Cover Page

COMPSCI 345 / SOFTENG 350 Human-Computer Interaction

Assignment One: Usability Evaluation

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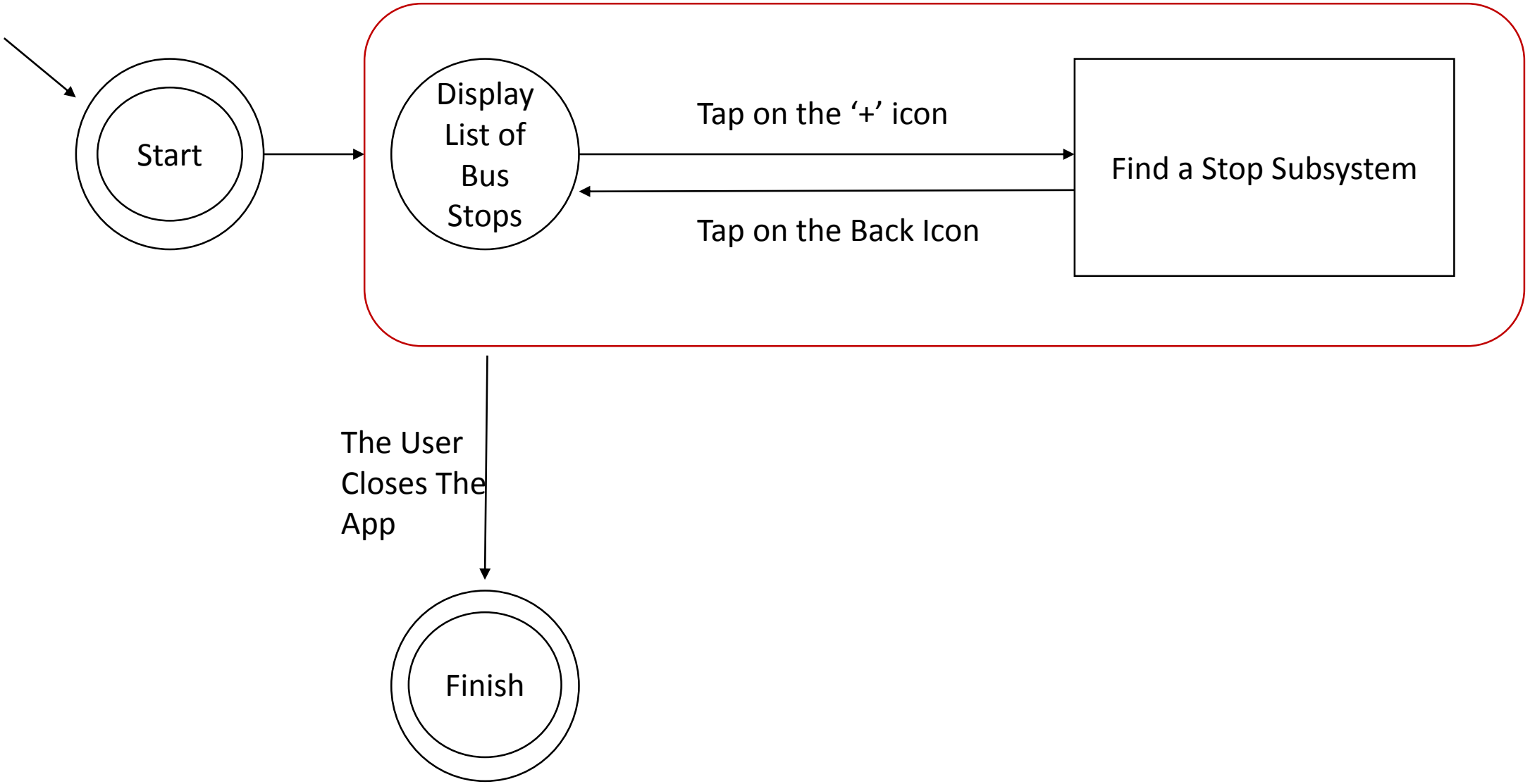
Note: To ensure a fair playing field for all students in the class the University of Auckland will not tolerate cheating or assisting others to cheat, and views cheating in coursework as a serious academic offence.

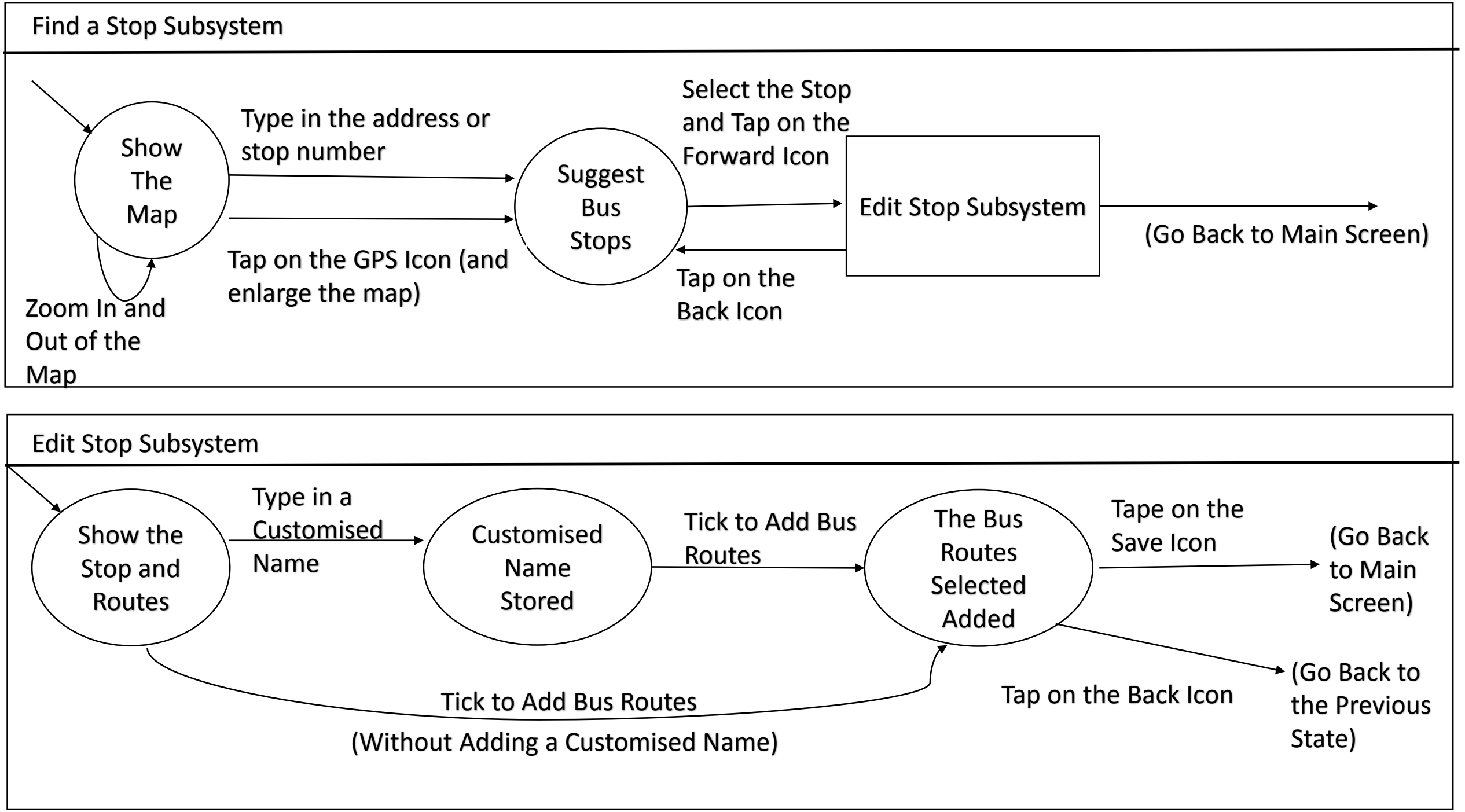
Student Declaration:

- I declare that this work is my own work and reflects my own learning.
- I declare that where work from other sources (including sources on the world-wide web) has been used, it has been properly acknowledged and referenced.
- I understand that my assessed work may be reviewed against electronic source material using computerised detection mechanisms.

Place this page in the front as the first page of your document that you are submitting to Canvas


Start
Display List of Bus Stops
Tap on the '+' icon
Tap on the Back Icon
Find a Stop Subsystem
The User Closes The App
Finish

Main System


Find a Stop Subsystem
Show The Map
Type in the address or stop number
Tap on the GPS Icon (and enlarge the map)
Zoom In and Out of the Map
Suggest Bus Stops
Select the Stop and Tap on the Forward Icon
Tap on the Back Icon
Edit Stop Subsystem
(Go Back to Main Screen)
Edit Stop Subsystem
Show the Stop and Routes
Type in a Customised Name
Customised Name Stored
Tick to Add Bus Routes
The Bus Routes Selected Added
Tape on the Save Icon
(Go Back to Main Screen)
Tick to Add Bus Routes
(Without Adding a Customised Name)
Tap on the Back Icon
(Go Back to the Previous State)

SOFTENG 350 Assignment 1

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Part 1:

1.

- Delete a bus stop: Remove the selected stop from the list of monitored bus stops
- Add a bus stop: Add the selected stop from the list of monitored bus stops
- Prioritise the list of bus stops: Disable the user to edit or delete the list of monitored bus stops while prioritising the bus stop list by dragging the accordions up and down
- Find a stop: Find a bus stop by the bus stop number, by the GPS location, or suggest nearby stops from an address
- Label a stop: Customise the name of the selected bus stop
- Add a bus route for a stop: Add a bus route for the monitored bus stop
- Delete a bus route for a stop: Delete a bus route for the monitored bus stop
- Display bus stops: Display the list of monitored bus stops
- Display bus status: Display the bus arrival status of the monitored bus stop

2.

- **Visibility of system status**

The user is given status information by means of a progress bar and other visual symbols. The system gives visual feedback when inputs have been received. Visual features such as screens change as the user carries out tasks to minimise ambiguity. The user can prioritise the bus stops by dragging up and down the bus stop accordions in the main screen.
The system utilised the direct manipulation technique that uses visible objects and gives visible results. The majority of the features are easy to identify and not hidden.
Yet, for those users who do not know which buses operate to which areas, it is quite difficult for the user to find that out easily inside this app. Thus, a bus route search function should be included.
The feedback of user actions is usually timely and accurate. However, thorough feedback is not provided for all user actions. For example, after pressing the slider icon on the main screen, there is only a small graphical change in the accordions of bus stops and the user may not understand the purpose of that.

- **Match between system and the real world**

The system displays the amount of stops away from current position for a monitored bus route to match the physical world. Time is displayed in 12-hour clock and a map is used. The map representation in the app is a metaphor of real world locations.
The priority of the monitored bus stops is visualised by the stacking accordions. This is intuitive because humans tend to put the most important thing on the top of the stack, and the least important at the bottom. Specific bus departing times are encapsulated in the matching bus stop only to follow real-world conventions. These features utilise the user's background knowledge.
The workflow that guides the user from selecting a bus stop to selecting the bus routes of that stop matches real world conventions and is very natural and logical. Intuitive and natural vocabulary is utilised for general stakeholders, such as 'stop' for 'bus stop', instead of system-oriented terms.
In addition, the system displays the most current position of the monitored bus on the map. All the functionalities have appropriate titles that can be intuitively understood.

- **User control and freedom**

The app is easy to use in terms of ergonomics. It can easily be used with one hand after setting up the monitored bus stops and routes appropriately. It enables the user to interact

with one finger for most functionalities. The content is located in recognizable positions. The user is given the freedom to prioritise the bus stops monitored.
The system also supports ‘backward’ buttons in most functionalities to abandon unwanted states.
However, forgiveness is not given for all actions. After deleting a selected bus stop, the user can not reverse this action and retrieve the data lost. An undo function should be introduced for this particular scenario.

- **Consistency and standards**

In general, the vocabulary used is consistent such as ‘stop’ for ‘bus stop’. The icons as well as the information are set and displayed at similar positions across different screens. For example, the back icon is generally on the top left corner. The dark blue colour theme is used consistently across different screens.
The map functionality allows the user to zoom in and out of the map. This conforms to the platform interface conventions of most mobile applications.
The users can differentiate various words, situations, and actions effectively in general.

- **Error prevention**

Sometimes the system shows the message that ‘no service for the next two hours’ in the bus stop screen. This can be caused by an empty list of monitored bus routes for that bus stop, or there are actually no buses operating during that period. These should be distinguished clearly and individually. Additionally, the system should constructively suggest a solution for this situation.
The main screen also gives a warning when no internet connection is established. The bus map functionality prevents the users from selecting non-existing bus stops.
To prevent the users from accidentally deleting a saved bus stop, additional confirmation before deletion should be introduced.

- **Recognition rather than recall**

All user needs are accessible through the GUI. Icons and other visual indicators are well utilised to visualise functionalities. The system allows ‘seeing-and-pointing’ instead of ‘remember-and-type’. Typing is mostly minimised by the touch actions.
The lists of bus stops and routes are provided to allow the user to pick from them.
However, the ‘no service for the next two hours’ message and the slider icon can easily mislead and confuse the user. They can require the user to recall and rely on prior experience. Therefore, this violates the rule that instructions for use of the system should be visible or easily retrievable whenever appropriate.

- **Flexibility and efficiency of use**

One of the good things about the app is that it displays the required information in a reasonable time. For a user who knows their bus and bus stop number, the required steps are minimal.
Since acting quickly is one of the crucial features for the users looking to find the next bus as soon as possible, this real-time app is working efficiently.
Physical interactions with the system feels natural in general. The auto-complete function when inputting an address and the GPS location function improves user’s efficiency.
However, the user may forget to select bus routes for the monitored bus stop which may reduce efficiency.
The user interface can be more customisable to improve flexibility. The colour theme should be customisable like the default light colour theme and the dark ‘Dracula’ theme of IntelliJ IDEA. This can improve screen readability in various conditions.

- **Aesthetic and minimalist design**

The app has a minimalist design and it helps the user in finding things easily. Textual descriptions in the app are kept to a minimum and replaced by graphical symbols instead. The

dialogues do not contain irrelevant or rarely needed information. The dark blue colour theme around the borders is inconspicuous and gives a cold impression. The blue button icons fade away with the dark blue theme. The main content pops up from the large area of lighter background, as a result of the high contrast between the text and the white background.

- **Help users recognize, diagnose, and recover from errors**

N/A. Unless the user has the first release which includes a debug mode.

- **Help and documentation**

A user generally only asks for help when desperate to sort out an issue with the bus schedule or the routes. However, the help section simply does not exist in the app.
The system should display hint messages when the user the taps and holds onto an icon. Only some help messages are displayed when the user uses the app for the first time. They then disappear after that. Some instructions can be found in the app store, but they are not detailed enough, e.g. which buttons to press for certain functionalities. There are also some unofficial reviews online that might help the user to understand how the app works.
The documentation to be introduced should be easy to search and focus on the user's tasks. Nevertheless, it must list concrete steps to be carried out, and not be too large.

Task Two: Usability Test Plan

Product under test:

The AT METRO Track My Bus App is used to identify and monitor bus stops and the selected bus routes of these stops.

Test Objectives:

The object of this test is to evaluate the usability of the AT METRO Track My Bus App, which is used to identify and monitor bus stops and the selected bus routes of these stops. The core functionalities tested would be to locate and add a bus stop, select bus routes for the bus stop, and finally read the bus arrival times of that bus stop. In addition, deletion of a bus stop will also be tested.

Participants:

The study will require approximately 16 participants. There will be an equal balance of age, tech savviness, and bus and non-bus commuters. The bus commuters are defined to commute by bus approximately 5 times a week. Both tech savviness and bus commuters will be self-rated.

	Age	Tech savvy	Bus Commuter
Participant 1	< 20	N	N
Participant 2	< 20	N	Y
Participant 3	< 20	Y	N
Participant 4	< 20	Y	Y
Participant 5	20 ~ 40	N	N
Participant 6	20 ~ 40	N	Y
Participant 7	20 ~ 40	Y	N
Participant 8	20 ~ 40	Y	Y
Participant 9	40 ~ 60	N	N
Participant 10	40 ~ 60	N	Y
Participant 11	40 ~ 60	Y	N
Participant 12	40 ~ 60	Y	Y
Participant 13	> 60	N	N
Participant 14	> 60	N	Y
Participant 15	> 60	Y	N
Participant 16	> 60	Y	Y

Tasks:

1. Delete and reinstall the app if it has been installed
2. Open the app
3. Navigate to the ‘Find a stop’ screen and locate a bus stop
4. Edit the bus stop name and select the bus routes
5. Find and estimate the arrival time of a particular bus
6. Locate and add another bus stop
7. Edit the bus stop name and select the bus routes for that bus stop
8. Prioritise the bus stops
9. Delete the newly added bus stop

Questionnaire:

Age	< 20, 20 ~ 40, 40 ~ 60, > 60
Tech Savvy	Yes / No
Bus Commuter (approximately 5 times a week)	Yes / No
How easy was it to locate and select a bus stop?	Very easy / Easy / Neutral / Difficult / Impossible
How easy was it to edit the name of a bus stop?	Very easy / Easy / Neutral / Difficult / Impossible
How easy was it to add bus routes of a bus stop?	Very easy / Easy / Neutral / Difficult / Impossible
How easy was it to find and estimate the arrival time of a particular bus?	Very easy / Easy / Neutral / Difficult / Impossible
How would you rate the basic operation? (E.g. adding and monitoring bus stops and routes)	Very easy / Easy / Neutral / Difficult / Impossible
Describe what the message 'no service for the next two hours' in the app means for you?	
Describe what the slider icon does?	
How would you rate the advanced operation? (prioritise the stops, customise stop names)	Very easy / Easy / Neutral / Difficult / Impossible
I think that I would like to use this application frequently.	Strongly disagree / Disagree / Neutral / Agree / Strongly agree
Which feature of the software did you like the most?	
Which feature of the software did you dislike the most?	
What other feature(s) would you like to see implemented in the software?	

Data:

Participant demographics and opinion from the questionnaire above.
In addition, time used, success rate, and facilitator observation for the level of frustration for each task undertaken.

Test Procedure:

1. Two people, a facilitator and an observer will be at the test. The facilitator will look after the participants and the observer will record timing data and other observations such as by filming participants' reactions.
2. Install the app inside the device provided. Delete and reinstall the app if it has been installed already. This ensures the app will start at the initial start state.
3. The device used will be the same for every participant for consistency. The step above will be repeated before each participant starts testing.
    a. The devices used will be a smartphone and a tablet. A tablet will be primarily provided for the older participants who are older than 60 years old with decreased eyesight.

4. The facilitator will introduce himself or herself to the participants, and describe the propose of each task.
    a. Script: “Hi guys, I am XXX and this is YYY. We are testing the usability of the AT METRO Track My Bus App. I am going to require you to complete a couple of designed tasks in the app individually. The device, ZZZ will be provided. YYY is going to take notes and film your reactions. We can stop filming if you feel uncomfortable.”
    b. Start filming if the participant agrees. Record the time taken for each task.
    c. First open the app by tapping on the touch screen.
    d. Tap on the ‘+’ icon to navigate to the ‘Find a bus stop’ screen.
    e. Find the bus stop at location 999. The facilitator should direct the user to type in the search box.
        i. Great.
        ii. Assist the participant if he or she is still struggling.
    f. The facilitator: “Now please select bus route 999 and find its arrival time to the bus stop.” The participant should tap on the bus stop accordion.
    g. The facilitator: “Now please find how many stops away the bus is, and find it on the map.” The participant should read how many stops away in the accordion and tap on the bus route accordion to navigate to the map.
    h. The facilitator: “Great, now please select add another stop 888 and the bus route 888 to that stop.” The participant should require less assistance this time, but adequate assistance should still be given.
    i. The facilitator: “Great, type in your customised name for this bus stop.”
    j. The facilitator: “Please navigate back to the main screen. Please use the slider icon to prioritise your bus stop priority and by dragging the accordions.”
        i. Demonstrate the actions required if the participant struggles for too long. Allow time for some trial and error.
    k. The facilitator: “Please navigate back to the main screen again. Try to delete the newly added bus stop now.”
        i. Demonstrate the actions required if the participant struggles for too long. Allow time for some trial and error.
    l. Tell the participant that “it took me a long time to figure it out, too” and “this is the software’s fault, not yours” if they struggle with any of the tasks.
5. The facilitator will invite the participant to complete the succinct questionnaire.
6. Repeat the steps above for each participant. Each participant should complete the tasks individually.
7. Thank the participants for their cooperation and shake their hands.
8. Award the participant with vouchers or coffee and refreshments.

Analysis:

Firstly, I would put all the data collected into an Excel Spreadsheet like this:

Participant Name	Age	Tech Savvy	Bus Commuter	Task 1		Task 2	…	Questionnaire responses	Observations
				time	Success or other results		…		

I would then calculate tea mean, standard deviation, and the p-value on times. I would analyse them to match any obvious patterns. Software tools such as R and opencsv can be utilised. Unfortunately, statistically significant results are unlikely to exist due to the few

number of participants. However, I believe it is possible to find a relationship between the time taken, the task completion data, questionnaire responses, and our observations.
The compilation of the video of user experiences and reactions will also assist to find the relationship.

Results:
I will summarise the results per task as fact-based data first by task.

Task 1:
X participants successfully completed the task with an average of YY seconds. Y participants failed to complete the task, giving up after ZZ seconds.
The comments were…
Our observations were…
What we learnt from the video recording…

I will then make concluding remarks to summarise what I have found. The most likely statistical relation between the time take, the task completion data, questionnaire responses, and our observations will be suggested in the summary.

Lastly, the table above will be included in the appendix of the results.