Milestone One: Preparation

Mobility Innovation Center: Event Attendees

Streamlining Public Transportation for Event Attendees

Team 20
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SOUNDTRANSIT

Seattle Department of Transportation

WSDOT

CHALLENGE SEATTLE

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Summary of Contents[1]

This document is a collection of works we have produced for our first project milestone. In preparation for the next milestones, we have created artifacts to support our work in the research and evaluation phase of our project. We have also conducted heuristic evaluations of the TransitGO application, competitive analyses of similar transit applications, and field studies to establish context and develop user research materials. Through the preparation of these materials, we have refined our sense of the demands of the next milestone. We conclude this document by proposing steps to achieve our goals in the research and evaluation phase.

Initial Data

The following three sections cover the initial data gathering we did to inform the planning for our next phases. These steps were selected to help us gain insight into various elements of the project and to begin to build our knowledge and set context to work from as we move forward. The heuristic evaluation was an in-depth analysis of the current TransitGO application. The competitive analysis gave us a broader understanding of mobile applications in the public transportation sphere, both around the world and locally. The field study helped inform us about the general behaviors of event attendees and what events might be best to focus on with the research and evaluation we will be doing in Milestone Two.

[1] The format of documents such as the Note-Taking Form/Data Collection Sheets has been modified to fit into this document. To see the complete version please see the links provided in the associated plan.

Heuristic Evaluation[2]

The following is a heuristic evaluation on the TransitGO application. TransitGO is an application that allows mobile ticketing purchase for Seattle-area public transportation, including King County Metro and Sound Transit Light Rail. The goal of the heuristic evaluation is to evaluate the design of the TransitGO application against industry best practices. A heuristic is defined as enabling a person to discover or learn something for themselves. We will look at ten heuristics to see how the app either allows or does not allow users to complete the necessary tasks.

Definition of Heuristics[3]

Visibility of system status - The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and the real world - The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom - Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards - Users should not have to wonder whether different words, situations, or actions mean the same thing.

Error prevention - Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

[2] Disclaimer: Parts of this document were adapted from projects that the team has conducted in previous coursework.
[3] Sourced from Jakob Nielsen's Usability Heuristics

Recognition rather than recall - Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Flexibility and efficiency of use - Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Aesthetic and minimalist design - Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors - Errors should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation - Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Definition of Severity Ratings

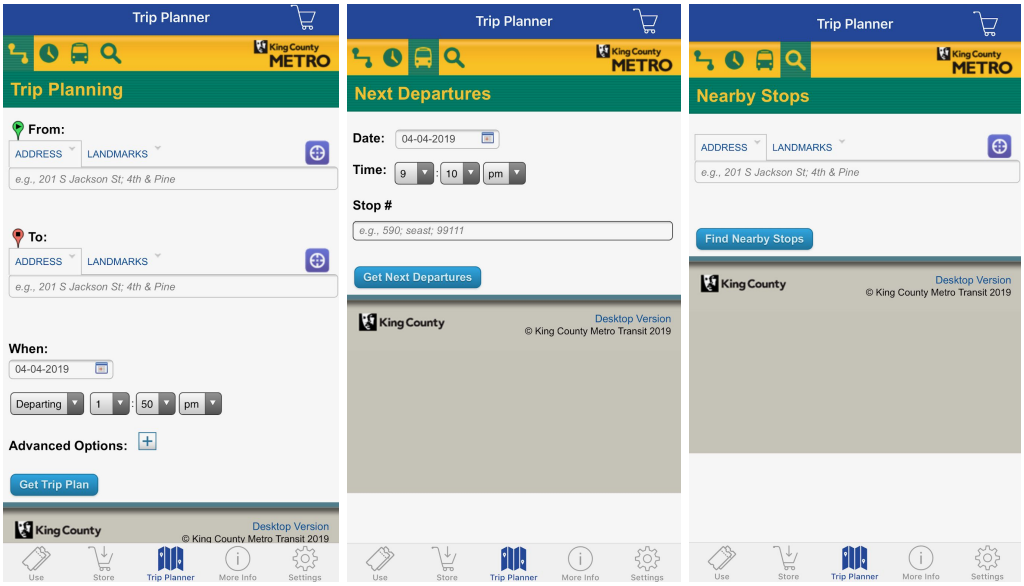
The severity ratings for the heuristic evaluation range from 1 to 3, with 1 being the most severe.

1	A severity rating of 1 means that the failure of the heuristic would impede the user from completing the task and should be addressed as soon as possible.
2	A severity rating of 2 indicates that the problem would not stop the user from completing the task but adds additional confusion and time to it's completion.
3	A severity rating of 3 is the least severe, and means that the problem is noticeable, but minor in impeding the user.

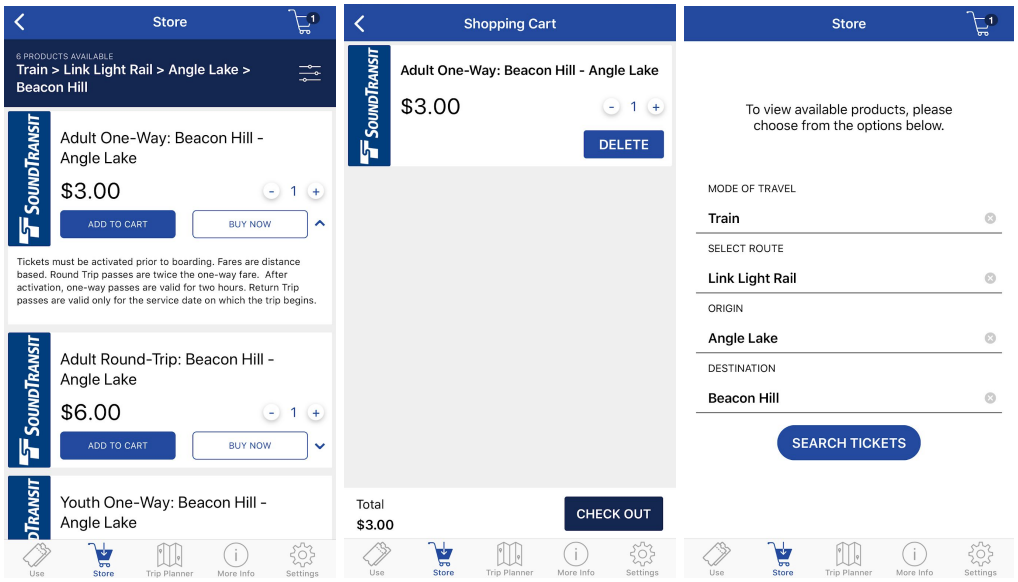
Definition of Pages

Below are screenshots of the pages being analyzed to provide context. The screenshots are from a mix of Android and iPhone because the app was examined on both systems.

Trip Planner

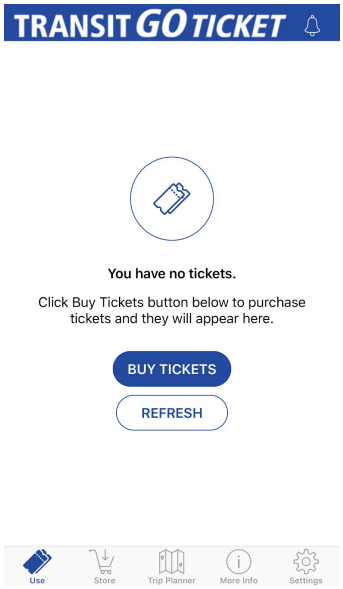


Store

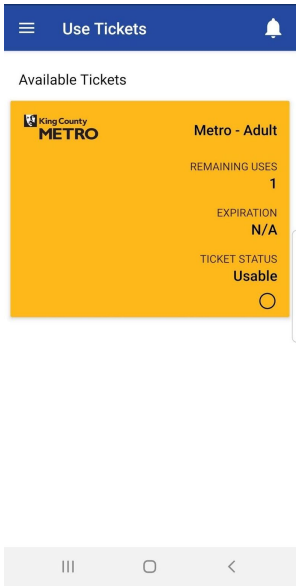


Use

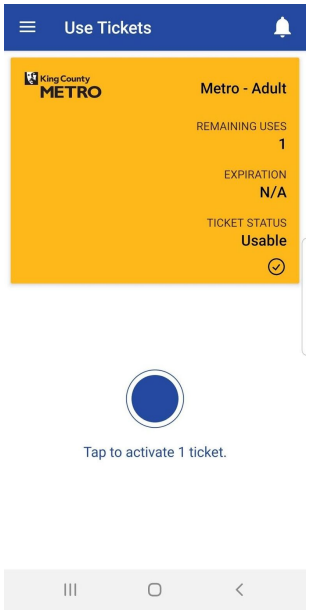
Initial “Use” Screen:

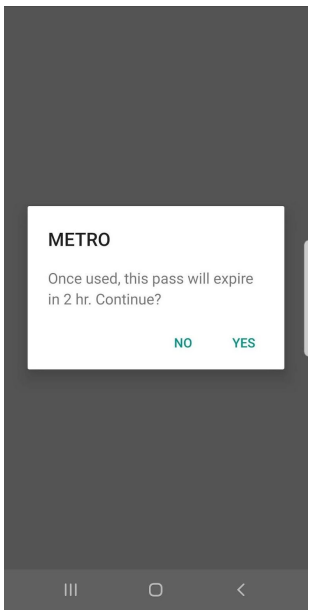


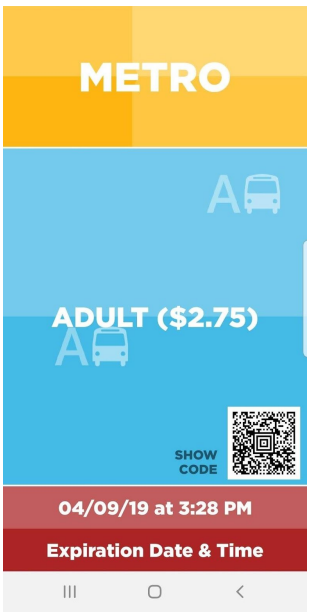
1 ticket available:



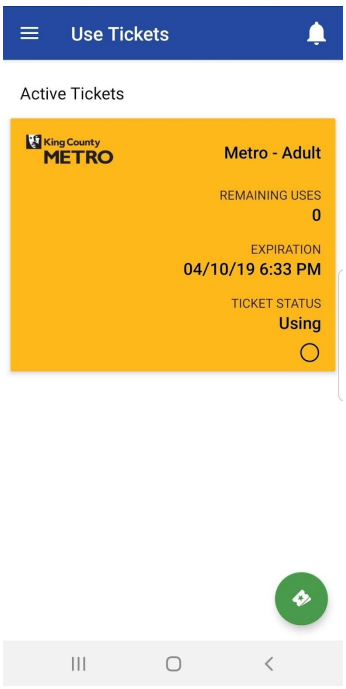
Using available ticket:





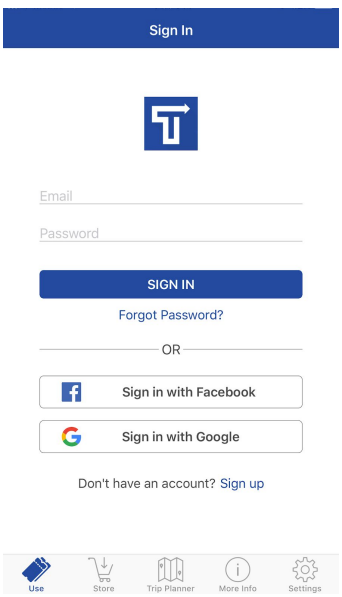


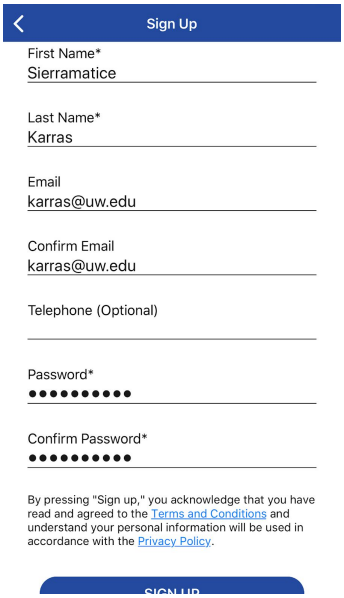
One ticket in use:



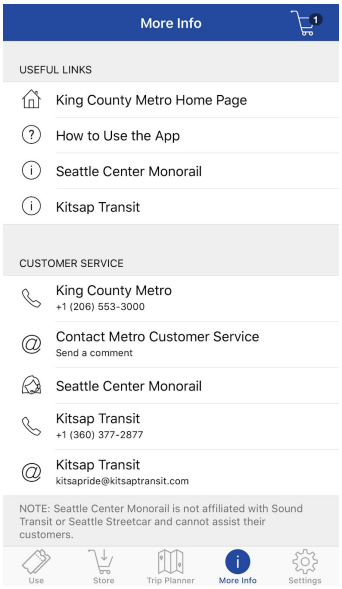
Two tickets in use:

Account

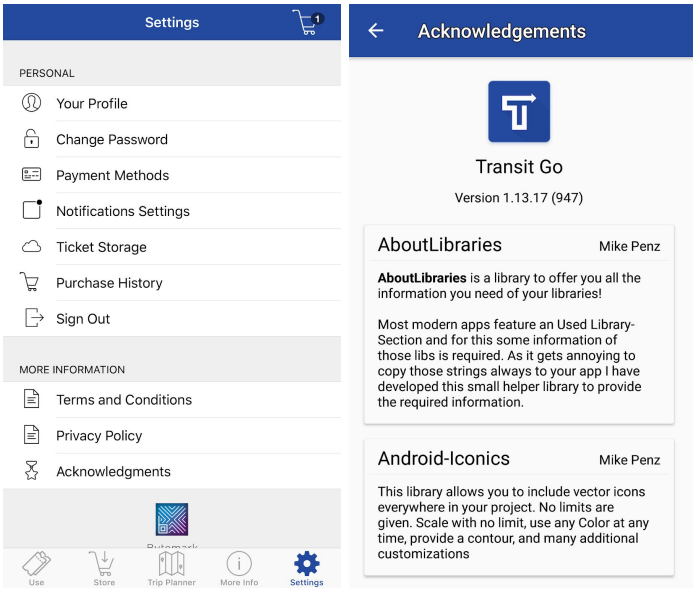




More Info



Settings



Heuristics Rubric

The following table summarizes the results from the heuristic evaluation of the TransitGO application.

Heuristic	Pass/ Fail	Explanation	Severity	Design Change Recommendation
Visibility of system status		General description of the problem		What you'd do to fix it
Trip Planner	Fail	Input boxes have inadequate descriptive text.	2	Concise and descriptive instructions should be included along with input boxes so the user knows exactly what they need to provide and what the result will be.
		No loading signaling	3	Provide information to the users about if the system is loading their request or if they need to click again.
Store	Pass			
Use	Fail	The difference between "Available Tickets" and "Active Tickets" is too	3	Enlarge the text for the status of the ticket and maybe color code for a

		subtle.		ticket which is active.
Account	Pass			
More Info	Pass			
Settings	Pass			
Match between system and the real world				
Trip Planner	Fail	“Nearby Stops” tab icon is indicative of a search function, not its actual function.	3	Change icon to something that resembles a transit stop.
Store	Fail	While the Light Rail is technically a train, most people do not think of it in the same category of trains like the Sounder, and its location may cause difficulty locating Light Rail tickets.	2	Give the Light Rail its own category like the Monorail and Streetcar have.
		Stops for trains are alphabetically ordered rather than in order of stops, which may be confusing to infrequent users.	3	Provide more context to users about the order of stops
Use	Pass			
Account	Pass			
More Info	Fail	Page includes contact information for King County Metro, Kitsap Transit and Seattle Monorail, but not Sound Transit or Streetcar (which are also services provided by the application)	3	Include information for all entities of transportation that the application provides.
Settings	Pass			
User control and freedom				

Trip Planner	Pass			
Store	Fail	The current system will not allow the user to purchase tickets from multiple service providers in the same cart. For example you cannot purchase a lightrail ticket and a bus ticket in a single transaction	1	Allow users to purchase any number or combination of tickets at the same time. The use of both the lightrail and a bus in a single trip is common and should be a simple process to purchase the required tickets.
Use	Pass			
Account	Pass			
More Info	Fail	When clicking on the Metro Customer Service phone number, it exits the app and opens the phone function. The user must exit their phone and reopen the application.	3	Make sure that the user knows what clicking the phone number will do or prompt them to copy the phone number.
Settings	Fail	When clicking on any of the “Acknowledgements,” the app will redirect you to a webpage in your mobile browser. The buttons can easily be accidently clicked, and the user must exit their web browser and reopen the application.	3	Confirm with the user that they want to leave the application after clicking an acknowledgement.
Consistency and standards				
Trip Planner	Fail	There are 2 navigation bar on the top of the screen, denoted only by icons. The top bar is for app page navigation and the bottom is for trip planner tabs. The two could be confused when deciphering the different types of navigation. In addition, branding elements like the yellow/green color scheme and fonts are inconsistent with the rest of the application.	2	Rethink trip planner as app-native instead of a widget. Make branding elements consistent with the rest of the app.

Store	Fail	The information button on the different ticket options provide different kinds of information on different ticket types. For example the Bus tickets say “Any trip, any time, in all travel zones.” while the Monorail ticket says “**Transportation between Westlake & Seattle Center.** Fast, direct transportation between Westlake Station (5th and Pine) and Seattle Center! To use your fare, please active and display it to the cashier or station attendant. Tickets expire one week after purchase. Trains depart approximately every 10 minutes.”	3	Have a consistent set of information for each type of ticket. Providing expiration time and usage information is useful to people using the app.
Use	Pass			
Account	Pass			
More Info	Pass			
Settings	Pass			
Error prevention				
Trip Planner	Fail	No error messages for invalid inputs on “Route Schedules” page. Nothing happens.	3	Add the error messages found on other pages to the “Route Schedules” route input box.
Store	Pass			
Use	Pass			
Account	Fail	Does not provide password requirements unless the password does not meet them	3	Provide instruction to the user so they do not have to re-enter a new password after learning their original

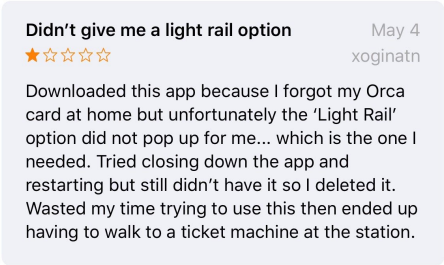
				does not meet the requirements
More Info	Pass			
Settings	Pass			
Recognition rather than recall				
Trip Planner	Pass			
Store	Pass			
Use	Fail	The green icon in the bottom right that brings a user to their most recent active ticket is misleading. It looks like a conventional “buy ticket” button.	1	Change the icon color from green, which is associated with addition, to gray or black.
Account	Pass			
More Info	Pass			
Settings	Pass			
Flexibility and efficiency of use				
Trip Planner	Fail	No design efforts to speed up repeat entries.	3	Allow users to save locations so they do not have to enter whole addresses for home or place of work.
Store	Fail	For each ticket purchase one must select options from the beginning, there is no way to save a user’s most common ticket purchase for fast access.	3	Have a section for frequently bought or repurchasing tickets that a user has used in the past.
Use	Pass			
Account	Pass			
More Info	Pass			

Settings	Pass			
Aesthetic and minimalist design				
Trip Planner	Fail	No design efforts to make input a simplified step-by-step process instead of “fill out this form”	1	Create an experience whereby users need only think about one step of the process at a time. In combination with more descriptive accompanying text, a step-by-step process could reduce the user’s cognitive load significantly. In addition, this refined experience could remove the need for tabs and instead sense the goal of the user based on their input.
Store	Pass			
Use	Fail	The ticket display is very busy with several layers of movement in the background and bright colors that at times make the text hard to read. There is unnecessary text displayed on the ticket. On the “Use Tickets” page there is an Expiration which is usually “N/A”	2	Change colors to be softer colors, slow down the movement speed of the busses to more of a crawl. Remove “($2.75)” Make the bottom panel read “Expires: 04/11/19 at 2:57PM” Remove the Expiration from the tickets if it is N/A
Account	Pass			
More Info	Fail	When clicking on “How to Use the App,” the user is taken to a YouTube video, which is unhelpful if someone wants to use it on the go.	2	Have a text-based version of the instructions on how to use the application.
Settings	Fail	The Bytemark Privacy Policy is slightly off center, and covers up the header of the page.	3	Make sure the formatting of the page makes it easy to read and that the design is clean.

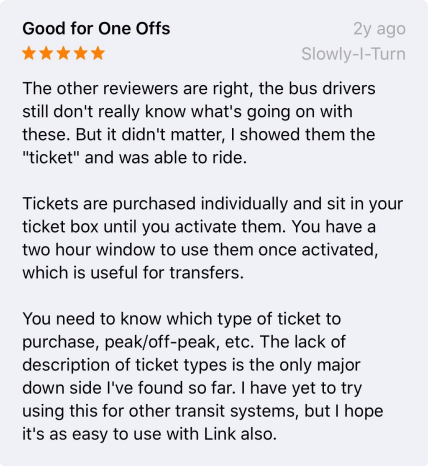
Help users recognize, diagnose, and recover from errors				
Trip Planner	Pass			
Store	Pass			
Use	Pass			
Account	Pass			
More Info	Pass			
Settings	Pass			

User Reviews

On the Apple App store the TrainsitGo App has an average review of 2.7, and on the Google Play Store the app has an average review of 2.6. Many of the reviews mention the app crashing and other bugs, which are outside the scope of our project, we focused on reviews that brought up issues related to infrequent and new users of the app. The issues highlighted by user reviews often highlighted the same issues that we had found in our own heuristic analysis.

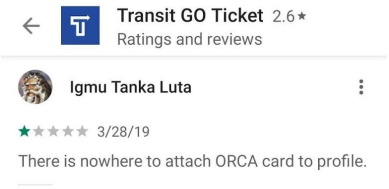


The user who left the above review was unable to locate the Light Rail option, likely because it was under the train category.



In this review the user mentions that there is little information about the different tickets available in the the store. The descriptions for each ticket are inconsistent in what information they provide.

Infrequent users would like to be able to checkout as guests. Setting up an entire account for those who do not often use public transit can be irritating for users.



The concepts for Orca 2.0 is something that users want. This is good validation for the plan moving forward.

Key Findings and Conclusions

Most of the issues we encountered we relatively minor, and would only cause inconvenience to users of the app. However there were a few major issues that we feel would impede use:

- The format of the trip planner forces a great deal of cognitive load on the users. A better information flow would be taking the users through the form step by step rather than presenting it all at once.
- The inability to purchase tickets from multiple providers in a single transaction. There is already complaints from users that you have to buy seperate tickets when transferring between providers (unlike when buying cash tickets). It is common for users to need both a lightrail and bus ticket, this process should not require users to checkout twice.
- There is much confusion caused on the “Use” screen due to the subtlety of the difference between “Active” Tickets and “Available” Tickets, the misleading icon for returning to the last used ticket, and the busyness of the ticket display.
- The demand for a cloud based Orca system with instant account updating exists.

Competitive Analysis

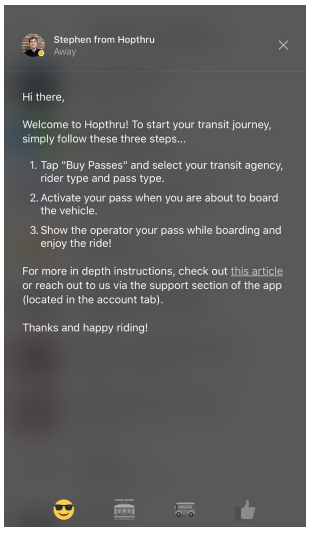
Introduction

The following document contains competitive analysis of public transportation applications similar to TransitGO. PiercePay, used for Pierce County buses was tested in-person, while four other applications were analyzed remotely. The remote tested applications were analyzed by downloading the application to evaluate overall design and features and by looking at user reviews. The details and full results of the competitive analysis are documented below.

In-Person Analysis: PiercePay (Tacoma)

On Friday, April 9th, Zoe Escalona and Zach Thomas made their way to Tacoma in Pierce County to test the PiercePay mobile transit payment. PiercePay[4] is available through the Hopthru app.[5] We traveled by LightRail to the International District station during the morning commute and then take the Sounder train to Tacoma.

Testing Method



The PiercePay application, through HopThru, was tested in several ways. We evaluated account set-up. Additionally, we tested different ticket types (both single-rider and the 1 day pass). These tickets were activated and used from the same device to test the scenario of having a group of people using the same phone to ride the bus. Finally, we did a comparison of using the app to board the bus versus paying with cash.

The Hopthru application includes ticketing options for many different public transportation agencies across the country, but for this competitive analysis we are only testing the Pierce County portion of the application.

The notes from the test of the PiercePay system are available in the appendix at the end of the competitive analysis document

[4] https://www.piercetransit.org/pierce-pay-with-hopthru/
[5] https://www.hopthru.com/

Reviews

The HopThru application has 4.2 stars (out of 5) from 19 ratings on the Apple Store, and 3.9 stars (out of 5) from 56 ratings on the GooglePlay store. Since HopThru serves many different public transportation agencies, it's unclear exactly how many of the ratings are specifically for Pierce County. Below are some reviews evaluating the design of the application from the GooglePlay store.

[redacted]

★ ★ ★ ★ ★ March 29, 2019

3

Awesome app. Hopefully King County Metro picks this up and it would be great if they included a trip planner along with it!

[redacted]

★ ★ ★ ★ ★ March 14, 2019

Not much use without a schedule, unless I cannot find it in the app. Appears to work well if you only want to buy tickets.

[redacted]

★ ★ ★ ★ ★ October 31, 2018

Pierce county transit is the worst transit system In the country by far this app makes it at least tolerable so I think it's awesome and way worth having

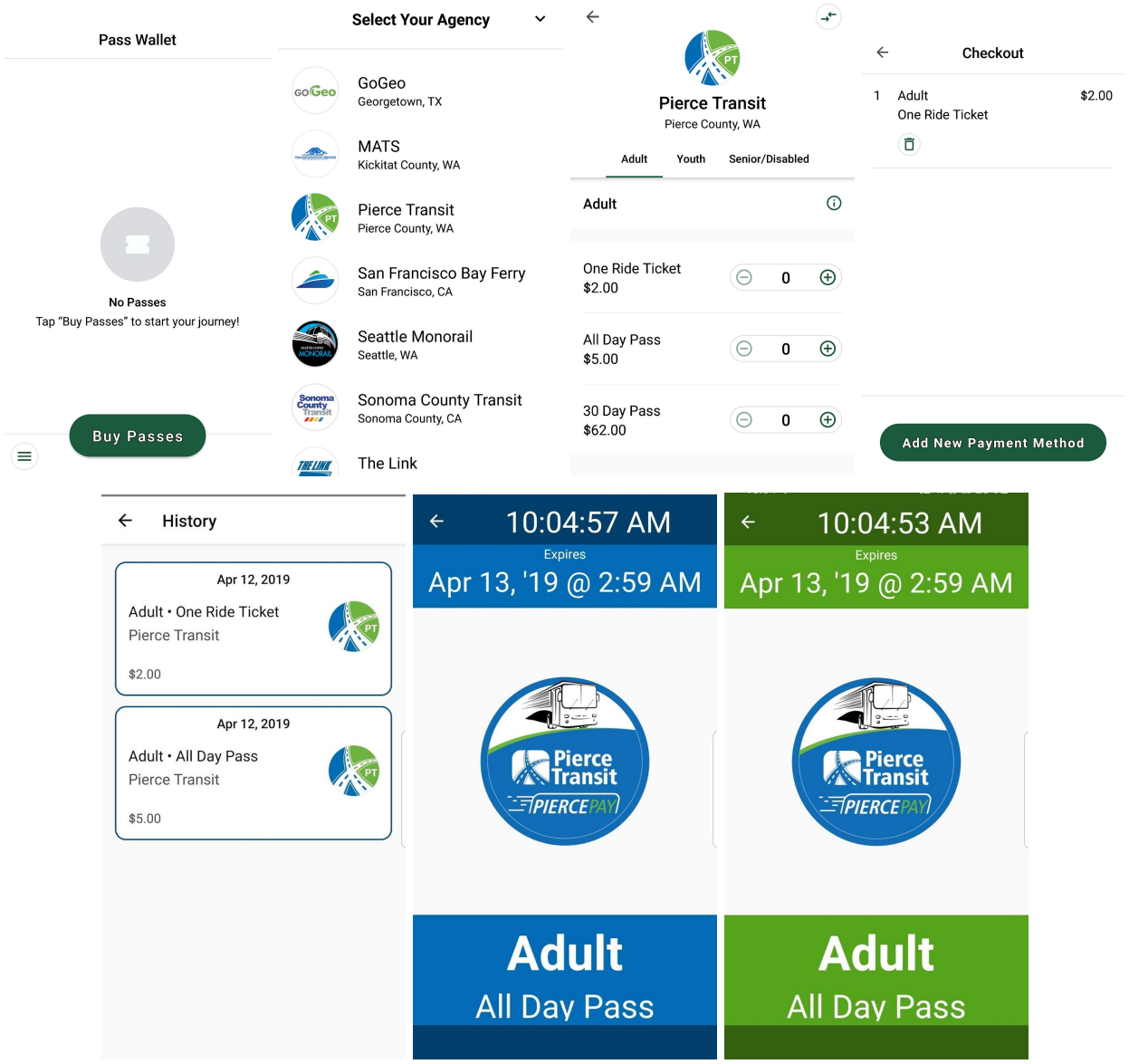
[redacted]

★ ★ ★ ★ ★ March 10, 2018

It would be great if it would give 2 hours for transfers like the card does, unfortunately without that it is only useful for the rare all day pass I want to be able to get once in a while.

Reviews from the GooglePlay Store for Hopthru

Results



Ticket Buying Process for PiercePay through Hopthru

Unlike the single tickets on the TransitGO application, which allows a two hours transfer window between buses, single-ride tickets on PiercePay only remain active for 10 minutes which prevents transfers.

The process of boarding the bus using a ticket on PiercePay was very simple. The ticket is activated right as a user is boarding the bus and then taps the interactive, color changing screen as they pass the bus driver. Boarding the bus and paying with cash, however, involved putting bills into the machine one at a time. We did

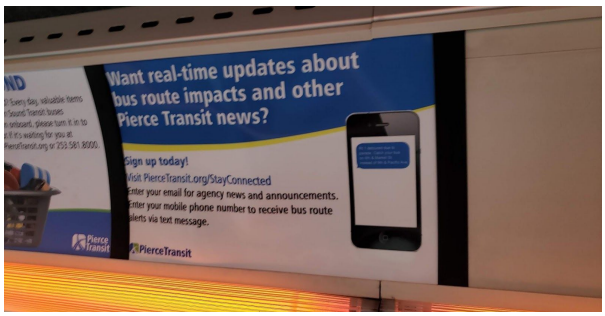
not receive a ticket or any kind of receipt after paying in cash, likely because there are no transfers available which means it is not necessary to have a ticket.

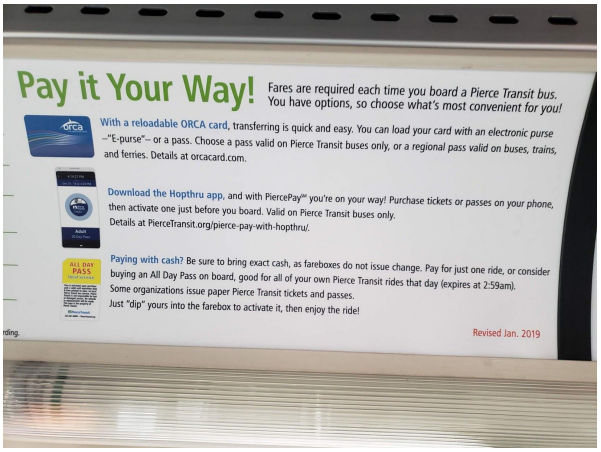
All of this is nearly identical to the system for TransitGO and King County Metro at large. The largest difference being the simplicity of the PiercePay system. The only tickets available to buy on PiercePay are single-ride bus tickets which are active for 10 minutes and all-day bus tickets which are active until 2:59 AM. The only other form of public transit available is the T-Link, a smaller version of the light rail which operates on the street and is free to all.

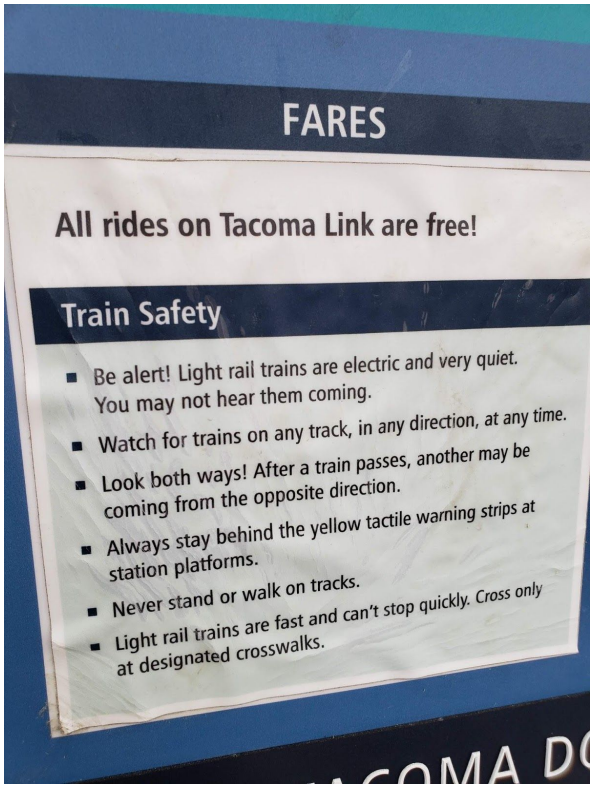
There is a “transfer tickets to other devices” option available on the android platform, however whenever we have tried to use it the application froze and needed to be restarted.

Notes from In-Person Analysis

- Types of payment to test: All-Day Pass, One-Ride Ticket, Cash.
- App crashed several times while looking through ticket options.
- There is a “transfer tickets between devices” option that freezes the app every time.
- The T-Link is a free Light Rail with 6 stops run by Sound Transit.
- When using tickets you tap the screen to change the color in order to authenticate it for the bus driver.
    - The bus driver explained how to do it.
- Easy to activate two tickets at a time.
- There are no transfers for one way tickets.
    - One-way tickets are only active for 10 minutes.
- Saw a man use the app.
- Paying with cash is noticeably slower.
    - There was no ticket or receipt given for cash payments.







Remote Analysis

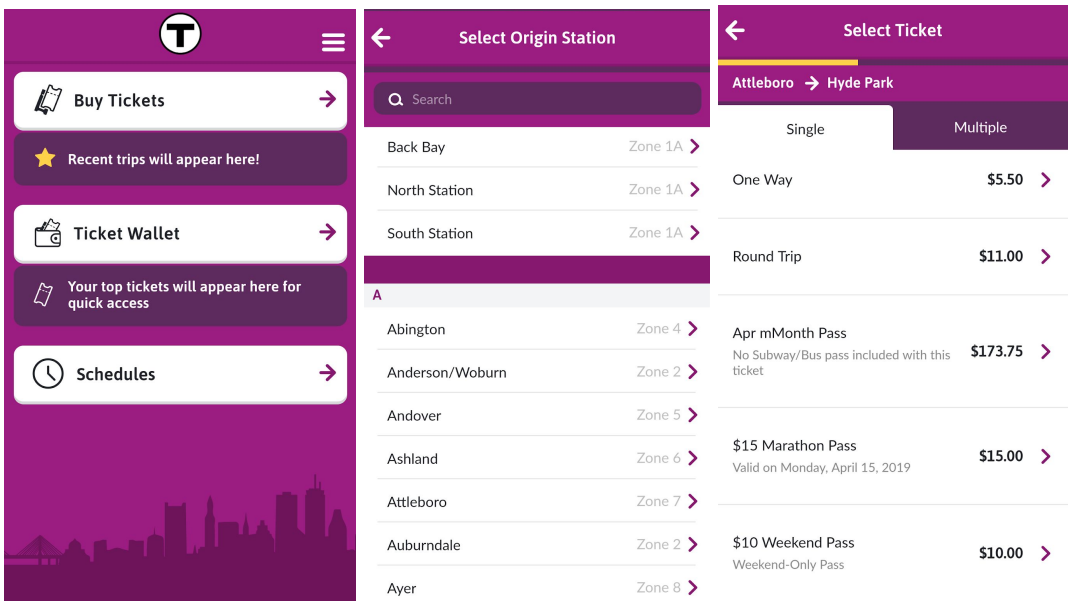
Each team member selected a competitor application to analyze and compare to the TransitGO application. For each application the individual team members focused on one or two elements that the system implemented well.

MBTA mTicket (Boston, USA)[6]

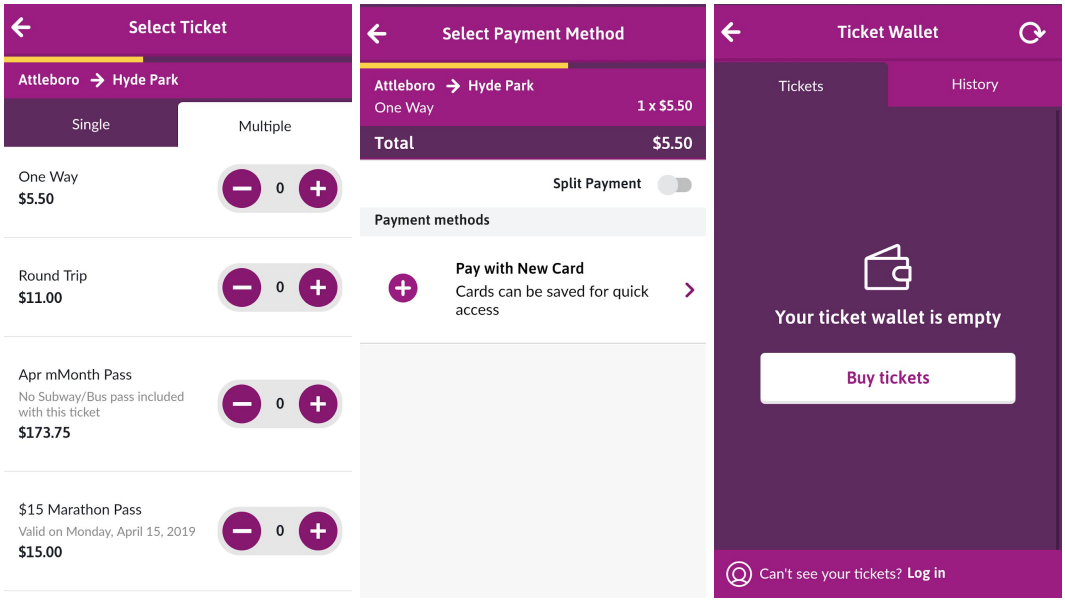
The MBTA mTicket is a mobile ticketing platform based in Boston, Massachusetts for their commuter rail system run by the Massachusetts Bay Transportation Authority. It was first piloted in 2012 and was the "first full smartphone commuter rail ticketing system."[7] The application was first piloted on four of the MBTA lines, but was expanded to the rest of the system. It has over 100,000 downloads on the GooglePlay store and is also available for IOS. The MBTA partnered with Masabi, who have also developed mobile ticketing systems for New York, Los Angeles, and more, to create the application.

Features

The homepage allows the user to buy tickets, show them their "ticket wallet," and search for schedules. The application will also show you your most recent trips and popular tickets on the homepage.



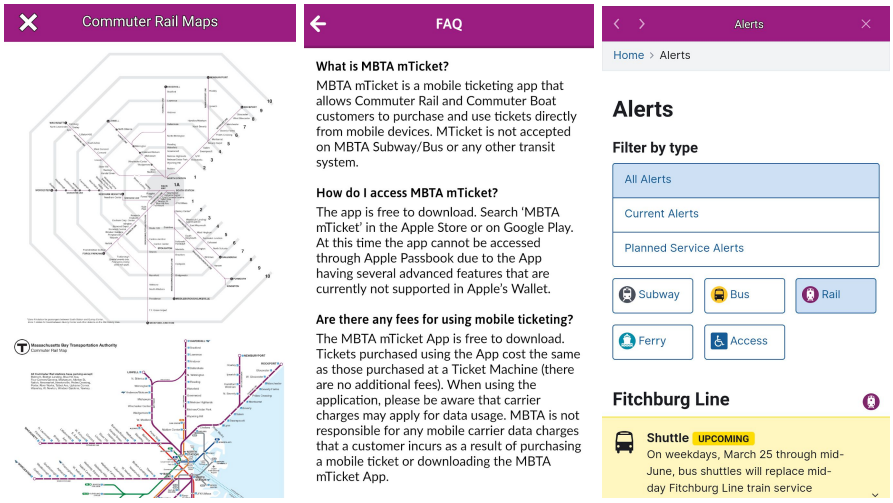
[6] https://blog.mass.gov/transportation/mbta/mbta-commuter-rail-mobile-ticketing/
[7]https://blog.mass.gov/transportation/mbta/enhancements-coming-to-mbtas-pioneering-mticketing-system-for-commuter-rail/



MBTA mTicket payment and use screens

When buying a ticket, the user is prompted to input their origin station via a search or by scrolling through the alphabetized list of stations. The user then inputs their destination station using the same methods. Once the route is selected, the user is taken to a screen with various ticketing options including options to buy multiple tickets, monthly passes, and special deals (like weekend passes or for a marathon). The user can then buy the ticket by entering their payment information, including an option to "split" the payment between multiple cards. Users can activate their tickets via the "Ticket Wallet," as well as easily access a history of their ticket use.

Other features of the application include: seeing travel alerts and transit maps, a list of your save credit/debit cards, and an in-app FAQ.



Maps, FAQ, and Alerts features on MBTA mTicket

Comparison to TransitGO

MBTA mTicket differs from TransitGO in several ways. First, the application is focused on a single transportation type (e.g. commuter rail), while TransitGO provides ticketing options for a variety of Seattle-area transportation (like bus, light rail, commuter rail, etc.)

The quick access to a user's "top tickets" and to re-buy "recent trips" improves the efficiency of use. Additionally, the option to split the payment allows the user more flexibility. These features are not included in TransitGO.

Finally, MBTA mTicket allows the user to have access to information about the the transportation system with its inclusion of travel alerts and maps. While these features are not included separately in TransitGO, some of them are accessible through the Trip Planner.

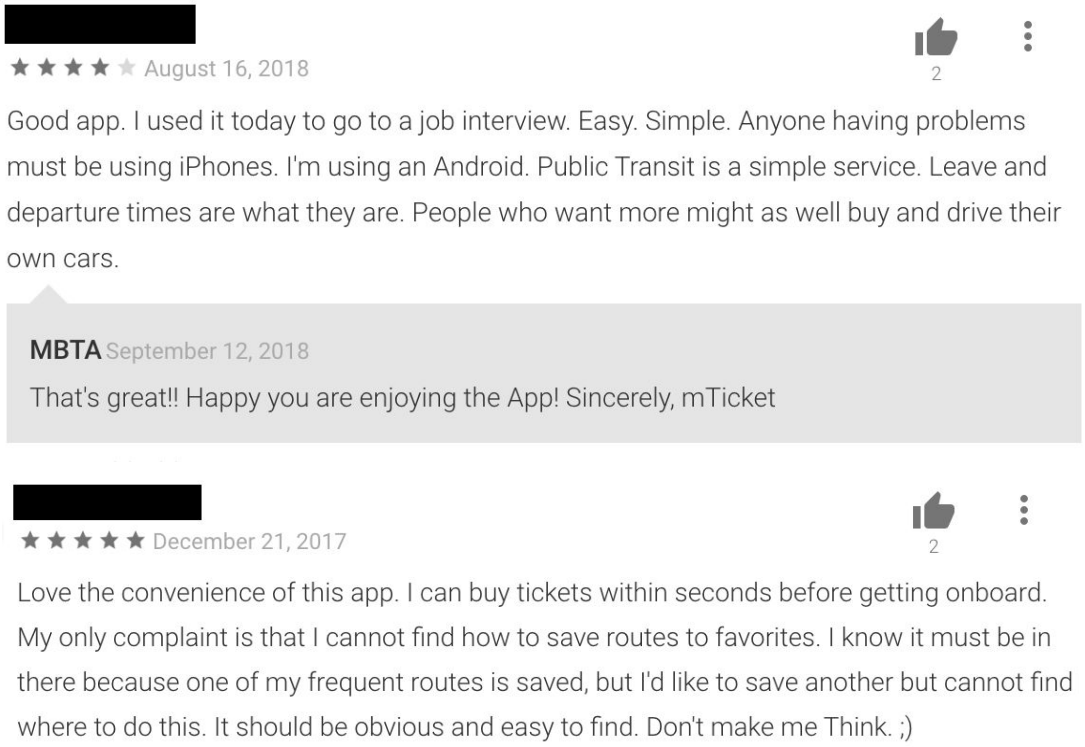
Reviews

The application has 2.8 stars and 155 ratings on the Apple Store. In contrast, on GooglePlay, MBTA mTicket has 3.8 stars and over 1,100 ratings. The MBTA are also active at replying to reviews from users.

Comparison of User Reviews/Ratings (Top: Apple Store, Bottom: GooglePlay)

Positive Reviews

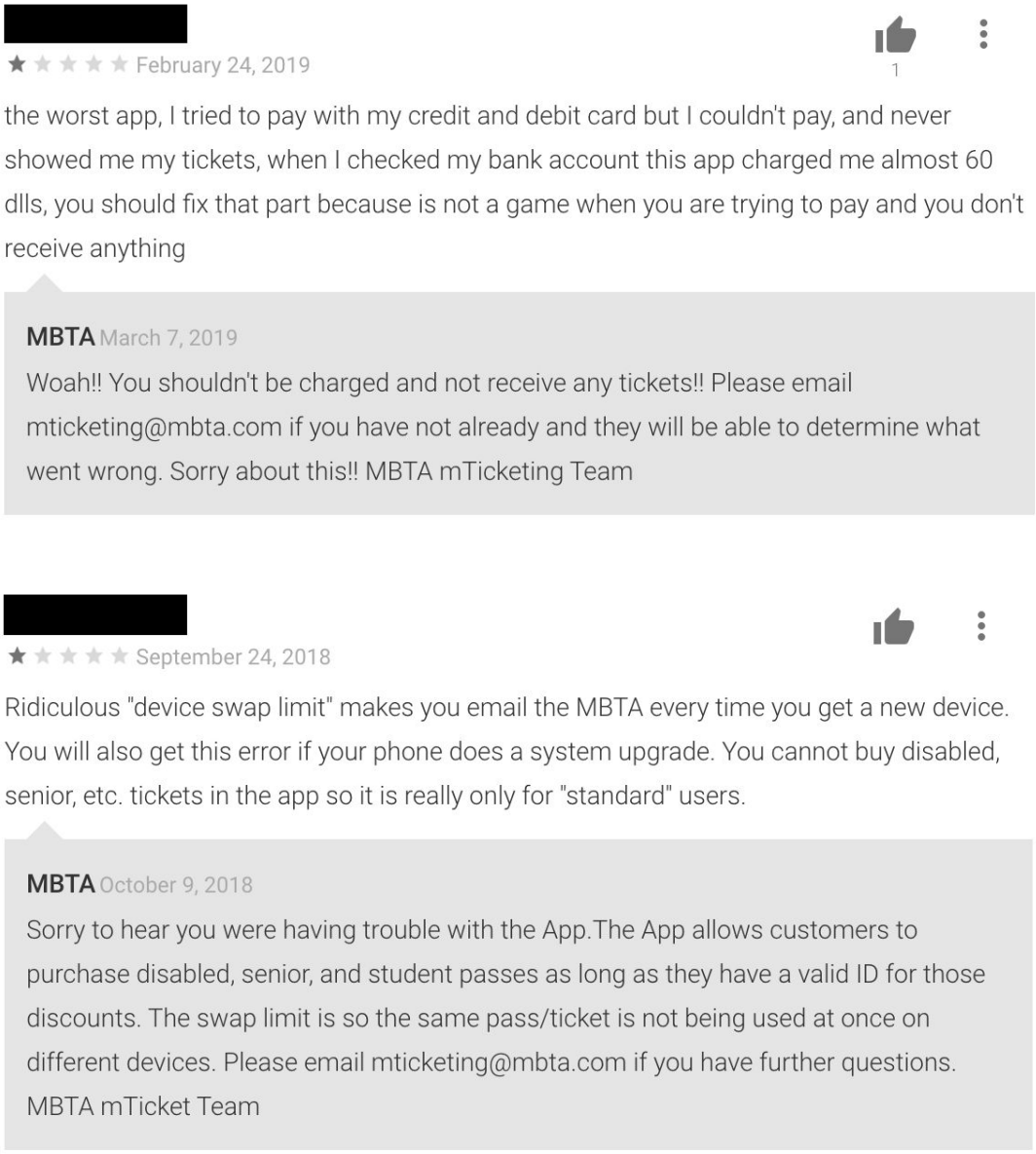
Positive reviews of MBTA mTicket focus on the convenience of the application and the slight discount on tickets when using it (compared to buying them on the train).



Positive Reviews of MBTA mTicket from GooglePlay

Negative Reviews

Negative reviews of MBTA mTicket focus on a bug that caused users to pay for tickets without receiving them, lack of specialized tickets, and the “device swap limit.



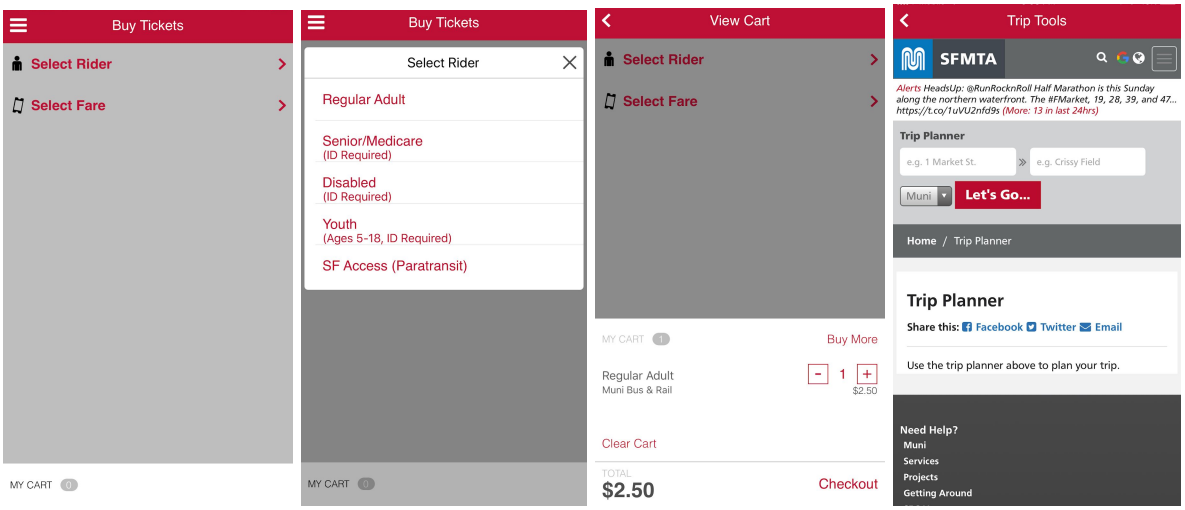
Negative Reviews of MBTA mTicket from GooglePlay

User Wishes

Additional Reviews from GooglePlay

Some of the improvements that users mention wanting in their reviews are a way to specifically save certain routes, supporting other Boston-area transportation, and automating payments.

MuniMobile (San Francisco, USA)[8]



Screenshots from the MuniMobile Application

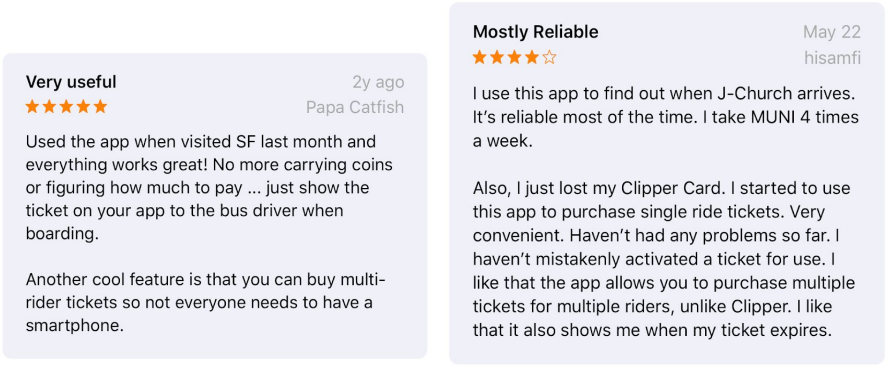
The San Francisco MuniMobile application overall has many similarities to the TransitGO application, with some key differences. The MuniMoblie application benefits from the simplicity of the San Francisco public transportation system, instead of the many different methods of transportation that Seattle has, there are only buses and trolleys. This dramatically streamlines the ticket purchasing process. Both of the apps include a trip planner that appears to be an embedded version of the web trip planner. In addition (from app store reviews) both apps seem to suffer from similar issues, like bugs, crashing and accidently activating purchased tickets.

Payment Options

A small feature that MuniMoble includes that streamlines the checkout process is the integration of paypal as a payment option. This increases the efficiency of check out and increases the level of trust a user has in providing financial information. This would be a beneficial addition to the TransitGO App as it would provide more options to users.

[8] https://www.sfmta.com/getting-around/muni/fares/munimobile

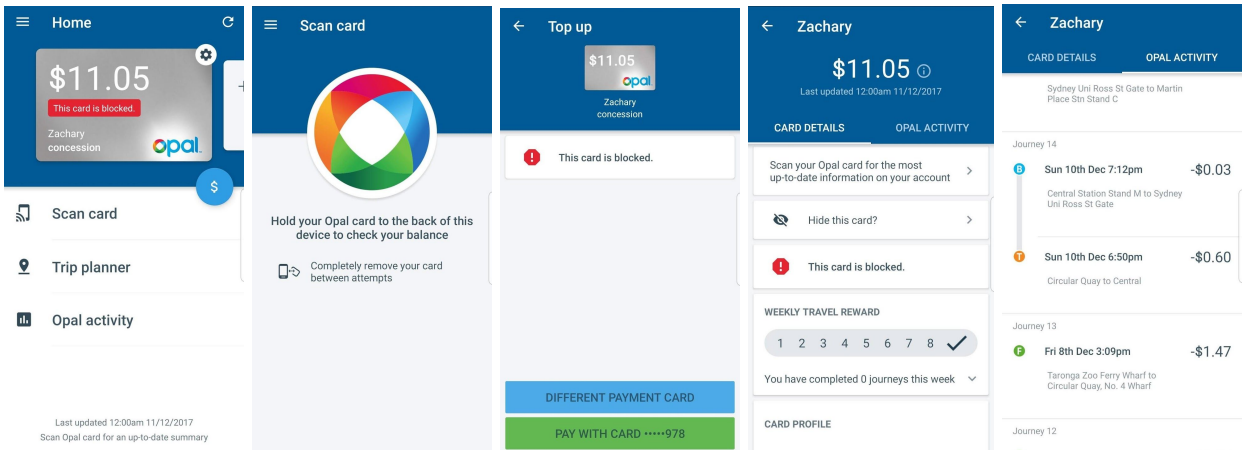
Multi-Rider Ticket



App reviews sourced from the Apple Store.

A beneficial feature that MuniMobile has that TransitGO does not is a multi-rider ticket. A multi-rider ticket allows a single person to purchase tickets for themselves and those traveling with them. This could be a beneficial addition to the Seattle App, especially for event attendees. With a multi-rider feature only one member of a group would need to download the app and create an account.

Opal Card (Sydney, Australia)[9]



Screenshots from the Opal Travel Mobile Application (Android)

The Opal Travel app varies from the TransitGO app in that it is not itself a ticketing system. This application allows users to manage their account that is tied to a physical card, much like the vision for Orca 2.0. The app is on a constant connection to a user's cloud based account allowing them to check their current balance,

[9] https://www.opal.com.au/registered/index

review history of transactions, and “top up” (reload) their card any time they like. The trip planner function tells a user precisely how much a trip will cost them and what buses/trains to take. There is also a card scanning function that allows a user check the balance of any Opal card, not just their own.

“Top Up” - Card balance refill

The Opal Travel app’s main function is loading more money onto an Opal Card account. The process is straightforward. When a user gets an Opal card they are required to set up an account attached to the card. By logging into that account with the app a user has access to the card balance. To top up a user must input their credit card or authorize Google/Apple pay. After that initial set up a user only needs to select “top up” then choose the amount of money they wish to load onto the card. The funds are instantly available for use after the transaction is authorized.

This is a very effective model, heuristically, for the Orca 2.0 system to be modelled after.

Account Status

The Opal app provides a comprehensive view of the current status of each card linked to an account. There is a current balance displayed at the top with two tabs for “Card Details” and “Opal Activity.” The “Card Details” shows the progress toward the weekly reward (All rides after 8 in one week are free), The card serial number, status e.g. “active,” “blocked,” “paused,” and the auto-top up threshold. The “Opal Activity” tab shows a user a detailed history of their card use. The history includes the exact time and location of each boarding and disembarking, how much that ride cost and which service the ride used.

Oyster Card (London, UK)[10]

In this analysis, we compare King County Metro’s TransitGO to London Metro’s Transit for London (TfL). The two applications share the common function of delivering an itinerary based on from/to locations and a timeframe given by the user (King County’s Metro’s Trip Planner and London Metro’s Journey Planner). Our analysis will focus on this specific function.

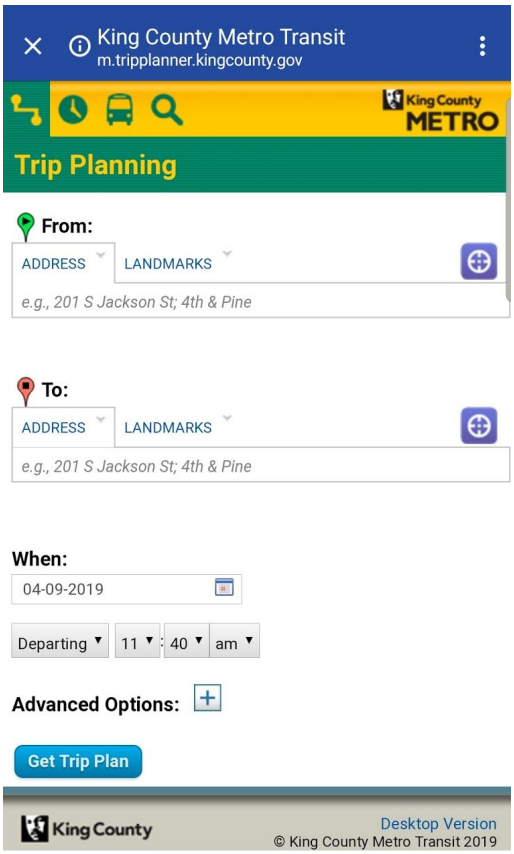
[10]https://tfl.gov.uk/fares/how-to-pay-and-where-to-buy-tickets-and-oyster/tfl-oyster-and-contactless-app

The Trip Planner function has enormous potential to onboard event attendees to the TransitGO application. Trip Planner allows event attendees to get a definitive, time-designated route from nearly anywhere with an address to an event. This may remedy some of the concerns towards using public transportation to get to an event, such as time management and confusion about the system.

Analysis

In this section we compare and contrast features of Trip Planner and Journey planner on an objective basis.

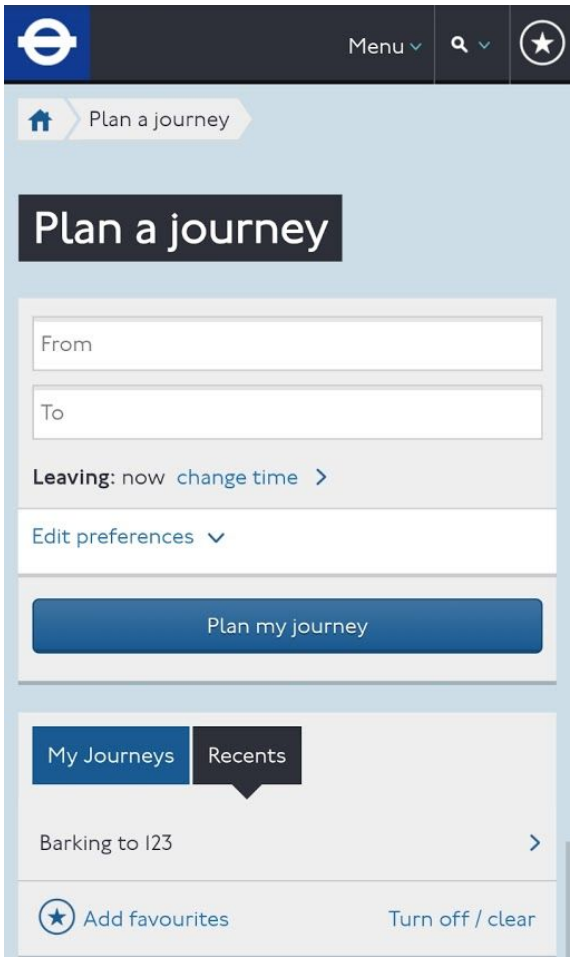
Landing page



Trip Planner Landing

Trip Planner takes a few parameters from the user to generate an itinerary. The user inputs their desired FROM location, TO location, and defines a time frame for the trip. The user is given the freedom to pick any address, landmark, or metro station as input, and the itinerary includes walking/biking/etc. times. The user is also given different options, usually employing alternative metro service routes. In

addition, the user is able to filter results via the “Advanced Options” dropdown, which can be very useful for handicapped riders.



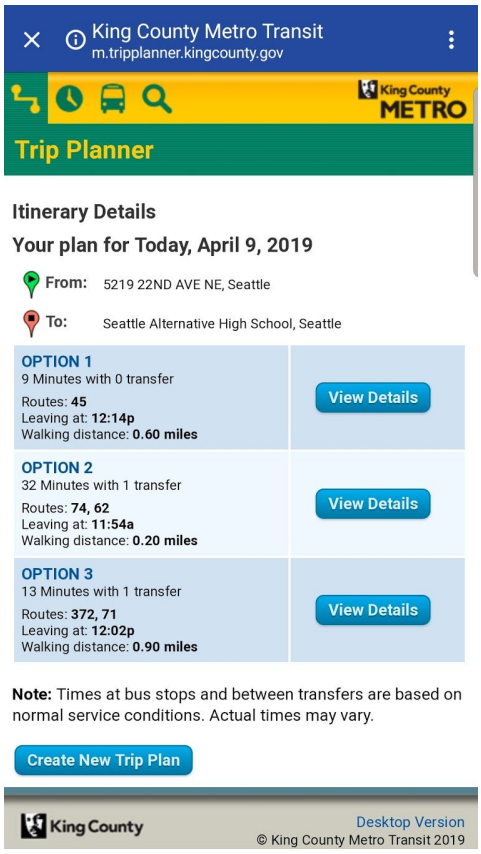
TfL Journey Planner Landing

The Journey Planner form has all the capabilities and options of the Trip Planner form, and a little more. Below the form, there is a “favourites” section (Figure 4). This section tracks journeys made via a user’s Oyster Card and allows users to save their journeys as favorites to be recalled for later use.

Journey Planner features a UI that is clean and consistent in visual communication. The Feature is only available through TfL’s desktop site, as is Trip Planner with KC Metro’s site. Even so, Journey planner remains consistent with its branding and feels more like an integral part of the application than Trip Planner.

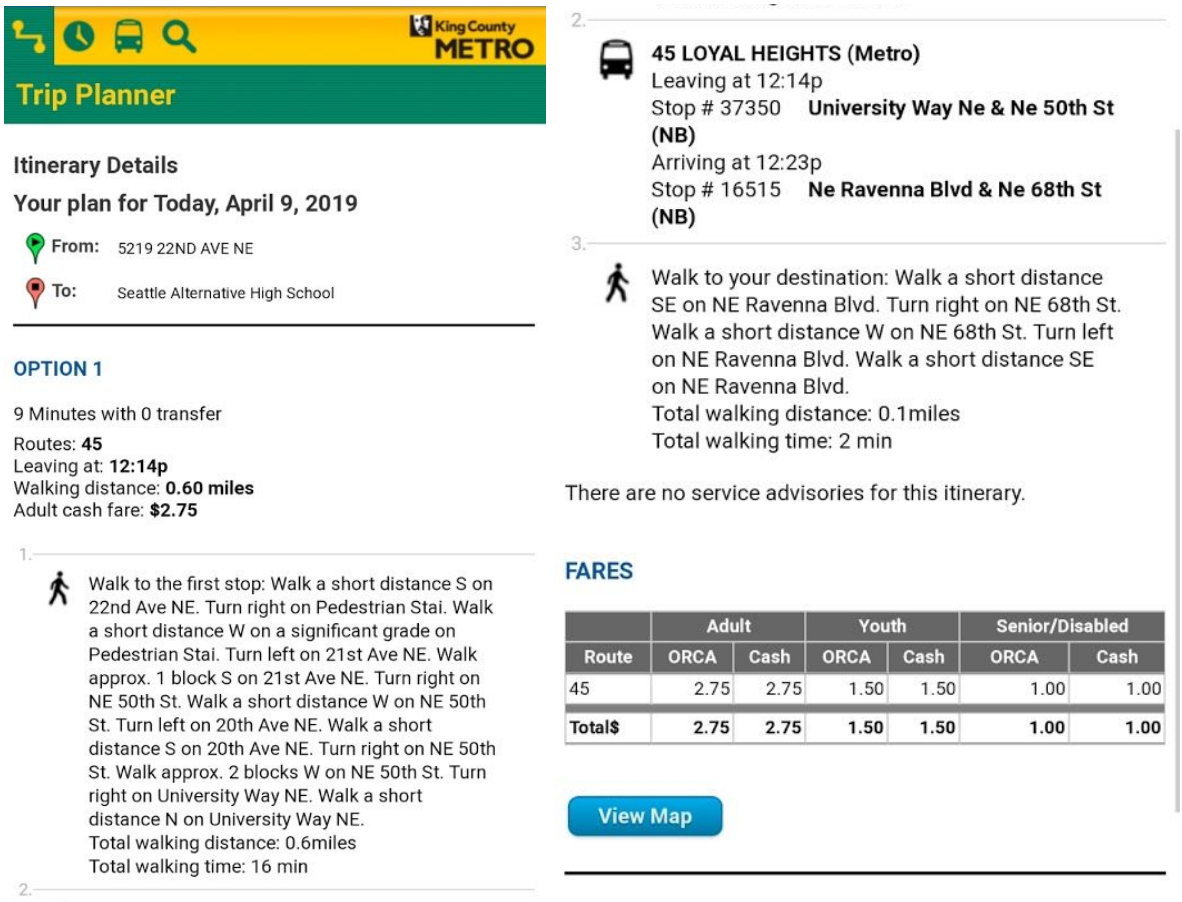
Results

This section compares Trip Planner's landing page to that of Journey Planner.



Trip Planner Results

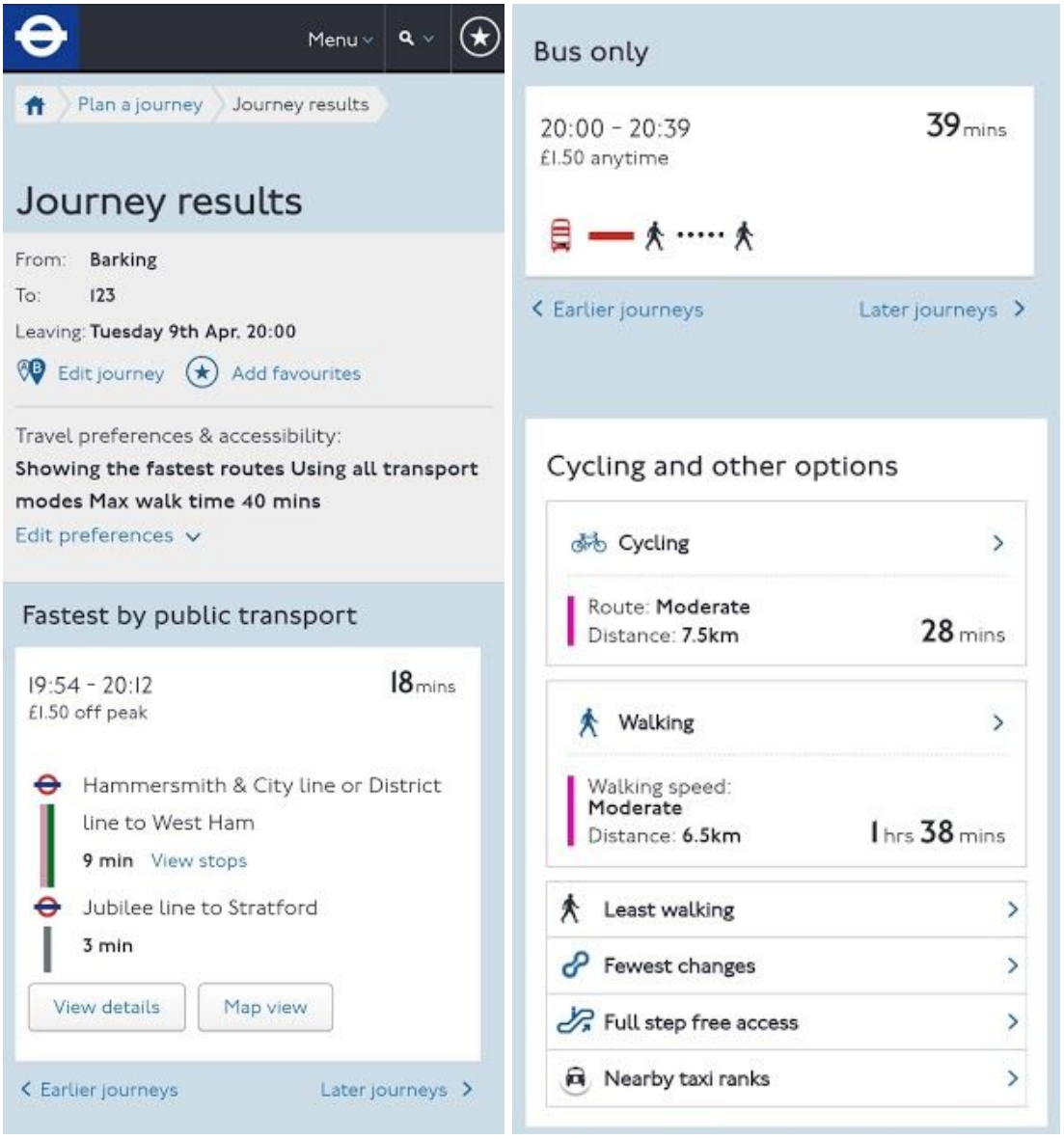
The result of filling out the boxes and tapping "Get Trip Plan" is a list of options for the trip the user plans to take. Relevant information like departure time and walking distance is readily available, which allows users to make an informed decision. The user then selects an option from the list by tapping the "View Details" button.



Trip Planner Detailed Result

The detailed result is an exhaustive list of directions that outlines the walk to and from a transit station as well as information about the mode of transportation chosen by the user.

In terms of functionality, Trip Planner gives a far more comprehensive result than Journey Planner. The directions are incedibly detailed and the function works with any address, landmark, or transit station as input. Journey planner only allows users to pick from established transit stations, so they will need to do a secondary search to find stations if they are not well acquainted with the system.



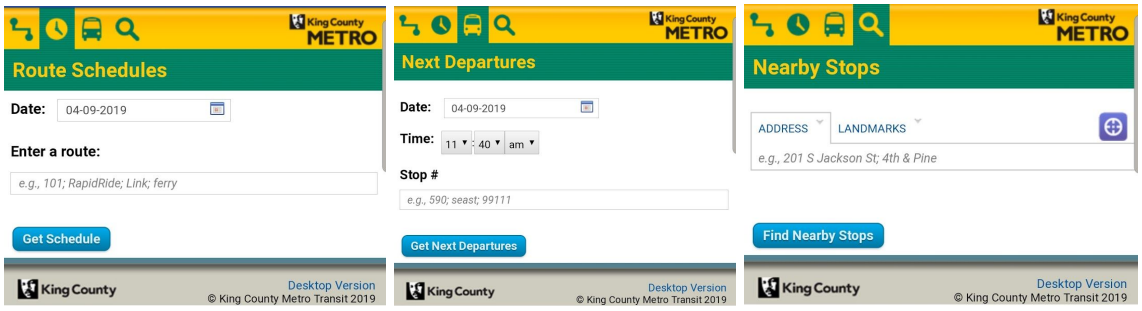
TfL Journey Planner Result

Journey planner creates a user experience that that is faster and less dense with information. This is achieved by picking a best-fit result (shown above), compartmentalizing many of the options, and vertically stacking content to extend below the fold. These design choices minimize the cognitive load on the user and improve usability.

Conclusions

Trip Planner is an amazing piece of software whose potential functionality is greater than that of the other apps we looked at. Users are able to get detailed directions from nearly any location and do not need to supplement their trip plan with accessory searches. They are able to purchase tickets for an incredibly wide variety of public transportation.

The London Journey Planner makes many assumptions about their users, which offers a faster and cleaner-looking experience, but may not be the best for event attendees who are unfamiliar with the public transportation system. Journey planner has the upper hand on Trip Planner when it comes to visual communication. If nothing else, Trip Planner should seek a content organization scheme that reduces the cognitive load on the user. Everything about the Trip Planner indicates to the user that they left the TransitGO app entirely and are now looking at a website designed strictly for desktop screens. Compartmentalization of options, the elimination of the Trip Planner Results in lieu of a best-fit itinerary, and a more assumptions made about the average user may help speed up and clarify the trip-planning experience.



Trip Planner Accessory Pages

Finally, a comprehensive overhaul of Trip Planner would see the Accessory Pages more seamlessly integrated into the user experience. The tab system ensures that users who need to use any one of these functions will need to navigate multiple pages to get all the information they need to meet their transportation needs. Further competitive analysis should evaluate Trip Planner's Accessory Pages against transportation apps like OneBusAway. OneBusAway has integrated the 3 Accessory Pages into a single page with an intuitive pinned-map UI. This app also features a trip planning function, so we may get hints about how to bridge the gap between Trip Planner and the Accessory Pages.

In addition to improvements to the TransitGO Trip Planner, we would also recommend the addition of some features such as more payment options, an improved organizational hierarchy for transportation methods, and integrated multi-rider tickets (which could be especially beneficial for event attendees). Having the option to split payments and to easily re-buy recent trips would also be helpful for event attendees who only used public transportation to get to events, instead of daily use.

Field Study Plan

Project Focus

The focus of this field study is to get a more thorough understanding for further study, second is to learn how riders use the ORCA system and ticketing kiosks, especially during events which increase the load of the public transportation system, and third is to learn about pains/frustrations in context. This research will be conducted in 1 to 3 sessions of roughly 30 minutes of observational research.

Research Goal

With this research we aim to answer the question of how people currently use metro to get to and from events and get a better understanding to inform our future research.

Session Times

Research will be conducted before and after major events happening in Seattle. The most people will be traveling to an event immediately before and leaving immediately after, so those will be the prime times to do field study sessions. Some events that we plan to observe the attendees of are:

- Mariners Home Games
- Sounders Games
- Emerald City Comic Con
- Major Concerts

Data Collection

For this study, data will be collected through pure observation. During the first observation sessions we will observe the general behavior of all those present and then in subsequent sessions we will observe the behaviors of those in specific locations, such as in line to purchase light rail passes or boarding the bus/light rail.

Entree

As bus stations, light rail stations and event spaces are public spaces, access will not be an issue. If our actions and motivations are questioned during our study we will identify ourselves as conducting an observational study with the University of Washington and Seattle Metro.

Ethics

We will be observing people in a public environment, but because we will not be asking individuals for consent, we will not be recording any data that could be used to identify individuals, and if we record any photos or videos faces will be blurred out.

Field Study Protocol

Preparation

Getting ready for each study session will involve selecting an event, determining which team members will be facilitating the study session and preparing the materials needed for the study. For each study session the researchers will need to have a note taking method of their choice (paper, tablet, laptop). Additionally a hand held click counter or similar device might be useful for more accurate count.

Study session

The format of the session itself will be very flexible to fit the variety of locations and events that we are observing. Overall the researchers will aim to answer the following questions;

- What are individuals doing?
    - Payment method
- How does the number of people fluctuate from one bus or train to the next?
- How long do people seem to be waiting for ticket purchasing?
- When is the peak load on the system before/after games?

Wrapping Up

After a session the researcher or researchers will take a moment to look through their notes and clarify any confusing notation. They will then write a one to two sentence summary of the observational session.

Field Study Data

Observer: Sierramatice Karras

Event: Emerald City Comic Con

Date	Time	Location	Notes
3/15	10:00 AM	University Light Rail	As event begins that day. No crowds, or lines at the kiosks.
3/15	5:00 PM	Westlake Light Rail	2 hours before event ends that day. No crowds, or lines at the kiosks
3/16	12:00 PM	University Light Rail	2 hours after event begins that day. No crowds, or lines at the kiosks
3/16	7:00 PM	Westlake Light Rail	As event ends that day. No crowds, or lines at the kiosks
3/17	9:30 PM	University Light Rail	30 min before event starts this day. No crowds, or lines at the kiosks.
3/17	5:00 PM	Westlake Light Rail	As event ends. No crowds, or lines at the kiosks

Because of the type of event that ECCC is (flexible start and end times for individual attendees and many people stay downtown at hotels near the convention center to attend) there is not a heavy load on the metro system.

Observer: Ryan Zuzelski

Event: Mariners VS Red Sox

Location: Stadium Light Rail Station

Date: 3/31/19

4:30 - 4:34 PM

4:35 PM

- Bottom of the 8th inning
- Kiosk line no longer than 1 rider
- Families with children typically do not tap a card or use the kiosk
    - Round trip tickets?
    - Increased planning when accommodating children?
- Cash payments overwhelmingly made by older (50+) riders
    - Familiarity?
- Riders running across the street and through station to make the train

4:39 PM

- Top of the 9th inning
- Kiosk line 1 rider +/- 1
- Lime Bikes in front of ORCA tapper do not stop riders from reaching over to use them

4:45 PM

- Top of the 9th inning
- Visibly drunk patrons typically do not tap or use kiosk
    - Prepared for inundation?
    - Forget to pay?

4:50 PM

- Mariners win, can hear air horns from rail station
- Guy thought he could tap his ORCA for 2 riders, was wrong, decided not to pay for another ticket and just got on train
- Most kiosk payments made with card
- Metro/event employees all use ORCA
- Some riders reloading ORCA purse at kiosk between train arrivals

4:55 PM

- 50ish riders on platform
- People running to make train do not tap or use kiosk
    - Tunnel vision/forget to pay?
    - Prepared?

5:00 PM

- Influx of riders, +100ish
- Kiosk used frequently by riders who appear to be travelling
- Increased frequency of no-tappers in larger crowd
- Kiosk continues to be favored by older riders

5:05 PM

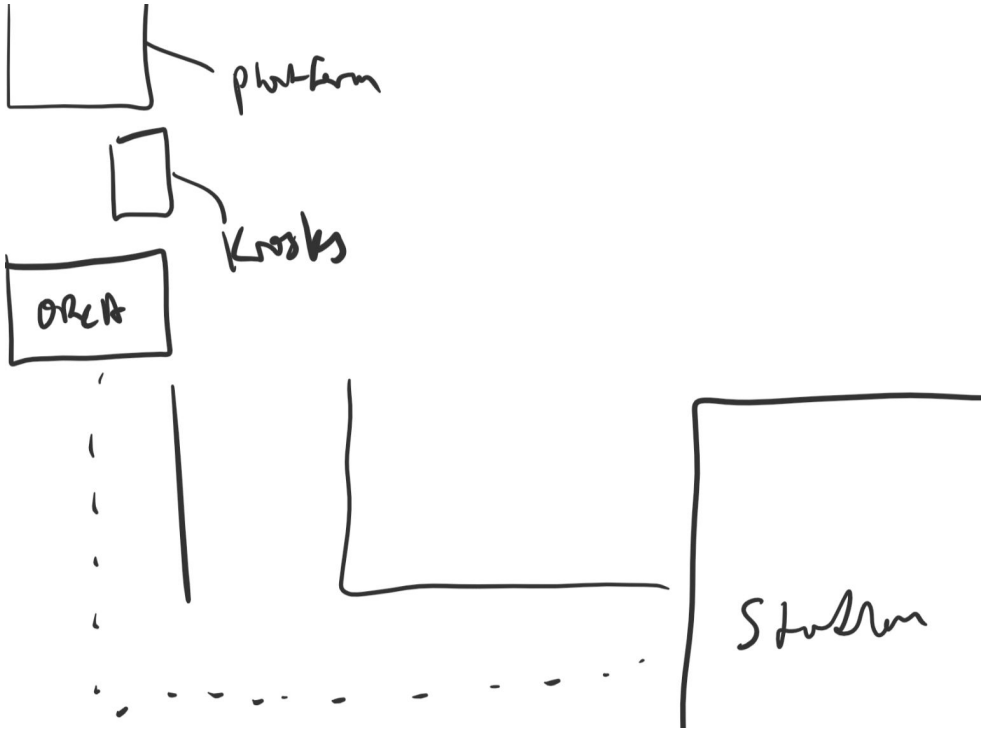
- Kiosk line consistently greater than 1 rider
- Kiosk payments often a group effort; trying to figure it out more likely than buying multiple tickets
- Conversations holding up kiosk line

5:10 PM

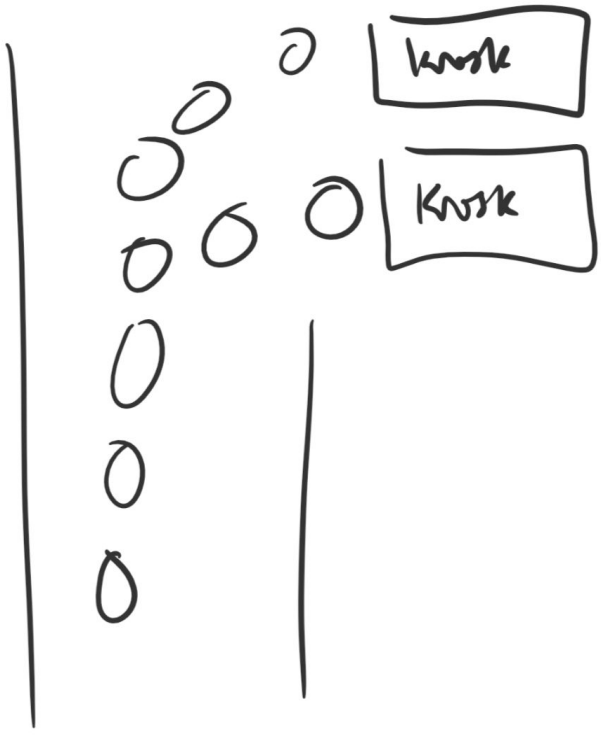
- Kiosk line consistently greater than 3 riders; continues to be dominated by older riders
- Kiosk payments still mostly made by card

5:15 PM

- Some kids without parents use cash to pay at kiosk
- Kiosk line consistently greater than 5 riders



Overview of station layout, dashed line is path of event attendees to light rail



Two kiosk lines merge into one when platform is busy

5:20 PM

- Woman recalls time she didn't pay fare because she had never seen fare enforcement officers, rode the light rail to capitol hill station and saw officers board train as she left. Now she always pays
- 150-200 riders on platform (peak)
- Train still fits all riders on platform, leaves none behind

5:25 PM

- Guy asks me if I am doing a book report. I state my intentions, he mentions a need for additional signage marking ORCA tappers.
- 50ish riders on platform
- Kiosk line still greater than 1 rider
- Guy sprints to the train, spilling his uncovered beer all over the platform and it is dripping in the train

5:30 PM

- Less than 50 riders on the platform
- Family with 3 kids; one kid runs ahead and waits by the kiosk for her parents. Mom tells her they already have their tickets, they board

5:35 PM

- Less than 50 riders on platform
- Kiosk line 1 rider +/- 1

Questions for Metro officials (yellow vests on platforms)

- How long have you been here today?
- Describe the activity at kiosks prior to the game.
- After?
- What FAQs do you get from riders?
- Describe the riders that use kiosks to pay fare.
- Describe the riders that use cash to pay fare.

Planning for Future Phases

The following test kits contain all of the elements needed to complete the Usability Tests and User Interviews being done in Milestone Two. The consent form is used for both testing plans. Below, each plan introduces the purpose, key research questions, method of testing, note-taking documents, and analysis method for the respective research.

Usability Testing Plan[11]

Purpose

The goal of the usability testing is to test the TransitGO application and its capacity to meet event attendees' user needs. A usability test is used to evaluate the current status of a application or website to further understand where is is meeting (or not meeting) users' needs.

Research Questions

Key research questions that will guide this usability test on TransitGO are:

- Are users able to buy and use tickets on the TransitGO Application
- Does TransitGO effectively help event attendees use Seattle-area public transportation?

Participant Characteristics

We aim to conduct this informal usability testing with 10 to 15 participants. These participants will be event goers -- this is ensured by our recruitment strategy. All participants will be over 18 years old.

Method

The usability testing will be performed at events or major transportation hubs in the Seattle Area. This "guerilla" recruitment method will replace any formal recruitment procedures. The smartphone that we are testing with is equipped with a version of TransitGO in which the participants may go through the entire process without paying for a ticket.

Consent Form

Each participant will be asked to sign a consent form, which can be found here.[12]

[11]Disclaimer: Parts of this document were adapted from projects that the team has conducted in previous coursework.
[12]https://docs.google.com/document/d/1ky2056rlBhMesKeHbiGF15emoF6xKYCvUBiRvEM7exI/edit?usp=sharing

Test Approach

Below is an outline of how the usability test will be conducted. Since the usability studies will be conducted informally, at event, we aim for each test to last about 15 minutes.

Pre-Test Questions

The following questions will be asked to each participant to quickly gauge their familiarity with Seattle public transportation and the TransitGO application. If the participant has preceded the usability test with a user interview, these questions can be skipped.

- How did you get to the event today?
    - If public transportation, what type?
- How often do you use public transportation?
- Have you ever used the TransitGO application?

Tasks

All participants will be asked to demonstrate two key tasks during the usability tests:

1) Buy bus a ticket on the TransitGO App
2) Use a ticket on the Transit Go App

Additional tasks are listed below. These are to be used if participant availability allows the team to perform additional testing to gather more data.

3) Buy a link ticket from the stadium station to mt. baker
4) User downloads and sets up app on personal device

Post-Test Questions

Below are questions that each participant will be asked:

- On a scale from 1 to 5, with 1 being the easiest, how easy or hard was each task?
- On a scale of 1 to 5, with 1 being the least useful, how useful is this application? Why?

- What was good, what was bad and what can be improved? Do you have any suggestions for the TransitGO application?
- Any other questions or comments?

Moderation Script

The moderation script can be found integrated into the data collection form found here.[13]

Test Environment

The usability tests will take place outside of popular Seattle events and at key public transportation hubs. Our main events of study will be Seattle Mariners games. This was chosen based on the amount of event attendees and the logistics of our timeline. We will also try to conduct usability studies at concerts, conventions, and other Seattle events if time allows. Our testing environment will be loud and we will be surrounded by many other people.

Facilitation Approach

Sessions will be conducted on the ground at events with one moderator and one notetaker. The participants will be asked to think out loud while completing the tasks. A note-taking sheet will be created to ensure consistency between team members' data collection.

Data Collection

Data will be collected using a note-taking form to ensure consistent information gathering from all researchers. This will be taken using a paper form. If given consent by the participant, the testing sessions will be recorded using either video or audio.

Data Evaluation

We will evaluate our qualitative data via thematic analysis. By grouping non-numeric data based on prevalent themes, we can observe meaningful patterns across our study. Affinity diagramming will also allow us to structure our findings, identify themes, and prioritize our results. Qualitative data will be analyzed via calculating the average ease or difficulty of each task.

[13] https://docs.google.com/document/d/1nnEVOy2ojR6RC1lPOut1m8yYdTpttbsoGpm7Bp4aMis/edit?usp=sharing

Reporting

This data will be compiled with other evaluation methods and reported on in a final report on April 29th, 2019. The findings from the usability study will be further used to create design recommendations and final materials that will be presented on June 7th, 2019.

Usability Testing Note-Taking Form/Data Collection Sheet

Event_____ Date___/___ Time___:___ Participant # _____

Reminder - Participant needs to sign Consent Form

If the participant has preceded the usability test with a user interview, the first 3 questions can be skipped

Bold text is script to be read aloud

SCRIPT: **Hello. We are UW students working with King County Metro and Sound Transit. Would you be willing to participate in a 5 to 10 minute usability study?**

Thank you for participating in our usability study. First, we need you to sign this consent form (*hand over form).* Before we begin the test, we would like to ask you some questions about your transportation habits.

How did you get here today? (Circle)

Bus	Light Rail	Sounder	Car	Ride Share	Walk	Other

How often do you use public transportation, if at all?

Have you ever used the TransitGO application? (Circle)

Yes	No

SCRIPT: **Thank you so much. We will now conduct the usability test. I want to emphasize that we are testing the application, and not you. None of us designed the application and we want your honest feedback to improve it. As you go through each task, I will ask you to think out loud, to help me better understand your thoughts. Please describe your actions, emotions, and thoughts as they happen. (*Hand participant the phone open to the TransitGO App)***

Notes:

Task 1: **Please use the app to buy a bus ticket**	Task 2: **Use the you bought ticket on the app**

Do you have additional time to complete more tasks, or would you like to move on to the debrief?

Task 4: **Buy a link ticket from the Stadium Station to Mt. Baker** *(Skip if needed)*	Task 3: **Download and set up the app on personal device** (*Skip if needed)*
	Would you be willing to test this app on your personal device?

On a scale from 1 to 5, with 1 being the easiest, how easy or hard was each task? And why? (Circle)

Task 1

1	2	3	4	5

Task 2

1	2	3	4	5

Task 3 (*Optional*)

1	2	3	4	5

Task 4 (*Optional*)

1	2	3	4	5

On a scale of 1 to 5, with 1 being the least useful, how useful is this application? Why?

1	2	3	4	5

What was good, what was bad and what can be improved? Do you have any suggestions for the TransitGO application?

SCRIPT: **Thank you so much for participating in our usability test. Do you have any additional questions or comments for me?**

Interview Plan[14]

Purpose

To assess the needs and pain points of Seattle event attendees using public transit.

Research Questions

Key research questions that the user research will aim to answer are:

- How do event attendees get to events?
- How do public transit users pay for the use of buses/light rail/etc.?
- For those riders who use cash, what is preventing them from using the TransitGO app?
- For those riders using the TransitGO app what parts of the app are effective and ineffective?

Participant Characteristics

We aim to conduct this informal interviews with 10 to 15 participants. These participants will be event goers -- this is ensured by our recruitment strategy. All participants will be over 18 years old.

Method

The interviews will be performed at events or major transportation hubs in the Seattle Area. This “guerilla” recruitment method will replace any formal recruitment procedures. We have both a short script interview, which is a list of checkboxes that can be addressed quickly if the participant does not have much time, and a long answer interview, a series of open ended questions that we will ask to get a more detailed look into a user’s experience, this longer interview will be incentivized with gift cards.

Consent Form

Each participant will be asked to sign a consent form, which can be found here.[15]

[14]Disclaimer: Parts of this document were adapted from projects that the team has conducted in previous coursework.
[15]https://docs.google.com/document/d/1ky2056rlBhMesKeHbiGF15emoF6xKYCvUBiRvEM7exI/edit?usp=sharing

Test Approach

Interview Questions

- How did you get here today? (Circle)
- Why did you choose that transportation method? Is this your typical method of transportation?
- If public transit: (if no skip to next set of questions)
    - How did you pay for your public transit? (Circle)
    - Overall how would you rate your experience for these categories: (Circle) *(Skip if short on time)*
        - Crowding (1-Not at all crowded, 5-extremely crowded)
        - Ease of Use (1-Very easy to use, 5-Very difficult to use)
        - Wait Time (1-Very easy to use, 5-Very difficult to use)
    - What challenges were there? (i.e. route planning, transfers, buying tickets)
- How often do you use public transportation? (Circle)
- Which mode do you use most frequently? (Circle)
- Why do you use this mode?
- Have you ever heard of the TransitGO app? (Circle) *Skip to tell us about experience if they used app today*
    - If no: Would you be interested in a mobile app alternative to paying with cash? (Circle)
        - Why or Why not?
    - If yes: Have you used the TransitGO app? (Circle)
        - If yes: Can you tell us about your experience?
        - If no: What has prevented you from useing it?
- What incentives would make you want to download and use the TransitGO app? *(Skip if short on time)*
- Do you have any additional questions or comments for me?

Moderation Script

The moderation script can be found integrated into the data collection form found here.[16]

[16]https://docs.google.com/document/d/1q2P3ppqdusIHJZ8SCI3gTxjvi3fTHnKL3A30l-IIBA0/edit?usp=sharing

Test Environment

The interviews will take place outside of popular Seattle events and at key public transportation hubs. Our main events of study will be Seattle Mariners games. This was chosen based on the amount of event attendees and the logistics of our timeline. We will also try to conduct usability studies at concerts, conventions, and other Seattle events if time allows. Our testing environment will be loud and we will be surrounded by many other people.

Facilitation Approach

Sessions will be conducted on the ground at events with one moderator and one notetaker. The participants will be asked to think out loud while completing the tasks. A note-taking sheet will be created to ensure consistency between team members' data collection.

Data Collection

Data will be collected using a note-taking form to ensure consistent information gathering from all researchers. This will be taken using a paper form. If given consent by the participant, the testing sessions will be recorded using either video or audio.

Data Evaluation

We will evaluate our qualitative data via thematic analysis. By grouping non-numeric data based on prevalent themes, we can observe meaningful patterns across our study. Affinity diagramming will also allow us to structure our findings, identify themes, and prioritize our results. Qualitative data will be analyzed via calculating the average experience answers from the Likert scales.

Reporting

This data will be compiled with other research methods and reported on in a final report on April 29th, 2019. The findings from the interviews will be further used to create design recommendations and final materials that will be presented on June 7th, 2019.

Interview Note-Taking Form/Data Collection Sheet

Event_____ Date___/___ Time___:___ Participant # _____

Reminder - Participant needs to sign Consent Form

Bold text is script to be read aloud

SCRIPT: **Hello. We are UW students working with King County Metro and Sound Transit. Would you be willing to participate in a 5 to 10 minute interview about your transportation habits?**

Thank you for participating in our interview. First, we need you to sign this consent form (*hand over form).* Let's get started.

How did you get here today? (Circle)

Bus	Light Rail	Sounder	Car	Ride Share	Walk	Other

Why did you choose that transportation method? Is this your typical method of transportation?

If public transit: (if no skip to next set of questions)

How did you pay for your public transit? (Circle)

Personal ORCA	Org ORCA	TransitGO	On Board Cash	Kiosk Cash/Card	Pre Bought Ticket	Other

Overall how would you rate your experience for these categories: (Circle) *(Skip if short on time)*

Crowding (1-Not at all crowded, 5-extremely crowded)

1	2	3	4	5

Ease of Use (1-Very easy to use, 5-Very difficult to use)

1	2	3	4	5

Wait Time (1-Very easy to use, 5-Very difficult to use)

1	2	3	4	5

What challenges were there? (i.e. route planning, transfers, buying tickets)

How often do you use public transportation?

Never	Monthly	Weekly	Daily	Other

Which mode do you use most frequently? (Circle)

Bus	Light Rail	Sounder	Other

Why do you use this mode?

Have you ever heard of the TransitGO app? (Circle) *Skip to tell us about experience if they used app today*

Yes	No

If no: **Would you be interested in a mobile app alternative to paying with cash?**

Yes	No

Why or Why not?

If yes: **Have you used the TransitGO app?** (Circle)

Yes	No	
Can you tell us about your experience?	**What has prevented you from using it?**	
		I normally use an orca card or other form of payment
		Don't want another app on my phone
		Don't use public transit enough
		Too much effort to install the app and set up an account
		Don't trust putting my payment information online
		Other

What incentives would make you want to download and use the TransitGO app? *(Skip if short on time)*

SCRIPT: **Thank you so much for participating in our interview. Do you have any additional questions or comments for me?**

Consent Form

We are students at the University of Washington working with Seattle Metro. We will be interviewing you about your use of the Metro system to attend today's event and/or your knowledge and opinion of the TransitGO app. Participants in this interview could have some of their information included in reports we create for class.

Important things to know:

- If you don't want to be interviewed, you don't have to be.
- You can stop being in the research at any time. If you want to stop, please tell the researchers.
- You can talk to research team members at any time. Ask us any questions you have.
- If you would like to redact anything from the transcript after the interview, let us know.
- You may be filmed, photographed or recorded. If you do not want to be please let us know and the interview will be done without any recording.

If you consent to participate in our interviews please sign below.

#	Date	Printed Name	Signature

Next Steps

With the completion of the elements of Milestone One, our team is fully prepared to work on Milestone Two. The results of our initial research are essential to understanding the background and context of our design space. The test kits will allow us to efficiently complete our usability tests and user interviews with consistent data collection. With the knowledge we gained and the tools we created in this Milestone, we are confident going into our next stage of our capstone project.

In the research and evaluation phase, we will continue to conduct independent research and begin to collect user research data using the materials we created in the preparation phase. Big data analysis, user interviews, and usability testing will lead to a comprehensive analysis of our research and evaluation data, constructing a framework for the design phase.