the testing in the real context and environment. Hence, it is possible that we cannot get the feedback the same as conducting the testing in the real situation. The necessity of these two pages were questioned, because some users mentioned that they might not able to view these pages due to the space constraints, time

availability, or the internet accessibility. However, some of them also thought that these pages are good to have because through these kind of pages, they said that it seems the service providers are trying to find the solutions towards the rider pain points. They also felt that there was a communication channel between the bus riders and the service provider.

6.4.2 Changes made: Revised prototype

Based on the pilot interviews, we reworked the pages, removed redundancies, added more appropriate icons and metaphors, and reworked linkages and logical flows in Invision.

Please find the revised prototype by click on this link: https://invis.io/2V96942ST

Specifically, we made the homepage more icon and button oriented, as the users found a 'complete map view' to be confusing. We also moved the favorites button to the homepage view. Now, the homepage has six possible functions: 1) Trip planning 2) Bus schedule lookup 3) Favorites look up 4) Ticketing 5) General Bus stop info, finding and routing to nearby stops 6) Searching for new stops, routes or reaching a new destination.

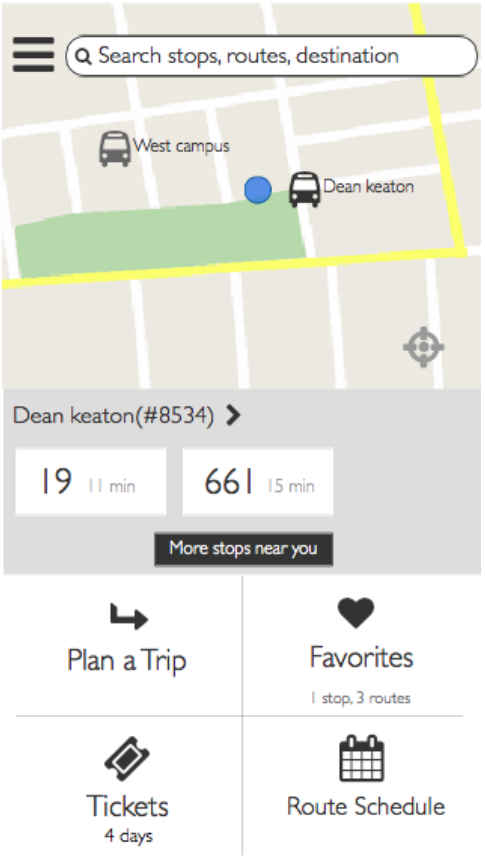
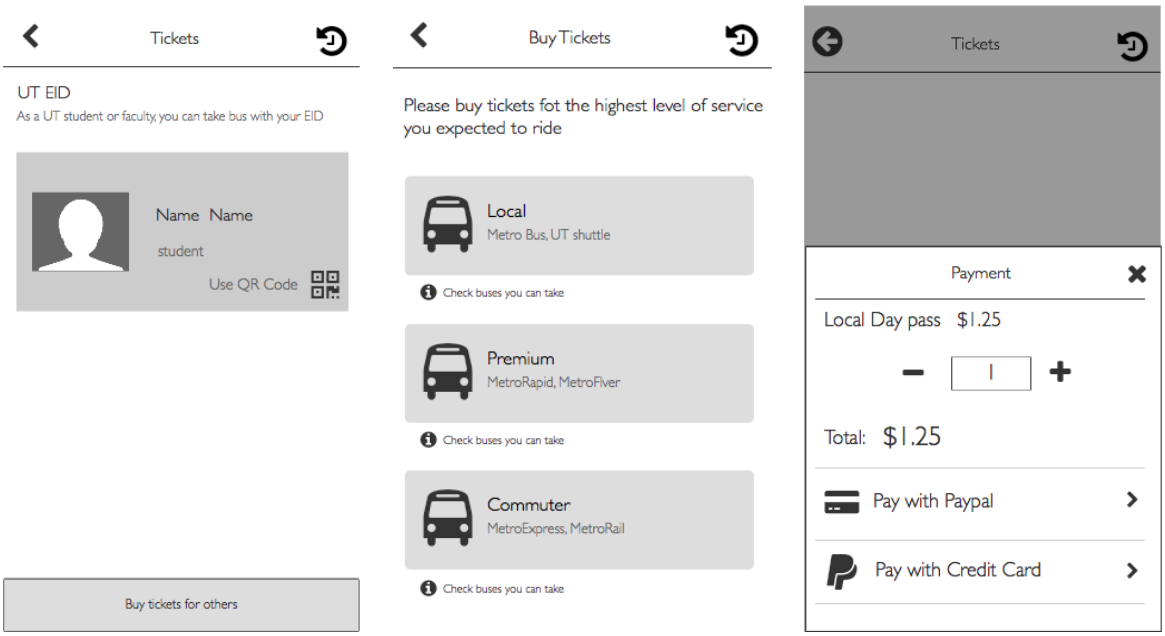


Figure 35: Revised Home Page

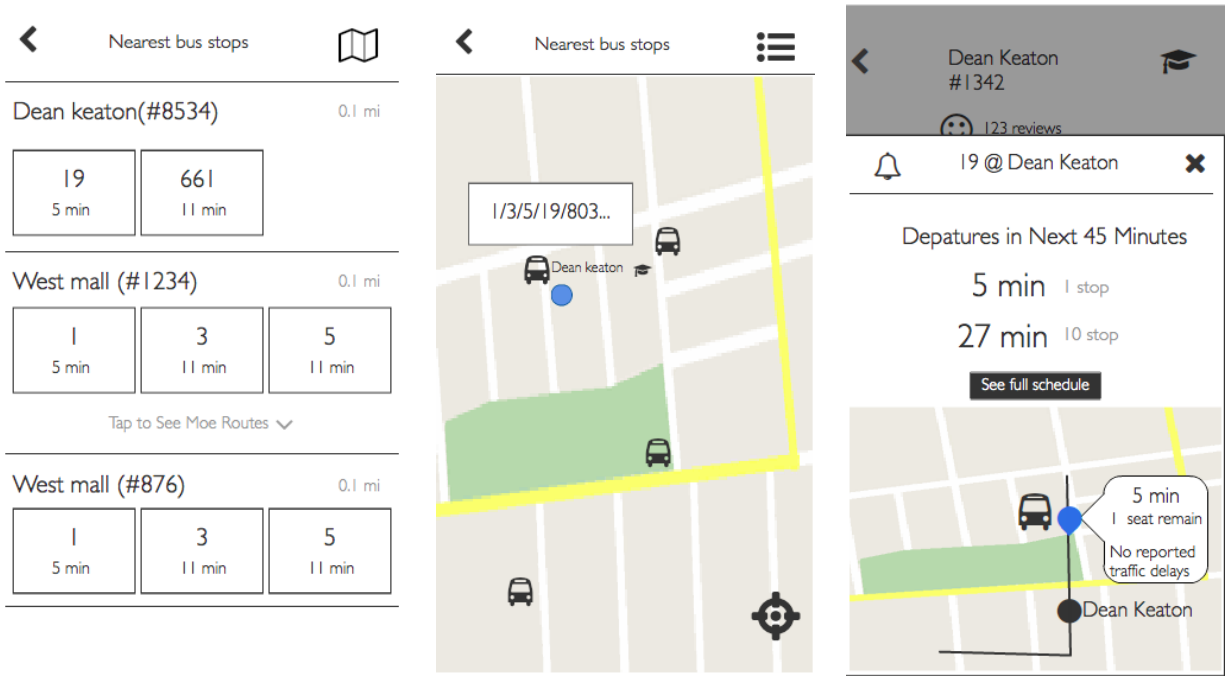
The ticketing option provides various ways to pay for tickets. It also allows users to use their UT EID digitally.



(a) UT EID usage (b) Ticket Options (c) Payment options

Figure 36: Ticketing options

The nearest bus stops helps users find information about nearest bus stops, navigate to the bus stops, and find information about the bus stop (safety reviews) and buses coming at the bus stop.

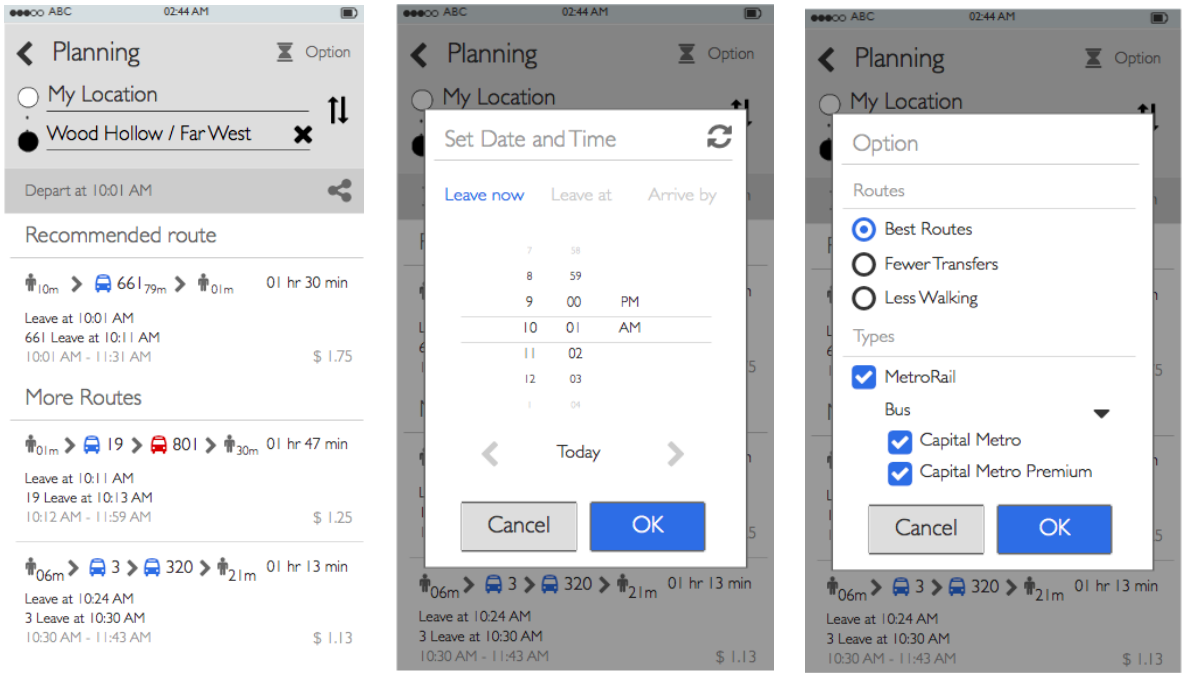


(a) Nearest bus stops (b) Navigation to bus stops (c) Bus info at bus stop

Figure 37: Nearest bus stop information

The trip planning gives various options about planning trips, including time and

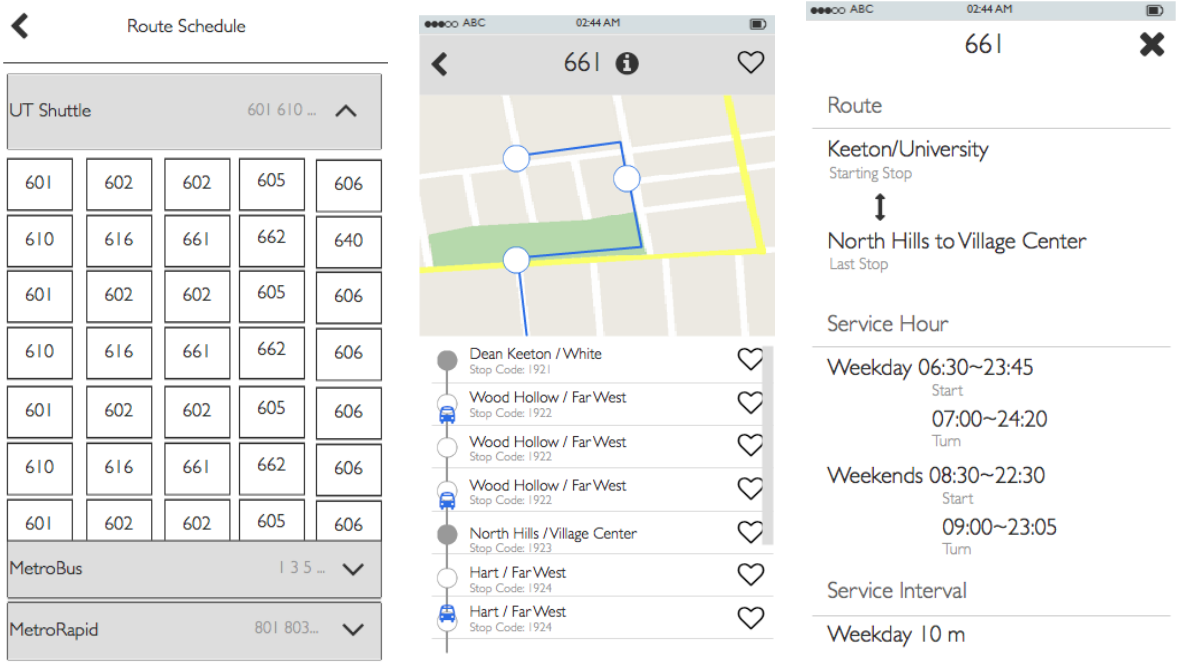
date options. Users can search for bus stops or enter the destination they want to go to.



(a) Planning results (b) Date and Time (c) Route Options

Figure 38: Trip planning options

The routes schedule gives bus roue information on various bus routes.



(a) Listing of Bus routes (b) Route Map (c) Route Schedule

Figure 39: Bus Route Information

The Favorites functions will redirect to 1) Trip planning (in case users search for/favorite destinations) 2) Bus stop information (in case users favorite bus stops) 3)Bus schedule information (in case they search for bus routes information)

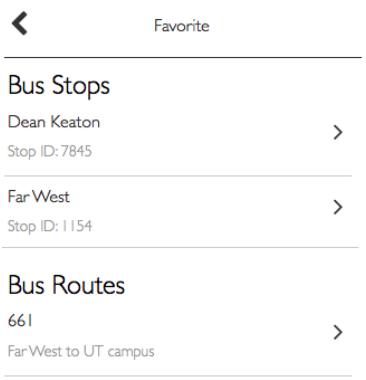


Figure 40: Favorites

The Search function helps users search for bus routes, bus stops, or desired destinations. The page will redirect to 1) Trip planning (in case users search for destinations) 2) Bus stop information (in case users search for bus stops) 3)Bus schedule information (in case users search for bus routes information)

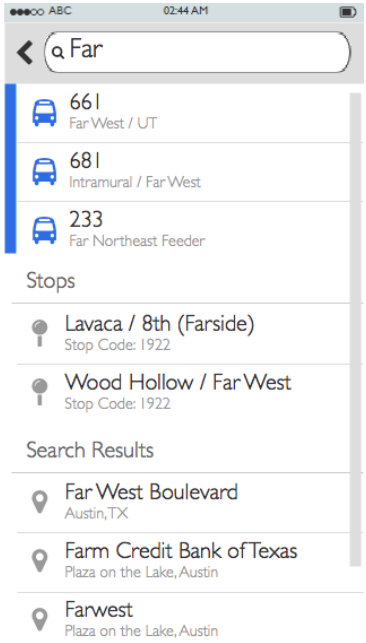


Figure 41: Search Results

In the profile view, we removed the ticketing option, as it was redundant. We replaced some of the icons with a word button, especially for sharing safety and

traffic information. We also renamed some of the buttons to sound more appropriate (eg, alarm 'notifications' was changed to 'reminders' and 'alerts' was changed to 'notifications'). We also have a button that users can click once they are inside the bus, this feature will provide ride information. We have information about the miles travelled and energy savings as a motivation.

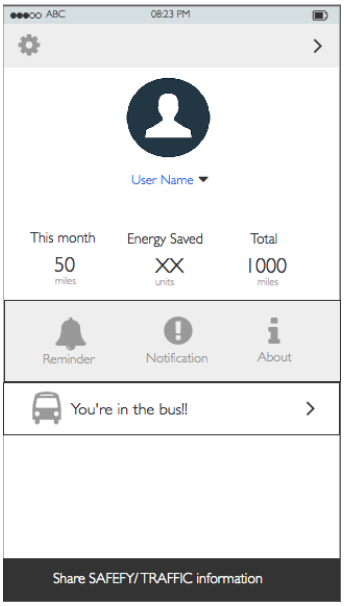
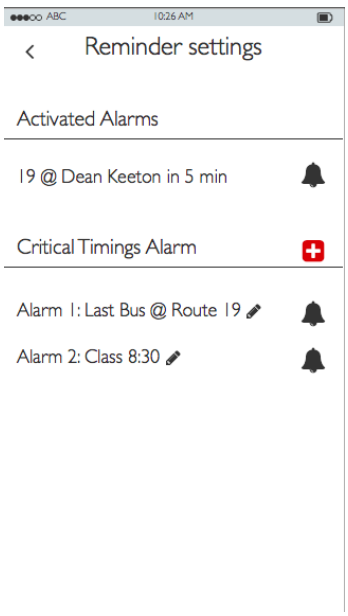
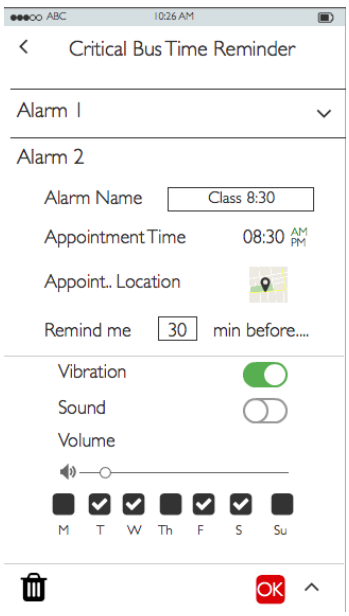


Figure 42: Profile page

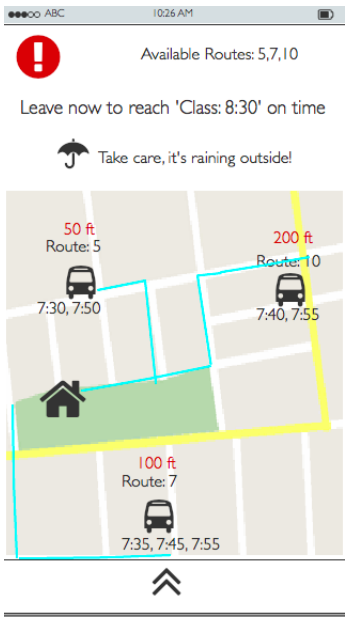
We have direct connections from trip planning page and bus stop info page to set alarms for normal trip planning. We only kept critical alarms, i.e. for users to make it to early morning appointments/classes and making sure they dont miss the last bus.



(a) Listing of Bus routes



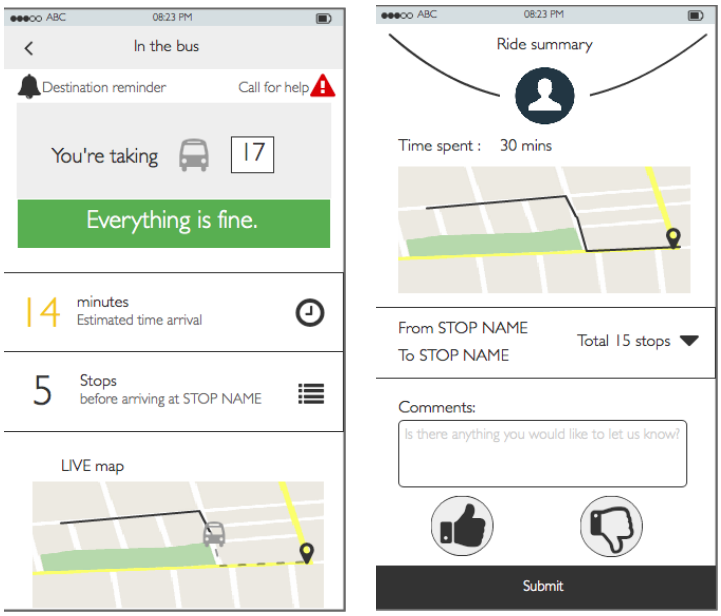
(b) Route Map



(c) Route Schedule

Figure 43: Bus Route Information

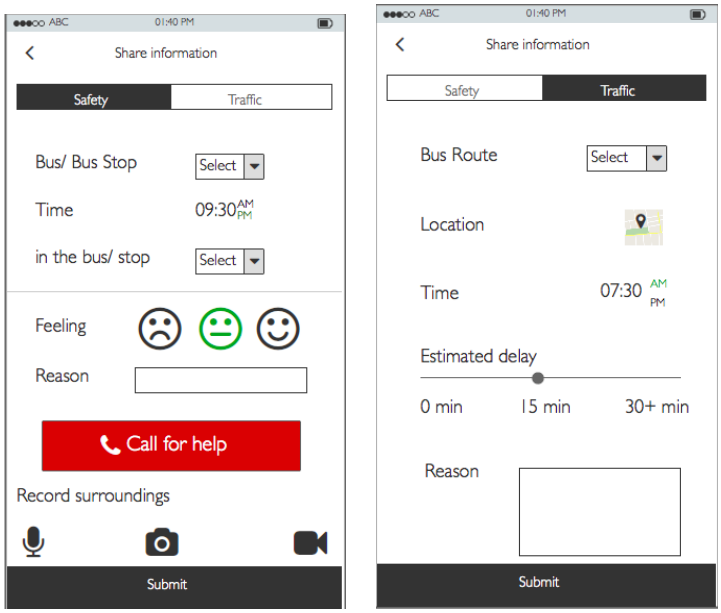
We also have information for users while they are on the bus. They can set an alarm reminder, call for help and give feedback once the ride is over.



(a) 'In bus' information (b) Ride summary

Figure 44: Ride information

Finally, users have options of sharing bus stop safety information and traffic information. This info later gets conveyed in the bus stop and bus information page.



(a) 'In bus' information (b) Ride summary

Figure 45: User generated data

See the list below to know the specific instructions we had for ourselves for these changes to be made:

- Home: Add icons as metaphors for easy understanding of functions.
- Home map: Route to the nearest bus stop
- Map page & bus stop page: Add Navigation icon for nearest bus stop.
- Pop-up bus description: Add seat availability, alarm next departure and Direction of bus
- Tickets: Three options: Sign In, UT Sign In, "See buying options"
- Ticket options after Sign In: Buy or Activate/Show "Just show multiple ticket buying options"
- Add "Expiring on" (Activated ticket)
- Favorites: Add description about how to add favorites
- Change stars to hearts in Favorites.
- Add scroll in schedule page
- Search: Remove Home icon
- Search with keyboard: Remove favorites section. Continue to have "all lines" and "recent search"
- Search: Remove recent searches in 'typing' page.
- Search: Remove recent searches in results page.
- After choosing search result bus stop: Go to bus stop page
- After choosing search result destination: Go to destination/planning page
- After choosing search result routes: Go to schedule/routes page directly
- Planning: Remove the home button.
- Planning: Only destination and bus stops sgould be included
- Planning: Add travel times with minutes in each section.
- Planning: Report specific departure time of buses.
- Profile: Remove tickets option.
- Profile: Put reminders (alarms) and notifications (alert) as main functions.
- Profile: Next levels of importance: back button in top right corner, settings in the left corner, about in the bottom.
- Profile: Continue to have "Share information panel".
- Add a "I'm on the bus" button on the profile page. This will link to while on bus page.
- "While on bus page": Options to set destination alarm, set panic button.
- Reminders page: Just have critical time setting and show a list of other alarms.

To see the overall logical flows, information architecture, and depths of interactions, please see the diagrams below. We hope to see if these interactions are intuitive in our evalution of the prototype.

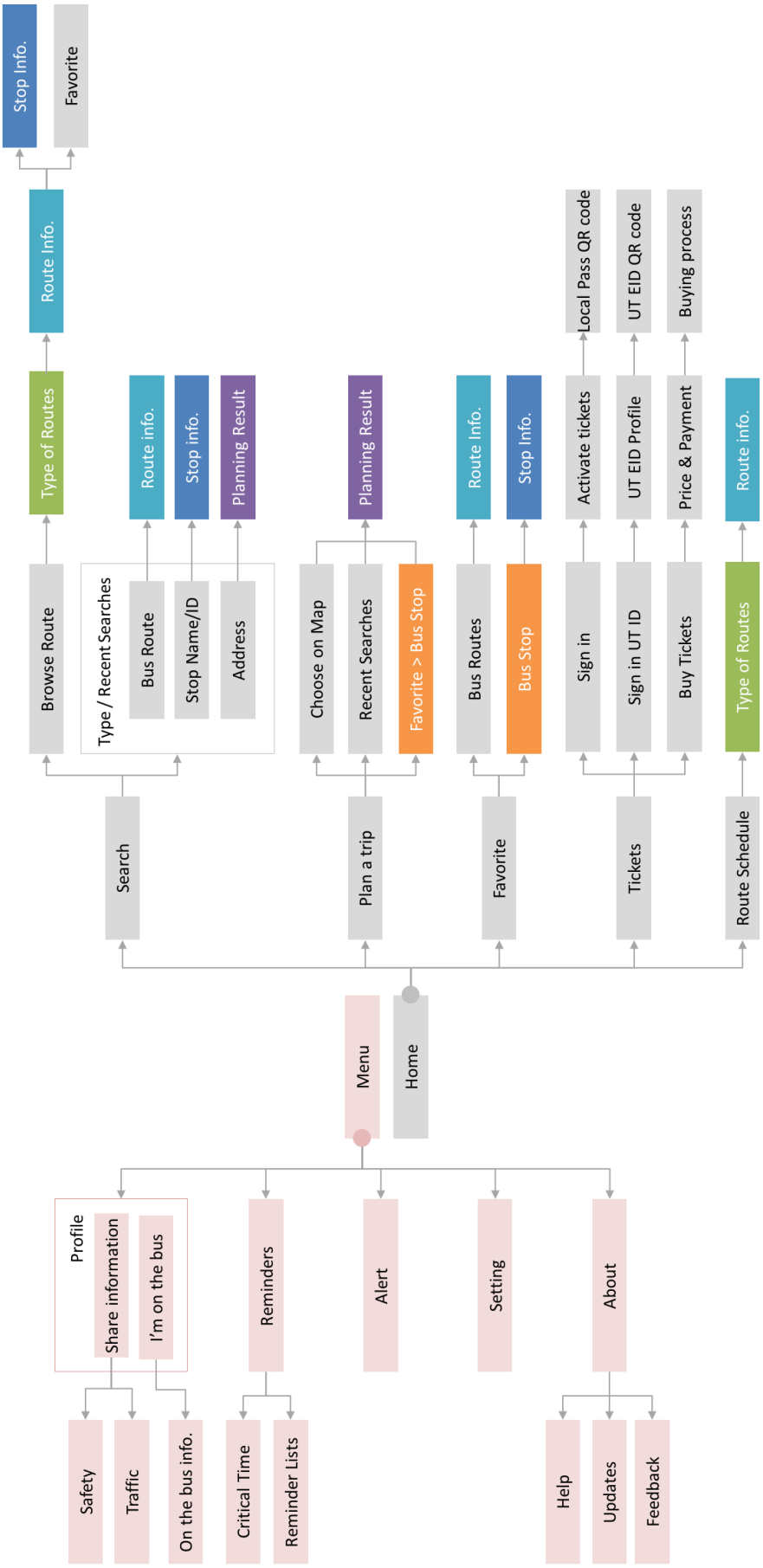


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Figure 46: Revised Prototype Logical Flows

1 Depth	2 Depth	3 Depth	4 Depth	5 Depth
Home	Search	Browse Route	UT shuttle	Bus information
			Metro Bus	
			Metro Rapid	
			Metro Rail	
		Favorite	Option Popup (set destination Nearby stop Add favorite)	Set destination
		Recent Search		Nearby stop
		Search Box		Add favorite
	Nearest bus stop	Map view		
		List of bus stop	Bus information	
	Plan a trip	Option		
		Exchange		
		Choose on map	Result Set time option	
		Favorite		
		Recent Search		
	Favorites	Bus stop		
		Bus route		
	Route Schedule	Category	Bus Information	
	Tickets	Sign in	Activate tickets	Local Pass QR code
		Sign in with UT ID	UT EID	UT EID QR code
		But Tickets	Payment option	Payment
	Menu	Profile	Share information	Safety
				Traffic
		Notification	Next bus arrival reminder	Detail alarm setting
			Critical bus timing reminder	Detail alarm setting
			Destination bus stop reminder	Detail alarm setting
		Alerts		
		Settings		
		About	New in this version	
			Feedback	
			Help	

Figure 47: Revised Prototype: Depth of Interactions