Milestone Two: Research and Evaluation

Mobility Innovation Center: Event Attendees

Streamlining Public Transportation for Event Attendees

Team 20
Sierramatice Karras, Zach Thomas, Ryan Zuzelski, Zoe Escalona

In Partnership with

MOBILITY INNOVATION CENTER at the UNIVERSITY of WASHINGTON

King County METRO

SOUNDTRANSIT

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CHALLENGE SEATTLE

Executive Summary[1]

This document discusses our methods, results, and findings generated during our Research and Evaluation phase. We conducted user interviews, usability testing, and big data analysis, through which a number of artifacts were created to aid in defining and defending research findings.

Interviews yielded a refined sense of what event attendees need and expect from a mobile ticketing application. These requirements served as a foundation for our usability testing. Usability tests provided insight about our users' mental models in relation to mobile ticketing. These findings will leverage future design decisions in pursuit of a more intuitive user experience. Big data analysis offers a macro-view of the problem space and allows us to analyze the public transportation experience of event attendees on a systems level.

Our major findings from research and evaluation suggest that increased adoption of the TransitGO application by cash users may be achieved through UX design improvements. More careful integration of Trip Planner, modern payment options, and app usability upgrades are among the highest priorities. These changes seek to make TransitGO the one-stop mobile application for Seattle public transit that it could be, turning would-be cash payments into digital ones through association of mobile ticketing with other critical features.

[1] Disclaimer: Parts of this document were adapted from projects that the team has conducted in previous coursework.

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Introduction

This document is a compilation of the work that we have produced during our Research and Evaluation phase. We have conducted interviews and usability testing to refine our idea of who our users are, what they want out of the TransitGO application, and how we can improve their ticketing experience. Through analysis of the data collected through these methods, we have produced artifacts to aid in our Design phase.

In the Research and Evaluation phase, we collected data from a total of 48 participants. It should be noted that due to guerilla research tactics some participants participated in either interviews or usability testing, while others participated in both. However, our participant numbers are consistent throughout our artifacts. We collected both qualitative and quantitative data during research and evaluation. This data appears in this document mainly in the form of graphs, charts, tables, and direct quotes.

The Interview Report captures sentiment towards TransitGO and the ticketing experience in general. The Usability Testing Report summarizes the successes and shortcomings of TransitGO as a mobile ticketing application for use by event attendee public transportation riders. The Big Data Analysis Report evaluates the public transportation experience of event attendees on a systems level.

We conclude this document with a holistic examination of our findings during the Research and Evaluation phase, where we identify design implications and direction for future work.

Interview Report

Goals

We conducted interviews of event attendees in order to get a better understanding of their current habits as well as their knowledge and expectations of the TransitGO application. The research questions we attempted to answer with our interviews are as follows:

- 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?
- What features do people expect from TransitGO?

These research questions get us closer to achieving our ultimate goals by dissecting the public transportation ticketing experience and revealing the motivations behind different user flows.

Approach

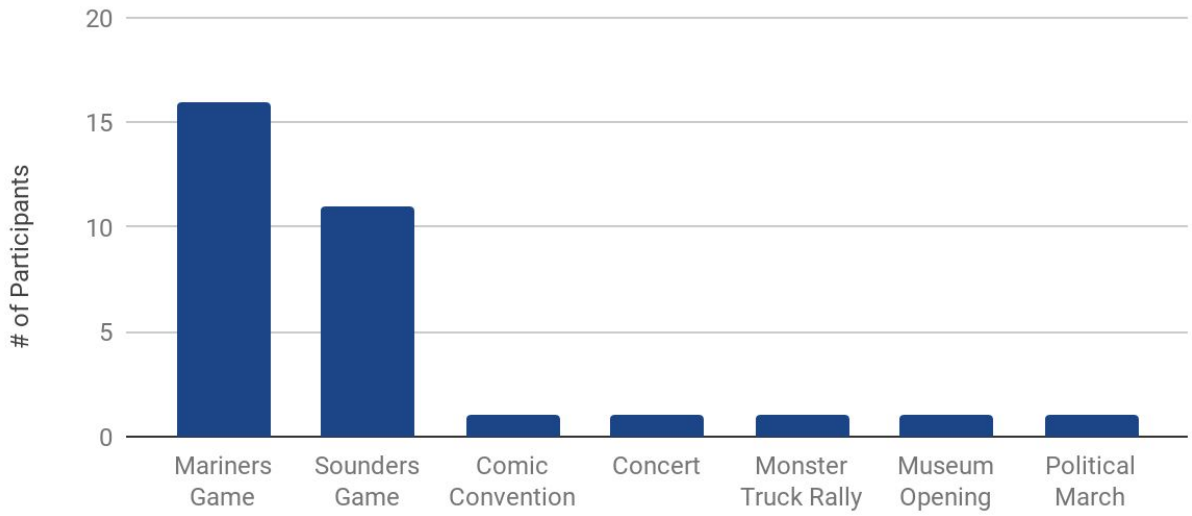
These interviews were conducted at events or major transportation hubs in the Seattle Area by approaching potential event attendees and asking them to participate in our study. We supplemented these interviews (which were often cut short by participant's buses or friends arriving) by interviewing people who had recently attended events about their experience. These sit down interviews allowed us to take more detailed notes and ask more follow up questions. Participants in both formats of the interview signed a consent form, the form and the signatures are available in Appendix V and VI.

The interviews were conducted by a moderator and recorded by a notetaker. Notes were taken using a note-taking form to both increase the efficiency of and standardize the interview process. Two different forms were used during the study, the second form being created based on the findings of the first ones and the gaps we were seeing in our data. The note-taking forms are available in Appendix III.

Overview of Participants

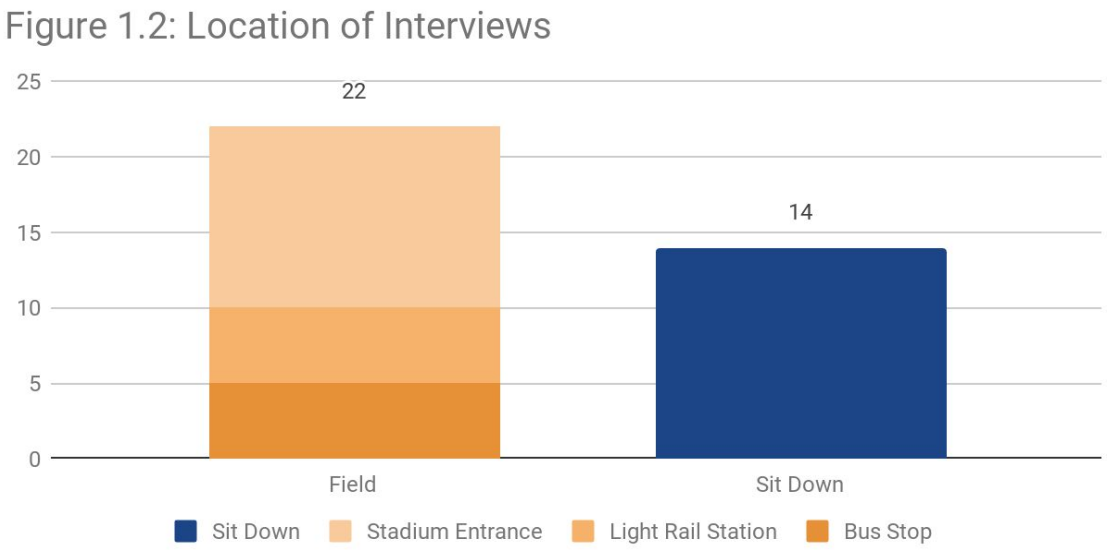
We interviewed a total of 36 participants, more than doubling our original goal of 10 to 15. All of our participants were event attendees and above 18 years old. The following graphs display some further demographics of our participants[2].

Figure 1.1: Most Recent Event Attended by Participant

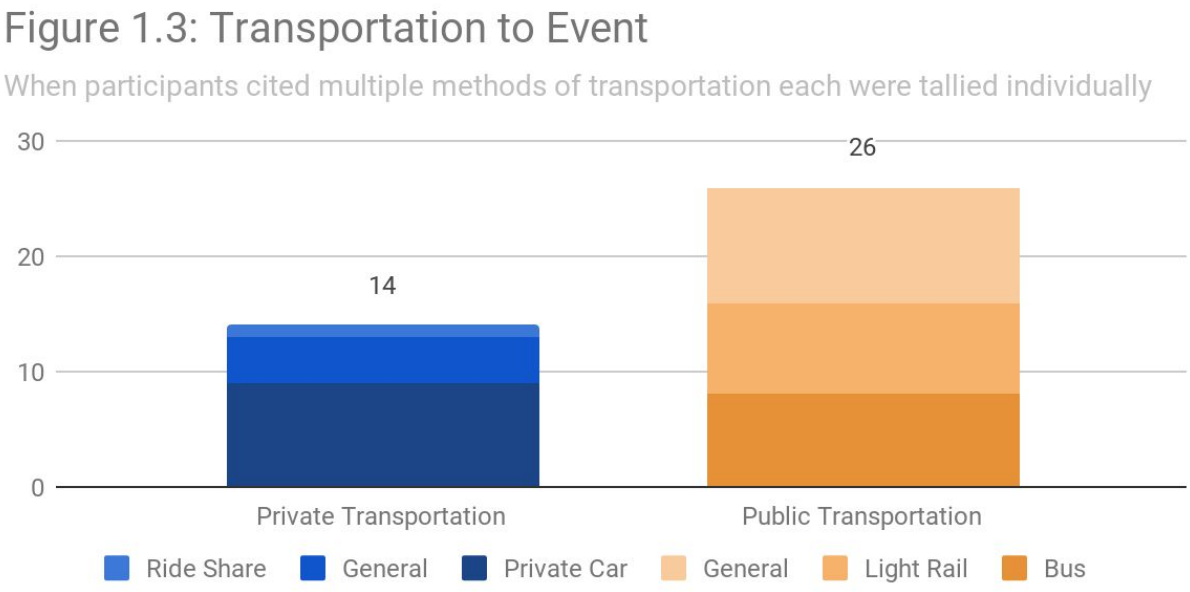


Our participants were attendees of events ranging from monster truck rallies to art museum openings, but the vast majority of our participants were recent attendees of a major sporting event. Figure 1.1 shows what events they attended. Participants were recruited at major events, and due to the time of year Mariners and Sounders games were the most frequent. For the supplemental interviews we asked the participants about the last event they had attended. Figure 1.2 shows the number of in the field and sit down interviews we conducted, as well as specifically where the field interviews took place.

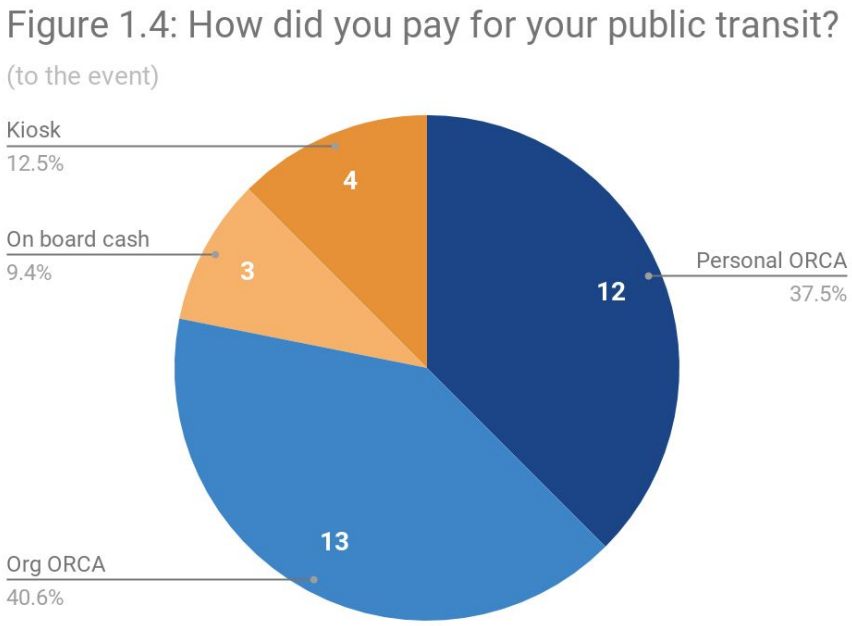
[2] Disclaimer: not all participants answered all questions due to both the branching format of our interviews and the frequency of interviews being cut short due to the setting.



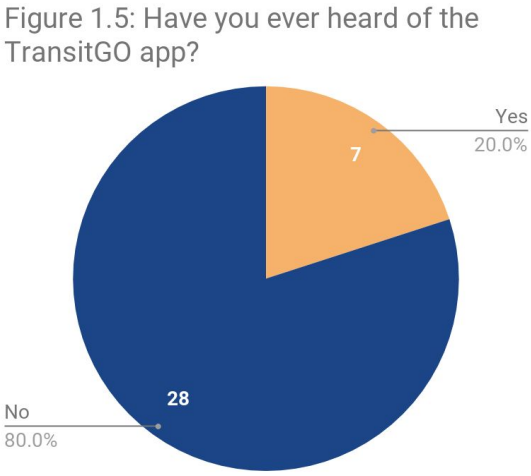
The interviewees got to events in a variety of ways, but the majority of the people we talked to used public transportation. Figure 1.3 shows the distribution of how our participants got to their most recent event.

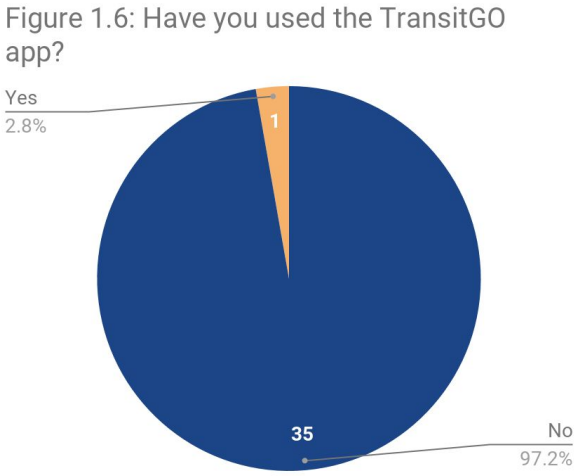


The majority of the public transportation users that we spoke to, most frequently used ORCA (either personal or provided by an organization like school or work) to pay. The distribution of payment type with our participants is shown in figure 1.4 below.



Of the 36 that we interviewed, only 7 people had heard of the TransitGO application (shown in figure 1.5) and only 1 had ever used it (shown in figure 1.6).





Unfortunately, due to the informal format of our interview, we were unable to have an in-depth conversation with the single participant who had used the app (his bus arrived mid-interview). We were able to get a large number of insights from people

using the app in our Usability Study, the report of which is included in this document.

Results

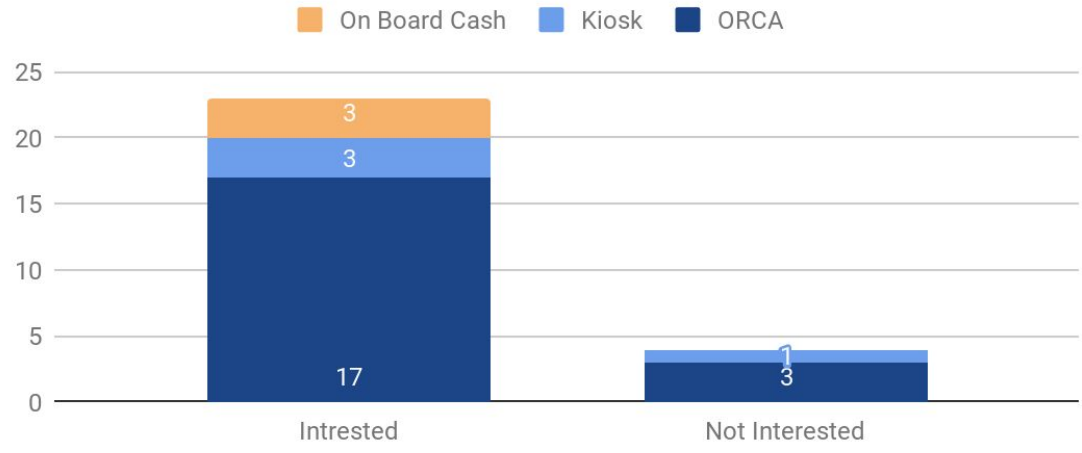
Our interviews yielded a number of interesting findings about our participants' relationship with mobile ticketing, prior knowledge of TransitGO, and desired features of a mobile ticketing application. These findings are discussed in-depth below.

Who wants Mobile Ticketing?

We asked our participants, "Would you be interested in a mobile app alternative to paying with cash? Why or why not"? Later, this question was changed to, "Would you find a mobile ticketing application useful for getting to events"? We found that the majority of the people we spoke to were interested in a mobile ticket application for Seattle transit. All of the on board cash users and most of the kiosk users we spoke to were interested in the idea of a mobile alternative to using cash on the bus, this can be seen in figure 1.7 below.

Figure 1.7: Interest in a mobile ticket alternative to cash

based on respondent's current payment method



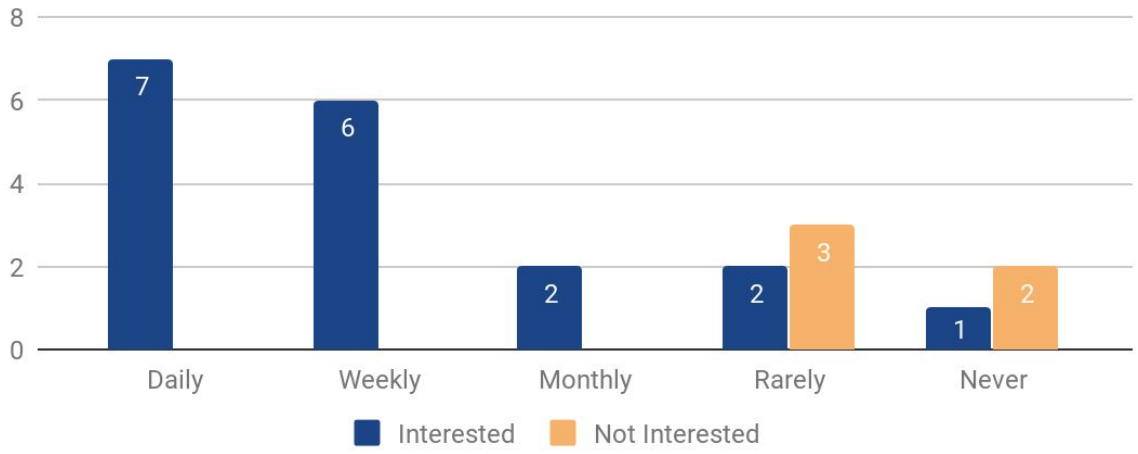
Many of the ORCA card users we spoke to were interested in mobile ticketing. Some of these were infrequent users of the public transit system, ones who frequently forgot to refill their card. Others were so frustrated with the online refill system and the 24-48 hours it took to apply to the card that they were only refilling their ORCA

card at kiosks (which they frequently had to go out of their way to get to). These users expressed a willingness to stop using the ORCA card in lieu of TransitGO mobile ticketing.

Others cited the app as a good back-up or supplemental tool to their ORCA card. These users didn't want to switch away from using their card, but liked the idea of having the TransitGO application in the "Crap, I don't have cash" moments (Participant 36). One participant relayed that he had a work provided ORCA card, but was only allowed to use it for work related travel, so he had used cash to pay his fare to the Mariners Game (Participant 31). This particular group of users may be very advantageous to target advertisement at, possibly through their employers. Another reason cited by ORCA users as why they would be interested in a mobile ticket app was to buy tickets for others accompanying them, as that is not a feature easily provided on the current ORCA system.

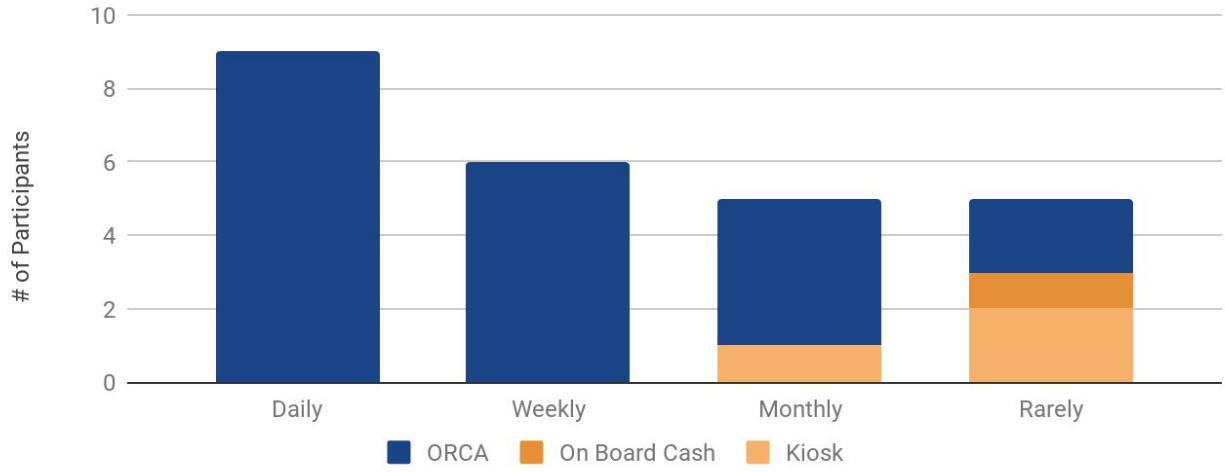
Figure 1.8: Interest in a mobile transit ticketing application

based on frequency of public transportation use



One of the goals of this project was to find ways to encourage infrequent users of public transportation to reduce cash use and adopt the TransitGO application in their event transportation. Unfortunately, our user interviews revealed that less frequent users of public transportation were less likely to be interested in a mobile ticketing application (seen in Figure 1.8). With Figure 1.9, we can see that these users are also those most likely to be paying with cash or at a kiosk. This combination creates an interesting design space to navigate when trying to target event attendees who are infrequent users of public transportation with the TransitGO application.

Figure 1.9: Frequency of Public Transportation Use and Payment Type



Ineffective Advertisements

As discussed in the participant overview, of the 36 participants that we interviewed, only 7 people had heard of the TransitGO application and only 1 had ever used it. Those who had heard of the TransitGO application did so first by mainly word of mouth and observing others use of it (4 out of 6 participants), while only 1 participant cited the advertisements for the application as how they knew of TransitGO. Of the participants who purchased light rail tickets at the station kiosks (the main location(s) that we observed TransitGO advertisements) none of them had heard of the application.

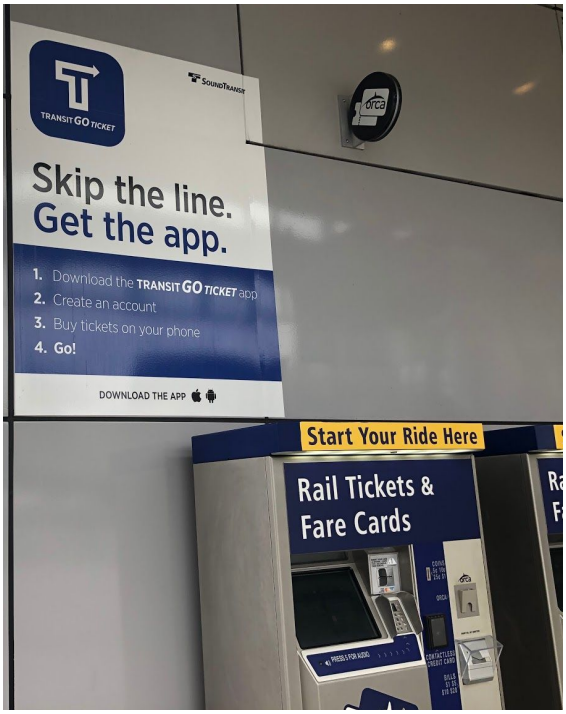


Figure 1.10: An example of a TransitGO advertisement

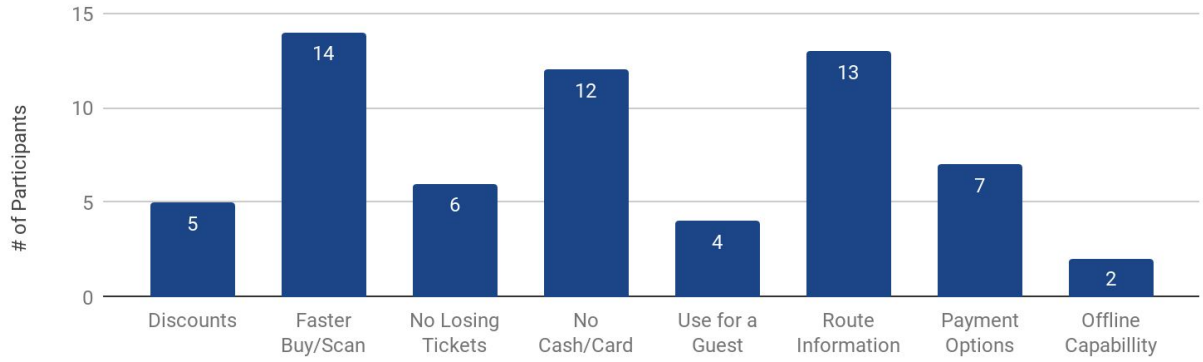
Additionally, there were those who were interested in downloading the app after learning about it, but they were never reminded to in a location conducive to do so. When one participant saw the advertisement for the app, she thought about downloading the app, but decided against it because it was “faster to use a kiosk than download [and set up] an app” (Participant 34). Another participant said he was interested in the application and thought about downloading when he was at bus stations but forgot about the app when he was in a more stationary setting.

Desirable Features

When asking about interest in a public transportation mobile ticketing app, we also asked what they would want or expect from it. Participants mentioned a wide variety of features, in Figure 1.11, the frequency of those mentions is shown. The majority of these respondents had not used the application and were speaking of features that would get their interest or be needed in this type of application.

Figure 1.11: Desirable Features in a Mobile Transit Ticket App

definitions and examples of these categories are provided in a table below



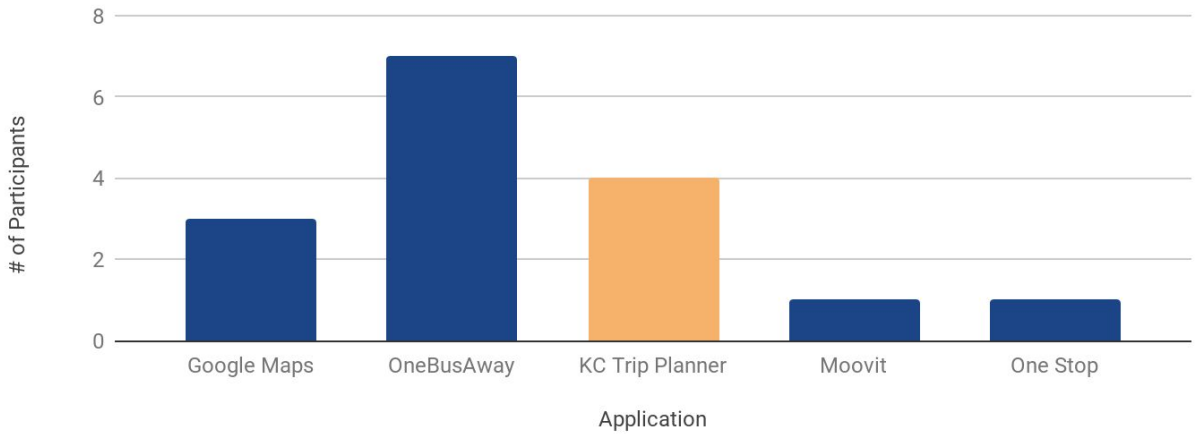
Some of these features are things that the TransitGO applications already includes in some capacity, such as faster buying and scanning of tickets, and not having to worry about losing paper tickets. These features should be emphasized in future designs.

Frequency	Category	Definition/Examples	Existing?
5 out of 33 Participants	Discounts	• A first time free ticket, bulk discounts, cheaper app fares than cash fares	No
14 out of 33 Participants	Faster Buy/Scan	• Not needed to backtrack to a kiosk or for cash when ORCA card doesn't have enough money • Faster than reloading an ORCA card online • Places to scan ORCA cards are in inconvenient locations/not on light rail platforms	Yes
6 out of 33 Participants	No Losing Tickets	• No need to keep track of a paper ticket or separate ORCA card	Yes
12 out of 33 Participants	No Cash/Card	• Not having to carry cash or a credit card • Everything is centralized in a phone • Sporting event venues do not	Yes

		allow bags	
4 out of 33 Participants	Use for a Guest	• Sending tickets to a friend • Using multiple tickets for a group/family	Partial
13 out of 33 Participants	Route Information	• Inclusion of information such as a trip planner, maps of bus routes, bus schedules, on-time bus information, and incident reports	Partial
7 out of 33 Participants	Payment Options	• A want to use a secondary payment option such as apple pay to purchase tickets • Not wanting to get their credit card out	No
2 out of 33 Participants	Offline Capability	• The application working offline and in areas with poor service	No

Some features that our interviewees found desirable are not currently available in the TransitGO application. The most popular of these is route information, which is offered by Trip Planner. Trip Planner is implemented in the TransitGO application as a link to its desktop site. The experience of obtaining a Trip Planner itinerary and then buying tickets through TransitGO has much room for improvement, but we believe it can be remedied by more careful integration.

Figure 1.12: What apps do you use to plan trips with public transportation?



We asked interviewees, “What mobile applications or websites do you use to support your trip?”. The above chart (Figure 1.12) visualizes the responses.

We believe that one way to improve adoption of the TransitGO application is to offer features that create a more comprehensive public transportation information system. The use of multiple apps to plan a trip and buy tickets ensures a long and complicated user flow. By offering accessory amenities, use of the mobile ticketing functionality could improve by association.

Reflection

From these interviews we learned more about the current habits of potential users and their desires from a mobile ticketing application. If we repeated this process, and had more time, we would do more piloting of the questionnaire to give us more opportunities to revise questions beforehand. We would also aim to interview attendees at a wider variety of events in order to see if there are any trends within attendees of specific event types, rather than event attendees as a whole. The knowledge that we gained from this process will significantly help inform our design choices in the next phase. The above findings will be aggregated with the findings from the usability study and big data analysis to provide conclusions and recommendations at the end of this document.

Usability Testing Report

Introduction

The following section documents the entirety of our informal usability testing on the TransitGO application, including materials needed for replication. We outline the study goals, key research questions, and method of evaluation. Additionally, we analyze the results and present our findings.

Study Goals

The goal of the usability testing was to evaluate the TransitGO application and its capacity to meet event attendees' user needs. More specifically, the testing focused on the fundamental functions of TrasitGO, namely ticket buying, ticket activation, and the Trip Planner function. The results of this study are to be used to offer design recommendations for TransitGO that will reduce cash fare and increase the use of the application among Seattle-area event attendees.

Research Questions

Core research questions that guided this usability test on TransitGO were:

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

Methods

The following section outlines the logistic information for the usability test. This includes information on recruitment, participant demographics, test environment, testing format, and tasks.

Participants

We tested 22 adult participants for our usability study, which is more than the 10 to 15 participants that we outlined in our test plan. These participants were recruited on-site at various events, and also through the team's various social networks. Participants were incentivized to participant in the study by receiving an $5 Amazon e-gift card or two King County Metro bus tickets, also valued at approximately $5. The inclusion and exclusion criteria for our participants are listed below.

Inclusion Criteria	Exclusion Criteria
- Recently attended an event in the Seattle area	- Under the age of 18 (minors) - Has not attended an event in the Seattle area

The demographics of the 22 participants are documented below. This includes general public transportation frequency, the type of transportation taken to the event, and previous use of the TransitGO application. This information was acquired through pre-test questionnaires.

Figure 2.1 shows the public transportation frequency of the 22 participants in the usability test. Participant answers were organized into five broad buckets: daily, weekly, monthly, rarely, and never.

Figure 2.1: Public Transportation Habits of Participants

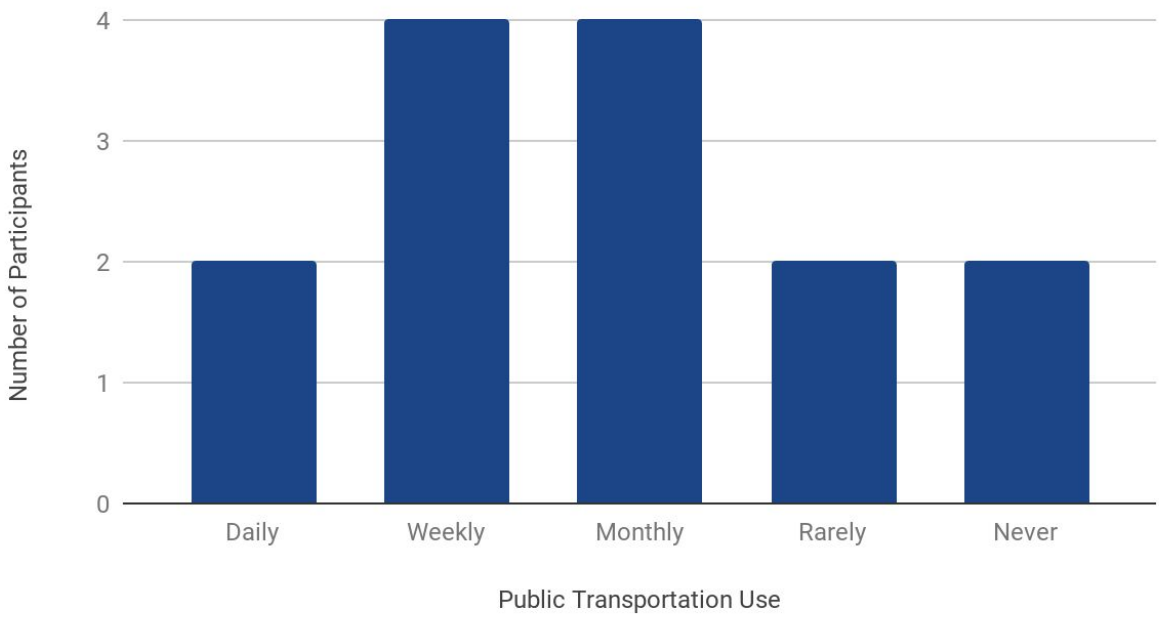
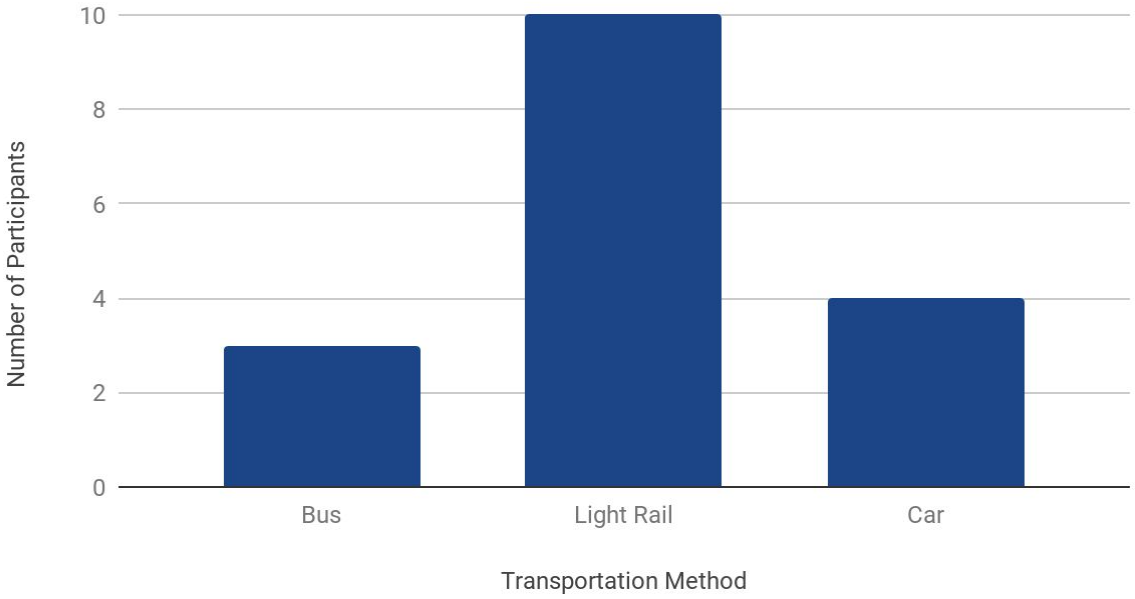


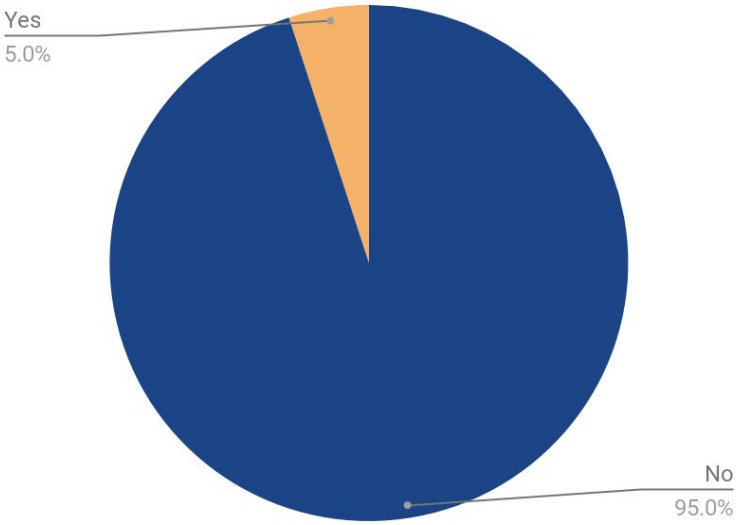
Figure 2.2 shows how usability test participants traveled to and from events, showing that a majority of participants used the Link Light Rail.

Figure 2.2: Event Transportation Method of Participants



Additionally, only one participant had ever used the TransitGo application prior to the usability test (seen in Figure 2.3.)

Figure 2.3: Prior TransitGO use by Participants

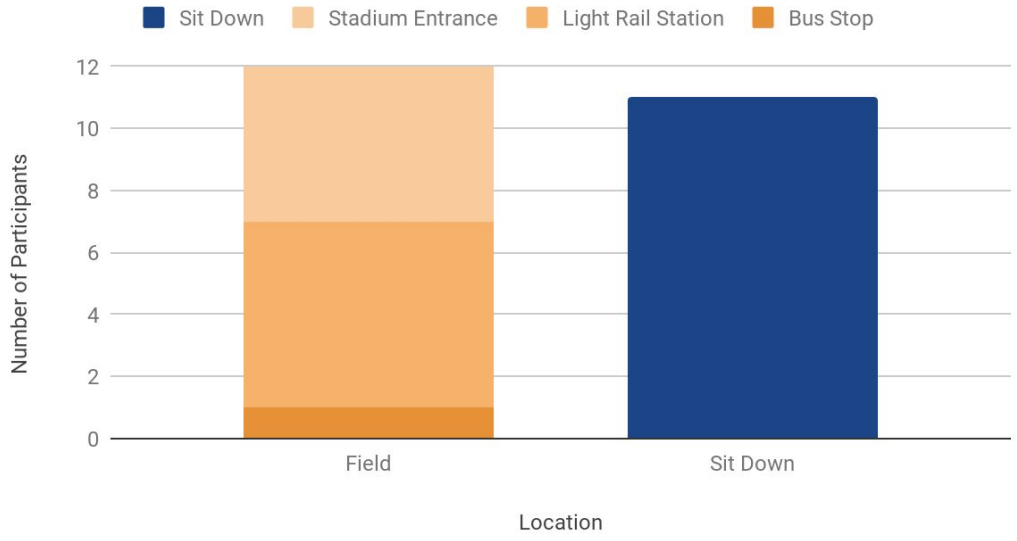


Test Environment

The usability test involved multiple test environments because of the nature of the on-site recruitment of participants. Test environments included outside of T-Mobile Park, various Link Light Rail stations, bus stops, and also at-home, sit-down usability tests with event attendees. These environments were an attempt to mimic the setting that a user would need to use TransitGO. In addition, adding sit-down tests allowed us to have a longer test session and complete more in-depth tasks with a single participant.

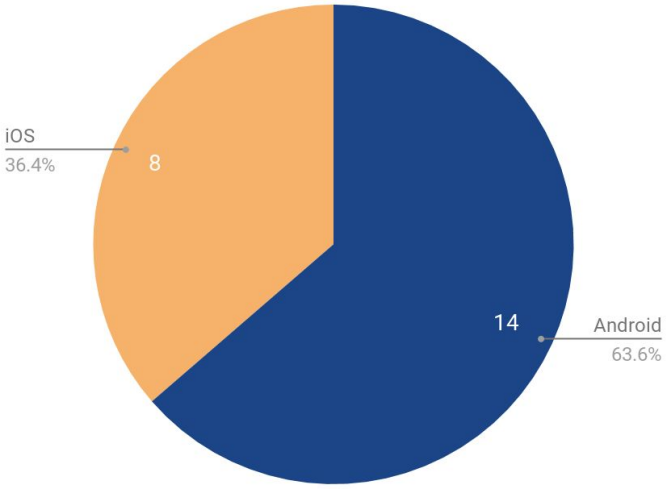
Figure 2.4 shows the location of each usability test, divided into field tests and sit-down. Field tests are further broken down into their respective testing environments: T-Mobile Park stadium entrance, light rail stations, and bus stops.

Figure 2.4: Location of Usability Tests



The usability tests were conducted on both Android and iOS operating systems (see Figure 2.5.) We chose to conduct tests on both operating systems in order to discover any differences between the two versions of the application and validate if our findings were relevant to all versions of TransitGO or a specific platform.

Figure 2.5: Operating System of Usability Test



Session Format

Each session comprised of three main parts: a pre-test questionnaire, usability testing of specific tasks, and a post-test questionnaire. The sessions would only commence after the participant had signed a consent form. The length of the sessions was determined by the amount of time that the participant had, ranging from 5 to 20 minutes.

There were two different sets of tasks that the participants could have completed. The first set of tasks (Tasks 1 through 4) were largely stand-alone tasks that aimed to test the core functions of the TransitGO application (e.g. buying and activating a ticket). The second set of tasks (Tasks 5 through 7), were introduced to more closely evaluate how a user would actually use the application (e.g. using the Trip Planner before buying and activating the tickets). Tasks 5 through 7 were to be completed in sequence, with each task building upon the previous one. This second set of tasks was introduced mid-way through the informal usability testing for two reasons. First, we were reaching data saturation on our original tasks, and, second, in order to gather additional data on other features of the TransitGO application (e.g. Trip Planner).

Session Roles

Each session involved a participant, test moderator, and note-taker. The moderator would ask the pre and post-test questionnaires and lead the participant through the tasks. The note-taker stood to the side and observed the participant's actions

on the TransitGO application. Using the note-taking form, they would record questionnaire answers and participant actions and quotes.

Tasks

Participants were asked to complete two to seven tasks, depending on their availability. We had 22 participants in total, but because of our testing method and environment, not all participants completed every task. The number of participants who completed each specific task is indicated below. The full description of these tasks (and scenarios) can be found on the note-taking forms in Appendix II.

Task #	Task Description	# of Participants
1	Buy a King County Metro bus ticket	15
2	Use the bus ticket purchased in Task 1	15
3	Buy a one-way Link Light Rail ticket from Stadium Station to Mt. Baker	8
4	Download and install TransitGO on a personal device [3]	1
5	Plan a journey between UW and the Showbox SoDo	8
6	Buy the tickets for planned journey (continued from Task 5)	8
7	Use the purchased tickets in the correct order (continued from Task 6)	7

These tasks allowed us to test the core functions of the TransitGO application, including buying and using various types of tickets and planning a journey through the in-application Trip Planner, along with general usability of the application.

Metrics

During each usability test we collected both qualitative and quantitative data. The types of data collected are summarized below, with the full note-taking sheets available in Appendix II.

[3] This task had only a single participant because their task involved their own personal device instead of the test device.

Qualitative Data	Quantitative Data
• Pre-test interview questions • Participant actions/quotes (through think-aloud notes) • Post-test interview questions • Screen-recording of selected testing sessions	• Successful task completions • Likert Scale for each task difficulty

Results

This section outlines the results of our usability testing. The methods of data evaluation and description of severity ratings are described below. Key findings are organized by severity rating, while additional findings are sorted by UI element in a separate table. We also outline several successes of the application unveiled during usability testing.

Analysis

The raw data from the usability testing was analyzed in several ways. First, the hand-written notes were aggregated into a spreadsheet in order to aid ease of analyzation. Affinity diagramming was used to find common themes and identify key findings. Images of the affinity diagramming can be found in Appendix IV. The quantitative data was also analyzed via averaging the Likert Scale rating for each task difficulty.

Overall Task Difficulty

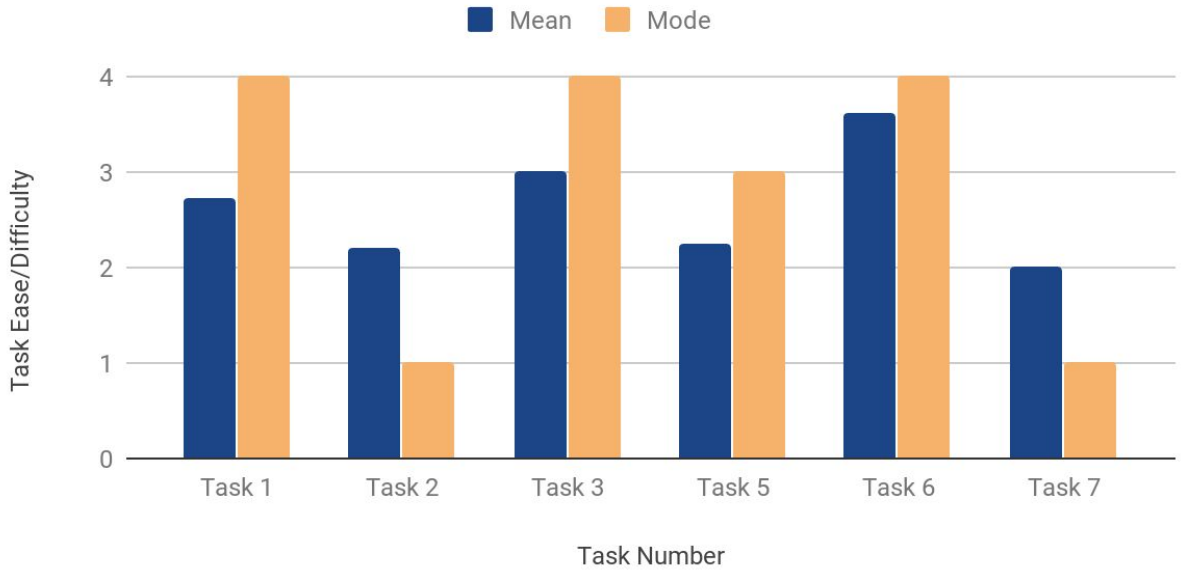
Figure 2.6 summarizes the perceived ease/difficulty of each based on the Likert Scale response from the participants. We measured the ease/difficulty on a five-point scale, with one being easy and five being hard. Both the mean and mode are represented on the chart to show the average difficulty versus the most common answer. Task 4 is not listed because only one participant chose to download the application on their personal device.

Task 6, purchasing tickets for a planned route between UW and Showbox SODO had the highest average difficulty and was tied for the highest mode (with the two

other ticket buying tasks, Task 1 and Task 3). The easiest tasks were Task 2 and Task 7, which both involved using tickets that the participant had purchased.

Figure 2.6: Perceived Task Ease/Difficulty

On a scale of 1-5 (1 being easiest)



Successes

The table below documents several of the successes of the TransitGO application that were discovered via the informal usability testing.

Findings and Evidence	*Severity*	*UI Area*
Creating an Account is Fast and Easy	**N/A**	**Account Creation**
Participants found the initial setup of the TransitGO application to be a simple process. Adherence to modern registration form standards and Google account integration made for an intuitive sign-up/sign-in process. This finding is supported by data from 1 out of 1 participants that were tasked with downloading and setting up the application on a personal device.		

Evidence • The only participant that was tasked with signing into the TransitGO application reported no problems and appreciated the Google sign-in feature. (Participant 34, Task 4)

Using Tickets is Intuitive	**N/A**	**Use**
Participants generally had no problems using their purchased tickets. The "View Tickets" button that appears after purchasing tickets and the ability to use tickets on the landing page of the app ensures quick access to purchased tickets. This finding is supported by data from 14 out of 22 participants that were tasked with buying and using tickets. *Evidence* • No reported problems on task 2: use bus ticket (Participants: 1, 14, 18, 20, 22, 24, 28, 30, 32, 34, 38, Task 2) • No reported problems on task 7: use tickets for your trip (Participants: 30, 40, 41, 43, Task 7)		

Severity Ratings

The severity ratings for each finding range from 1 to 3, with 1 being the most severe. The full descriptions of the severity ratings are described in the table below.

1	A severity rating of 1 means that the finding 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.

Findings Severity

The following table summarizes the findings of our usability testing and the number of participants that experienced each finding. Key findings are bolded. The full descriptions of the findings are listed below in *Descriptions of Key Findings* and *Additional Findings.*

Severity	Findings	# of Participants
1	**Taxonomy Issues** **a. Unintuitive Placement of "Light Rail" in the "Train" Category** **b. Confusion over the term "Store"**	20
	Inadequate Visibility of System Status	7
2	**Poor Trip Planner Integration** **a. Inability to Purchase Tickets through Trip Planner** **b. Confusion over Trip Planner Design**	11
	Unclear Function of Green Button (Android)	9
	Landing Page Lacks Appropriate Functionality	8
	Seperation of Sound Transit and King County Metro Purchases	3
3	Desire for Other Payment Options	2
	Lack of Accessibility	2
	Lack of Information about Ticket Types	2

Descriptions of Key Findings

Below are the full descriptions of the key findings, along with supporting evidence (which includes screenshots of the TransitGO application and participant quotes).The evidence also includes the specific participant and task that the finding was observed in. The findings are organized by severity from most severe to least severe.

Findings and Evidence	*Severity*	*UI Area*
Taxonomy Issues	**1**	**Global**
Participants were confused by the nomenclature used throughout the TransitGO application. This prevented some participants from completing tasks without intervention from the moderator during testing. This issue was seen most strongly		

in the categorization of the Light Rail and the naming of the ticket purchasing page.

a. **Unintuitive Placement of “Light Rail” in the “Train” Category**

Participants were often unable to find the Link Light Rail option when buying tickets, leading some to buy the wrong tickets or not buy a ticket at all. To find this option in the TransitGO application, the user must go to the “Train” category before selecting the Link Light Rail. This was unintuitive to participants, leading many of them to express frustration or confusion. This finding is supported by data from 9 out of 15 participants that purchased a Link Light Rail ticket.

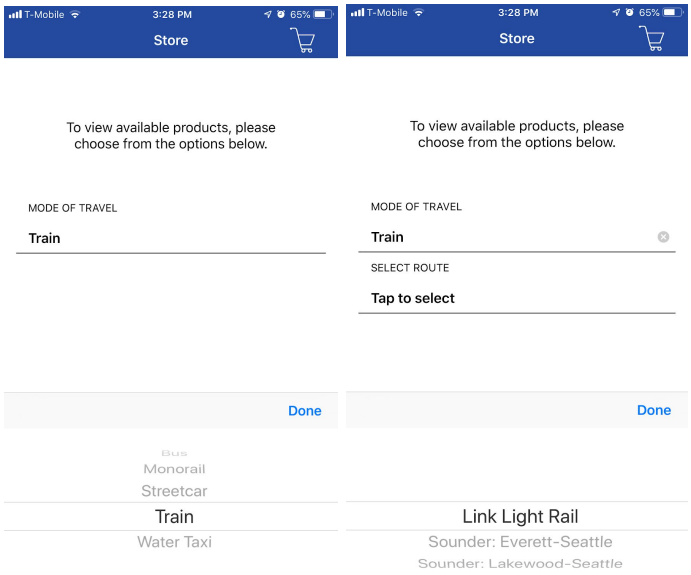


Figure 2.7: User Flow to find Link Light Rail in TransitGO

Evidence

- “That would be… that’s a train? Is it a train? Nope. It’s not any of these things.” (Participant 26, Task 3)
- “I guess train would be it.” (Participant 43, Task 6)
- “No option for light rail.” The participant buys second bus ticket instead. (Participant 43, Task 6)
- Moderator explains Light Rail was under Train, “Ohhh… I didn’t see that.” (Participant 22, Task 3)

	• Moderator shows participant that Light Rail is under Train, “Oh, it's a train?” (Participant 1, Task 3) • “Train? Which one is Light Rail. Train? Nope it's not a train.” (Participant 22, Task 3) • “Nope it's not the Monorail.” (Participant 4, Task 1) • “Wait, it just says train, where’s Link? I don’t think of them as the same thing at all.” (Participant 38, Task 3) • “I guess it's a train?” (Participant 45, Task 6) • “That was the most difficult [task]." (Participant 22, Task 3)
b.	**Confusion over the term “Store”** Participants experienced difficulty navigating to the page that allows them to purchase tickets. These participants did not associate the term “Store” with the function to buy tickets. This taxonomy confusion was experienced by 13 out of 22 participants. *Evidence* • “You kept saying ‘buy’ so I was looking for ‘buy’ not ‘store.’” (Participant 28, Post-Test) • “Taxonomy is bad.” (Participant 1, Post-Test) • Moderator explains buying new tickets, “It's not very obvious.” (Participant 1, Task 1) • “Not seeing anything obvious for buying a bus ticket.” Moderator guides participant to store, “It should say Buy Tickets.” (Participant 24, Task 1) • After given first task, “Where do I go for that?” (Participant 20, Task 1)

Inadequate Visibility of System Status	**1**	**Global**
Participants displayed confusion while using the TransitGO application to buy, activate, and use tickets for public transportation due to inadequate visibility of system status. Participants were not properly informed of their location in the application, the functions available to them on any given page, and the consequences of the actions they performed on the app. This finding is supported by data from 9 out of 22 participants.		

Evidence

- User clicks between “Use” and “Store” trying to activate ticket, and is unaware that they are already on the correct page (Participant 4, Task 2)
- Confused between newly purchased and old tickets (Participant 28, Post-Test)
- “Is that the one I just bought? How do I know the one I just bought?” (Participant 3, Task 2)
- When trying to find the ticket they purchased, “I’m assuming it’s the one at the top... oh no it’s not.” (Participant 28, Task 2)
- Having a hard time getting out of ticket viewing page (Participant 32, Task 2)
- Taps ticket, activates it successfully, but looks confused (Participant 20, Task 2)
- Looking at tickets, “So these are mine?” (Participant 45, Task 7)
- Tapping on “Use” tab when already on the Use screen (Participant 42, Task 7)
- Doesn’t know what to show driver/fare collection officer (Participant 36, Task 7)
- “Why do I have to activate it? I’m ignorant on why it just doesn’t work.” (Participant 28, Post-Test)
- “I don’t know how I would use [the ticket].” (Participant 3, Task 2)

Lack of Trip Planner Integration	**2**	**Trip Planner**

Participants experienced difficulty using the Trip Planner to plan their route and find out what tickets that they needed to purchase. They felt that the function should be more well integrated into TransitGO and offer a more usable interface.

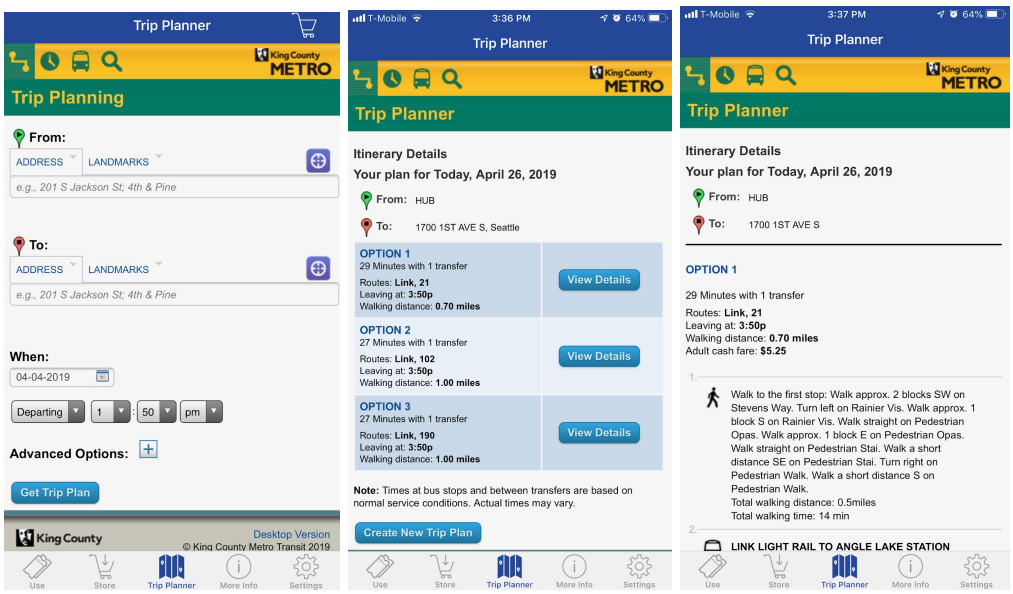


Figure 2.8: Screenshots of the Trip Planner in TransitGO

a. **Inability to Purchase Tickets through Trip Planner**

Participants expressed a desire to be able to either purchase tickets directly from trip planner or to have their planned trip information transfer over to the ticket store. This finding is supported by 8 out of 8 participants that had a task involving the trip planner.

Evidence

- "Trip Planner doesn't let you buy tickets." (Participant 32, Post-Test)
- Participant tries to buy tickets from Trip Planner but is unable to, "I don't know what to do from here." (Participant 42, Task 6)
- After using Trip Planner, "That does not appear to have gotten me to a ticket." (Participant 32, Task 3)
- "Wait, am I right? I'm going back to Trip Planner" [when purchasing tickets for a planned route.] (Participant 34, Task 6)
- Participant expected data to be transferred from Trip Planner to ticket purchasing. (Participant 40, Task 5)
- Participant expected to be able to buy a ticket from Trip Planner. (Participant 43, Task 6)

b.	**Confusion over Trip Planner Design** Participants who were unfamiliar with Trip Planner experienced difficulty achieving the task of using the program to generate an itinerary. They had issues at a number of locations such as entering a location, a lack of loading signaling and navigating within the Trip Planner. This finding is supported by 8 out of 8 participants that included a task involving the trip planner. *Evidence* ● "To be honest, I would've exited the app by now." (Participant 45, Task 5) ● "I'm going to view the details if it ever fucking loads" [at the lack of loading signaling] (Participant 34, Task 5) ● "How do you get back to the other route options?" (Participant 30, Task 5) ● "Is that in landmarks?" [when looking for a location] (Participant 30, Task 5) ● "The blue box doesn't do anything." (Participant 40, Task 5) ● "Did that work?" (Participant 40, Task 5) ● When using Trip Planner, "This is really confusing." (Participant 45, Task 5)

Unclear Function of Green Button (Android)	**2**	**Use**
Participants associated the green ticket icon that appears in the lower right corner of the Android platform with purchasing a ticket. (The button does not appear on the iOS version of the TransitGO application.) In reality, the button brings up the most recently viewed ticket. Participants used this button expecting it to take them to a screen where they could buy more tickets, often selecting it more than once while trying to complete a ticket purchasing task. When asked why participants made this association they cited the placement in the lower right and the natural connection between the color green and money led them to the assumption. This finding was supported by 11 out of 14 participants who tested on the Android platform.		

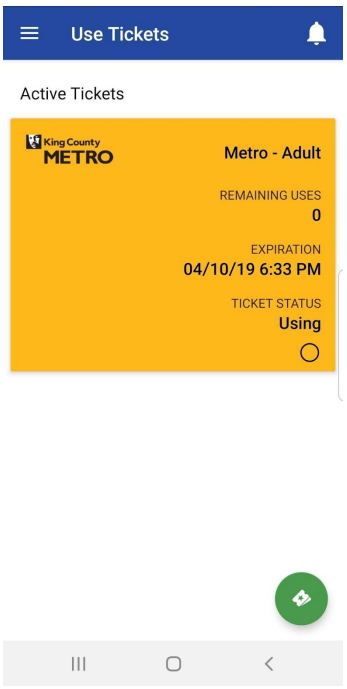


Figure 2.9: Green Button (in lower right corner) on Android Platform

Evidence

- While trying to buy a bus ticket "I thought that green button with the money symbol was buy." (Participant 1, Task 1)
- "To [the] ticket button … [participant selects the green icon] .. no that's not right." (Participant 45, Task 6)
- "Green equals money equals buy a ticket." (Participant 22, Task 1)
- Participant taps the green icon when trying to buy a ticket, "Nope." (Participant 45, Task 6)
- "What is the little green ticket?" (Participant 3, Task 1)

Landing Page Lacks Appropriate Functionality	**2**	**Use**

Participants were surprised by the initial landing page of the TransitGO application. They expressed that it was unclear and did not provide the functions they were expecting from the first screen of the application. This finding was supported by 5 out of 22 participants.

Evidence

- "[Home screen is] unclear for first time user." (Participant 38, Task 5)
- "Is this what the screen opens to?" (Participant 30, Task 1)

- Participant on landing page: “I’m not at the front yet.” Moderator: “This is the front.” (Participant 28, Task 1)
- “Start screen didn’t have any info that I wanted on it.” (Participant 20, Post Task)

Additional Findings

Along with the above key findings, we also found several additional findings that were experienced by a smaller sub-section of our participants or were considered to be less severe. These findings could be considered “quality of life” improvements and should be prioritized below our key findings. These findings are organized by UI Area.

Findings and Evidence	*Severity*	*UI Area*
Lack of Accessibility	**3**	**Global**
The lack of accessibility of the application was mentioned during the usability tests. 2 out of 22 participants cited the lack of contrast and small font size being inaccessible to seniors. *Evidence* • Lack of contrast and inaccessible font size to seniors (Participants 32 and 44, All Tasks)		
Lack of information About Ticket Types	**3**	**Store**
Participants noted the lack of information about the various ticket types that were purchasable through the TransitGO application (e.g. Youth and Reduced fares). There was also confusion over how the TransitGO application would allow users to transfer between transportation systems. This confusion was expressed by 2 of the 22 participants. *Evidence* • “What are the qualifications for reduced [fare]? I’m going to buy it.” (Participant 38, Task 3) • “It doesn’t explain what a youth is.” (Participant 38, Post-Test) • Explain transfer system better. (Participant 41, Post-Test)		

- "If I transfer, do I just need one ticket?" (Participant 41, Task 6)
- "Transfer between bus/light rail?" (Participant 38, Post-Test)

Desire for Other Payment Options	**3**	**Check-Out**

Currently to use TransitGO, the user must enter a credit or debit card to purchase tickets. Apple Pay integration (along with other payment options) was explicitly mentioned by 2 out of 22 participants.

Evidence

- Wanted Apple Pay integration (Participants 38 and 40, Post-Test)

Seperation of Sound Transit and King County Metro Purchases	**2**	**Check-Out**

TransitGO is unable to complete ticket purchases for King County Metro and Sound Transit in the same transaction. Instead, the application forces the user to make two separate purchases. Frustration over this separation was explicitly mentioned by 3 out of 8 participants that tried to purchase both a King County Bus ticket and a Light Rail ticket.

Evidence

- Participant's order was deleted by adding a second ticket, "I feel very sad." (Participant 34, Task 6)
- "For some reason it won't let me do both [light rail and bus ticket]." (Participant 45, Task 6)
- When the participant discovered that they weren't able to buy both bus and light rail ticket in one transaction, "That's crazy." (Participant 40, Task 6)
- Separate agencies make the experience confusing. (Participant 34, Post-Test)

Reflection

The usability testing allowed us to better understand how TransitGo works in the field and how users interact with the application. In addition, the testing allowed us to identify key areas to focus on for our design phase.

If we were to revisit usability testing or had more time, we could improve in a few ways. First, we would run more pilot tests to get a better understanding of how our tasks answer our research questions. We would also try to recruit participants from a greater variety of events. Based on the timing of our tests, most of our participants were Mariners and Sounders event attendees. A larger variety of events (concerts, ComicCon, etc.) may present us with alternative use cases for the TransitGO application. Finally and most importantly, we would want to have the ability to reset the application between usability tests. This was not a function of the test version of the application we used, so the usability tests were not accurate to a first time user. Instead, the participants were faced with many tickets that had already been activated. This meant that moderator intervention was required to explain the starting state of the application.

The above findings will be aggregated with the findings from the user interviews and big data analysis to provide conclusions and recommendations at the end of this document.

Big Data Analysis Report

Goals

The goal of the Big Data Analysis is to gain an understanding of how events affect the public transit system at a high level as well as to understand how the rest of our findings generalize to a larger scale. This insight allows us to better design for how King County Metro and Sound Transit can effectively handle the increased load that is seen around large-scale events. The Big Data Analysis done up to this point has been at the proof of concept level. The findings are intentionally limited but help point future analysis in the correct direction.

Methods

The Big Data analysis is being conducted on the data collected by King County Metro's APC (Automated Passenger Counter) during February of 2019. The APC system has been implemented on roughly half of the King County Metro fleet and collects information on the number of passengers who get on and off a bus at each stop. The file for February, 2019 is 745MB and contains more than 11 million rows of data. It is being analyzed as a proof of concept before moving on to larger amounts of data.

The data cleaning was performed in a Jupyter Python notebook primarily with the Pandas package. The data was refined down to the four stops that are closest to CenturyLink Stadium with STOP_ID 30635, 620, 390, 843 for simplicity's sake. All of the events that occured at CenturyLink Stadium during February 2019 were documented in a separate file and then added to the dataframe in the Python notebook with information about start time, end time and total attendance. All times were converted from the original format (minutes past midnight) to a standard datetime object for processing purposes.

The data, after being cleaned, was transferred to Tableau in order to be analyzed. The largest event that occurred in February 2019 was a friendly soccer match between the Seattle Sounders and the Club Nacional de Football on Wednesday February 20 and so this was the focus of the analysis. In order to avoid as much noise as possible the analysis was focused on the Wednesdays recorded during the

month, the first two of which had no events and the last (2/27/19) had the "Seattle Home Show."

Results

In this limited case study it was found that in the period leading up to and just after the Sounders game the bus stops surrounding Centurylink Stadium saw a 20% increase in passenger load as compared to a Wednesday without an event at the same time of day. This is illustrated below Figures 3.1, 3.2 and 3.3 below. The event was attended by about 32,000 people.

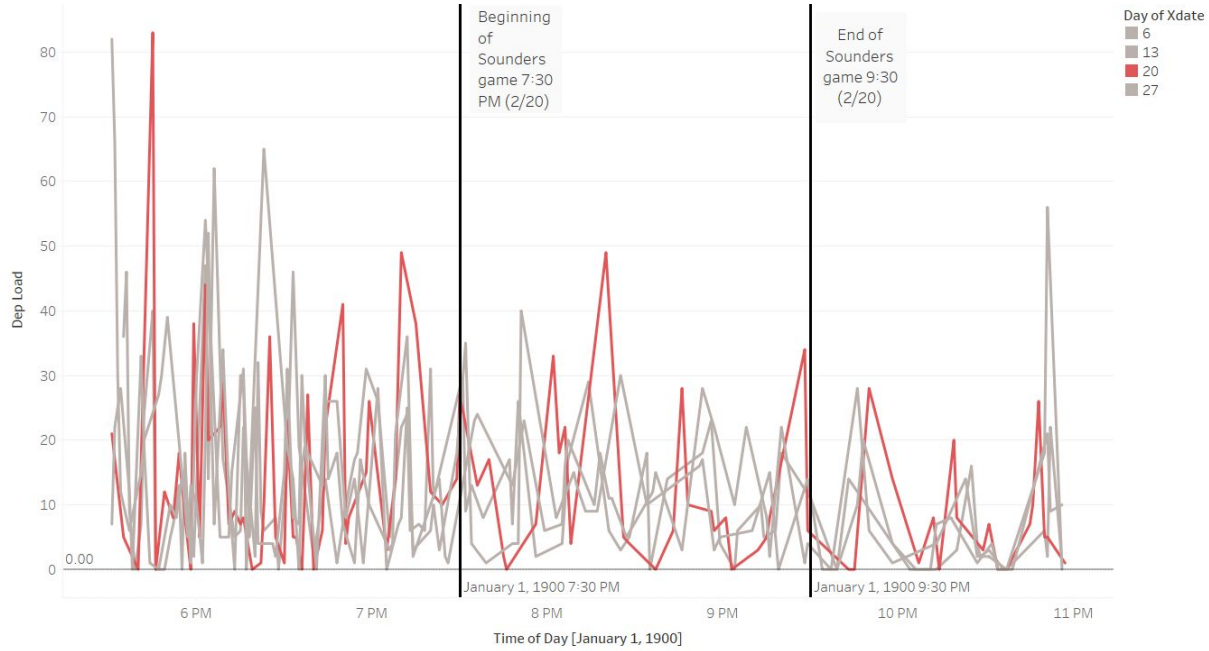
Figure 3.1: *Ridership for CenturyLink Stadium Bus Stops Wednesdays in February (6:30pm-7:30pm)*
Seattle Sounders Friendly Match (7:30pm - 10:30pm)

Day	Total Riders	Average Riders
2/6/19	286	8.67
2/13/19	264	7.77
2/20/19	375	9.87
2/28/19	312	9.18
Total	1237	8.87

Figure 3.2: *Ridership for CenturyLink Stadium Bus Stops Wednesdays in February (9:00pm-10:30pm)*
Seattle Sounders Friendly Match (7:30pm - 10:30pm)

Day	Total Riders	Average Riders
2/6/19	131	5.24
2/13/19	90	4.50
2/20/19	146	5.84
2/28/19	99	3.67
Total	466	4.81

Figure 3.3: *Ridership for CenturyLink Stadium Bus Stops Wednesdays in February*
Day of Sounders Friendly Match (February 20)



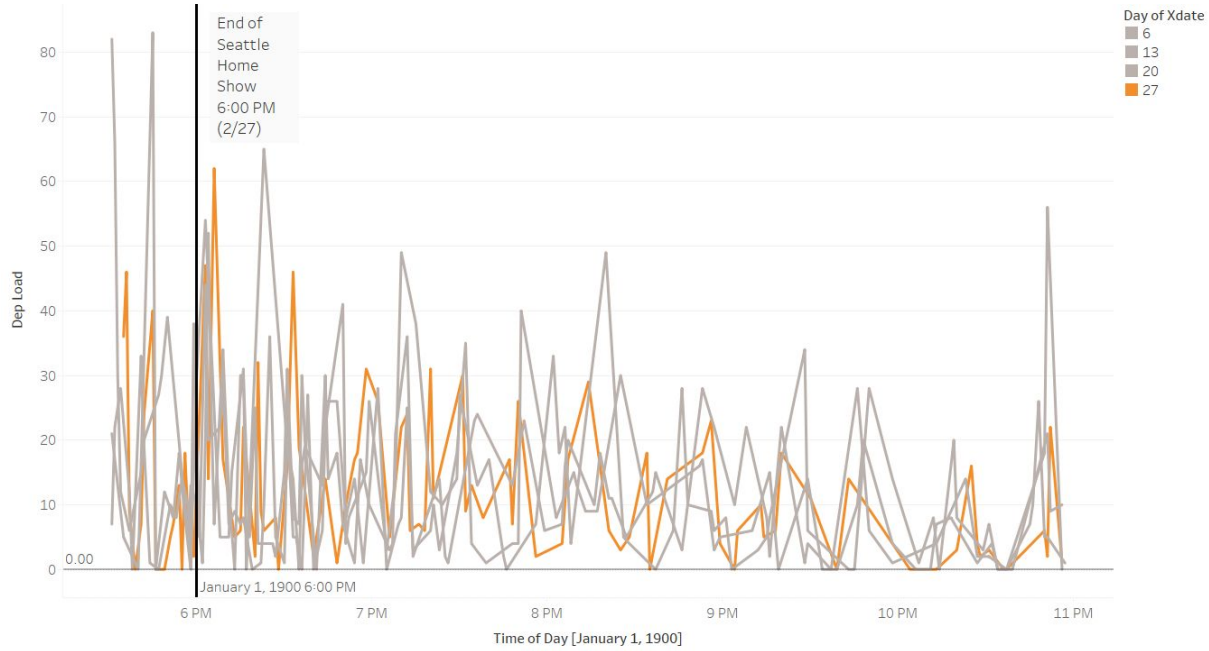
The trend of sum of Dep Load for Act Arr Time Minute. Color shows details about Xdate Day. The data is filtered on Stop Id, which keeps 620 and 30635. The view is filtered on sum of Dep Load, Act Arr Time Minute and Xdate Day. The sum of Dep Load filter keeps non-Null values only. The Act Arr Time Minute filter ranges from January 1, 1900 5:30 PM to January 1, 1900 11:00 PM. The Xdate Day filter keeps 6, 13, 20 and 27.

The "Seattle Home Show" took place throughout the day at CenturyLink Stadium and ended at 6:00pm. I investigated the time surrounding the ending of this event and found that there was no increase in the average riders. This event was considerably smaller than the Sounders match with a total of about 8,000 attendees spread over the entire day. This is shown in Figures 3.4 and 3.5 below.

Figure 3.4: *Ridership for CenturyLink Stadium Bus Stops Wednesdays in February (5:30pm-6:45pm)*
Seattle Home Show (ended at 6:00pm)

Day	Total Riders	Average Riders
2/6/19	761	9.32
2/13/19	477	8.38
2/20/19	570	8.52
2/28/19	575	8.21
Total	2383	8.61

Figure 3.5: *Ridership for CenturyLink Stadium Bus Stops Wednesdays in February Seattle Home Show (ended at 6:00pm)*



The trend of sum of Dep Load for Act Arr Time Minute. Color shows details about Xdate Day. The data is filtered on Stop Id, which keeps 620 and 30635. The view is filtered on sum of Dep Load, Act Arr Time Minute and Xdate Day. The sum of Dep Load filter keeps non-Null values only. The Act Arr Time Minute filter ranges from January 1, 1900 5:30 PM to January 1, 1900 11:00 PM. The Xdate Day filter keeps 6, 13, 20 and 27.

Reflection

While this analysis revealed hints that there is significant ties between events and bus ridership it cannot be conclusive with such a small focus. February is not an ideal month for this kind of analysis because the only large event was the Sounders friendly match, which is still relatively small. This level of analysis was mostly a proof of concept attempt to rationalize devoting effort to a larger scale dive into the APC data. Moving forward we will explore a larger time period, specifically during the Seahawks and Mariners season because these are the largest events Seattle sees. We believe there is potential for exploration of Linear Regression and Random Forest modeling to make more accurate predictions of how many people will be taking any given bus at any given time.

Conclusion

Implications for Design

This section details the design implications derived from the findings of our data analyses. These will be used to guide us in the redesign of the TransitGO application. Current sentiment towards TransitGO is not ideal, with participants giving comments such as, “I could miss the bus using this thing” (Participant 44, Post Task), and, “If I used transit all the time, I feel like I could figure it out” (Participant 3, Post Task) during our usability evaluations. We believe that modifications in any of the following areas could combat these negative sentiments, promote adoption of TransitGO by cash users, and provide a better overall user experience.[4]

Marketing
Target Advertisements • Employees with work only ORCA cards • Online within Google maps or OneBusAway
Physical advertisements located in sedentary spaces within transit system
Mobile Ticketing
Integration of Trip Planner • Tickets buyable through Trip Planner • Data retention across pages
Increase visibility of system status • Differentiate pages of ticket buying, using, etc. • Loading signals • Success/error messaging • Differentiate Active/old tickets
Revisit information architecture • Add functionality to landing page • Acknowledge common/recent user flows
Offer alternative payment methods • Apple Pay • Samsung Pay • Google Pay

[4] Areas of focus are organized by category, not priority

• Paypal/Venmo
Revisit cart checkout system • Separation of Sound Transit and King County Metro purchases • Order deletion
Provide additional information regarding ticket types • Youth, reduced, senior rates
Make the “Big green button” on the Android system not look like a call-to-action
Trip Planner
Modernize graphic design
Readily offer route information
Tickets buyable through Trip Planner
Data retention across pages
Remove blue button with no functionality
Global
Improve taxonomy • Unintuitive Placement of “Light Rail” in the “Train” Category • Confusion over the term “Store” • Revisit tab names and icons in Trip Planner
Improve accessibility • Increase some font sizes • Increased button contrast
Promote consistency in branding and UI elements across TransitGO and Trip Planner

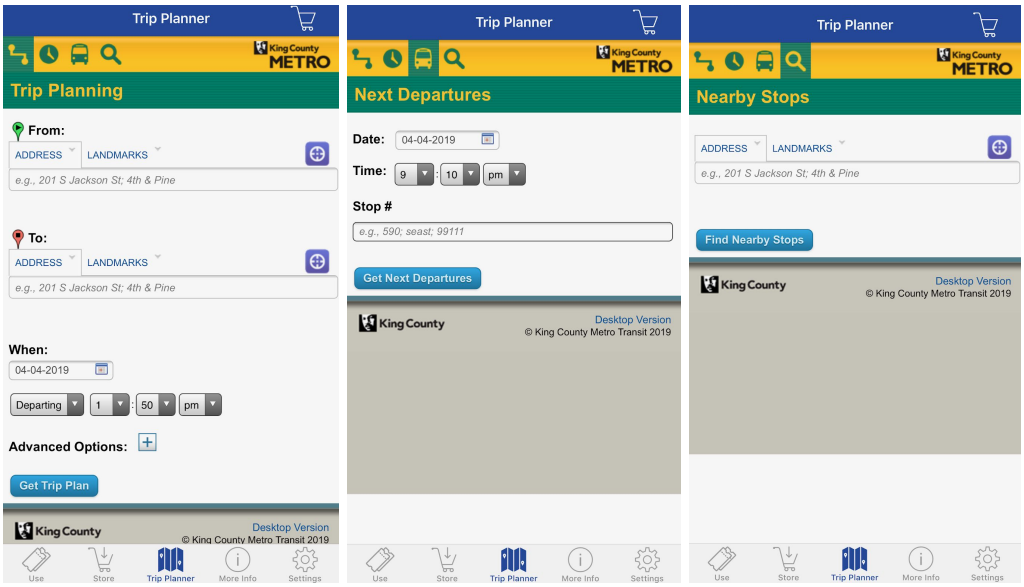
Future Work

The work we have completed in the Research and Evaluation phase has created a number of design implications which we will consider in the Design phase of our project. We will create design recommendations and conduct design sessions to create wireframes and markups. These artifacts will graduate in fidelity as we prototype and apply an iterative design process in pursuit of a final design for the TransitGO application. This will be accomplished in Milestone 3 and the Final Milestone which will be available on May 13th and May 27th, respectively.

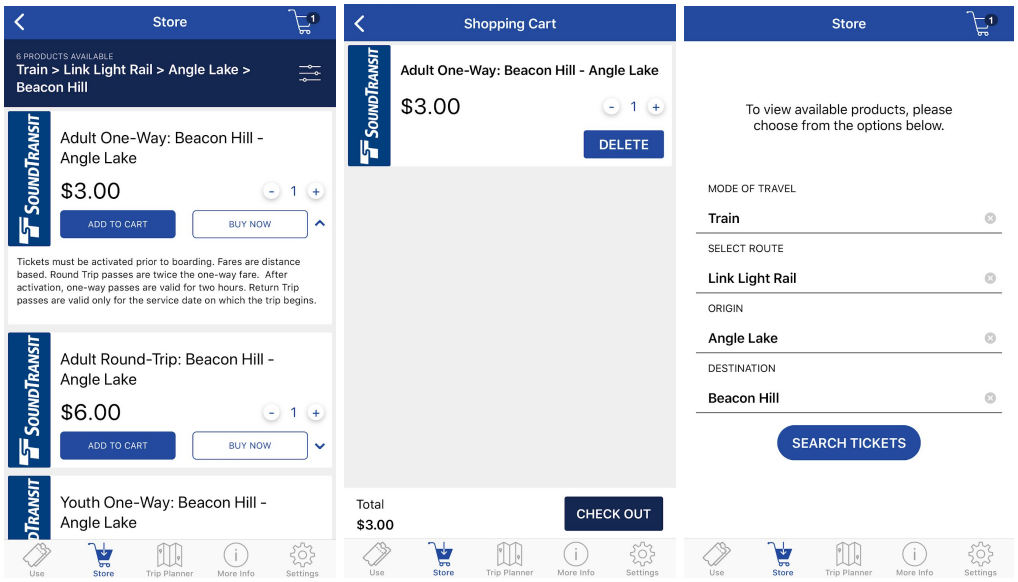
Appendix I: Application Reference Screenshots

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

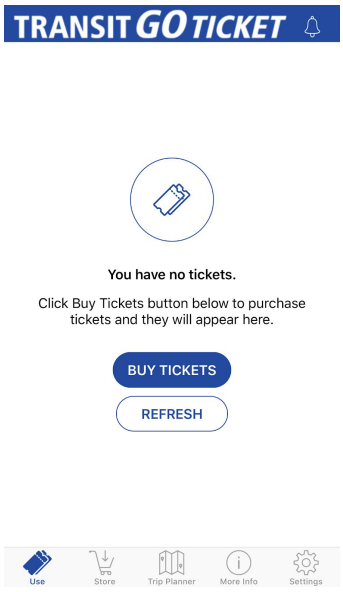


Store

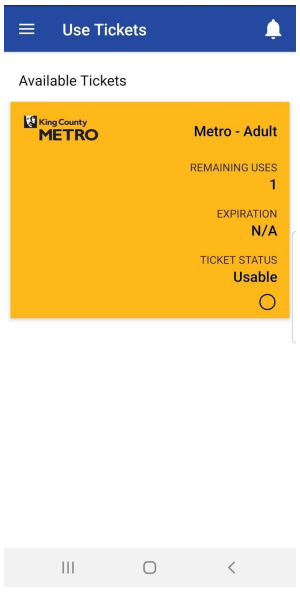


Use

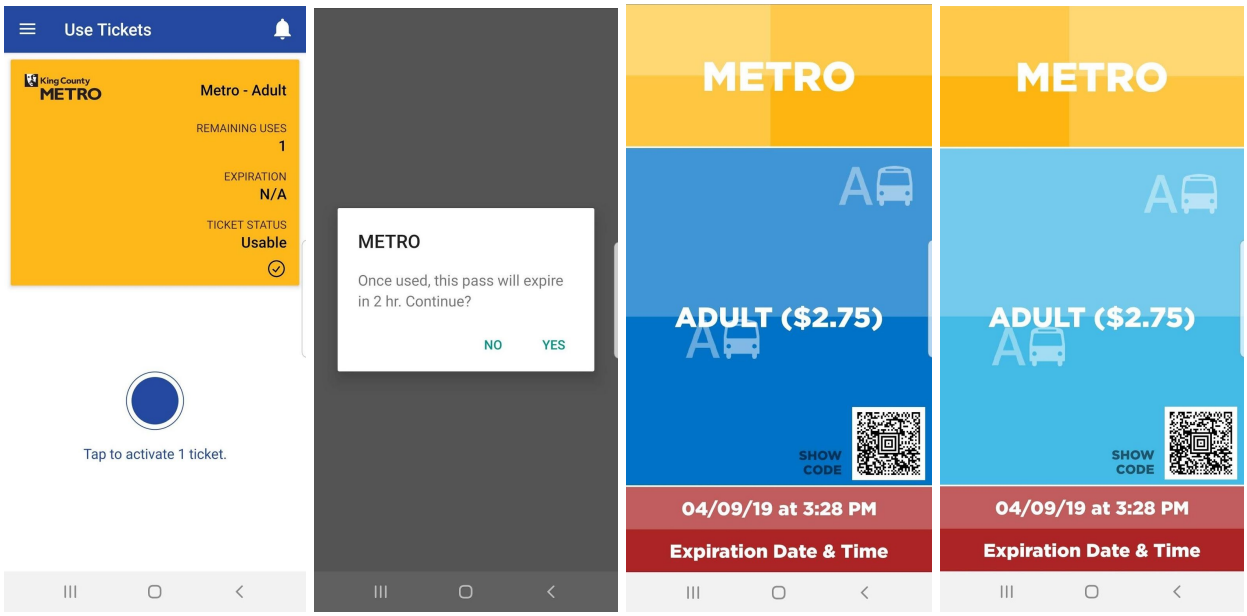
Initial “Use” Screen:



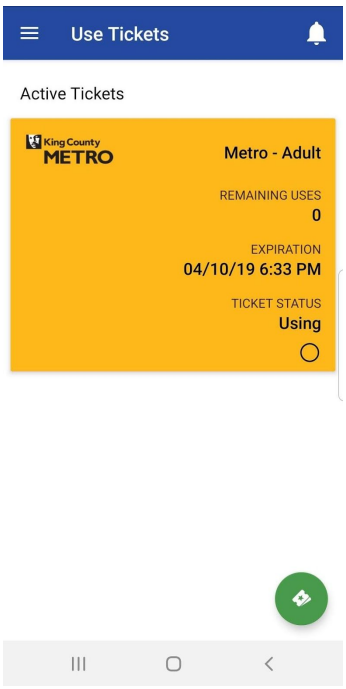
1 ticket available:



Using available ticket:

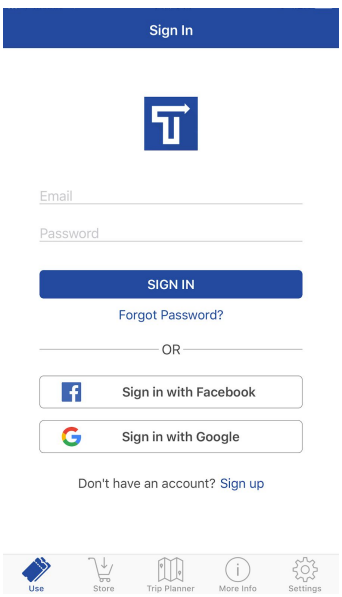


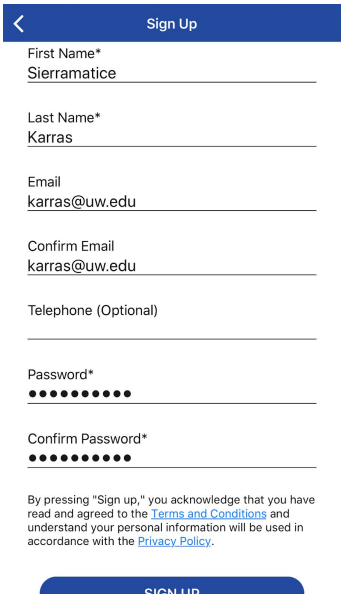
One ticket in use:



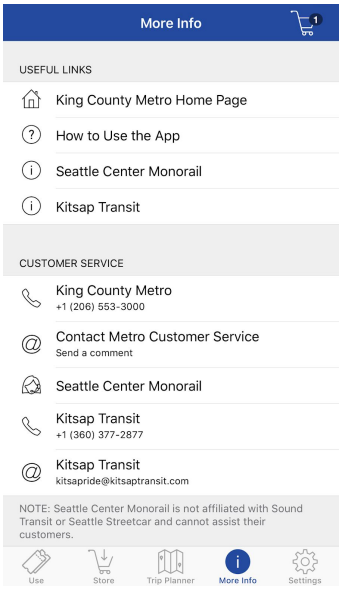
Two tickets in use:

Account

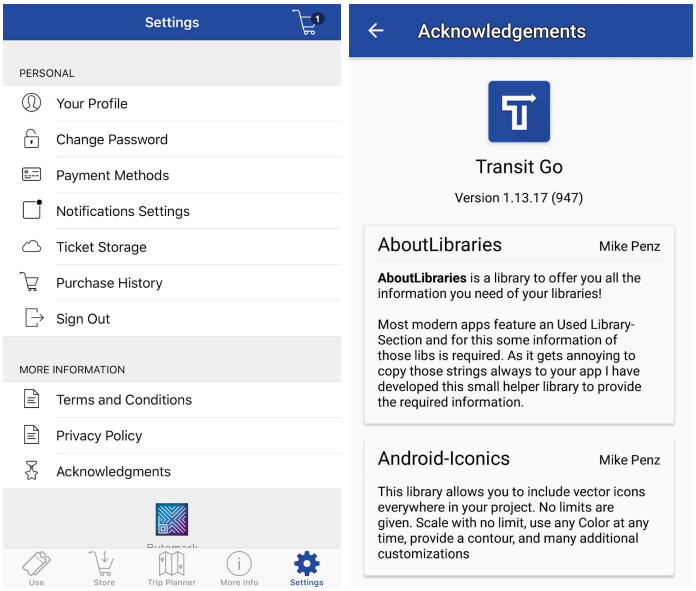




More Info



Settings



Appendix II: Usability Testing Kit[5]

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 even 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.[6]

[5]Disclaimer: Parts of this document were adapted from projects that the team has conducted in previous coursework.
[6]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.[7]

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.

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

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.

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: V1

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?**

Usability Testing Note-Taking Form/Data Collection Sheet: V2

Evaluation iOS / Andriod Location_____ Event_____ Date___/___
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 (to your last event)? (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. Finally, please go all the way through each process, nothing will be charged. (*Hand participant the phone open to the TransitGo App)***

Notes:

Task 1.2: **Plan a journey from the UW to showbox SoDo (1700 1St Ave S). Your**	Task 2.2: **Buy the tickets necessary for the journey**

show starts in 45 min and you want to walk as little as possible.	

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

Task 3.2: **Use the tickets in the order of the journey**	Task 4: **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 1.2

1	2	3	4	5

Task 2.2

1	2	3	4	5

Task 3.2

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?

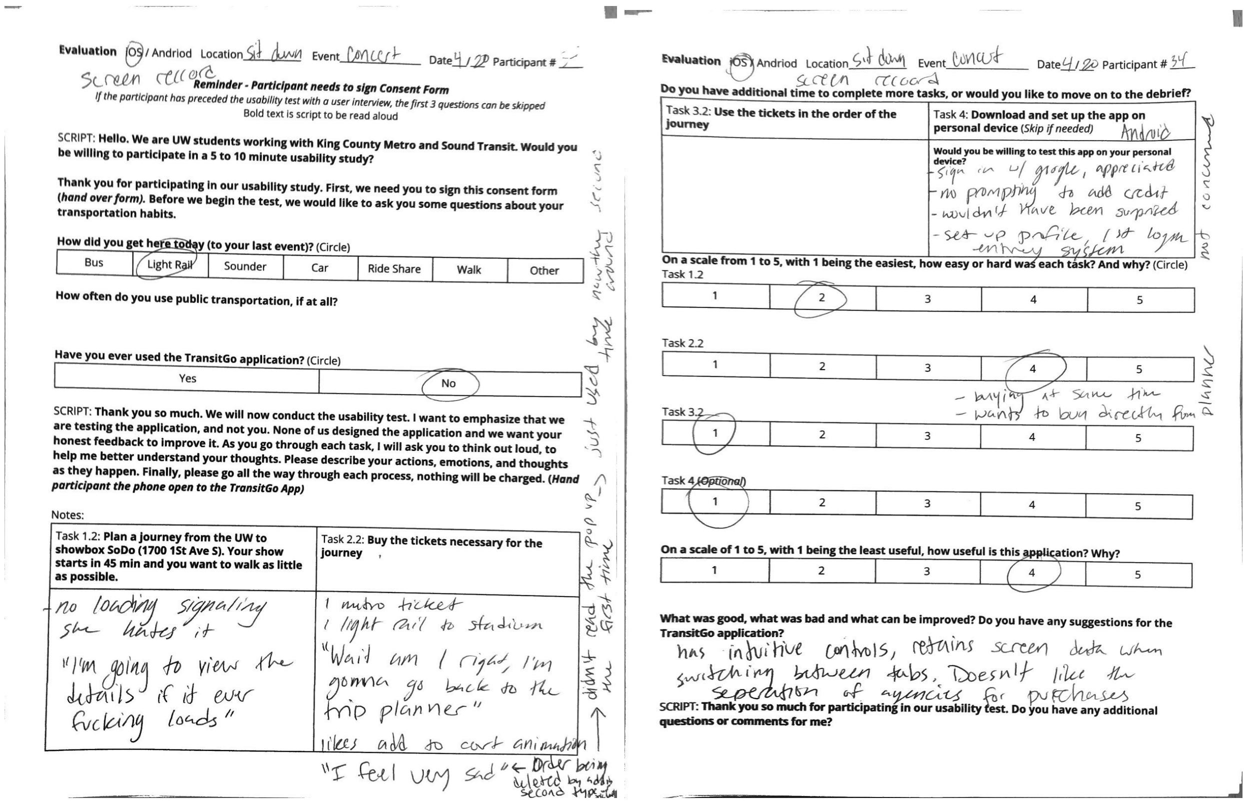
1	2	3	4	5

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?**

Appendix III: Usability Testing Data

Example of a filled out note taking sheet



Evaluation iOS / Andriod Location Sit down Event Concert Date 4/20 Participant #

Screen record

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 (to your last event)? (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. Finally, please go all the way through each process, nothing will be charged. (*Hand participant the phone open to the TransitGo App*)**

Notes:

Task 1.2: **Plan a journey from the UW to showbox SoDo (1700 1St Ave S). Your show starts in 45 min and you want to walk as little as possible.**	Task 2.2: **Buy the tickets necessary for the journey**
no loading signaling she hates it "I'm going to view the details if it ever fucking loads"	1 metro ticket 1 light rail to stadium "Wait am I right, I'm gonna go back to the trip planner" likes add to cart animation

"I feel very sad" ← Order being deleted by adding second type

just used by time → didn't read the pop up the first time

Evaluation iOS / Andriod Location Sit down Event Concert Date 4/20 Participant # 34

screen record

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

Task 3.2: **Use the tickets in the order of the journey**	Task 4: **Download and set up the app on personal device** (*Skip if needed*) Android
	Would you be willing to test this app on your personal device? - sign in w/ google, appreciated - no prompting to add credit - wouldn't have been surprised - set up profile, 1st login entry system

not concerned

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

Task 1.2

1	2	3	4	5

Task 2.2

1	2	3	4	5

- buying at same time
- wants to buy directly from planner

Task 3.2

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?

has intuitive controls, retains screen data when switching between tabs. Doesn't like the seperation of agencies for purchases

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

An archive of the full raw data is available here[8]

The full data set in table form

Participant	Screen Recorded	OS	Event	Location	How did you get here?	How often do you use public transportation, if at all?	Have you ever used the TransitGO application?
1	No	Android	Mariners	Stadium Entrance	Light Rail	N/A	No
3	No	Android	Mariners	Stadium Entrance	Car	Out of Town-ers	No
4	No	Android	Mariners	Stadium Entrance	Light Rail	N/A	No

[8] https://drive.google.com/file/d/1wqh6eLI0p_qcGBfZVWbaaRGJ3o4TWMaR/view?usp=sharing

14	No	Android	Sounders	International District Light Rail	Light Rail	Everyday	No
16	No	Android	Sounders	international District Light Rail	Light Rail	At least 2-3 times a week	No
18	No	Android	Sounders	International District Light Rail	Light Rail	Just Game Days	No
20	No	Android	Sounders	Bus Stop	Bus	Daily	No
22	No	Android	Sounders	International District Light Rail	Bus	3-4 Days per week	Yes
24	No	Android	Sounders	International District Light Rail	Light Rail	Only when going downtown	No
26	No	Android	Mariners	Ticketing	Car	Not very much. From the East Side	No
28	No	Android	Mariners	Stadium Entrance	Bus (Sound Transit)	Once every two months	No
30	Yes	iOS	Sounders	Sit Down	Light Rail	Two times a month	No
32	Yes	iOS	ECCC	Sit Down	N/A	Every Few Months	No
34	Yes	iOS	Concert	Sit Down	Light Rail	N/A	No
36	No	iOS	Monster Truck Rally	Sit Down	Car	Never	No
38	No	iOS	Sounders	Sit Down	Light Rail	Weekly	No
40	Yes	iOS	Sounders	Sit Down	Light Rail	Monthly	No
41	Yes	Android	Mariners	Sit Down	N/A	N/A	No
42	No	iOS	Art Opening	Sit Down	Car	N/A	No
43	Yes	Android	Mariners	Sit Down	N/A	N/A	No
44	No	iOS	Women's March	Sit Down	N/A	N/A	No
45	No	Android	Mariners	Sit Down	N/A	N/A	No

Participant	Task 1: Please use the app to buy a bus ticket	Scale[9]	Task 2: Use the ticket you bought	Scale[6]	Task 3: Buy a one-way Link ticket from Stadium station to Mt. Baker	Scale[6]
1	- Swipes through current active tickets. Tapping ticket to change colors - Uses bus ticket from previous test. - points to the green ticket icon in the right corner. - Zach explains buying new tickets - "It's not very obvious" - Zach shows participant the hamburger menu - Goes to store, Zach prompts particpant to finish purchase	5	- Activates ticket without much trouble	2	- On "Use" screen. - Clicks on Train, then Monorail. Stays on Monorail for a while. - Asks for locations whil on the Monorail screen. - Zach guides to correct option - "Oh, it's a train?" - scrolls through options to find ticket	4
3	- Clicks on already active ticket and uses it. Stares at it and asks if they are done - continues to click on Use Tickets - Zach prompts to locate menu - finds it - Goes to Trip Planner - Zach backs out of Trip Planner - "Store?" - Gets to ticket screen and places order	4	- "Is that the one I just bought? How do I know the one I just bought?" - "I don't know how I would use it." - Zach prompts/guides, particpant reads dialogue boxes and uses ticket.	5	N/A	N/A
4	- "No, it's not the Monorail." - "Finish the purchase."	4	- Clicks bettween Use + Store	4.5	N/A	N/A
14	- Looks at Use ticket first - Goes to Store - Easily selects Bus - Places order	1	- Activates ticket without much trouble	1	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A	N/A
18	- Clicks on a active bus ticket - Clicks on green button to activate - goes to hamburger menu, clicks "Use" - Clicks on the ticket to change colors - Zach guides to menu - "Store?" - Clicks on bus, selects ticket and buys	3 (once known) 5 (while learning)	- Activates ticket without much trouble. Clicks on ticket to get it to change colors	N/A	N/A	N/A

[9] On a scale from 1 to 5 (1 easy 5 hard), how easy/hard

20	- clicks on active ticket and switches colors back and forth - "Where do I go for that?" - Zach guides to hamburger menu - navigates to Store, goes to bus ticket, and checks out	4	- Clicks on old ticket/activates the QR code - Clicks on the ticket they bought and activates it, looks a little confused	3	N/A	N/A
22	- Tries to scroll through active tickets on homepage. Clicks on green circle - Find and reads the hamburger menu, clicks on Store - Goes to Bus, Metro, and buys ticket.	2	- "Tickets" - Clicks on QR tickets and tries to activate old ones - "Available tickets?" - taps to activate	3.5	- Back to Store - "Train? Which one is light rail? Train"? - Nope it's not a train." - Zach explains train was right - "Ohhh... I didn't see that."	4 "That was the most difficult"
24	- hamburger menu to "Use" - scrolls up and down, clicks on specific ticket - Goes to Trip Planner - "Not seeing anything obvious for buying a bus ticket" - Zach guides participant to store - "It should say 'Buy Tickets" - Navigates and buys bus ticket	3	- scrolls through already active tickets - wants the app to show available tickets at the top instead - activates tickets	Easier than Task 1	- Goes to Store in menu, finds light rail and buys ticket	N/A
26	- Opens hamburger menu, goes to Store - Finds ticket, adds to cart, and checks out	1	- Clicks green button. - clicks on an already active ticket -- thinks it's a success (even though they did not activate a new ticket)	1	- Goes to Store - "That would be... that's not a train? Is it a train? Nope. It's not any of those things." - Zach guides to Light Rail ticket	2
28	- Clicks green button to look at active tickets - looks confused - "I'm not at the front yet." Zach replies, "This is the front." - Reads hamburger menu, clicks "Use". - "I need to buy a new ticket." - Zach gives a little guidance - "Store! Okay." - Buys ticket with quick buy	4	- Clicks "View Tickets" - "I'm assuming it's the one at the top... oh no it's not." - Zach scrolls to the button - Participant activates the ticket.	3	N/A	N/A
30	- "Is that what the screen opens to?" - hard time adding a credit card	1	- No problems	1	- Went to trip planner first - scrolled past lightrail stops in land marks of trip planner - Needed hint to get out of trip planner - Went to monorail first - didn't like that is saved bus from last ticket he bought	4

32	- likes highlighted bus ticket -doesn't like scroll bar (not standing out against background)	2	- surprised by the dramatic brightness increase when opening ticket -hard time getting out of ticket	1	-1st thought was to go to trip planner - "that does not appear to have gotten me to a ticket" -went to the store and the app crashed - mix up between old and new tickets	3
34	- Selected available ticket first, then realized mistake	1	- No problems - likes being able to pull up ticket again	1	- appreciates alphabetical order	1

					- no problems	
36	N/A	N/A	N/A	N/A	N/A	N/A
38	- wants to click on active tickets -found store after a while - wants a day pass for bus or lightrail, annoyed that it doesn't have went into settings looking for an all day pass or for over 60 options -icons are confusing, thought cart icon was things already in the shopping cart, not store	2	- no issues -cool that you don't need to leave app open when ticket is in use -should be able to transfer to apple wallet, wants to show on apple watch	1	-"wait it just says train, where's link?", "I don't think of them as the same thing at all" - UW isn't a good name for the huskey stadium stop, University Street should be called beneroya hall, "They shouldn't be alphabetical they should be where they are in the line" - it takes too many clicks, doesn't like scrolling through all the stops - "What are the qualifications for reduced? I'm going to buy it" - didn't see lightrail option at first - **why no day pass?**	3
40	N/A	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A	N/A
44	- Went to "active tickets" first - "I'm not seeing a generic 'choose your route'" - Contrast on tab labels is bad - Chose street car - Font not accessible to seniors	3	- Doesn't realize he bought a street car ticket and can't find ticket to acivate - "How do I activate that"?	2	N/A	N/A
45	N/A	N/A	N/A	N/A	N/A	N/A

Participant	Task 1.2:	Scale[6]	Task 2.2	Scale[6]	Task 3.2	Scale[6]
1	N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A	N/A

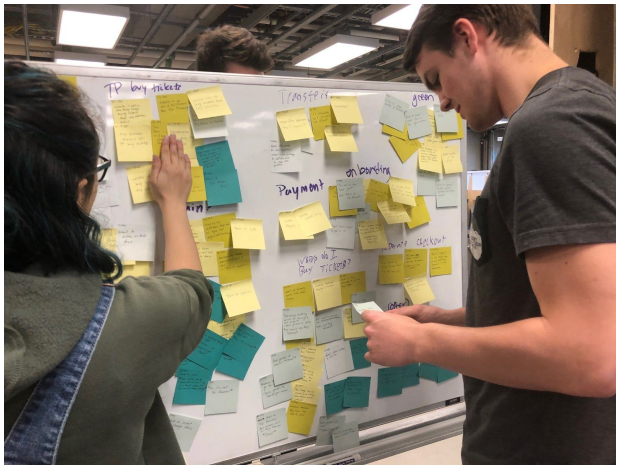
30	- "Is that in landmarks?" There's just so many - "How do you go back to the other route options?", "Oh how'd it get back here?"	4	- Did buy it now as a first instinct, did not encounter that you can't buy buy both at the same time	2	- No problem	1
32	N/A	N/A	N/A	N/A	N/A	N/A
34	- Hates lack of loading signal - "I'm going to view the details if it ever fucking loads"	2	- "Wait am I right, I'm going to go back to the trip planner" - Likes "add to cart" animation. - Order deleted by adding second ticket, "I feel very sad"	4	N/A	1
36	-found trip planner no problem, going from current location	1	- needed hint to leave trip planner, "would have given up without hint" - worried about remembering bus # - "Unclear for first time user"	5	- instinct was that tickets don't need to be activated, wants bigger notification of that need - likes activation warning - doesn't know what to show driver	3
38	N/A	N/A	N/A	N/A	N/A	N/A
40	-Opened into last planned trip - Blue box doesn't do anything - Looked in landmarks for venues - "Did that work?" - Took a while to load - seems crazy that the info doesn't transfer to buying tickets, a lot of back and forth	3	- "It doesn't show how to buy - Went to tickets, more info, then store - Thrown by mid landing - "That's crazy" to not being able to buy both in one transaction	2	- No problems - Worried about ticket expiry (round trip)	2
41	- Has used TP before, navigates successfully	1	- Taps big green button, "Nope" - "If I transfer do I just need one ticket?" - Took a few attempts to get to buy page - Buys 2 bus tickets instead of bus and light rail	4	- No problems	1
42	- Clicked on active tickets - App crashed - No loading signals - "With two transfers I'm taking my car" - "$8 is that for real?"	3	- "I don't know what to do from here" (trying to buy tickets from TP) - Accidentally choose monorail instead of bus - "This is awful" - Confusion between buy now and add to cart - Hung up by the secondary pop-ups of type and origin/destination	5	- Clicking on use tab when already on the "use ticket" page - "I don't know how" - "Worry about activating all tickets	6
43	- "Option 1 looks the best"	1	- Expects to be able to buy ticket from TP - Bus first, then Light Rail - "No option for Light Rail" - Buys second bus ticket - Instructed to go back and get a Light Rail ticket - "I guess train would be it" - Repeats TP process to recall correct transit station	3	- No problems	1
44	N/A	N/A	N/A	N/A	N/A	N/A

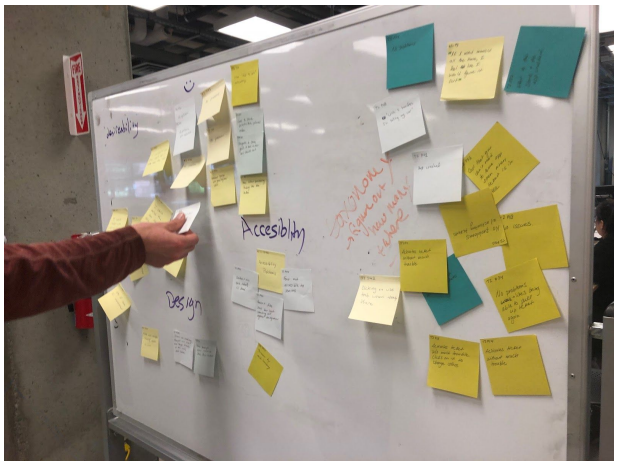
45	- After a while, "TBH I would've exited the app by now - Chose option 2, instructed to use option 1 - "Where does it get off at"? - "This is really confusing"	3	- "Back to the ticket button...no, that's not right" - "I guess it's a train"? - "For some reason it won't let me do both"	4	- "So these are mine"?	1

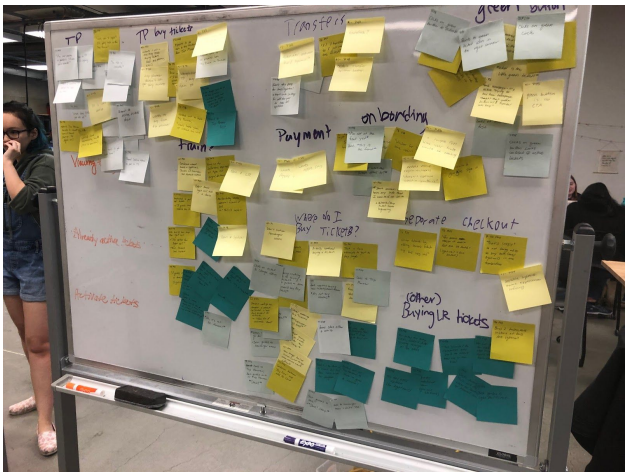
Participant	Task 4	Scale[6]	On a scale of 1 to 5, with 1 being the least useful, how useful is this application? Why?	What was good, what was bad and what can be improved? Do you have any suggestions for the TransitGo application?
1	N/A	N/A	N/A	- Easy: After purchasing, finding the use button - Hard: Homepage - it's active, trying to buy from homepage. Thought that the green button with $ symbol thought it was Buy. Didn't notice the hamburger menu. Advertising is bad - I never heard of it. "Store" meaning "Buy Tickets." - "Taxonomy is bad"
3	N/A	N/A	N/A	- Easy: Liked to put destination and buy ticket." - "What is the little green ticket?" - If I used transit all the time, I feel like I would figure it out."
4	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	- "I just use a lot of apps. Look at the hamburger menu." - My friend's a UX designer, pretty straight forward."
16	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	- "Start screen didn't have any info that I wanted on it." - Doesn't have what I want- Activate/buy ticket from the beginning
22	N/A	N/A	N/A	- Initially confused buying a ticket - "Green = money = buy a ticket;" Understood the menu afterwards - Confused about trains = light rail. Thinks of Sounder and Amtrak instead
24	N/A	N/A	N/A	General design was good/legible/clear, but it was seeing how things feel on the screen/what things were named which was difficult.
26	N/A	N/A	N/A	- Didn't know lightrail was a train
28	N/A	N/A	N/A	- Confused with old tickets - "You kept saying 'buy,' so I was looking for 'Buy' not "Store." - "Why do I have to activate it? I'm ignorant on why it just doesn't work."

30	N/A	N/A	1	- Wants it all in one thing (wants to buy tickets from trip planner, a map would be nice) - Blue box in trip planner doesn't do anything - Doesn't like the scroll menu for train type, landmark, station, its hard to see all the options - Typing out addresses isn't pracitical - liked the double click for activating tickets, prevents accidents
32	N/A	N/A	4	- trip planner doen't let you buy tickets - "I wouldn't use it but I can see the uses"
34	(did on an Android Phone) -sign in w/ google, appreciated -no prompting to add credit card, but not concerned, expects/wouldn't be surprised to add later -set up profile, 1st login entry system	1	4	- Likes data preservation upon tab switch - Seperate agencies make experience confusing - Would like to buy tickets from Trip Planner
36	N/A	N/A	N/A	- a couple of first time user hints in the app would be amazing
38	N/A	N/A	3	-Lots of room for improvement - wants apple pay, it is nice that you can scan in card, but his card is already on his phone -needs more explainations, "doesn't explain what a youth is" - Make using multiple tickets obvious, especially for parents and kids (has seen dad using the app get in trouble on Light Rail bc he didn't activate his kid's ticket) - not going to use app bc there are no transfers between bus and light rail
40	N/A	N/A	N/A	- "It's just easier to use the ORCA" - Transfers should be better represented - Wants to add Apple Pay
41	N/A	N/A	N/A	- Train =/= Light Rail - Explain transfer system better - Integrated trip planner would be nice, able to buy tickets from trip planner
42	N/A	N/A	1	- "I would never use that" - Wants to buy from trip planner - "I wish that tickets didn't expire"
43	N/A	N/A	3	- Train =/= Light rail - Integrate TP
44	N/A	N/A	N/A	- "I could miss the bus using this thing" - Accessibility problems
45	N/A	N/A	N/A	- Need to be able to access purchased tickets quickly - Past purchases idea - TP is information dense - Green button looks too CTA - Need wealth of prior experience with KC Metro system to use app

Appendix IV: Usability Testing Affinity Diagramming







Appendix V: Interview Kit[10]

Purpose

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

[10]Disclaimer: Parts of this document were adapted from projects that the team has conducted in previous coursework.

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.[11]

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)

[11]https://docs.google.com/document/d/1ky2056rlBhMesKeHbiGF15emoF6xKYCvUBiRvEM7exI/edit?usp=sharing

    - 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.[12]

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.

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

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: V1

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?**

Interview Note-Taking Form/Data Collection Sheet: V2

Research 2 Location_____ Event_____ Date___/___ 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 often do you use public transportation in general? (Circle)

Never	Rarely	Yearly	Monthly	Weekly	Daily

How often do you attend large events (sport games, concerts, etc.)? (Circle)

Never	Rarely	Yearly	Monthly	Weekly

How often do you take public transportation to these events?

Never	Rarely	Some of the time	Most of the time

When you take public transportation to get to events:

Why?

How do you plan your trip?

What mobile applications or websites do you use to support your trip?

When you don't take public transportation, how do you get there and why do you choose that mode?

How do you generally pay for your public transit? (Circle)

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

Why do you pay that way?

Exceptions?

Have you heard of the TransitGo app? (Circle)

Yes	No
How did you hear about it?	

Would you find a mobile ticketing application useful for getting to events? (Circle)

Yes	No

Why or Why not?

If you have heard of the TransitGo app, have you used it? (Circle)

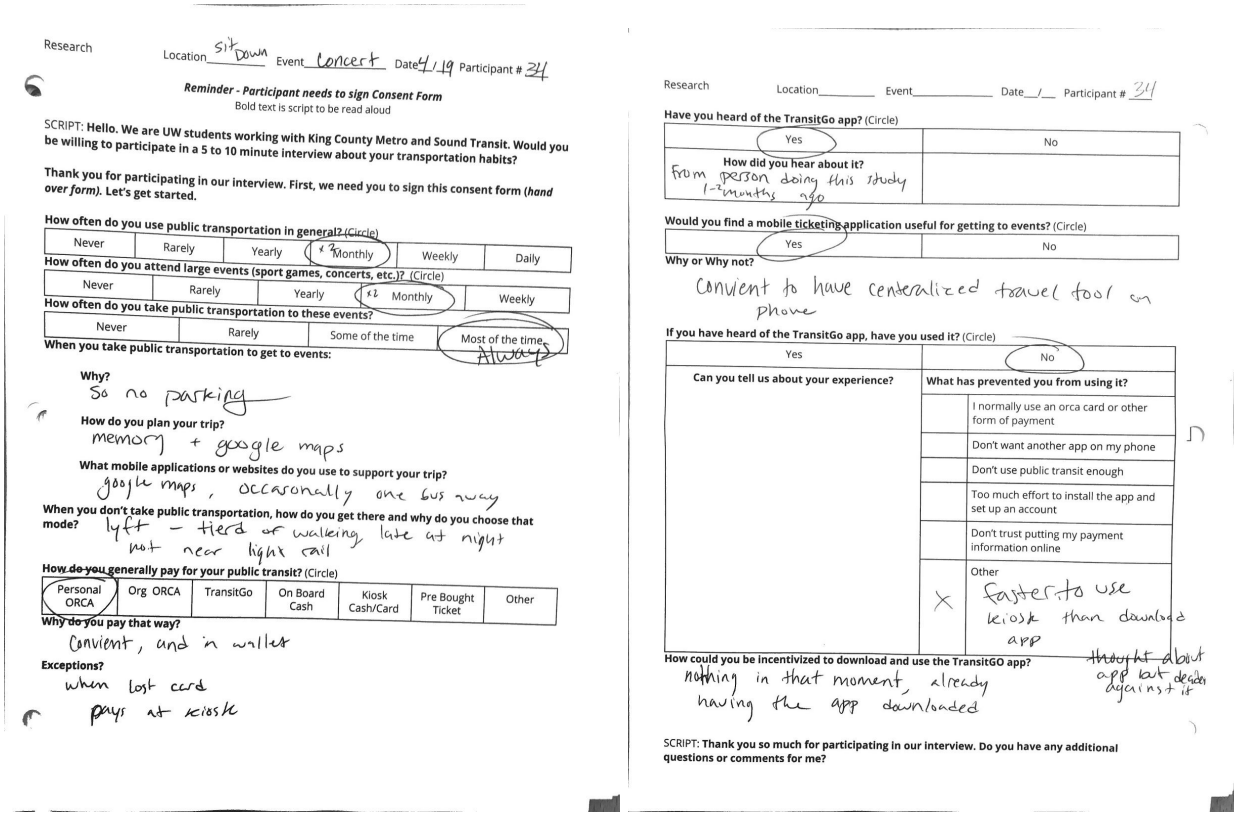
Yes	No	
Can you tell us about your experience?	**What has prevented you from using it?**	
		I normally use an orca card or other form of payment
		Don't want another app on my phone
		Don't use public transit enough
		Too much effort to install the app and set up an account
		Don't trust putting my payment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

How could you be incentivized to download and use the TransitGO app?

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

Appendix VI: Interview Data

Example of a filled out note taking sheet



Research Location sit down Event concert Date 4/19 Participant # 34

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 often do you use public transportation in general? (Circle)

Never	Rarely	Yearly	x3 Monthly	Weekly	Daily

How often do you attend large events (sport games, concerts, etc.)? (Circle)

Never	Rarely	Yearly	x2 Monthly	Weekly

How often do you take public transportation to these events?

Never	Rarely	Some of the time	Most of the time Always

When you take public transportation to get to events:

Why? So no parking

How do you plan your trip? memory + google maps

What mobile applications or websites do you use to support your trip? google maps, occasionally one bus away

When you don't take public transportation, how do you get there and why do you choose that mode? lyft - tired of walking, late at night not near light rail

How do you generally pay for your public transit? (Circle)

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

Why do you pay that way? Convient, and in wallet

Exceptions? when lost card pays at kiosk

Research Location____ Event____ Date__/__ Participant # 34

Have you heard of the TransitGo app? (Circle)

Yes	No
How did you hear about it? From person doing this study 1-2 months ago	

Would you find a mobile ticketing application useful for getting to events? (Circle)

Yes	No

Why or Why not? Convient to have centeralized travel tool on phone

If you have heard of the TransitGo app, have you used it? (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
X	Other: faster to use kiosk than download app

How could you be incentivized to download and use the TransitGO app? nothing in that moment, already having the app downloaded

~~thought about app but decided against it~~

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

An archive of the full raw data is available here[13]

The full data set in table form

Date	Participant	Location	Event (Last event)	How did you get here today?	Why did you choose that transportation method? Is this your typical method of transportation?	How did you pay for your public transit?	Why do you pay that way?	Exceptions?	Crowding	Ease of Use	Wait Time	What challenges were there?
4/2	2	Stadium Entrance	Mariners Game	Light Rail	Works downtown in westlake, convenient	Org ORCA	N/A	N/A	3	4	1	None

[13]https://drive.google.com/file/d/1Govf9OdoxqJK4PzeTKgQ8je-KAKhd6g-/view?usp=sharing

4/12	5	Stadium Entrance	Mariners Game	Light Rail, Bus	Easiest from home to downtown, Never wants to drive - no traffic, parking, ect	Personal ORCA	N/A	N/A	4	1	1	Keeping up with route changes
4/2	6	Stadium Entrance	Mariners Game	Rental Car	(Previous Experience) Convenient and inexpensive	Other (Not Specified)	N/A	N/A	2	1	2	It was great
4/12	7	Stadium Entrance	Mariners Game	Light Rail, Car	Didn't wanna deal with parking and traffic, more convenient, the timeing of the game could make them drive.	Personal ORCA	N/A	N/A	2	1	1	None, sometimes carsick
4/2	8	Stadium Entrance	Mariners Game	Car	Eaiser than bus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/12	9	Stadium Entrance	Mariners Game	Bus	No driving or parking, safe to get home	Personal ORCA (used to have u-pass)	N/A	N/A	3	2	2	bus was late, double bus, new stop but was easy
4/2	10	Stadium Entrance	Mariners Game	Car and Ferry	Distance, Easiest	Cash at Kiosk	N/A	N/A	5	5	3	N/A
4/12	11	Stadium Entrance	Mariners Game	Car and Ferry	Daily commute via ferry, drove so they could get home tonight	Personal ORCA	N/A	N/A	N/A	N/A	N/A	Service, work doesn't pay
4/12	12	Light Rail Station	Mariners Game	Light Rail	Easiest, Parking is expensive, when traveling with friends its easier, its included in Student IDs	Org ORCA (UW)	N/A	N/A	N/A	N/A	N/A	Lives in a place thats hard to get to light rail. Takes Uber or Lyft to Station
4/13	13	Bus Stop	Sounders Game	Bus	Closest to house, better than parking	Personal ORCA	N/A	N/A	1	1	1	none

4/13	15	Bus Stop	Sounders Game	Bus	Only one car	On board cash (hasn't gotten around to getting an ORCA)	N/A	N/A	N/A	N/A	N/A	N/A
4/13	17	Bus Stop	Sounders Game	Bus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/13	19	Bus Stop	Sounders Game	Bus	easier than parking	Org ORCA	N/A	N/A	N/A	1	2	homeless people, kid isn't a problem they are free
4/13	21	Bus Stop	Sounders Game	Bus	Easiest, light rail is further from house	Org ORCA	N/A	N/A	1	1.5	3	tunnel changes
4/13	23	Light Rail Station	Sounders Game	Ride Share (Uber)	was faster, leaving via light rail bc cheaper	Kiosk (Card)	N/A	N/A	N/A	N/A	N/A	change is only given in coins when paying in cash
4/13	27	Light Rail Station	Sounders Game	Car	Typically bus, but needs to drive to next thing, no parking	Personal ORCA	N/A	N/A	4	1	3	Park + ride is great, weekends are harder (less access), always crowded on the way home
4/13	29	Light Rail Station	Sounders Game	Light Rail	Used park + ride, hard to park downtown, traffic	Kiosk	N/A	N/A	1	1	2	Worried about getting a spot at the park and ride
4/16	30	Sit Down	Sounders Game	Light Rail + Car	Drove or walks to light rail	Org ORCA (School, Personal ORCA during the summer)	N/A	N/A	2	1	2	none

4/13	31	Between station + stadium	Mariners Game	Bus	No parking or traffic	Org ORCA most of the time, used on board cash today bc its not travel for work	N/A	N/A	4	1	1	nope
4/18	32	Sit down	Emerald City Comicon			Org ORCA	Free, payed for monthly	None	N/A	N/A	N/A	N/A
4/13	33	Stadium Entrance	Mariners Game	Light Rail	No parking downtown, the park and ride is great and easy	Personal ORCA	N/A	N/A	5	1	1	I-5 traffic
4/19	34	Sit Down	Concert	N/A	N/A	Personal ORCA	Convenient because it's always in their wallet	Lost the card, paid at kiosk	N/A	N/A	N/A	N/A
4/13	35	Stadium Entrance	Mariners Game	Car	Bus not convenient	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/19	36	Sit Down	Monster Trucks			On board cash	easier, just coings in my pocket	N/A	N/A	N/A	N/A	N/A
4/13	37	Stadium Entrance	Mariners Game	Car	Hard to carry stuff for kids on the bus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/19	38	Sit Down	Sounders			Org ORCA (Work)	Don't have to pay out of pocket	None	N/A	N/A	N/A	N/A
4/13	39	Stadium Entrance	Mariners Game	Light Rail	Easier than driving, cheaper than parking, hardly ever takes bus	Kiosk (doesn't have cash, doesn't use often enough for ORCA)	N/A	N/A	2	1	1	N/A

4/19	40	Sit Down	Sounders	N/A	N/A	Personal ORCA	easy	nope	N/A	N/A	N/A	N/A
4/18	41	Participant's home	Mariners Game	N/A	N/a	Org ORCA (U-Pass)	Already paid for with tuition	In the summer the U-Pass isn't active. Pays with cash because its not worth getting an ORCA card	N/A	N/A	N/A	N/A
4/19	42	Sit Down	Art Museum	N/A	N/A	Personal ORCA	N/A	N/A	N/A	N/A	N/A	N/A
4/18	43	Participant's home	Mariners Game	N/A	N/A	Org ORCA (U-Pass)	already paid for with tuition	Over the summer uses an Org ORCA fro his work	N/A	N/A	N/A	N/A
4/19	44	Sit Down	Women's March	N/A	N/A	Personal ORCA	N/A	N/A	N/A	N/A	N/A	N/A
4/18	45	Participant's home	N/A	N/A	N/A	Org ORCA (U-Pass)	Already paid for with tuition	Would probably get on the lightrail without paying	N/A	N/A	N/A	N/A
4/23	46	Sit Down	N/A	N/A	N/A	Org. ORCA (Work)	Free through work	Uses cash when he didn't have an Org. ORCA.	N/A	N/A	N/A	N/A
4/23	47	Sit Down	N/A	N/A	N/A	Org. ORCA (Work)	Free through work	Debit card at kiosk	N/A	N/A	N/A	N/A
4/23	48	Sit Down	N/A	N/A	N/A	Org. ORCA (Work)	Free through work	"I'm a cash-only kind of gal." More security than convenience (cash over card)	N/A	N/A	N/A	N/A

Date	Participant	How often do you use public transportation?	How often do you attend large events? (NEW FORMS ONLY)	How often do you take public transportation to those events?	Which mode do you use most frequently?	Why do you use this mode?/Why do you take public transit to events?	How do you plan your trip? (NEW FORMS ONLY)	What mobile applications or websites do you use to support your trip? (NEW FORMS ONLY)	When you don't take public transportation, how do you get there and why do you choose that mode?
4/2	2	Daily	N/A	N/A	Bus	Work	N/A	N/A	N/A
4/12	5	Daily	N/A	N/A	Lightrail and Bus	Daily trip	N/A	N/A	N/A
4/2	6	Never	N/A	N/A	Airline	Last used lightrail two years ago, friends payed with a pass	N/A	N/A	N/A
4/12	7	Monthly (only baseball, theatre and comic con)	N/A	N/A	Light Rail	The park and ride, parking is free	N/A	N/A	N/A
4/2	8	N/A	N/A	N/A	Bus	More convenient for some trips, traffic and gas makes it inconvient to drive	N/A	N/A	N/A
4/12	9	Daily	N/A	N/A	Bus	For work, lives close to work so driving doesn't make sense	N/A	N/A	N/A
4/2	10	Every Few Months	N/A	N/A	Bus, Light Rail, Ferry	N/A	N/A	N/A	N/A
4/12	11	Every Few Months	N/A	N/A	Sounder	for work, but stopped bc of service	N/A	N/A	N/A
4/12	12	Weekly	N/A	N/A	Bus	For work	N/A	N/A	N/A

4/13	13	Two times a month, games are the only use of public transport	N/A	N/A	Bus	N/A	N/A	N/A	N/A
4/13	15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/13	17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/13	19	Daily	N/A	N/A	Bus	Direct Route	N/A	N/A	N/A
4/13	21	Daily	N/A	N/A	Bus, Light Rail	Light rail is faster	N/A	N/A	N/A
4/13	23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/13	27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/13	29	Two times a month	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/16	30	Two times a month	N/A	N/A	Light Rail	fast and easy, usually are seats	N/A	N/A	N/A
4/13	31	Daily	N/A	N/A	Bus	most convenient	N/A	N/A	N/A
4/18	32	Monthly/Yearly	Monthly/Yearly	Some of the time		Parking is difficult and expensive	Google Maps	Google Maps, Onebus away	Drive car, ride share
4/13	33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/19	34	x2 Month	x2 Monthly	always	N/A	So no parking	Memory and google maps	Google Maps, occasionally one bus away	Lyft (tired of walking, late at night, not near the light rail)
4/13	35	N/A	N/A	N/A	N/A	To not drink and drive	N/A	N/A	N/A
4/19	36	Never	Monthly	Almost never		Public transit is too inconvenient	N/A	N/A	Drive
4/13	37	Never	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/19	38	Weekly	Monthly	Always	N/A	Most efficient, no traffic, better better for environment	prior knowledge, light rail is every 10 minutes	One bus away	Lyft (weather, hard to get to a station, cheaper if many people are going)

4/13	39	Almost Never (Just for games)	N/A	N/A	N/A	Uses Park and Ride	N/A	N/A	N/A
4/19	40	Monthly	6-8 times a year	Most of the time	N/A	-Electic car charging at Light Rail -easier -don't like driving in traffic	pretty much always lightrail so no planning		Lyft, if destination light rail doesn't go to or bad weather
4/18	41	Weekly	Weekly	Most of the time	N/A	It's free and easier, don't have to find/pay for parking, no traffic	Figure out who he's going with, Already know's it's a 20 minute ride to stadium station & 10 minute walk to light rail, leaves 30 min before wants to be there. Mostly prior knowledge	OneBus away	Car (It's the only other option. If he was coming from anywhere not by the lightrail station)
4/19	42	Yearly	x2 Monthly	Some of the time	N/A	N/A	N/A	N/A	N/A
4/18	43	Weekly	Weekly	Most of the time	N/A	Don't need to find/pay for parking, no traffic	Prior Knowledge	Onebus away	Car (easy flexible, useful if there is somewhere they have to go after the game that isn't easy to get to by public transit)
4/19	44	Several times a week	Rarely	Never	N/A	N/A	N/A	N/A	N/A

4/18	45	Weekly	Monthly	Most of the time	N/A	Cheaper than rideshares, More eco-friendly, UW lightrail station is convenient and goes most places	King County Metro Trip planner Find a stop near the address of the event and click on it to see routes, Google Maps	King County Metro Website, OneBus away, Google Maps	Bike, rideshare (more conveniet because they pick you up from your house and drop you off exactly where you need to be, especially for Seattle center) Numbers of busses are confusing and seem random
4/23	46	Daily	Monthly	Most of the time	N/A	Dislike Parking, leave faster.	Take familiar route and walk the rest of the way. Use KC MEto website to find bus schedule.	N/A	Drive for distances (Gorge, White River)
4/23	47	Daily	Monthly	Some of the time	N/A	Parking	Trip Planner	Moovit, same as OneBusAway, more accurate.	Drive, when comfortable with parking. Take the bus to somewhere new.
4/23	48	Daily	Monthly	Always	N/A	Parking inconvenient, and "like to have an alcoholic beverage."	Online Trip Planner. Getting itinerary, best routes.	OneStop; times and location of buses, map interface. OneBusAway too. Thinks OneStop is more accurate.	Drive, based on distance only.

Date	Participant	Have you ever heard of the Transit Go app?	How did you hear about the TransitGO app?	Would you be interested in a mobile app alternative to paying with cash?	Why/Why Not	Have you used the Transit Go app?	Can you tell us about your experience?	What has prevented you from using it?	What incentives would make you want to download and use the TransitGO app?	Other Notes
4/2	2	No	N/A	Yes	Don't always have cash	No	N/A	N/A	Free app, easy to use, fine instead of ORCA	

4/12	5	No	N/A	N/A	Techphobia' slow to adapt. Uses One Bus Away, Transit Trip Planner	No	N/A	N/A	If friends are using it, word of mouth	
4/2	6	No	N/A	No	Uses public transportation so infrequently	No	N/A	N/A	If they lived locally, discount	
4/12	7	No	N/A	Yes	Convenince, no line (Only refils ORCA at kiosk, frustrated by online system)	No	N/A	N/A	Speed, anything faster is good. Doesn't want to remember how to log in	
4/2	8	N/A	N/A	N/A	N/A	No	N/A	N/A	If used the bus more, if it was faster than ORCA, if it gets you there quickly	
4/12	9	No	N/A	Maybe	Refiling on the website is confusing	No	N/A	N/A	Discount	
4/2	10	No	N/A	No	parinod about ID theft, a digital format will be hacked	No	N/A	Don't trust putting my payment information online	Conveince, won't loose	
4/12	11	No	N/A	No	No ferry, wants one way to pay for everything	No	N/A	N/A	Single payment method, easy, convenient	

4/12	12	No	N/A	Yes	If not a student, after graduation, places to scan ORCA are inconvenient	No	N/A	N/A	If it saves time	
4/13	13	No	N/A	Yes	Makes public transportation easier, never has cash	No	N/A	N/A	For a guest, faster refill	Uses google maps instead of one bus away
4/13	15	No	N/A	Yes	Convenince	No	N/A	N/A	N/A	Employee of Century Link
4/13	17	Yes	N/A	N/A	N/A	Yes	Likes it a lot	N/A	N/A	
4/13	19	Yes	works at sound transit	N/A	N/A	No	N/A	Other (doesn't think to download when he's able to)	knowlage of it	Sound Transit Employee
4/13	21	Yes	N/A	N/A	N/A	No	N/A	I normally use an ORCA card or other form of payment, Other (has one bus away, confusion about purpose of app)	ease over cash, if it had times places and locations	

4/13	23	No	N/A	Yes	the kiosk is hard with kids, unclear that there wasn't a kiosk on the platform, want to buy ahead of time	No	N/A	N/A	More convient, having on phone maps planning, knowlage, google maps intergration, got info their but wasn't able to pay	
4/13	27	No	N/A	Yes	Doesn't have to carry a card, no space (events don't allow bags)	No	N/A	N/A	Perfers app over card (already has phone), limited to loading card at stations with kiosks, needs to work offline, not hog battery	uses onebusaway to plan ahead of time, its a lot of work
4/13	29	No	N/A	Yes	Convienc e	No	N/A	N/A	Not losing ticket, pays for parking with an app, would buy family tickets when they come with, doesn't want to wait in line for tickets	
4/16	30	Yes	knows someone working on it	N/A	N/A	No	N/A	I normally use an ORCA card or other form of payment	if ORCA card stopped working	
4/13	31	No	N/A	Yes	thought he had the app but it was trip planner, not needing cash is convenen t	No	N/A	N/A	Conveince, showing delay and timing info	
4/18	32	No		No	Already use ORCA card	No			Not really anything	

4/13	33	No	N/A	No	Already has an ORCA card	No	N/A	N/A	Discount, Time Tables	
4/19	34	Yes	From person doing this study	Yes	Convient to have a centeralized travel tool on phone	No	N/A	Other (faster to use kiosk than download app, thought about app but decided against it)	Nothing in that moment, already having the app downloaded	Lost ORCA card right before event and bought lightrail ticket as the kiosk
4/13	35	No	N/A	N/A	Has used one in Oregon	No, but has used Oregon Digital Ticket	no app needed to use ticket	N/A	Ease	
4/19	36	No		Yes	Likes the idea of having on phone where everything else is	No			Knowledge, in the "Crap I don't have cash" moments	
4/13	37	No	N/A	No	No buses from location	No	N/A	N/A	N/A	
4/19	38	Yes	Signs at light rail station	Yes	Wouldn't hvae to carry my wallet, everything else is on phone (event tickets, apple pay)	No		I normally use an orca card or other form of payment	Would love to link to orca card, cheaper fares, bulk discount	
4/13	39	No	N/A	Yes	N/A	No	N/A	N/A	would use if they took transit more, free ticket on the 1st download, wants bus times, apple pay, route planning	

4/19	40	Kinda, not by name	Seeing people using it on light rail	yes	-not interested in single purchases -refillable account (like good to go pass)	No		I normally use an orca card or other form of payment	if it could replace ORCA, wants to buy ahead of time, doesn't want to have to remember to buy, round trips	
4/18	41	No	N/A	Yes	Don't have to carry cash, Useful to figure out bus routes	No	N/A	N/A	Easy access to bus/lgihtrail times, Put digital version of U-Pass on the app so you don't have to carry a card, Digital credit card imbedded to pay (like apple wallet)	
4/19	42	No	N/A	Yes	been times that haven't had enough $ on ORCA and needs to backtrack to refill	No	N/A	N/A	would probably look at it, but wouldn't if it was complex, doesn't want to have to get out credit card	
4/18	43	No	N/A	Yes	Saves time getting on the bus vs. cash.	No	N/A	N/A	Easy acces to schedules, delays, buying tickets in advance. Integration of U-Pass into the app like apple wallet	
4/19	44	No	N/A	Yes	Occaionally, times when ORCA is empty and it takes 24-48 hours to refill	No	N/A	N/A	knowlage, doing research about it, sounds useful, wants secure payment	

4/18	45	No	N/A	Yes	No need to stop at a kiosk to get a lightrail ticket, Can get a bus ticket without having to carry cash	No	N/A	N/A	Alrts to busses, schedules (basically everything on one-bus away), ability to check/refill ORCA balance, Donload maps offline, Include wifi in the tunnels for users from out of town. Would like the app to make bus routes easier to understand, ability to send tickets to other people.	
4/23	46	No	N/A	Yes	Keep payment on phone, don't have to carry stuff around. Apple Pay would be nice.	No	N/A	N/A	Centralize transportation information. TP, ticketing, ORCA management	
4/23	47	No	N/A	Yes	Don't have to carry cards.	No	N/A	N/A	Features offered: Where to go, how to get there, how long to get there, if there's traffic, if there's "icky" people on the bus (lol), best times to go	

4/23	48	No	N/A	Yes	Convenient. ApplePay and Paypal would be more convenient. Likes having everything on her phone. Tapping is a much better experience.	No	N/A	N/A	Features offered: Know where buses are, timing, paying.	

Appendix VII: 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

Appendix VIII: Signed Consent Forms[14]

King County METRO

HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

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.

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- 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
24	4/13/19	James Barter	James M Barter
26	4/13/19	Rachel Terpsma	Rachel Terpsma
28	4/13/19	Diane Gasal	Diane Gasal
30	4/16/19	Jasper Karras	

[14] The participant numbers are out of order because we had multiple teams doing interviews and field studies at the same time.

King County METRO

HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

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 [redacted] 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
32	4/18	Gavin King	
34	4/19	Zoe Ness	
36	4/19	Seri Thompson	
38	4/19	Bryant Thomas Karras	
40	4/19	Kari Westphal	
42	4/19	Marin Curry	
44	4/19	TIM ROOD	

King County METRO

HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

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:

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- 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
[redacted]		[redacted]	
27	4/13	Becca Folden	Becca
29	4/13	Bruce Schrader	
31	4/13	Roman Jose	
33	4/13	Stephanie Hernandez	
35	4/13	Kristina Espinoza	
37	4/13	David Edson	
39	4/13	[illegible]	
41	4/18	TJ Michael	TJ Michael
43	4/18	Kyle Elliott	
45	4/18	Jorn Peterson	

King County METRO

HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

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- 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
2	4/12	Nicole Hanson	
4	4/12	Amy Bree	
6	4/12		
8	4/12		
10	4/12	Scott Rainer	
12	4/12	Ashley Kouma	
14	4/13	Gary Semple	
16	4/13	Dalton Conn	
18	4/13	Scott Trankob	
20	4/12	Adam Carlton	
22	4/13	Nathan McClure	

King County METRO

HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

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.

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- 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
1	4/12	Zico Deng	
3	4/12	Mishal Rowley	
5	4/12	MARK TOMIKI	
7	4/12	ANDY HECKROTH	
9	4/12	Jordan Metz	
11	4/12	Nancy Holt	
13	4/13	LINDSEY KOEHLER	
15	4/13	Jay LaRocca	
17	4-13	[illegible] Sachs	
19	4/13	GREG PARKER	
21	4/13	Jil Hendershot	
23	4/13	[illegible]	

Appendix IX: Big Data Cleaning Code[15]

```
#!/usr/bin/env python
# coding: utf-8

# In[2]:


# Importing necessary packages
import pandas as pd
import numpy as np
import datetime


# In[3]:


# Loading the events at CenturyLink Stadium from February 2019
feb_events = pd.read_csv('Feb_Events.csv')
display(feb_events)


# In[4]:


# Removing the last column which is empty
feb_events = feb_events.iloc[:(len(feb_events) - 1),]


# In[5]:


# Loading the APC data
data = pd.read_csv('data.csv')


# In[19]:


# Narrowing to only the stops that surround CenturyLink Stadium
centurylink_stops = [30635,620,390,843]
data_small = data[data.STOP_ID == 30635]
data_small = data_small.append(data[data.STOP_ID == 620])
data_small = data_small.append(data[data.STOP_ID == 390])
data_small = data_small.append(data[data.STOP_ID == 843])
print(len(data_small))
# Removing all of the rows where the bus was not actually operated
for index, row in data_small.iterrows():
    if row['OPD'] == 'N':
        data_small = data_small.drop(index)
```

[15] The data set this analysis was done on is too large to include in this document (745MB, more than 11 million lines), the data can be provided upon request.

```
print(len(data_small))

# In[22]:

# Converting XDATE column in APC data to datetime objects
data_small.loc[:,'XDATE'] = pd.to_datetime(data_small['XDATE'], format = '%Y-%m-%d')

# In[23]:

# Converting data column in feb_events data to datetime objects
feb_events.loc[:,'date'] = pd.to_datetime(feb_events['date'], format = '%m/%d/%Y')

# In[24]:

# Creating a dataframe to combine the two data sets
data_events = data_small
data_events['century_link'] = [None] * len(data_events)
data_events['start_time'] = [None] * len(data_events)
data_events['end_time'] = [None] * len(data_events)
data_events['attendence'] = [None] * len(data_events)

# In[25]:

# Match the events data to the bus route data by date
# This cell takes some time to run
for index, row in data_events.iterrows():
    date = row['XDATE']
    for event_index, event_row in feb_events.iterrows():
        if (date == event_row['date']):
            data_events.loc[index,'century_link'] = 1
            data_events.loc[index,'start_time'] = event_row['start_time']
            data_events.loc[index,'end_time'] = event_row['end_time']
            data_events.loc[index,'attendence'] = event_row['attendence']

# In[26]:

# Method that converts a seconds since midnight value and returns it in hour:minute format as a String
def sec_to_time(seconds_midnight):
    hours = int(seconds_midnight / 60)
    seconds = int(seconds_midnight / 60 % 1 * 60)
    if seconds < 10:
        return("%s:0%s" % (hours, seconds))
    else:
        return("%s:%s" % (hours, seconds))

# In[27]:

#Create a dataframe with the same data as data_events and converts all of the times to standard format
data_events_time = data_events
for index, row in data_events_time.iterrows():
    try:
        if row['SCHED_START_TIME'] > 1339:
            data_events_time.loc[index, 'SCHED_START_TIME'] = 1339
        if row['ACT_ARR_TIME'] > 1339:
```

```
            data_events_time.loc[index, 'ACT_ARR_TIME'] = 1339
        data_events_time.loc[index, 'SCHED_START_TIME'] = sec_to_time(row['SCHED_START_TIME'])
        data_events_time.loc[index, 'ACT_ARR_TIME'] = sec_to_time(row['ACT_ARR_TIME'])
    except:
        print(index) # Print which rows through errors


# In[28]:


# Convert all of the strings in hour:minute String format to datetime objects
for index, row in data_events_time.iterrows():
    data_events_time.loc[index, 'SCHED_START_TIME'] = datetime.datetime.strptime(row['SCHED_START_TIME'],
'%H:%M').time()
    data_events_time.loc[index, 'ACT_ARR_TIME'] = datetime.datetime.strptime(row['ACT_ARR_TIME'], '%H:%M').time()


# In[31]:


# Export the cleaned data set as a csv so it can be used in Tableau
data_events_time.to_csv('data_events_time.csv')
```
