

## Introduction

I read the "**Commute Community**" topic suggestion, and I decided to take a different approach to supporting a community traveling together. Instead of commuting to work/school, this system ("Caravan GPS") would support people/families traveling together largely for leisure.

## 1) Task, Context, Users, And Assumptions

### Context / Overview

The mission of Caravan GPS is to support the communication and routing needs of people travel together in multiple vehicles who wish to arrive together at a common destination.

Our users are Travelers who choose to join a "Caravan". A Caravan represents a destination, an expected arrival date/time, and any number of Travelers choosing to travel together via buses, trucks, and cars. Travelers join Caravans dynamically; the same traveler might join one Caravan headed to a children's soccer tournament one weekend, and a different Caravan headed to a college homecoming event another weekend. A Caravan can accept a "Plan" created by a "Host" (the soccer tournament organizer, a university's alumni association) that would include the destination address, and other helpful information such as recommended roads for final approach to the location and parking information.

Caravan GPS will provide an extended set of features to support the communication needs of multiple vehicles traveling together, such as coordinating stops, changes in plans, and automatically notifying Hosts just before arrival. Caravan GPS will also support traditional GPS routing and other social features such as sharing arrival time and traffic/road hazard information.

### Users

There are two primary types of users of Caravan GPS. The **Host** establishes basic information about the destination; the **Traveler** uses that information to travel to the destination. Personas for each are described below.

**Traveler:** Bethany is a self-described "band mom" with 2 children (Amy, age 15, and Carson, age 11). Amy is a member of her high school marching band, which plays at football games (home and away) on Friday nights, and often participates in marching band competitions on Saturdays. The marching band is large enough that five school buses are needed to carry all the students, plus a tractor-trailer for large equipment. Sometimes Bethany will follow the buses to games/competitions; other times (when the buses are leaving early) she will plan with other parents to leave later than the buses and meet at the game/competition at a specific time. For Friday night football games, her husband Dave often will leave directly from work and drive separately to meet them.

Bethany often has Carson with her; he can be cranky when "dragged along" to Amy's events, and any misstep provides an opportunity to complain. For that reason, Bethany wants to be

confident that she has arrived at the right place, and knows where to park, and often the information provided to parents is limited or hard to understand.

Bethany is a frequent user of her smartphone for GPS, social media, e-mail & messaging. She is comfortable with technology and not afraid to try something new, especially if it is free and promises some added value.

**Host:** Ed is the organizer of a soccer tournament, drawing teams from northern Georgia and western Tennessee. The invited soccer teams don't use buses or trucks; parents drive their children in their individual vehicles. Sometimes two families will share a ride (all the parents, team members, and other children from both families in a single vehicle), but more often each family drives its own vehicle. Families want to travel together, and they need to arrive at the same time, as all team members are required to register together at a specific time before their first game. This year, the owner of a nearby fast-food franchise has agreed to sponsor the tournament; in return, she expects that Ed can direct families attending the tournament towards her restaurant, increasing her business.

Ed is an unpaid volunteer, organizing this tournament in addition to a full-time job and a family of his own. Ed loves organizing this tournament, but wants to reduce the time necessary to explain, over and over to multiple teams and parents, how to enter the county sports facility where the tournament is located, where to park, and where to register.

Ed is comfortable with computers, including web-based systems, and is a frequent user of a smartphone and a tablet for GPS, social media, e-mail & messaging.

### Major Tasks

There are two major tasks: a Host can **Establish a Plan**, and a Traveler can **Join a Caravan**. Each task has multiple options and features that can make the path through the task complex and unique. These tasks are described below with scenarios, one each from **Establish a Plan** and **Join a Caravan**.

- **Establish a Plan (Host):** Ed is the organizer of a soccer tournament. He logs onto Caravan's web based system, and creates a new Plan for his soccer tournament.

Creating a new Plan requires entering the address of the destination. Ed chooses to select "specify different arrival dates/times" for this Plan; if all teams were arriving simultaneously, Ed could enter one arrival date/time at this point. Although it's optional, Ed chooses to add "approach description", a brief textual explanation of where to turn into the facility (including landmarks), and upload a scanned map of the facility that describes where to park and where to meet for registration; he does not choose to add an optional "after parking" description, as the scanned map provides enough information. Ed also adds an optional "recommended stop" for a nearby fast-food franchise that has agreed to sponsor the tournament.

Ed then enters, for each team, the team name and its arrival date/time. At this point the Plan is ready to be used, and a specific ID is generated to identify the Plan. Ed can email that Plan ID to each team, or tell teams to use the search function of the Caravan GPS to find the Plan.

- **Join a Caravan (Traveler):** Bethany is on the way to a Friday night football game, an away game at a school that she has not visited before. She starts the Caravan GPS app on her smartphone and enters the Plan ID communicated by the band director. She knows that, if she has forgotten the Plan ID, she could search on the name of the school and find the Plan ID.

Once Bethany has selected the Plan ID, she selects "Join the Caravan". She can see that several other vehicles have also joined this Caravan, and they are still in the parking lot of her daughter's school, just a few miles away. She selects "meet up", which transmits a message to the other vehicles that "someone is joining you", and heads for the school, knowing that if the other vehicles leave before she arrives, Caravan GPS will continue to guide her, to help her meet up with them along the way to the destination.

The away game is further away than she thought, and her son Carson complains that he is hungry and needs to use the restroom. Bethany selects "pit stop?", which transmits the request to the other vehicles; she is relieved to see that at least one other vehicle has selected "yes" and will join her. (The other vehicles selected "continuing on"; they might meet up on the road later, or just meet at the destination.) Bethany selects "pit stop verified" and pulls into a nearby restaurant.

Out of the restaurant and back in her car, Bethany selects "resume" and Caravan GPS directs her back onto the road and towards her destination. The other cars are far enough ahead that Caravan GPS does not try to catch up with them, but it does help to keep her together with the other vehicle that stopped with her. She receives a "we arrived!" message from vehicles ahead of her that have already arrived at the destination. She is relieved to know it's not much longer to get there, and especially happy that she does not get a followup message with traffic or parking problems.

Nearing the destination, Bethany is able to select "park here" and scan the brief parking instructions, which helps her select the correct entrance to the school, and have the suggested \$1 donation available upon entering the parking area. Once parked, she selects "after parking" to read instructions on how to find the gate to enter the stadium; this automatically sends a "we arrived!" message to other travelers, including those who already arrived, and those behind her (including her husband; she is glad to see that he has left work, and will be arriving in just a few minutes). Optionally, the host could have selected to have a message automatically sent when travelers were about to arrive.

### Minor Tasks

There are some minor tasks that will be necessary. These tasks should be easy for the users, as they will be very similar to tasks they have performed before in other systems. In fact, it is important for these minimal tasks to be "vanilla" (as done elsewhere), to have a minimum cognitive load on the user, and scope should be carefully controlled to make sure that no requirements are introduced which would be unique to the Caravan GPS system. These tasks are listed below, and are not detailed further in this document:

- Host: Create a unique login to the web interface.
- Traveler: Create a unique "handle" (name), using the Caravan GPS app.

### Assumptions

- Caravan GPS will be developed as an app that runs on smartphones, distributed through the normal App Stores for common smartphones (Apple and Android, possibly Windows). A data plan will be required for Caravan GPS to function.
- Our users (Travelers) are expected to be knowledgeable about the use of smartphone Apps. This GPS, with its extended features, should not be the Travelers' first experience with GPS.
- Caravan GPS is not envisioned as a dedicated device (example: Garmin). However, a dedicated device could be created using a relatively low-cost small tablet running Android, with a data plan.
- Data and code from an existing GPS app will be acquired or licensed to provide many of the base functions of Caravan GPS. This will allow the development team to focus on the unique features of the product, and integration with the standard GPS software.
- Speech recognition software will be acquired or licensed to support voice commands, a specialized feature of Caravan GPS.
- The web interface used by a Host to create a Plan will be a custom development, using an available off-the-shelf n-tier web application technology that is reliable and low-cost, and well-known enough that it will be easy to acquire talent to build and operate this part of the system.
- Terms of Service will describe the privacy rights of Travelers. Travel information will exist only during their travel in a Caravan, and be deleted within 24 hours of actual or scheduled arrival; therefore, that information cannot be used or shared for marketing purposes, and is not available for government surveillance or subpoena. In the Terms of Service, Travelers will agree their travel information will be shared with fellow members of their Caravan (headed towards the same destination on the same Plan).
- Hosts will need to have an authenticated login to the web interface used to create a Plan. Creating this login will not have unique requirements as compared to the fairly standard process of creating a login used across many systems.
- Travelers will use the Caravan GPS app to create a unique "handle" (name) that will be visible to fellow Travelers. This name will be unique to the smartphone device (using the UDID on an Apple device or the Android ID on an Android device; <http://searchcio.techtarget.com/definition/device-ID-device-identification> ). The name

can be established once and never changed, or changed at will. The correlation between UDID or Android ID and the name is stored in a database (not deleted), however as mentioned above, the travel history is deleted within 24 hours of actual or scheduled arrival.

## 2) Implications From #1 Toward The Design

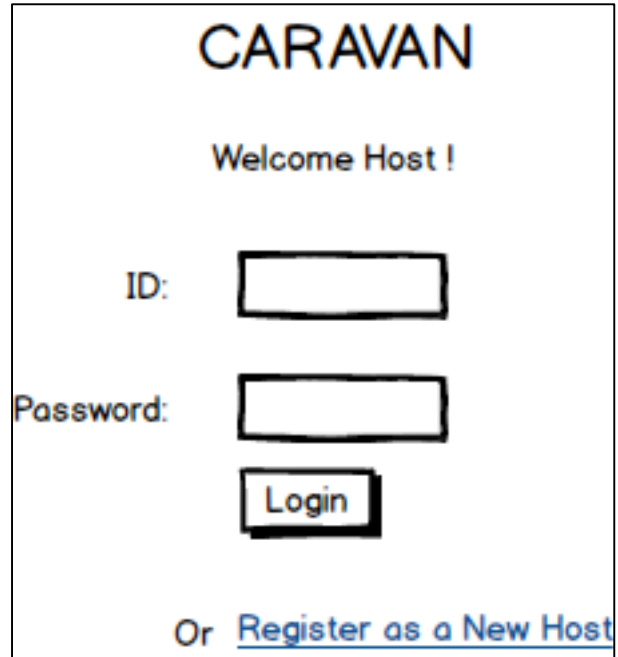
- Our users (Travelers) are assumed to be knowledgeable about the use of GPS apps. To reduce task load and learning curve, the Caravan GPS app should not "reinvent" how a Traveler uses a GPS; input selections and output instructions should be similar to "the competition", and not distinctively different. This ties directly to the assumption that "a general purpose GPS app and data will be acquired or licensed".
- Since this device will be used while driving, selecting and using the specialized functions for Caravan GPS must be extremely easy to use while a Travelers' full attention is on the task of driving. Any buttons to click on must be large enough to be seen and pressed without distracting attention. Many of the features should be accessible via speech command. This ties directly to the assumption that "Speech recognition software will be acquired or licensed".
- For a Traveler to select a Plan that a Host has created, a data plan will be needed so the Caravan GPS can access a database.
- For Travelers to recognize other Travelers headed towards the same destination (Plan), the Caravan GPS will be in a two-way conversation with a centralized or cloud-based database (data plan needed). These transmissions will include:
  - updating the database with the Travelers' current location
  - receiving updated information on the location of other Travelers, and their expected time to destination.
  - sending and retrieving messages between fellow Travelers, on the same Caravan to a specific Destination and date/time (Plan).

## 3) Design Overview

In this section, the two major portions of the system will be described, including how a user will complete a task, illustrated with mocked-up screen designs.

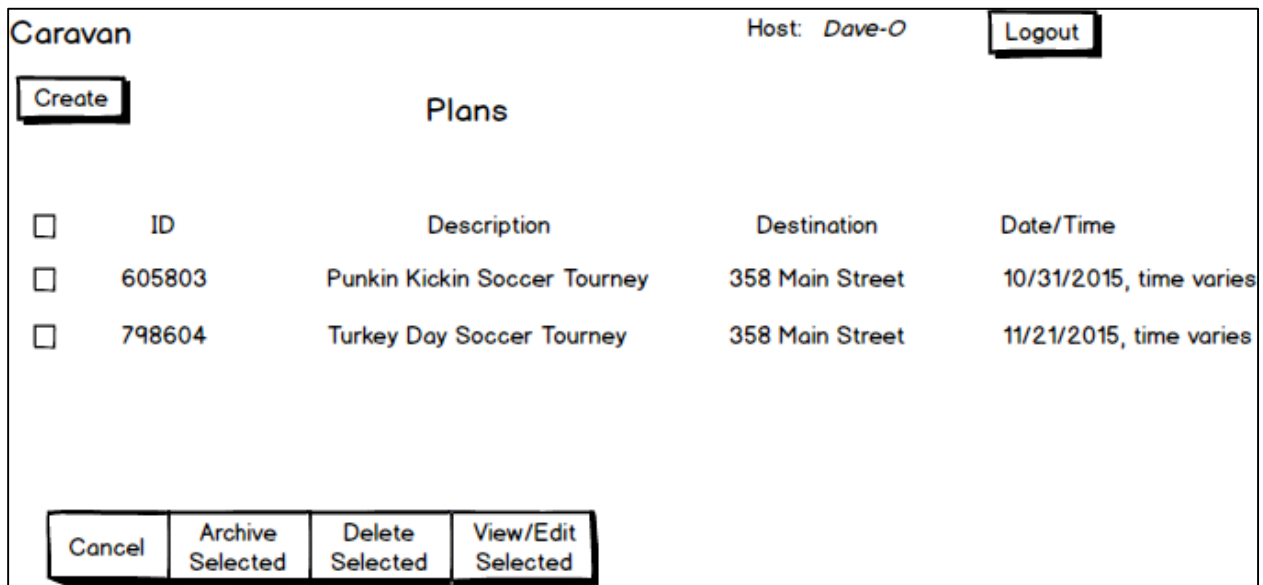
**Establish a Plan** is a task performed by a user called a **Host**. The Host is someone who is involved in the planning of the event. He or she knows or can gather information about the destination and arrival date/times, and can enter that information into Caravan's web based system. This information is important to those who are Traveling to the event.

First, the Host will log on to Caravan's web based system.



The image shows a login form for the 'CARAVAN' system. At the top, it says 'CARAVAN' in large letters, followed by 'Welcome Host !'. Below this are two input fields: 'ID:' and 'Password:'. A 'Login' button is positioned below the password field. At the bottom, there is a link that says 'Or [Register as a New Host](#)'.

The Host then clicks the **Create** button, to create a new Plan.



The image shows the 'Caravan' web interface for managing plans. At the top left is the 'Caravan' logo, and at the top right, it displays 'Host: Dave-O' and a 'Logout' button. A 'Create' button is highlighted in the top left corner. The main area is titled 'Plans' and contains a table with the following data:

<input type="checkbox"/>	ID	Description	Destination	Date/Time
<input type="checkbox"/>	605803	Punkin Kickin Soccer Tourney	358 Main Street	10/31/2015, time varies
<input type="checkbox"/>	798604	Turkey Day Soccer Tourney	358 Main Street	11/21/2015, time varies

At the bottom of the interface, there are four buttons: 'Cancel', 'Archive Selected', 'Delete Selected', and 'View/Edit Selected'.

The Host enters a description and the address of the destination. Rather than entering a single arrival date and time (if all teams were arriving simultaneously), the Host clicks on "specify different arrival dates/times" for this Plan. In this example, the Host also enters some optional information, such as "approach description" (a brief textual explanation of where to turn into the facility), and upload a scanned map of the facility that describes where to park and where to meet for registration. In this example, the Host does not enter optional "after parking" information, but does enter an optional "recommended stop" for a nearby restaurant.

Before the Host clicks "Save and Continue", he chooses to Publish the information. (Choosing "No" allows saving the information, but does not make it available yet to Travelers. This is useful when some information is available, but it's not yet complete.)


Caravan Host: *Dave-O* [Logout](#)

### Add/Update a Plan

Publish  Yes  No Plan ID: 605803

Description (Optional)

Address of Destination

Arrival Date and Time    [Specify Different Arrivals](#)

Approach Description (Optional)

Maps (Optional)  [Delete](#) [Add Map...](#)

Recommended Stop (Optional)

Description	<input type="text" value="Minnie Mae's Kickin' Chicken"/>
Address	<input type="text" value="402 Main Street"/>





After Parking (Optional)

[Cancel](#) [Save Draft](#) [Save and Continue](#)

The Host then enters, for each team, the team name and its arrival date/time, and clicks Update. At this point the Plan is ready to be used, and a specific ID is generated to identify the Plan. E can email that Plan ID to each team, or tell teams to use the search function of the Caravan GPS to find the Plan.

Caravan Host: *Dave-O* Logout

**Specify Plan Arrival Dates / Times**

<input type="checkbox"/>	Who?	When?		
<input type="checkbox"/>	<span style="border: 1px solid black; padding: 2px;">Bears</span>	<span style="border: 1px solid black; padding: 2px;">10/31/2015</span> 	<span style="border: 1px solid black; padding: 2px;">10:00 AM</span>	
<input type="checkbox"/>	<span style="border: 1px solid black; padding: 2px;">Tigers</span>	<span style="border: 1px solid black; padding: 2px;">10/31/2015</span> 	<span style="border: 1px solid black; padding: 2px;">10:00 AM</span>	
<input type="checkbox"/>	<span style="border: 1px solid black; padding: 2px;">Dragons</span>	<span style="border: 1px solid black; padding: 2px;">10/31/2015</span> 	<span style="border: 1px solid black; padding: 2px;">11:00 AM</span>	
<input type="checkbox"/>	<span style="border: 1px solid black; padding: 2px;">Eagles</span>	<span style="border: 1px solid black; padding: 2px;">10/31/2015</span> 	<span style="border: 1px solid black; padding: 2px;">11:00 AM</span>	

Cancel Update Delete Selected



**Join a Caravan** is a task performed by a user called a **Traveler**. The Traveler has the Caravan GPS app on her smartphone, and enters the Plan ID and clicks "Find it!".

She knows the Plan ID for this trip, because the Host has communicated the Plan ID to Travelers. However, if the Traveler does not know the Plan ID, she could search the Description field for the name of the school, or the Address field for the address of the school, and obtain the Plan ID that way.

The screenshot shows the 'Caravan' app interface. At the top left is the title 'Caravan' and at the top right is the user greeting 'Hello, Bitsy2' and an 'Exit' button. The main content area contains the following elements:

- 'Enter Plan ID:' followed by a text input field containing 'nnnnnn'.
- '- OR -' centered below the input field.
- 'Search for Plan:' followed by an empty text input field.
- 'Find it!' button centered at the bottom.

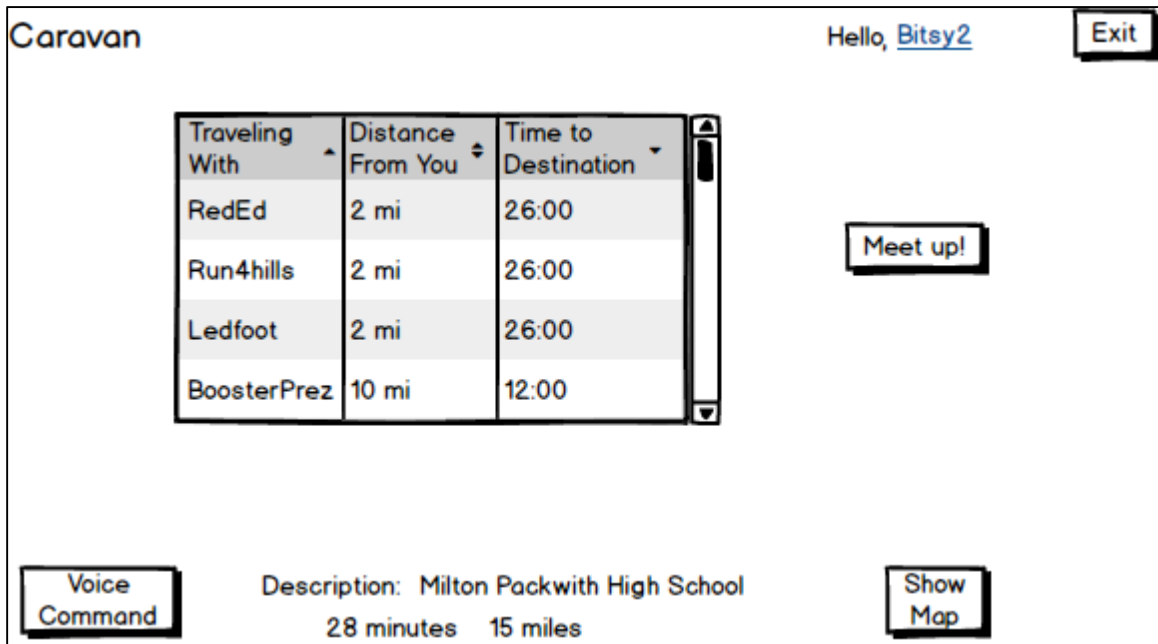
Once the Plan ID is selected, the Traveler can click "Join the Caravan". (If the Traveler thinks the wrong Plan ID has been selected, clicking "Return to Search" allows further searching for a different Plan.)

The screenshot shows the 'Caravan' app interface displaying details for a selected plan. At the top left is the title 'Caravan' and at the top right is the user greeting 'Hello, Bitsy2' and an 'Exit' button. The main content area contains the following information:

- 'Description: Milton Packwith High School'
- 'Address of Destination: 1000 Packer Drive'
- 'Arrival Date/Time: 10/30/2015 7:00 PM'
- 'Approach Description: Left at school sign, then immediate right into parking lot.'
- 'After Parking: Visitors enter through West Gate (right side of stadium)'
- 'Recommended Stop: Dave's Burger Barn 1522 Main Street'

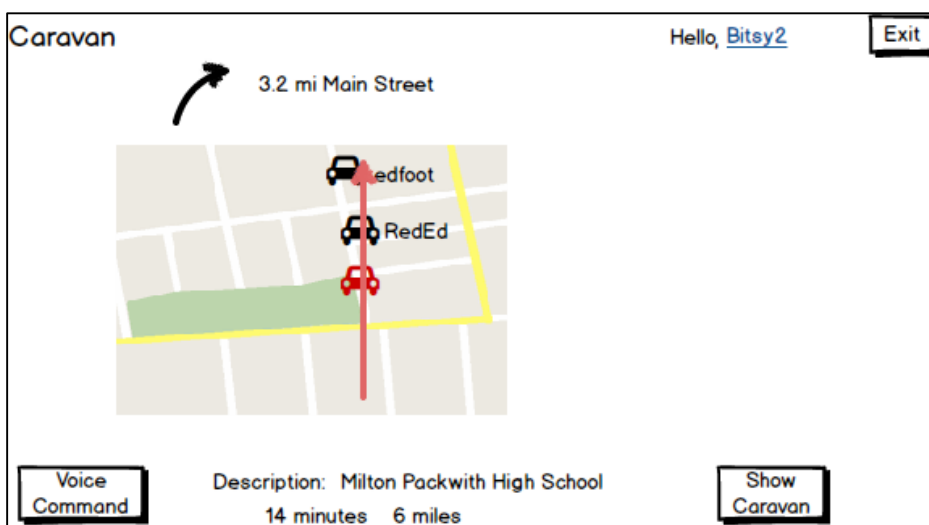
At the bottom, there are two buttons: 'Return To Search' and 'Join The Caravan'.

The Traveler can see that several other vehicles have joined this Caravan, and some are nearby. She clicks on "Meet up!", which starts the GPS, and also transmits a message to the other vehicles that "someone is joining you".



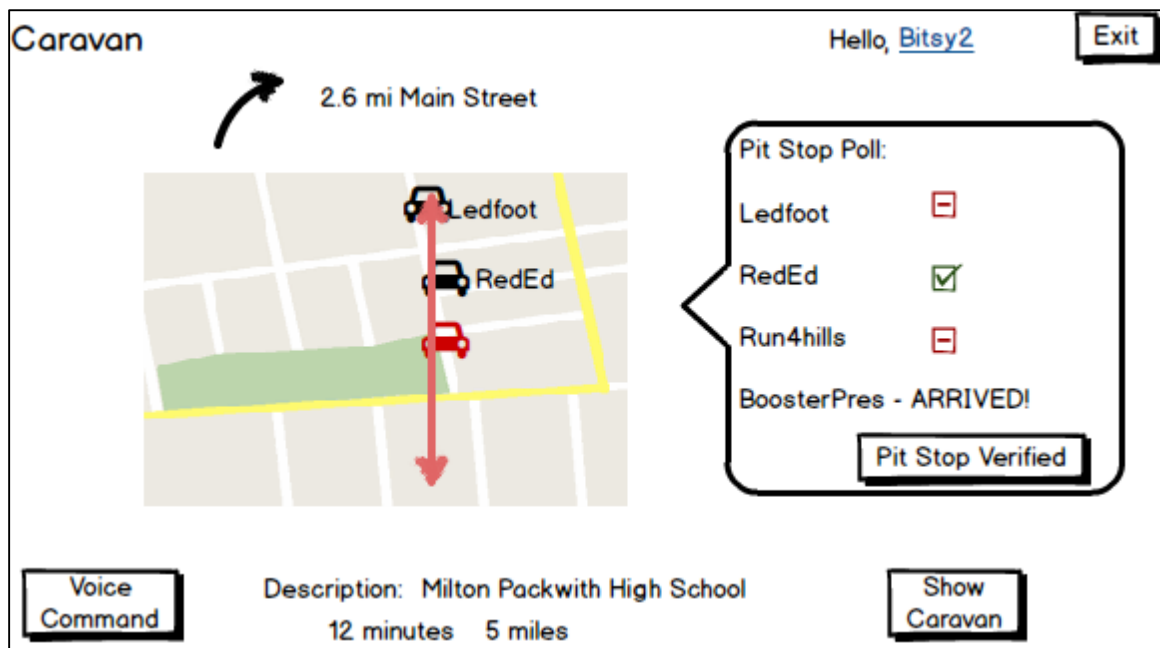
At this point, the "Voice Command" button appears, and can be clicked at any time to give a voice command. A valid voice command is "help", which will speak out loud the valid voice commands, and then wait for the Traveler to speak one of the commands.

Caravan GPS will now guide the Traveler to meet up with these vehicles along the way to the destination. Caravan GPS will not attempt to "catch up" with the fellow Traveler BoosterPrez, as he/she is too far ahead and that would be unsafe.

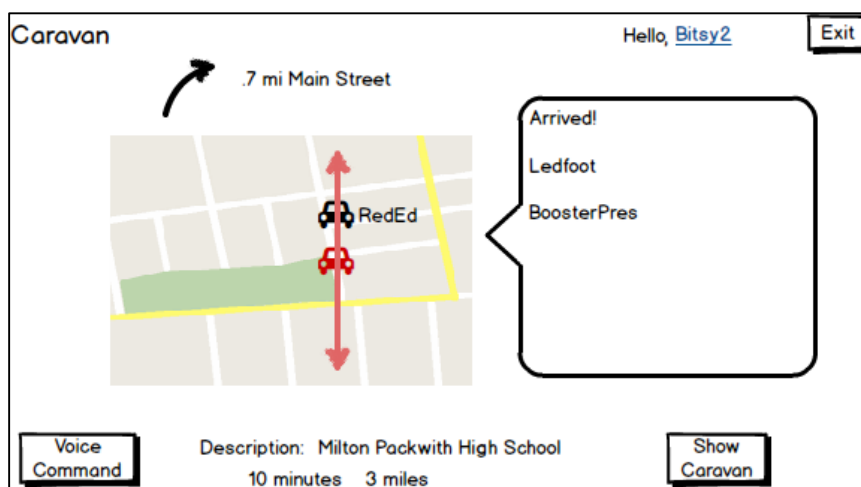


The Traveler decides to make a stop along the way. She clicks "Voice Command" and speaks "Pit Stop". This transmits a poll to the other vehicles. She is updated with the results of the poll (including showing her that at least one other Traveler will join her, and one Traveler has already reached the destination).

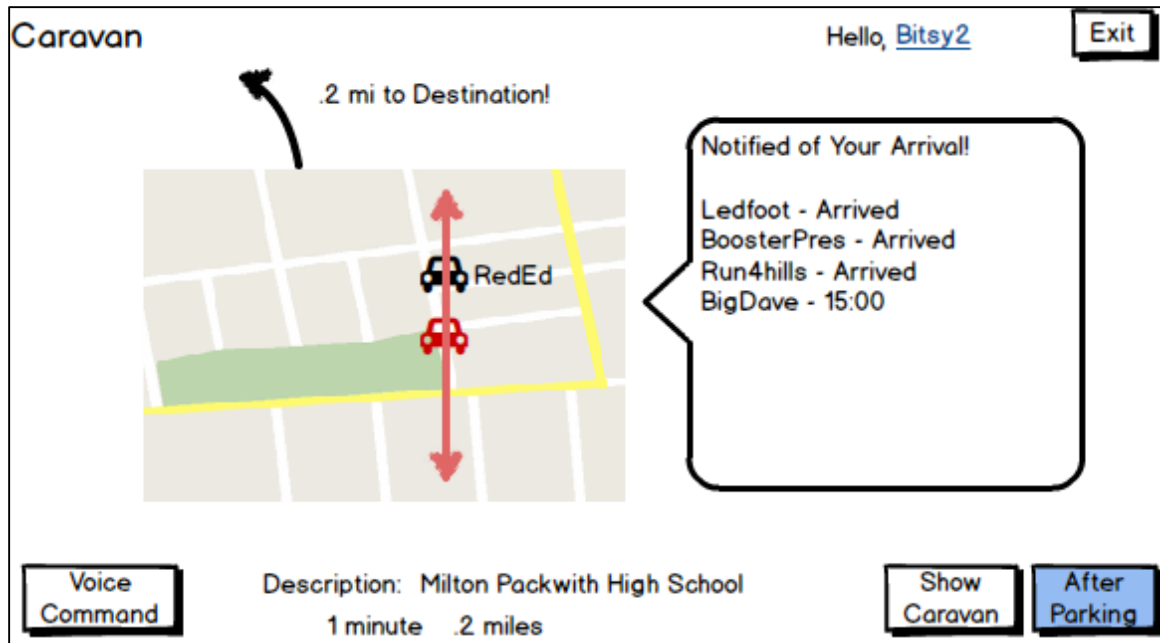
The Traveler clicks on "Pit Stop Verified" (or clicks "Voice Command" and speaks "Pit Stop Verified"), and pulls into a nearby restaurant.



After her stop, the Traveler resumes travel and Caravan GPS directs her back onto the road and towards her destination. She receives a "we arrived!" message from vehicles ahead of her that have already arrived at the destination.



Nearing the destination, fellow Travelers are sent an arrival notice message to inform them of the Traveler's arrival. The Traveler also receives an update on the arrival status of other Travelers. The Traveler can click on "After Parking" to read further instructions (or can click on "Voice Command" and speak "Parking" to see what information has been entered by the Host). Hosts can also, optionally, receive an arrival message when travelers are about to arrive.



#### 4) Sketches Or Mock-Ups Of The Design

The mockups of the design are included in section 3. I will also submit a separate PDF document which includes only the screen mockups. These screen mockups were generated using myBalsamiq. My original pencil mockups are available upon request.

#### 5) Usability Or Important Design Decisions

##### **Usability aspects of the web-based Caravan application, used by Hosts to Establish a Plan:**

- Ability to enter partial information about an event, when it is available; **not** requiring entry of all information at the same time (and immediate public release). This is better than the Host keeping a lot of "sticky notes" until all information is ready for release. I believe this represents "flexibility in use", a Universal Design principle.
- Ability to support multiple groups arriving at different entry times without creating a large number of Plans. Communicating a large number of Plan IDs, separate ones for each group and entry time, would be confusing.

**Usability aspects of the Caravan GPS app, used by Travelers to Join a Caravan:**

- Ability to go directly to a Plan if you have the Plan ID (ease of use), but also ability to search if you don't.
- Ability to "Return to Search" easily if you have found a Plan, but are not certain that's the one you want. This is "tolerance for error", a Universal Design principle.
- Ability of "Voice Command" to accept the spoken command of "help", which will speak out loud the valid voice commands. This takes advantage of the human ability to recognize more effectively than recall.
- Many aspects of Caravan GPS will be similar to other GPS systems (which Travelers will know), which will reduce the cognitive load and learning curve.

**Important Design Decisions:**

Below are several examples of **acquiring** technology that is necessary but provides no unique features, versus focusing development effort on technology that will distinguish Caravan GPS:

- Incorporation of Voice Command into GPS, through licensed technology.
- Incorporation of licensed GPS app code and data.
- Web system for Hosts to enter Plan information; there is no need to use an app for this, any computing device (including mobile) with a browser and internet access will suffice.