Improvements to OneBusAway

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Problem and Solution Overview

Public transit riders often need to plan their trips in advance in order to optimally utilize their time. Publicly available schedules of transit systems (such as the bus schedules) are useful but not accurate. They do not provide real time information for each stop. Applications such as OneBusAway have solved this problem by extracting real time information provided by transit officials and presenting it to users through the web, voicemail, texts and applications on smart phones. Although this application provides pertinent information in a timely manner, the user needs to spend a lot more time than necessary in effectively exploring and utilizing all the features. There are numerous useful features that are accessible in less obvious places within the app and hence not used regularly even by experienced users. We aim to obviate this problem through a user interface redesign for the current OneBusAway iOS application to ensure that OneBusAway provides an intuitive and streamlined user experience. Of specific interest in the redesign is promoting the alerts notification feature.

We also acknowledge that OneBusAway application tends to be less user friendly for first-time users of the application or for infrequent bus riders who may not be familiar with the Metro routes numbers, stops and terminals. To ensure that the app is easy to use by everyone, we plan to include a trip planning feature where the application incorporates Google Maps with Directions that would be useful to search for buses based on the destination place of interest such as restaurants. This ensures that the app user does not have to remember stop numbers, route numbers or addresses and has access to all transit related information in a single app.

Prototype

Our design has changed fairly significantly. Due to the fact that alerts are already implemented on OneBusAway for Android and even iPhone, we decided to tweak our design to address issues found in our Contextual Inquiry as well as make alerts a more prominent part of OneBusAway. Figure 1 shows that 'Search' from the available tabs in OneBusAway has been removed, making way for an 'Alerts' tab. This modification allows the elements that were previously held in 'Search' to be integrated with the home screen map.
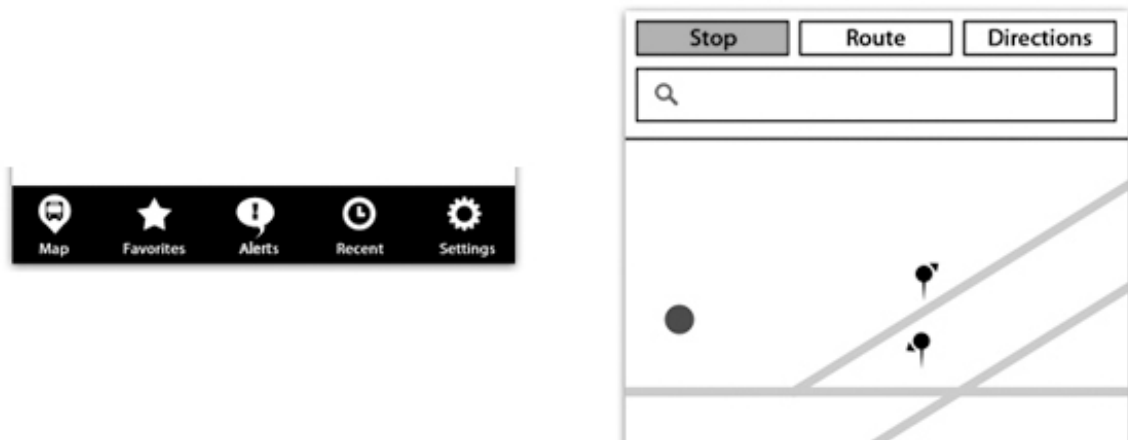

Figure 1. Modified navigation tab and map integrated with search.

Visual markers for bus stops have been modified on the map to look like pins to keep the UI less cluttered. Users can search for a bus stop, address, a particular route, or even have OneBusAway suggest a route to get to your destination. Once a search query is entered, the map shows different types of results based on what type of search is made. From left to right, Figure 2 shows how the default map looks; a search for a specific route, a search from a specific destination, and a separate map showing the user how to get their stop. In all these cases, the small pins that represent bus stops enlarge and display a bus icon to symbolize relevant stops based on the user's search.
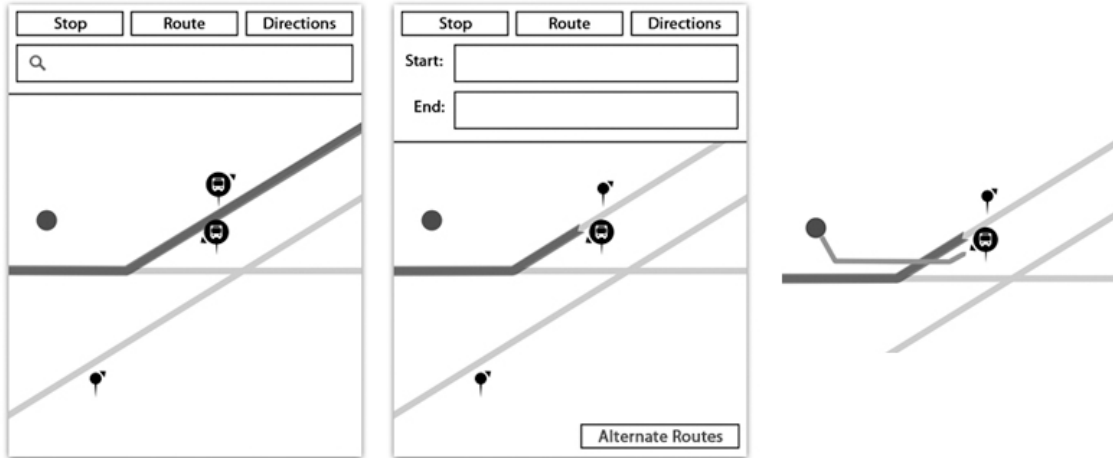
Figure 2. Different search results.

Clicking on bus stops on the map displays real-time information similar to OneBusAway but with slight differences. In Figure 3, the screen that displays real-time information only displays a limited number of upcoming buses by default. This keeps the amount of data to a minimum on the screen but still allows the user to load more upcoming buses if needed. 'Filter Route' and 'Favorite Stop' are positioned at the top for easier access. Both filtering and favoriting (previously bookmarking) are both implemented into OneBusAway, and we only repositioned them to emphasize these features. Users can click on a specific route in Figure 3, which displays a map of the selected route and the option to favorite it. Alternatively, users can simply press the star next to their desired bus to favorite it. All favorited items appear in a list under the 'Favorites' tab similar to 'Bookmarks' in OneBusAway.
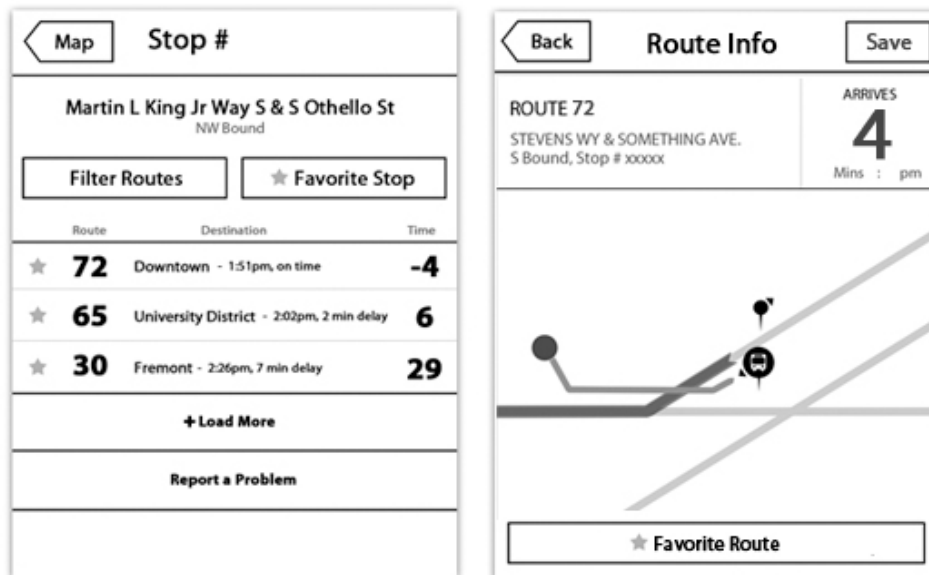

Figure 3. Stop information & route information.

Saved alerts can be viewed and added within the 'Alerts' tab. As shown in Figure 4, when adding an alert, the user searches for their stop, selects their route and the scheduled bus they intend to take. After selecting their bus, the user can set when they want to be alerted, how late a bus can be before being notified, alert repeating, ringtones, and the alert's label. After an alert is added, the user is returned to the 'Alert' screen.
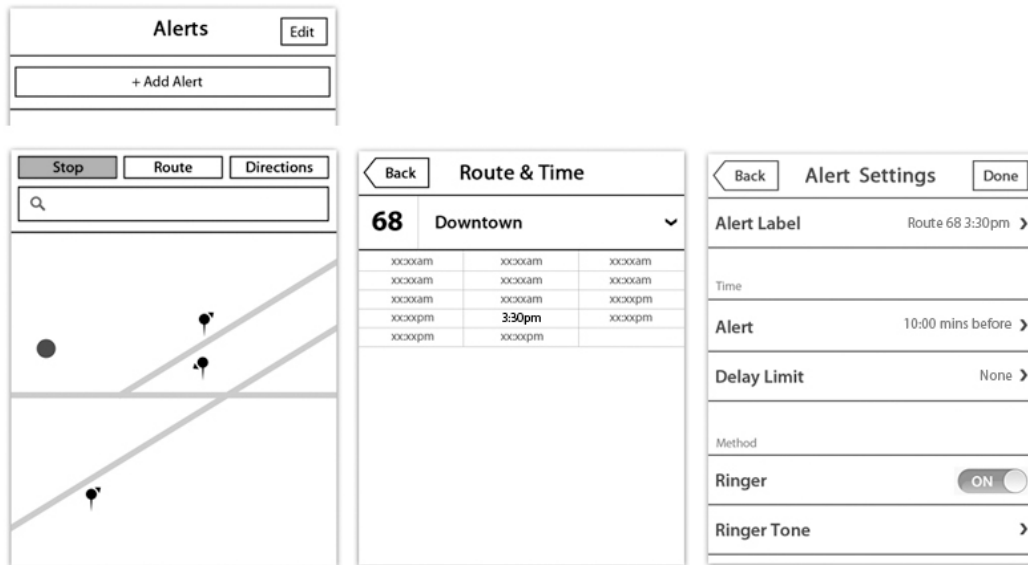

Figure 4. Adding an alert.

Our prototype focused on iOS so our alert designs were based off the in-phone alerts provided in iOS. Figure 5 shows how alerts display the alert's label, route, arrival time, as well as the address for the relevant bus stop and weather information. Not much could be done to the alert's design since we are using iOS, but a key feature of the alert is the 'Snooze' button. By clicking 'Snooze' the user can set a temporary alert for the next upcoming bus (thus snoozing your route) without opening up OneBusAway.
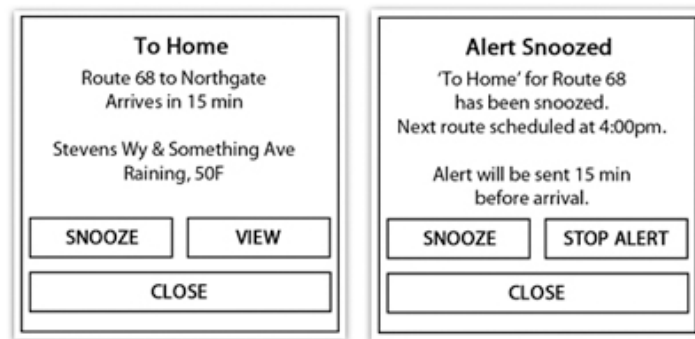

Figure 5. iOS alerts.

Testing Method

Participants
User A is a male Broadcast Technician at UWTV. He is 63 years old and is a frequent bus rider usually between home and work. He uses OneBusAway very frequently every day for about 2 years. Prior to using OneBusAway application on his iPhone (and occasionally on the web), he used an application developed in the Civil Engineering department at UW.

User B is a female student at the University of Washington. She is 20 years old and rarely rides the bus. She has never used the OneBusAway application before. Her preferred platform is Android.

User C is a male student at the University of Washington. He is a 21 years old frequent bus rider that uses the OneBusAway app on his iPhone every week to get to class on time.

Environment
Testing with User A was conducted in the conference room of the UW TV center in Kane Hall. User study with User B was done in Odegaard library, while testing with User C was conducted in the living room of an apartment. For all user testing, we spread out our paper prototype on the table for users to interact with. All of these environments were fairly quiet since we wanted minimal distraction. Despite having different locations for user testing, we tried to keep our method of testing consistent among all users.

Tasks
Task 1 A: You work as a businessman in an office. You have just started using the OneBusAway application and want to 'Favorite' a bus route at a particular stop that you frequently use. The route you frequently ride is Route 72. Add a favorite for the stop where route 72 passes through it.

Task 1 B: Now that you've added this stop, look up the status of your 72 ride to see when you should be leaving the office.

Task 2: You are at the U-District. You receive a call from a friend to meet him at the Cheesecake factory at Downtown Bellevue as soon as possible. Use the OneBusAway application to help you get to your destination.

Task 3 A: You take Route 68 at 3:30PM every Tuesday and Thursday to go to work after classes. Sometimes, you forget to leave campus on time, so you set an alert in the application to remind you of the bus' arrival.
Task 3 B: Today, just as you're getting ready to leave for work, your manager calls to inform you that you don't need to come into work until a half hour later than usual (you

want to take the 4:00PM bus). An alert will still pop up at 3:30PM, handle the alert and ensure that you will be notified for your modified 4:00PM departure time.

Procedure
We first sat down with the user, and told them about our project, why we're doing user testing, and what we hope to accomplish through user testing. We read them what was essentially on the consent form, and asked for their verbal agreement, assuring them that their data will be anonymous, and that we're not testing them. We told them that our prototypes were low-fidelity and asked them to feel free to point out anything they feel could be better. For User A and B, Sanjana and Jia Le took notes on the testing process while Viswa was the operator of the prototypes. All of us explained the user testing by demonstrating the usage with a sample task. We explained the need for the above mentioned tasks and encouraged the users to voice their thoughts out aloud as they performed them. While the users were carrying out the assigned tasks, we provided minimal to no assistance to see how easy the system was to use without any help.

Test Measures
In all the user studies, we used the same format of pre and post-study questionnaires to get the feedback from the users about the improvement in the system. We encouraged the users to think out aloud so we could better understand what they expected from the design and what eventually was selected in the interface. At certain instances, when the user was stuck in making a decision on how to proceed, we questioned them about their expectations on the user interface. This gave us insights on how 'natural' the user interface was.

Testing Results

All of the users liked the incorporation of trip planning and alerts with OneBusAway. When asked if they prefer to have separate app to accomplish these tasks, they preferred having one app for all of these functionalities. One user pointed out that people in "day care" would appreciate the alert feature. Also, our design made features like alerts and filtering routes more visually accessible. Even experienced users did not realized those were already implemented functionalities, and were pleasantly surprised when these were pointed out to them. Ultimately, we received a lot of good feedback on the interface and everyone thought learning to use it was easy and thought that the interface didn't stray too far from OneBusAway's.

We ran into some unexpected difficulties while performing the user testing. First of all, some of our labeling confused our users. All of the users were confused on the wording of "snooze." Snooze is conventionally used to repeat the same alert again with certain interval, thus, the suggestion was to name it "Next Bus". This will lead to the new pop-up which will give the user an option to set the alert for the next bus or look at all the upcoming buses for that route. Additionally, there were some confusion related to wording and grouping of different settings in the Alert Settings screen. For instance, the functionalities of Alert and Delay Limit were not clear.

Through the user testing, we noticed that there were inconsistencies in the design of our screens for adding alerts and editing alerts. Our adding alerts screen was very different from our editing alerts screen, and that caused some confusion among the users, who had trouble setting an alert. At first, when the user clicks on "add an alert," it takes them back to the map where they can search for routes or stops on which they want to add an alert to. This baffled the users, and we realized that it did not make a lot of sense that adding an alert would take the user back to the the main screen, which is the map, where they just came from.

We also ran into some issues concerning trip planning. The users were confused as to what to enter in the search bar: addresses, names of places, etc. When they were given a suggested route, they were able to see the route highlighted on the map. User A particularly disliked the layout of the map. He told us that he would have preferred the pins for the buses to display the bus number, as it was inconvenient to force the user to have to click on the bus stop to see the route they should take. Also, he wanted to see a clear indication of transfers. He suggested that finding some way of calculating the total amount of time to get from the starting to ending point would have been helpful, as well as allowing the user to set the leaving time to say, 4 hours from now. In this case, however, since the application is mainly used to access real-time data, we decided that such features like calculating total travel time are not necessary, and the user is responsible for finding bus arrival times if they want to leave several hours from the current time.

We explained to our users that our paper prototypes were low-fidelity, and in general, they felt comfortable pointing out aspects of our design that they disliked. They liked how our prototypes were very consistent to the look and feel of iOS. However, because our prototypes were on paper, there were some misunderstandings due to the fact that some things that would have been clear on the actual app did not completely come through in our prototypes. For example, without color, the users had trouble finding where their current location was on the map.

Interface Revisions

The procedure of adding an alert was one of the most prominent issues we found from our user testing. Many users found the procedure slightly confusing and not very well integrated within the rest of OneBusAway. With our prototype in Figure 1, adding an alert was limited to going through the 'Alert' tab. From there, the user would have to go through set steps to create their alert. Unfortunately, these steps were not as clear as we hoped, so we decided to redesign adding alerts to remove this step-based procedure, as shown in Figure 6. Here the user isn't forced into a step-based procedure and can easily change settings at will. On top of this, some settings have been reworded for more clarity. An option to add alerts while looking at route information has also been added for better alert adding integration within the app.

Figure 6. Improved alert adding.

On top of confusion surrounding adding alerts, users also found the 'Snooze' feature provided on alert pop-ups unclear. Currently, 'Snoozing' an alert/bus route allows the user to set up a temporary alert for the next arriving bus on the user's route. Unfortunately, the meaning of snooze for our given feature is ambiguous, so we decided to change the wording of the 'Snooze' button to 'Next Bus'. To further simplify this feature we decided to also modify what happens after hitting 'Next Bus.' Currently in Figure 5, after 'Snooze' is clicked, another alert pops up and a temporary alert for the next bus is automatically set. In the improved version, a temporary alert is not automatically set and instead the user is given the option of setting the alert. In Figure 7, new rewording of alert buttons is implemented and the middle screen shows a 'View More' button. By removing continuous snoozing, the 'Stop Alert' button in Figure 5 was

also removed, allowing us to add this new view button. This 'View More' button lets the user see more buses associated with their route, and from there they can choose to add a new alert.
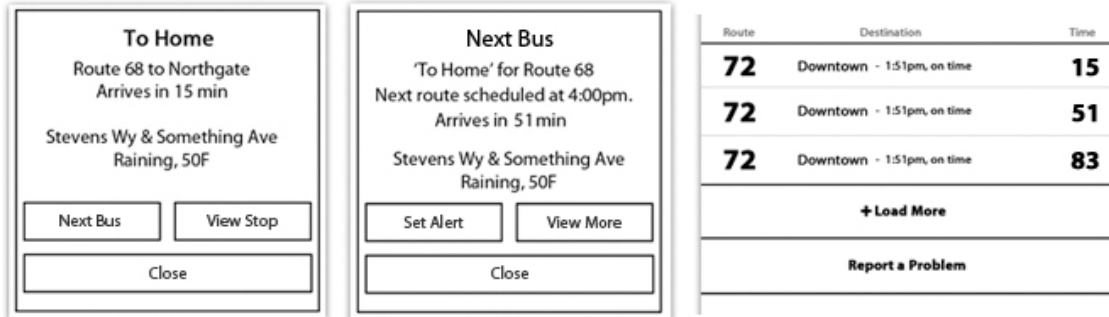

Figure 7. Improved Next Bus alert.

Our prototype also featured stars as a way to favorite specific buses through OneBusAway. Many users ignored the stars or found them unclear, so we eliminated these stars from stop information screens as shown in Figure 7 (far right image).

Lastly, most users found our trip planning/directions feature helpful in finding bus stops and routes to designated locations, but users had a problem with identifying what bus to take and how to spot transfers on the map. Our prototype expects users to always click on stop icons for more information, but we eventually thought this was too limited. To accommodate these map problems, Figure 8 shows that we included bus route labels to easily show which buses routes should be taken.
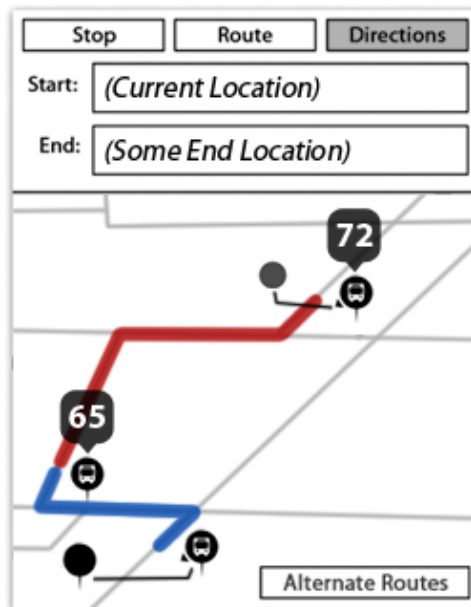

Figure 8. Improved map directions.

Additionally, different bus routes are color-coded to easily identify transfers. For those that are color-blind, the bus route label still serve as large markers, allowing color-blind users to still see if a different bus needs to be taken along their trip.

Summary

Our intentions of testing users was to identify potential user interface flaws as well as seek more opinion from existing OneBusAway application users for new features such as trip planning and comparing experienced users' reactions to the our redesign to new users' reactions. Users in general liked the overall new interface since it brought several features such as alerts in an easily accessible tab button.The general consensus within the group was that the trip planning feature was useful although the user interface could have been more elaborate. Specific areas of redesign were identified and include the search box which was confusing for one user. There appeared to be a lack of continuity with the trip planner since users expected a user interface similar to Google Maps. This was more of a shortcoming in our prototype rather than the actual system design since we were not able to replicate many essential features from Google Maps and Directions.

There were a few inconsistencies with the context of words used within the user interface such as "Snooze". The intended usage of the Snooze feature was not well understood by all users. We predict a significant change in how alerts are presented and edited by the app users. Specifically, we plan to simplify the alerts menu options and removing ambiguous options such as "Delay Limit".

In general, we feel that our user testing went well. However, because there were a lot of paper screens to keep track of, we did mistakenly give the user a wrong screen once or twice. We discovered that it takes a lot of practice (more than the two run-throughs we did) to smoothly run the prototype, even though we were very familiar with the design. We did uncover many issues that we might not have thought of, and the user testing contributed a lot to the improvement of our design.

Appendix A: Raw data from testing

User A:

Pre-Interview questions:
1. Gender: Male
2. Age range: 63
3. Occupation: UW TV broad cast technician
4. Frequent bus rider: Yes almost every day
5. Use of OneBusAway before, and how frequent: probably several times a day. First used to use the earlier bus tracking information on webpages, until he got a iTouch. Been using the app for around 2 years
6. Phone model: iPhone

Task 1

Questions or concerns:
1. He made sure he understood the task. He asked if he need to select the map before the map is load.
2. Do I select that bus stop or the next one? I want to pick the direction bus.
3. When we click on the bus stop, it should say N or S. I dunno if we already have that design.

Notes:
1. Knew to press favorite

Task 2

Notes:
1. It doesn't have the trip planner application particularly, this is where OBA doesn't …
2. Do I type in the Cheesecake Factory or the nearby stops.
3. Hit Search.
4. In the screen with the path, which bus to catch. Do I click on Start
5. Helpful to have which bus you would initially get on Not just the map.
6. Most people would like to know when you would theoretically arrive.
7. If we have the transfer does it do that? Transfer pike and second or something like that.
8. If possible in the main screen. How long, how many transfers. If there is alternate path???
9. Where I am gonna be and when am I getting there.
10. Strongest point on the bus stop: I can look at it, I plan on hitting that one. J
11. Use website in the morning and then in the Meany hall in iPhone at the evening!

Task 3

Questions/Concerns:
1. What is delay limit?
2. Repeat?
3. Set it for 4 pm using label?

Notes:
1. Route and bus stop to determine which time, which stop??? I would hit in favorite and hit the stop and some way for me to say, that is the bus I want, but I want it at 3:30. Haven't identified my stops....???
2. Search for 68, then opens up the map
3. Not sharp on reading so missed the alert
4. Repeat is not that clear
5. Half the time it is on vibration
6. How did I set the time before
7. Label can be edited?????? Label would be nice to be blank???
8. Some way to enter the data
9. Want to directly enter the data
10. Snooze means don't bother me: there is nothing that shows me
11. Quick way don't have to change anything, but wait till alert pops up and delay at 4 pm
12. Label Next Bus instead of snooze
13. Aiming for the same time, but just snooze – assumes some interval
14. Not very convenient in the meeting; not manipulating it
15. Next bus and the option to edit the change

Post interview questions:

1. Rate the following:
On a scale of 1 to 5, where 1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and 5 = strongly agree, describe how you feel about each of these statements.

The system is easy to use	5
The system is easy to learn to use	4/5
I would like alerts feature	4
I would like the trip planning feature	4
I like the overall design of the application	3

2. General questions
2.1: What did you like most about the system? Covered in 2.7

2.2: What did you like least about the system?
Map is not clear. Don't see the bar until I hit one of the options. Alert settings – save at bottom? Not sure what filter routes mean. Can hit the route. Then he started playing with it for a while in his iPhone.

2.3. How could the system be improved? Already covered while testing

2.4. What additional information would be useful for the alert system? And how do you want it to be presented and taken? Already covered while testing and in previous questions

2.5. How would using the system affect your experience of using public transit? Already covered while testing and in previous questions

2.6. What would you mostly use for it? Already covered while testing and in previous questions

2.7. For experienced users: Do you like the changes to the original application? Why or why not? Do you think you would use it?
Alert yes. Also Day care people would love it.
Trip planning is a neat feature – metro trip feature is not very useful
That is the frustration with web based trip planning

User B:

Pre-Interview questions:
1. Gender: Female
2. Age range: 20
3. Occupation: Student
4. Frequent bus rider: No
5. Use of OneBusAway before, and how frequent: No
6. Phone model: Android

Task 1

Notes:
1. Figure out where I am.
2. Lets assume it is showing the stops closer to you.

3. Done

She was very fast to accomplish the task.

Task 2

Questions or Concerns:
1. She typed Bellevue in the end location and she seemed confused. When asked, she said Usu google maps allows you to type Cheesecake factory, Bellevue. So we asked why didn't you do that? Then after thinking for a bit, she said "I guess I wanna do that," and changed her end to be Cheesecake factory, Bellevue"

Task 3

Confusion/Concerns:
1. View [Both users seem to be confused with the wording]
2. Add an alert for 4 pm [not gonna change it if gonna use it later ….]
3. Did the whole process again

Notes:
A. When asked "What do you think snooze mean?" Alert will pop up again, 10 mins or something....

Post interview questions:

1. Rate the following:
On a scale of 1 to 5, where 1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and 5 = strongly agree, describe how you feel about each of these statements.

The system is easy to use	3
The system is easy to learn to use	3
I would like alerts feature	4
I would like the trip planning feature	2
I like the overall design of the application	4

2. General questions
2.1: What did you like most about the system?
Like menus and easy to read. Buttons are big enough sizes.

2.2: What did you like least about the system?
Snooze. Not used to taking buses. Not sure where to start, several different ways you could do that? You have search bar for, if you have the routing direction again.
Press stop or search bar first???

2.3. How could the system be improved? Covered above

2.4. What additional information would be useful for the alert system? And how do you want it to be presented and taken?
weather option???: useful in general, work without window, it will be good indication to carry umbrella etc.

2.5. How would using the system affect your experience of using public transit?
N/A

2.6. What would you mostly use for it?
What would look for in the app like Task B? For either looking at information about the stops or alerts or what stops were around me.
I am a planner and before I leave the bus.
Incorporating the app is good idea

2.7. For experienced users: Do you like the changes to the original application? Why or why not?N/A

User C:

Pre-Interview questions:
1. Gender - Male
2. Age range - 21
3. Occupation - Student
4. Frequent bus rider - Yes
5. Use of OneBusAway before, and how frequent - Weekly
6. Phone model - iPhone

Task 1

Notes:
As an overview, he selected route and favorited a specific stop. Overall he thought the search was straight forward enough. It seems that having the star and being able to click on the route is confusing.

Task 2

Notes:
User said directions was helpful, but still made comparisons to google maps. He said that Google maps has a great UI for alternate routes and shows a lot more info on estimated time and everything. With these shortcomings, the user felt that the directions still presented an easier way for finding stops to get to a location.

Task 3

Questions or Concerns:
For part B, when alert popped up, he felt "adventurous" and clicked snooze. After this he clicked snooze again, subconciously thinking that snooze meant he wouldn't be alerted again until he needed to be (the functionality of close)

Notes:
The user really liked the concept of alerts and how he didn't have to even open the app. Unfortunately, snooze seemed to be ambiguous since he clicked it twice resulting due to poor wording. We haven't really discussed how snoozed (temporary alerts) will be handled within the UI... so that presents problems in itself.

Post interview questions:

1. Rate the following:
On a scale of 1 to 5, where 1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and 5 = strongly agree, describe how you feel about each of these statements.

The system is easy to use	4.3
The system is easy to learn to use	4
I would like alerts feature	5
I would like the trip planning feature	4.5
I like the overall design of the application	4

2. General questions
2.1: What did you like most about the system?

2.2: What did you like least about the system?
Adding an was prominent, but the steps seemed awkward. Maybe better integrate it with the map searching? It seemed redundant.

2.3. How could the system be improved?
Suggested that a cool feature would be able to show bus occupancy. Weather information was relatively small, and maybe more information features can be added. (Overall he really wanted to have bus occupancy since it was like the last missing puzzle for bus information)

2.4. What additional information would be useful for the alert system? And how do you want it to be presented and taken?
Service alerts would be helpful. (He briefly mentioned accidents, re routes, and other problems. I said that OBA has a service alerts button for routes, showed it to him, and he said that needs to be more prominent and more clear)

2.5. How would using the system affect your experience of using public transit?
Probably would ride the bus more knowing that I can rely on the map for easy access to information.

2.6. What would you mostly use for it?
Riding the bus... (He thought the questions was too obvious, he didn't go into detail.)

2.7. For experienced users: Do you like the changes to the original application? Why or why not?
He said it still feels like OBA, and that's not a bad thing. He didn't really realize that the designated search tab was gone. Overall, he said that it felt like it did what it was supposed to do. Additionally, he said he was fine with the old interface because he would just use it as a glorified bus schedule with real-time information. We also couldn't find alerts on his iPhone... so he said having it large and as a separate tab was good.

Appendix B: Task Sheet Given to User

TASK LIST

Task 1
A. You work as a businessman in a office. You have just started using the OneBusAway application and want to favorite a bus route at a particular stop that you frequently use. The route you frequently ride is Route 72. Add a favorite for the stop where route 72 passes through it.

B. Now that you've added this stop, look up the status of your 72 ride to see when you should be leaving the office.

Task 2
You are at the U-District. You receive a call from a friend to meet him at the Cheesecake factory at Downtown Bellevue as soon as possible. Use the OneBusAway application to get to your destination.

Task 3
A. You take Route 68 at 3:30PM every Tuesday and Thursday to go to work after classes. Sometimes, you forget to leave campus on time, so you set an alert in the application to remind you of the bus' arrival.

B. Today, just as you're getting ready to leave for work, your manager calls to inform you that you don't need to come into work until a half hour later than usual (you want to take the 4:00PM bus). An alert will still pop up at 3:30PM, handle the alert and ensure that you will be notified for your modified 4:00PM departure time.