SounderTransit

Team

Ariel Ho: research, storyboard and interview write-up
Kelley Chen: research, task and scenario development, proof reading
I-Miao Chien: research, task development, writing
Pei-Xin Chen: interview write up, task development, and revision

Problem and Solution Overview

Seattle now ranks as the fastest-growing big city among the 50 largest U.S. cities. Since 2002, the Link and bus ridership has grown at more than twice the rate of population growth [1], which makes travelling within the Greater Seattle Area faster and more convenient. However, our research has shown that the payment system and integration of bus and Link stations can actually be more confusing than convenient. The current Link payment system requires riders to go through trial-and-error, peer assistance, and observations to learn about the and ticketing system. In addition, we also discover that the integration of bus and Link stations can be confusing for riders as they sometimes expect Link but see buses arriving or the other way around. Some riders also mention that they often have troubles figuring out the upcoming stations when they are riding the link. These problems especially arise among riders with limited English proficiency because there exists an extra barrier for them to fully understand and feel comfortable with the whole system.

To tackle the problems, we propose to make the Link more informative and intuitive. Regarding the payment system, we intend to include tutorial videos at the entrance of the stations and will be in the form of demonstrations instead of explanations so we can eliminate the language barriers while educating riders about the payment system. The station would also be implemented with gates so it will be obvious to the riders as to when and where to tap their tickets. To help riders easily navigate through Link, we will have maps and signs at the stations and on Link cars to inform them about the informations needed.

[1] https://www.citylab.com/transportation/2017/01/a-growing-seattle-goes-all-in-on-transit/512321

Design Research Goals, Stakeholders, and Participants

We did a combination of behavioral mapping and observation to find pain points in the station that we could try to help improve. By observing people's behavior, we were able to see people performing tasks naturally and to obtain realistic information. To have a good balance between behavioral and attitudinal research, we also did four interviews with our participants, including a bus driver, two retired male elders, two local women and a fare enforcement officer. We chose a diverse group because we seek to obtain a comprehensive combination of information from different perspectives on the system.

Kelleen was the first stakeholder, a bus driver for Route 372, whom we interviewed at the intersection of NE Campus Parkway and University Way NE on October 18th early afternoon. According to Kelleen, there are a lot of people with limited English speaking and reading abilities taking the bus. While she could assist bus riders to navigate, there is not an obvious way nor any Link staff for riders to know if they made a mistake on Link Light Rail until they got fined. We, therefore, realized that the bus system is not the one at flaw and thus we decided to focus more on the Link Light Rail.

The two **American Chinese** ladies at the international district tunnel station were our second group of participants. One of the girls lives in Seattle and the other is a visitor. Both of them can speak and read English with comfort. When they got to the platform, they looked around for information on the wall and hanging signs. By observing, we found that they were confused, and they wondered around the station for a little trying to read the instructions to seek directions. They mentioned that coming down and seeing busses going through the tunnel when they expected the Link was confusing.

The two retired **Taiwanese immigrants** were our third group of participants. Neither of them reads or speaks English. One of them have lived here for almost 40 years and the other moved here in the states 3 years ago. They mentioned that there is a Taiwanese community in Seattle and they got assistance from the community to learn using the transportation, including how to get an ORCA card and when to tap the card. In fact, they often travel with friends or family that are familiar with the metro system during their first few trips and they just learn from experiences.

A **fare enforcement officer** was our last participant. We interviewed him at the International District Tunnel Station after he finished dealing with a situation that happened in the station. He explained language barriers as more of an inconvenience than a problem. If and when they encounter someone with a language barrier, they will take out a translator machine that contains instructions of the tap-on tap-off policy in a lot of different languages.

Design Research Results and Themes

According to our interviews and observations, the Link Light Rail is confusing because it does not have a clear instruction stating where or when the ORCA card should be tapped. Some riders have to observe how others do it for the first few times in order to learn the system, and some have to reach out to additional assistance from their community. Another key finding is that not only people with language barriers have troubles reading instructions, but people without language barriers also think the systems are confusing and the instructions are not as helpful. Therefore, our goal of the design is to build constraints to prevent misunderstandings and create systems that are intuitive without extra readings and create a simpler and more understandable design for Link.

1. From the participants we talked to, they all agreed that the transportation system is confusing. According to all of them, they all managed to learn the transportation system from their local friends or community who already had experiences with public transportation. From the English speakers we interviewed, they did not indicate that reading the instructions for buses or Link at the stations, on tickets, or online is helpful for them to feel confident while using the transportation system. The instructions are not very effective nor intuitive enough for people who speak English. Not to mention for people with language barriers, understanding the system can be even harder.

2. One of the participants mentioned that the fact that the Link and the buses sharing the same lane confused them. They were expecting Link but instead seeing buses coming, which made them unsure if they were in the right platform. Another participant also mentioned that she did not know that she was supposed to tap her card after getting off the Link. Therefore, she only tapped once when she got on the Link. It took her awhile to realize that she actually had to tap both on and off after seeing other passengers doing so. We also observed that the English instructions at the stations only mention about tapping before entering “Link Fare-Paid Zone” without saying if passengers should tap off or not.

3. Two of the participants advised that the stations can be clearer about the buses and Link sharing the lanes and platforms as such situation is uncommon. From their perspectives, the Link is a kind of train and should be separated from buses because buses belong to roads. If the stations can be clearer on that, the confusion could have been avoided. Participants suggested that the station should be clearer about tapping on and tapping off for Link because otherwise there is no obvious way they could learn that rule besides seeing how other people do it. It is not entirely reasonable that passengers should learn how to use the transportation by observing others.

Answers to Task Analysis Questions

- **Who is going to use the design?**

  People with limited English speaking and reading abilities are our target group. In addition to benefiting our target group, our design will also be intuitive enough for the majority of the riders. It may also reduce conflicts faced by officers checking tickets on Link because the passengers can be aware of the payment system without being confused about the reasons of getting fined.

- **What tasks do they now perform?**

  They seek help from the community that they are associated with. Take our second participant, for example, one non-English speaking elder knows how to get to Bellevue from Chinatown, Seattle and he takes the buses with the other non-English speaking elder who does not have experiences taking buses to Bellevue from Seattle. Both of them belong to a Taiwanese community and they can seek help from each other.

- **What tasks are desired?**

  The five main tasks for our design are as followed:

  Task 1: Identify the correct transportation when both the Link and the buses arrive at the same platform.

  Task 2: Take the link without having opportunities to perform wrong behaviors.

  Task 3: Commute in Seattle without knowing English by following images and symbols available around the station as well as on the transportation tools (inside the Link)

  Task 4: Purchase the correct ticket and make sure it is valid throughout the trip

  Task 5: Quickly learn Seattle's public transportation as a new comer

- **How are the tasks learned?**

  Riders on the Link Light Rails generally learn how to use the system by trial and error or from their peers. They usually learn the concept of tap on and tap off by observing other riders do the actions.

- **Where are the tasks performed?**

  The tasks are performed at Link stations, bus stations, on Link or on the bus by the passengers who have limited English speaking and reading abilities(, and possibly the majority of the riders).

- **What is the relationship between the person and data?**

  The language barriers make it harder for people to understand the non-intuitive and confusing transportation system because they do not have access to the instructions.

- **What other tools does the person have?**

  They have friends or the community they associated with. They may or may not be able to take advantage of the technologies available for them.

- **How do people communicate with each other?**

  They communicate in their languages or the police officers have translators equipped with them.

- **How often are the tasks performed?**

  Tasks are performed frequently, many times per day according to the facilitators we previously interviewed.

- **What are the time constraints on the tasks?**

  The Link come and go. This can put time pressure on passengers, and they do have a limited time to react before the bus or the Link leaves.

- **What happens when things go wrong?**

  The passengers might head to a destination that they did not mean to be go to. This can make them feel extremely unsafe and scared because they are in an unfamiliar place and can not communicate with other people in the commonly used language in the area. It can take them much more time to head to the desired destination and cost them extra expense.

Proposed Design Sketches - “3x4”

Design 1 | Tutorial Video

In this design, we intend to have videos playing on the walls of the station. These videos would show how to use the Link payment system through visual demonstrations (Task 3). The narrator in the video serves as a bonus that enhances the understanding of the majority of the riders, where as the visual demonstration is already sufficient for educational purpose. A rider would come into the station, watch the video, and have a better understanding of the system. The video would demonstrate where to go (Task 5) ,what ticket to buy as well as how to get into the station. The video would also show the functionality of the flashing light on the platforms which signifies if the next coming train is a bus or a Link light rail (Task 1). This video can help people clarify confusions so that they can have an easier process. They will then get to the gate and recall what was shown on the video and therefore tap the card to

get through the gate (Task 2). The screen would also be interactive with other information, and it would be playing the instructional video by default (Figure 1).

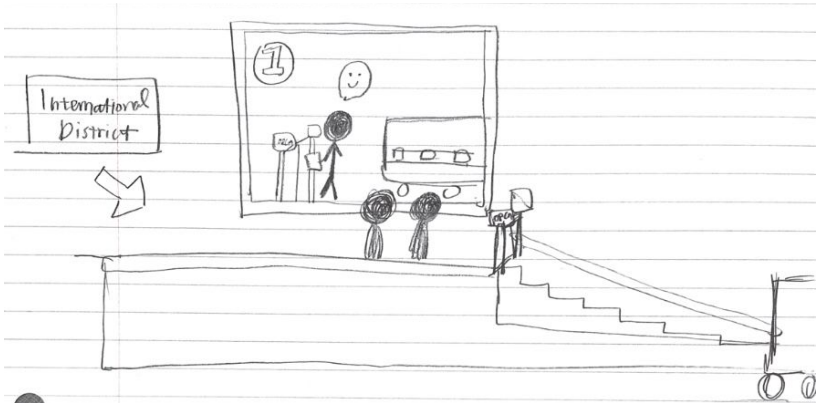

Figure 1. Tutorial Video at Each Station

Design 2 | E-ticket with Sensor

E-ticket is a device that can be scanned and detected from a rider's bag, so the rider does not have to explicitly take out the ticket every time she or he goes through the gate (Task 2). The device also provides real-time information of a rider's status such as the expiration time, and it also uses colors and universal signs to indicate if the ticket is still valid (Task 4). This way, people who have the tickets can just pass the gates without having to think about payment (Task 1,3). For example, a green arrow appears when the ticket is usable, and red X appears when the ticket is expired (Figure 2).

Figure 2. E-ticket with Sensor While User Passing the Gate

Design 3 | Better Signs on the Wall and Poles

There are poles with icons of the buses and the Link light rail on the platform which serve as an indication of the type of public transportation that will come to such platform. The light on the pole will flash corresponding to the type of public transportation that is coming, so the passengers will not be confused about whether they are at the right platform (Task 1). Also,

there is information of the previous/next stop on the sign to ensure the passengers will not go in the wrong direction even if they are unfamiliar with the system (Task 5) (Figure 3). With signs and flashing indication riders can clearly know what is happening and where to go (Task 3, 2).

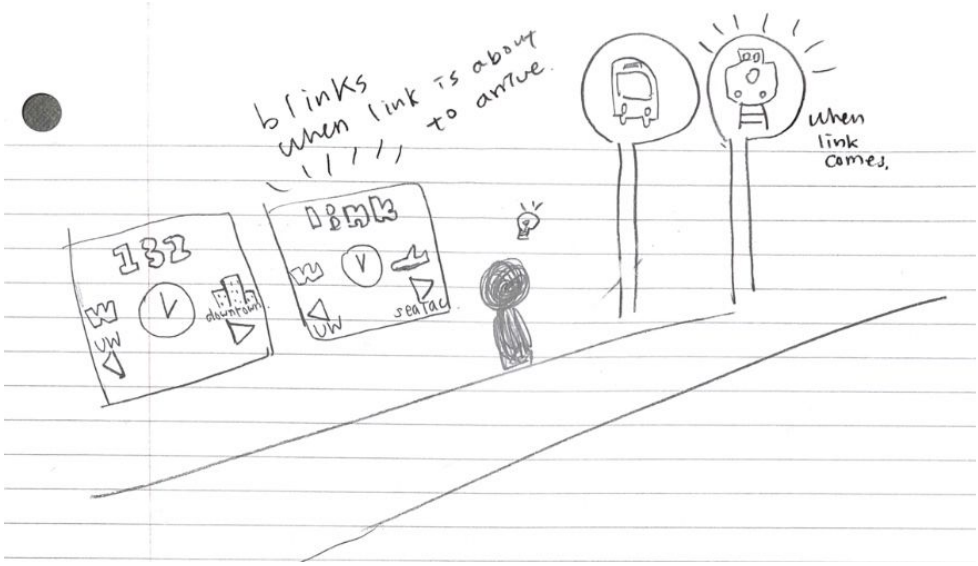

Figure 3. Clear Signs on the Wall and Poles

Selected Design & Tasks | Integration Design 1 & 3

We decided to combine certain features from our designs to help our riders (1) to easily understand the ticketing system and (2) to easily navigate through the transportation tool. We first want to implement tutorials at the entrance of the Link so that the passengers can see it right when they enter the station. Our tutorial will demonstrate the usage directly through a video instead of explaining in English so there will not be language barriers for people. To make the payment method intuitive, we will also implement gates for each station so it is obvious that they have to pay to pass the gates with pictures of e-tickets on the panel at the gates. Besides the payment system, our design attempts to have better indication for Link and Busses by having signs that would flash according to which one is coming. At the station, we will have maps with an obvious dot indicating the current station and an arrow pointing to the direction of the Link; in the Link car, we will have lights on the map for each station and the lights will only be on and flicker if it is the next coming stop.

Written Scenarios - “1x2”

Scenario 1: to easily understand the ticketing system (Figure 4)

Xiao-ming gets to the link station, it is her first time riding the Link and she is not sure how everything works. The first thing she sees is a big screen with instructions. The video shows someone holding their Orca card against a machine that also has an Orca logo on it (Task 5). After the person in the video tap the card, the gate opened up for them and they were able to go through. Xiaoming then proceeds to the gates that is right in front of her and she taps her card that she obtained from the ticket machine. The gate opens up, and the screen indicates that money has been taken off from her card and she is able to proceed down to the platform (Task 2).

Scenario 2: to easily navigate through the transportation tool (Figure 5)

Victoria is a tourist visiting Seattle and her flight just arrived yesterday. She decided to go check out Pike Place Market today and she found that she could take the Link Light Rail there. When she arrived at the station with the help of Google Map, she looked around the station to check if she was at the right station and if she was on the right side of the station. She saw an obvious sign with the symbol of the Link hanging from the ceiling of the station and confirmed that she was at the Link station (Task 1). She then saw a map on the wall and with a dot on the current station. There was an arrow pointing to the direction to her destination. She then ensured that she was on the right platform. After successfully getting on the Link, she started to worry that she would miss her stop. However, she quickly noticed another map in the Link with a light flickering on the Chinatown icon which was between her start and destination station. She realized that after arriving at the lighted station, the light will move onto the next stop and therefore she learned to identify her location on the Link (Task 3).

Storyboards of the Selected Design

Task 2 & 5

Figure 4. Process of Learning and Using the Payment System

Task 1 & 3

Figure 5. Process of Navigating Through the Transportation Tool