Deliverable #1 Software Requirement Specification (SRS)

SE 3A04: Software Design II – Large System Design

Tutorial Number: T01
Group Number: G6
Group Members:

- Jane Klavir
- Nathan Luong
- Areez Visram
- Jennifer Ye

1 Introduction

The following document is dedicated to showcasing the requirements of the taxi carpool app requested by a local taxi company. The app is dedicated to make rides cheaper and more convenient for their riders. This app is also meant to be a long-term project for the company, meaning this **SRS** is a living document which has the possibility of changing in the future. This document will explain the important stakeholders involved, requirements and viewpoints of each while also explaining the main functions of the app.

1.1 Purpose

This **SRS** is meant for developers, stakeholders and direct players in the planning and development of the app and should be understandable for all those involved. This **SRS** will further break down the functionalities, constraints, use cases and overall design of the project in further detail.

1.2 Scope

To develop this project the production of the main taxi request and offer app called TaxiCarPool, the Conversation Prompt Generator and a variety of databases will have to be produced. There will not be a need to produce a payment system into the app as this will be handled by the taxi company payment systems. The project will only project the cost of the ride but will not handle the payments as it is not part of the app's main functionality.

The TaxiCarPool app will perform the main functions of the app. This will include allowing users to request a carpool taxi, receive a list of possible rides to select and allow current rides to allow carpooling in their car. This product's objective is to perform the main functions of matchmaking users to a carpool to save money.

The Conversation Prompt Generator will randomly generate a conversation starter for the riders to use based on their profile. Their profile will specify if they want to use this feature and if so, what they are interested in. The generator will not be forced upon any of the users and can be switched off if desired. The goal of this product is to create a friendly environment when carpooling with others that one may not know. This function is mostly dedicated to benefit those who are carpooling to a further distance.

The creation of a database will hold all the necessary information for the app to function, making it easily

accessible and manageable. The information being stored can range from user information; name, email, phone number, to riding history, to preferences of taxi times, models, or other passengers.

1.3 Definitions, Acronyms, and Abbreviations

BE: Business Event is something that occurs between the client/stakeholder and the system.

SRS: Software Requirements Specification is a document that explains the requirements of the software being developed.

VP: Viewpoint, often in reference to a stakeholder/client interested in the system and how they view the business event.
CF: Creative Feature, an indication to one of the creative/innovative features

1.4 References

- Johns, K. (2022, July 7). Why design is the most important factor in a mobile app development?: ISHIR- mobile application development company india. ISHIR. Retrieved February 11, 2023, from https://www.ishir.com/blog/9633/why-design-is-the-most-important-factor-in-a-mobile-app-development.htm
- Schoenfelder, N. (n.d.). What are good latency & ping speeds? Graphical Network Monitoring and Troubleshooting. Retrieved February 11, 2023, from https://www.pingplotter.com/wisdom/article/is-my-connection-good
- statcounter. (n.d.). Mobile Operating System Market Share Worldwide. StatCounter Global Stats. Retrieved February 11, 2023, from https://gs.statcounter.com/os-market-share/mobile/worldwide
- UGEM. (2020, June 15). What are the core features of Minimalist app design? UGEM. Retrieved February 11, 2023, from https://ugem.design/blog/minimal-app-design
- Yee, J. (n.d.). Introduction to canadian digital accessibility laws. Accessibility.com: Empowering digital accessibility for businesses. Retrieved February 11, 2023, from https://www.accessibility.com/blog/introduction-to-canadian-digital-accessibility-laws

1.5 Overview

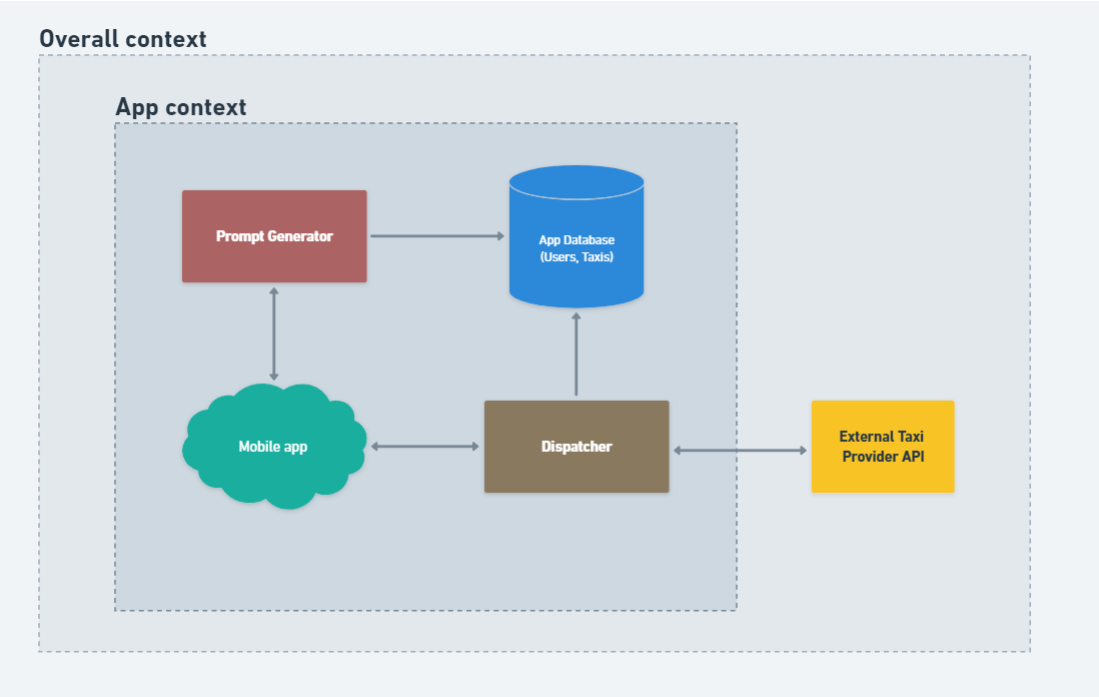
This **SRS** is structured to first give background information about the app. This will include how the app will interface with the taxi companies, along with the general functionalities and assumptions that are being made. The document will then follow with showcasing one of the main business events and its related use cases. This will explain how the main function will work across different scenarios and stakeholders in a visual manner. This will be further expanded upon in more detail throughout the document. It will include more business events with a variety of viewpoints and scenarios for both the function shown in the use case diagram and other main function of the project. This document will conclude by explaining the non-functional requirements involving presentation, performance, usability, security, and maintainability notes of the project.

2 Overall Description

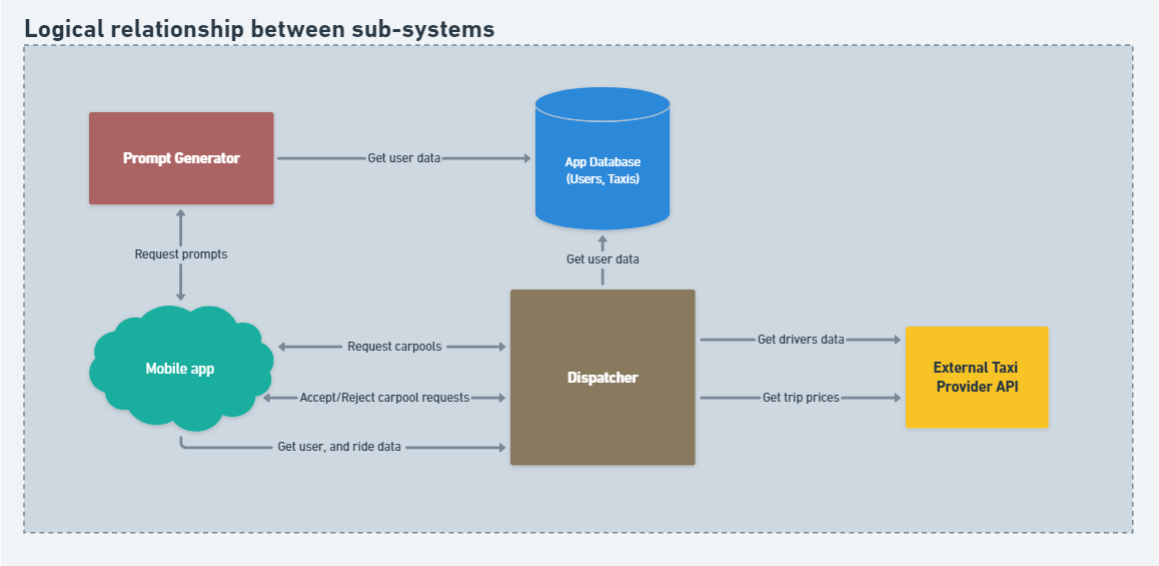
2.1 Product Perspective

a) The product being developed is an Android application which empowers the ability to book carpool via a user-friendly interface using a taxi company. The application will securely store customer personal information such as carpool request histories, and personal data inputted by the user. The product is not self-contained since its functionality depends heavily on the taxi service provider. There are several out-of-scope concerns such as: driver's information input (profile, shift, locations, etc.) and payment processing.

b) The general interaction can be visualized as follows:



2.2 Product Functions



a) The app will be able to book taxi.

- Able to communicate with taxi's service API.
- Able to handle and display taxi data correctly.

b) The app be able to handle carpool scheduling and coordination.

- Able to plan the most optimal route and let the driver follow the calculated route.

c) The app be able to display the estimate time-of-arrival (ETA) of taxis.

- Able to calculate ETA in real-time

d) The app be able to input the taxi's unique identifier via the mobile app.

2.3 User Characteristics

a) Riders

- Riders are users who use the app to request car pool.
- Riders can be anyone from any background of tech-expertise
- Riders are expected to:
  - Input personal information only a few times.
  - Have stable and highly available mobile internet connection.
- Riders might be interested one or more following characteristics of the app:
  - User interface and experience of navigating the mobile app.
  - Realtime taxi information display (ETA, location, route, ...)
  - Ease of taxi booking, and check-in.

b) Taxi Drivers

- Drivers are users who drive and operate taxis, fulfill carpool requests, and ensure the safety of the riders.
- Drivers must be registered with the taxi service and from any background of tech-expertise.
- Drivers are expected to have stable and highly available mobile internet connection.
- Drivers might be interested one or more following characteristics of the app:
  - Accuracy display of real-time pick-up and drop-off information.
  - Accuracy of aggregating and storing of rides information (since it ties directly to their performance).
  - Accuracy display of user's profile summarization.
  - User interface and experience of navigating the mobile app.
  - Ease of accepting/ rejecting rides.

2.4 Constraints

a) **Geographical**: The app can only operate on the land which the taxi service operate.

b) **Technological**: App must be integrated with softwares that the taxi service provider uses.

c) **Fare Determination**: Since the app does't support payment processing directly, the fare has to be determined and processed through the taxi service provider.

d) **Data Privacy Regulation**: Data which transmits and stored within the app needs to be processed in a way which complies with the data protection act.

2.5 Assumptions and Dependencies

a) Assumptions

- Drivers information are provided by the taxi provider (driver profile and shift).
- The taxi provider has dedicated API which provide real-time data on driver's availability.
- The taxi provider determines trip prices.
- Payment processing is external and not under the scope of the application.

b) Many problems may occur when the following assumptions failed to hold:

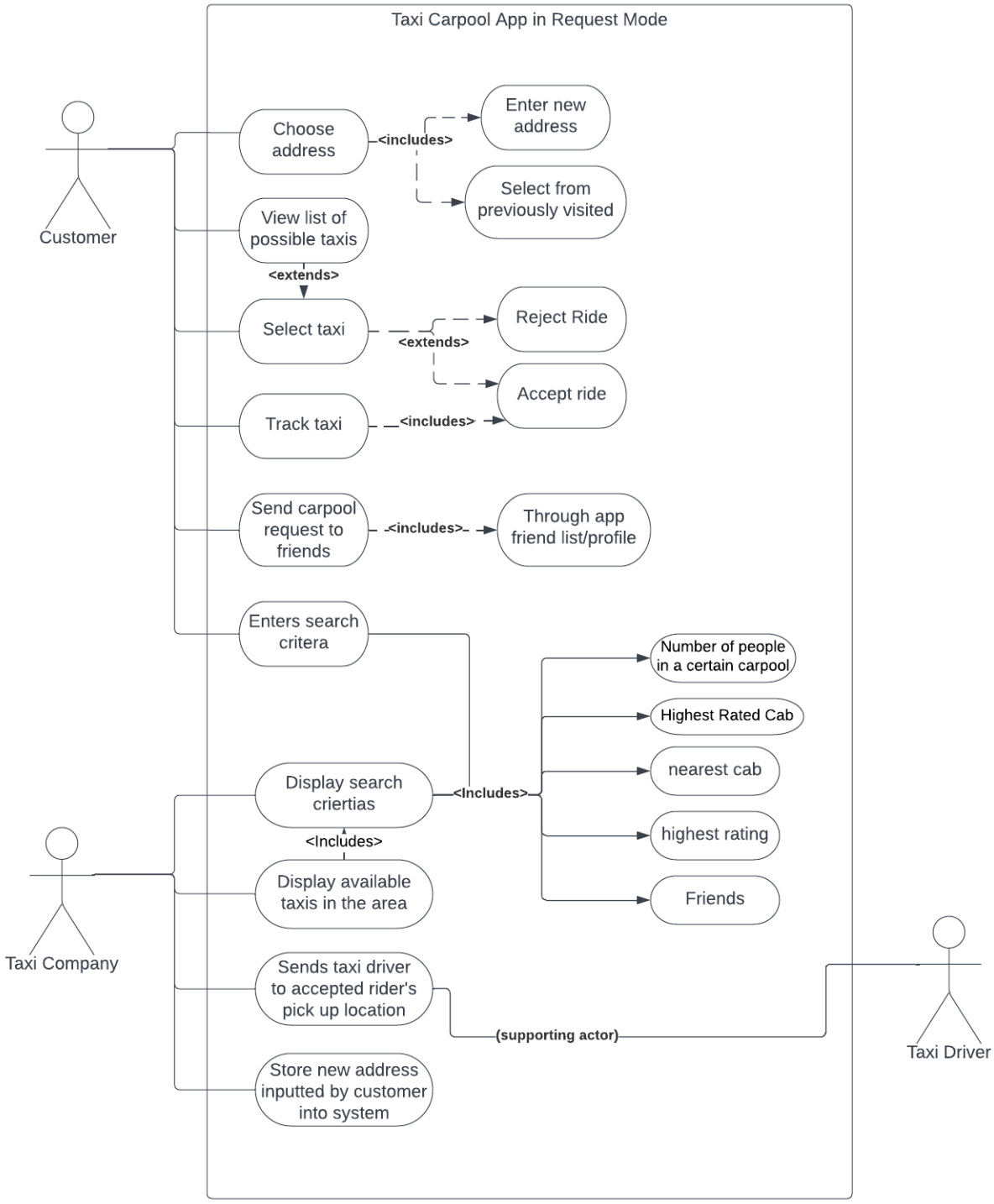
- If trip prices are not determined by the taxi service provider, additional calculations must be performed to find fare fees after each trip.
- If drivers data are stored and handled within the context of the app, additional mechanism must be provided for drivers to update their information. In addition, driver's data storage must comply with the Canadian Data Protection Act.

2.6 Apportioning of Requirements

a) **Technological**: Some specific technilogical requirements (Database type, Integration with taxi provider, etc...) have to be delayed untill the implementation phase.

b) Non-function Requiremens such as UI,UX, or performance can be finetuned when the app is being implemented or after release.

3 Use Case Diagram



4 Functional Requirements

BE1. Customer creates new user profile

VP1.1 Customers

S_1 System asks for customer's information (full name, email or phone number, username, password, riding/ social preferences)

E_1 Customer must input their information in all mandatory fields (full name, email or phone number, username, password) and optional fields (riding/ social preferences) if they choose

$S_{1.1}$ Username, email, and phone number must be unique

S_2 System asks customer to verify email or phone number

E_2 Customer verifies email or phone number

S_3 System registers customer profile as user in system

VP1.2 Taxi company

S_1 System sends new user data to taxi company

E_1 Taxi company logs data in their database

VP1.3 Taxi drivers

N/A

VP1.4 Investors

S_1 Every new 1000 sign-ups, system sends notification to investors

VP1.5 Legal

S_1 System securely stores user data to comply with GDPR privacy

Global Scenario for BE1

S_1 System asks for customer's information (username, password, email or phone number, riding/social preferences)

E_1 Customer must input their information in all mandatory fields (full name, username, email, password, phone number) and optional fields (riding/social preferences) if they choose

$E_{1.1}$ Username, email, and phone number must be unique

S_2 System asks customer to verify email or phone number

E_2 Customer verifies email or phone number

S_3 System registers customer profile as user in system

$S_{3.1}$ System sends new user data to taxi company

$E_{3.1}$ Taxi company logs data in their database

$S_{3.2}$ Every new 1000 sign-ups, system sends notification to investors

$S_{3.3}$ System securely stores user data to comply with GDPR privacy

BE2. User edits their profile

VP2.1 Customers

S_1 System asks customer to authenticate themselves

E_1 Customer completes authentication process

S2 System displays all fields (full name, username, email, phone number, riding/social preferences) of user profile

$E_{2.1}$ Customer edits desired fields

$E_{2.2}$ Customer saves edits, given that all mandatory fields are filled

S_3 System updates user profile

VP2.2 Taxi company

S_1 System sends updated user data to taxi company

E_1 Taxi company logs updated information in their database

VP2.3 Taxi drivers

N/A

VP2.4 Investors

N/A

VP2.5 Legal

S_1 System securely stores user data to comply with GDPR privacy

Global Scenario for BE2

S_1 System asks customer to authenticate themselves

$E_{1.1}$ Customer completes authentication process

S_2 System displays all fields (full name, username, email, phone number, riding/social preferences) of user profile

$E_{2.1}$ Customer edits desired fields

$E_{2.2}$ Customer saves edits, given that all mandatory fields are filled

S_3 System updates user profile

$S_{3.1}$ System sends updated user data to taxi company

$E_{3.1}$ Taxi company logs updated information in their database

$S_{3.2}$ System securely stores user data to comply with GDPR privacy

BE3. Taxi carpool is requested

VP3.1 Customers

S_1 System asks customers to input their destination

E_1 Customer inputs destination

S_2 System allows customers to sort carpools by search criteria (nearest cab, highest rating, friends first, number of people in carpool)

E_2 Customer selects taxi to send their carpool request to

$S_{3.1}$ Customers are returned to selection phase (i.e. after inputting destination) if request is denied, branch to S2

$S_{3.2}$ Customers notified if request is accepted

E_3 Customers can track location of designated cab

VP3.2 Taxi company

S_1 System notifies taxi company of new carpool

E_1 Taxi company computes estimated payment split (i.e. based on their fares)

VP3.3 Taxi drivers

N/A

VP3.4 Investors

N/A

VP3.5 Legal

N/A

Global Scenario for BE3

S_1 System asks customers to input their destination

E_1 Customer inputs destination

S_2 System notifies taxi company of new carpool

E_2 Taxi company computes estimated payment split (i.e. based on their fares)

S_3 System allows customers to sort carpools by search criteria (nearest cab, highest rating, friends first, number of people in carpool)

E_3 Customer selects taxi to send their carpool request to

$S_{3.1}$ Customers are returned to selection phase (i.e. after inputting destination) if request is denied, branch to S2

$S_{3.2}$ Customers notified if request is accepted

E_4 Customers can track location of designated cab

BE4. Taxi carpool is offered

VP4.1 Customers

S_1 System asks customers to scan QR code

E_1 Customer scans QR code

S_2 System asks customer to input destination, taxi ID, maximum number of customers to share with, and ride preferences

E_2 Customer inputs destination, taxi ID, maximum number of customers to share with, and ride preferences

S_3 Dispatcher returns potential match, displaying updated estimated fare, distance, time, and optimality measure

$E_{3.1}$ Customer accepts match

$E_{3.2}$ Customer rejects match, return to S3

$E_{3.3}$ Customer aborts offer mode

S_4 System matches users

VP4.2 Taxi company

S_1 New offer sent to dispatcher

E_1 Dispatcher stores offer in pool of live offers

VP4.3 Taxi drivers

S_1 Driver is given pick-up location and directions (i.e. detour) for new customer in carpool

E_1 Driver follows directions of detour to pick-up carpooler

S_2 Once detour is complete and carpooler is in the taxi, system displays original destination with updated directions

VP4.4 Investors

N/A

VP4.5 Legal

N/A

Global Scenario for BE4

S_1 New offer sent to dispatcher

E_1 Dispatcher stores offer in pool of live offers

S_2 System asks customers to scan QR code

E_2 Customer scans QR code

S_3 System asks customer to input destination, taxi ID, maximum number of customers to share with, and ride preferences

E_3 Customer inputs destination, taxi ID, maximum number of customers to share with, and ride preferences

S_4 Dispatcher returns potential match, displaying updated estimated fare, distance, time, and optimality measure

$E_{4.1}$ Customer accepts match

$S_{4.1.1}$ Driver is given pick-up location and directions (i.e. detour) for new customer in carpool

$E_{4.1.1}$ Driver follows directions of detour to pick-up carpooler

$S_{4.1.2}$ Once detour is complete and carpooler is in the taxi, system displays original destination with updated directions

$E_{4.2}$ Customer rejects match, return to S3

$E_{4.3}$ Customer aborts offer mode

S_5 System matches users

BE5. Taxi carpool arrives at destination

VP5.1 Customers

S_1 System displays fare to each customer

E_1 Customer pay taxi driver

S_2 Once payment approved, system prompts customer to rate, out of 5 stars, the other customers they shared a ride with, with an option to leave a review

E_2 Customers input rating and optional review

S_3 System stores rating and review in customers' profile

VP5.2 Taxi company

E_1 Drivers obtain payment from customers

E_2 Driver inputs that payment is complete

VP5.3 Taxi drivers

E_1 Driver obtains payment from customers

E_2 Driver inputs into system that payment is complete

S_2 System logs end of carpool

VP5.4 Investors

S_1 Every new 10 000 completed carpools, system sends notification to investors

VP5.5 Legal

N/A

Global Scenario for BE5

S_1 System displays fare to each customer

E_1 Customer pay taxi driver

$E_{1.1}$ Drivers obtain payment from customers

$E_{1.2}$ Driver input that payment is complete

S_2 Once payment approved, system prompts customer to rate, out of 5 stars, the other customers they shared a ride with, with an option to leave a review

E_2 Customers input rating and optional review

S_3 System stores rating and review in customers' profile

S_4 System logs end of carpool

$E_{4.1}$ Every new 10 000 completed carpools, system sends notification to investors

BE6. User activates emergency button

VP6.1 Customers

S_1 System runs procedure to ensure activation of emergency button is not accidental

$E_{1.1}$ Customer exits emergency mode

$S_{1.1}$ App is returned to normal home screen, end of business event

$E_{1.2}$ Customer responds to procedure, confirming that it is intentional

S_2 Customer connected to 911 dispatcher

E_3 Customer completes call with 911 dispatcher

S_3 App remains in emergency mode, emergency call button easily accessible

E_4 Customer inputs that emergency has been dealt with

S_4 App is returned to normal home screen

VP6.2 Taxi company

S_1 System shows that emergency activated in new taxi

E_1 Taxi company monitors emergency-activated taxis

VP6.3 Taxi drivers

$E_{1.1}$ Taxi driver activates emergency mode

$S_{1.1}$ System connects taxi driver to 911 dispatcher

$E_{2.1}$ Call with 911 dispatcher complete

$S_{2.1}$ System remains in emergency mode

$E_{3.1}$ Driver notifies system that emergency is taken care of, branch to S3

$E_{1.2}$ Customer notifies system of emergency

$S_{1.2}$ System is in emergency mode, driver can still see directions.

$E_{2.2}$ Emergency is taken care of, branch to S3

S_3 System returns to normal mode

VP6.4 Investors

N/A

VP6.5 Legal

S_1 System notifies local emergency services of emergency call

E_1 Emergency services connect app caller to emergency dispatcher

S_2 System sends taxi tracking information to emergency dispatcher

Global Scenario for BE6

S_1 System runs procedure to ensure activation of emergency button is not accidental

$_{1.1}$ Customer exits emergency mode

$S_{1.1}$ App is returned to normal home screen, end of business event

$E_{1.2}$ Customer responds to procedure, confirming that it is intentional

S_2 Customer connected to 911 dispatcher

$S_{2.1}$ System notifies local emergency services of emergency call

$S_{2.2}$ System shows that emergency activated in new taxi

$E_{2.2}$ Taxi company monitors emergency-activated taxis

E_3 Customer completes call with 911 dispatcher

S_3 App remains in emergency mode, emergency call button easily accessible

E_4 Customer inputs that emergency has been dealt with

S_4 App is returned to normal home screen

S_5 Taxi driver activates emergency mode

$S_{5.1}$ System connects taxi driver to 911 dispatcher

$E_{5.1}$ Call with 911 dispatcher complete

$S_{5.2}$ System remains in emergency mode

$E_{5.2}$ Driver notifies system that emergency is taken care of, branch to S3

$E_{1.2}$ Customer notifies system of emergency

$S_{1.2}$ System is in emergency mode, driver can still see directions.

$E_{2.2}$ Emergency is taken care of, branch to S3

S_3 System returns to normal mode

BE7. Carpoolers activate prompts

VP7.1 Customers

S_1 Carpool has started

E_1 Customers indicate that they want to enter prompts mode

S_2 Random prompt is generated

$E_{2.1}$ Customers interact between each other based on prompt

$E_{2.2}$ Customers select new prompt, branch to S2

$E_{2.3}$ Customers exit prompt mode, branch to S3

S_3 System returns to home screen

VP7.2 Taxi company

N/A

VP7.3 Taxi drivers

E_1 Driver begins commute once new customer is seated in taxi

S_1 System registers that carpool has started

VP7.4 Investors

N/A

VP7.5 Legal

N/A

Global Scenario for BE7

S_1 Carpool has started

E_1 Driver begins commute once new customer is seated in taxi

S_2 System registers that carpool has started

E_2 Customers indicate that they want to enter prompts mode

S_3 Random prompt is generated

$E_{3.1}$ Customers interact between each other based on prompt

$E_{3.2}$ Customers select new prompt, branch to S2

$E_{3.3}$ Customers exit prompt mode, branch to S3

$S4$ System returns to home screen

5 Non-Functional Requirements

5.1 Look and Feel Requirements

5.1.1 Appearance Requirements

LF-A1. The colour scheme of the application must match the branding colours of the company
Rationale: For marketing purposes, the colour scheme within the app need to match the branding colours of the company so the brand becomes well-recognized and there is no confusion among users about the brand.

5.1.2 Style Requirements

LF-S1. The app must have a UI that is clear (makes important information obvious), consistent, aesthetically pleasing
Rationale: Users are more likely to use and come back to mobile apps which have UIs that are clear, consistent and simple. This helps increase the user base and branding power of the app (Johns, 2022).

LF-S2. The app must have a simple, easy on the eyes, minimalist (not overflown with UI elements) design
Rationale: Minimalist designed mobile applications have faster loading times, easier navigation within the app, less maintenance and time spent on design/frontend and allow businesses to more clearly give messages to users within the application (UGEM, 2020).

5.2 Usability and Humanity Requirements

5.2.1 Ease of Use Requirements

UH-EOU1. The product must be easy to use for people aged 18 years or older, meaning the users can just straight into using the app with minimal to no training
Rationale: The intended audience of this application is adults who need to carpool, so anyone 18 or older must find the app easy to understand and use. People under this age may use the app but most likely their rides would be booked by parents/guardians, so the focus is on this age range.

UH-EOU2. The user must not encounter any unclear prompts from which they do not know how to proceed
Rationale: If the app is prompting the user to do something, that prompt must be clear and easy to understand so it is easy for the user to use the app.

UH-EOU3. The user must not encounter any errors while using the app, and if they do, what to do next must be clear
Rationale: The app must not show the user any errors while they are using it to prevent confusion and to make the app easy to use. On the chance an error does appear to the user, it must be clear on what the user has to do next to remove the error or continue. If the error is generic and confusing to understand, the app is no longer easy to use and leaves the user in confusion.

5.2.2 Personalization and Internationalization Requirements

UH-PI1. The product will operate in both English and French and the user will be able to set their preferred language
Rationale: The app will be available only in Canada, so it needs to contain support for both the national languages of Canada and allow the user to choose their preferred language

UH-PI2. The product will allow the user to set their preference for dark mode and light mode
Rationale: To make the app more personal, users must be able to customize the appearance to their liking. Its important for users to enjoy the appearance of the app so allowing them to personalize dark mode or light mode will help contribute to that.

5.2.3 Learning Requirements

UH-L1. The product must be able to be used immediately without any training, with no learning curve required to learn how to effectively use the app.
Rationale: Mobile apps designed for general users should have no learning curve. Upon using the app for the first time, the app should be designed in such a way that the user immediately knows how to use it. If users take a while to learn how to effectively use the app, they will not come back to it.

5.2.4 Understandability and Politeness Requirements

UH-UP1. The product must use language that any user of the app can understand clearly without having to try and interpret its meaning.
Rationale: The app is aimed to be used by anyone in Canada, so the symbols and language used must be understandable by the general Canadian population. Using symbols and language or slang that is specific to a certain group or culture would make the app hard to understand for some of the target users.

5.2.5 Accessibility Requirements

UH-A1. The product must be able to be used by partially sighted users by providing text-to-speech and voice activation for all features of the app.

Rationale: A successful mobile app should be accessible to all users, no matter what physical impairments they may face. The app should allow partially sighted or blind users to use the app through their voice or some other means that does not require them to be fully sighted.

UH-A2. The product must provide captions for audio content to allow users with hearing impairments to access that content.
Rationale: A successful mobile app should be accessible to all users, no matter what physical impairments they may face. The app should allow users with hearing impairments to still access any audio content within the app through captions, symbols or some other visual means so they are still able to access the content.

UH-A3. The product must conform to the WCAG (Web Content Accessibility Guidelines) 2.0 Level AA, meaning all content must be perceivable, operable, understandable and robust for all users. **Rationale:** The WCAG are a global standard on the accessibility of web based applications. In Ontario, all private organizations with 50 or more employees are required to be WCAG 2.0 AA accessible (Yee). Our company is not yet 50+ people but the hope is to one day get there, so implementing these accessibility features now makes for a smoother transition when the company expands.

5.3 Performance Requirements

5.3.1 Speed and Latency Requirements

PR-SL1. All responses from the product to the user must be within 50 milliseconds
Rationale: The perfect latency is between 20 to 40 milliseconds (Schoenfelder). If all product-to-user responses for our app are 50 milliseconds are better, this is an excellent latency and will bring users back to the app.

5.3.2 Safety-Critical Requirements

PR-SC1. All taxi services, drivers and other carpoolers will go through an external (out of app) safety check before being allowed to offer rides or join carpools on the app.
Rationale: Our app connects users with random members of the public, whether that be taxi drivers or fellow carpoolers. To ensure the safety of all users of the app, all drivers and carpoolers will have to go through a safety verification process to verify their intentions and ensure that the safety of the riders is guaranteed.

5.3.3 Precision or Accuracy Requirements

PR-PA1. All monetary amounts displayed within the application must be accurate to two decimal places
Rationale: Given that this app will involve payments for the taxi rides, all payment amounts will be displayed to two decimal places, which is accurate to the number of dollars and cents for the transaction. For example, "the total cost of the ride is $3.40"

PR-PA2. All times must be displayed in the form HH:MM PM/AM where HH is between 01 and 12.
Rationale: The app may show estimated time of arrival, which will be shown using the HH:MM format, showing only the hours and minutes and not anything more. If the app showed seconds or below it would be inaccurate and confusing for users. For example, "the estimated time of arrival is 10:04 PM"

PR-PA3. All distance measurements must be accurate to one decimal place.
Rationale: The app may show distance to a destination or how far the driver is from picking you up. These should be shown with one decimal place as more decimal places would make it harder to understand and would make it lose meaning. For example, "your driver is 3.2 km away"

5.3.4 Reliability and Availability Requirements

PR-RA1. The product must be available for use 24 hours per day, but will be unavailable for 5 hours a month for maintenance. The downtime will be in the middle of the night when the user activity is the lowest.
Rationale: An app that allows users to book carpool rides should be available 24/7 because users should be able to book a carpool at any time of the day on any day of the year. However, it is unrealistic that the app will be available 24/7, so there will be chosen periods of downtime that affect as little of the user base as possible.

PR-RA2. The product must perform without failure in 98% of use cases
Rationale: Failures are expected to occur in any software application, but if the app performs without failure for the majority of uses then it can be deemed to be a reliable application that only fails on the rare occasion. 98% is chosen because given the expected size of user base the app projects to have, a 98% failure rate would mean very few failures for a large set of users.

PR-RA3. The mean time to restore the product following a failure must not be greater than 10 minutes unless a malicious attack occurs, in which case the app will stay unavailable until the threat has been completely removed.
Rationale: When the product does fail, it should recover and become usable again within 10 minutes max, otherwise users will begin to question the reliability and usage of the app. If an attack causes the app to go down, 10 minute recovery time is unattainable, so the app will only be restored once the threat has been completely removed.

5.3.5 Robustness or Fault-Tolerance Requirements

PR-RFT1. The product must continue to be usable if external services it relies on go down, barring the Internet/cell tower failures.
Rationale: The app will rely on some external third party services, and it needs to be tolerant to faults in those systems. For example, if the app interfaces with an API from the taxi service and that API goes down, the app needs to continue to be usable. If an AWS region goes down and the app uses AWS cloud services, it must change to another region to ensure it continues to be usable. However if the Internet or cell towers go down, this is out of our control and the app will not be able to be used.

5.3.6 Capacity Requirements

PR-C1. The product must be able to handle up to 10000 users simultaneously at any given time
Rationale: Although the app will not start with 10000 concurrent users right away, 10000 is a good estimate as to how many concurrent users the app may have within a few years of business. Given that Uber, a similar ride sharing application has millions of concurrent users, 10000 is a realistic capacity limit for this app.

5.3.7 Scalability or Extensibility Requirements

PR-SE1. The product must be able to handle increases to the number of concurrent users
Rationale: In a previous requirement it was defined that the product should be able to handle 10000 concurrent users. Once the app scales, it should be able to handle increases to this value. Popular ride sharing app Uber serves millions of concurrent requests, so this app should be able to scale to these values as well.

5.3.8 Longevity Requirements

Not applicable.

5.4 Operational and Environmental Requirements

5.4.1 Expected Physical Environment

Not applicable.

5.4.2 Requirements for Interfacing with Adjacent Systems

Not applicable.

5.4.3 Productization Requirements

OE-P1. The product must be distributed as an Android mobile application
Rationale: The product being developed is a mobile app, therefore it should only be distributed as a mobile app and nothing else.

5.4.4 Release Requirements

OE-R1. Any subsequent releases of the product must not affect backwards-compatability with previous releases
Rationale: Backwards compatability between releases should always be maintained so new releases do not affect the usage of users who are still using previous releases.

5.5 Maintainability and Support Requirements

5.5.1 Maintenance Requirements

MS-M1. The product must be designed in a maintainable way by following the open-closed principle and strong object-oriented techniques. It will be designed in such that future changes are able to be easily added or removed (small changes take less than a week to implement)
Rationale: Writing maintainable software allows for quicker implementation and debugging. Iterations of the product will be able to be released faster if maintainable code and design principles are followed.

5.5.2 Supportability Requirements

Not applicable.

5.5.3 Adaptability Requirements

MS-A1. The product must be able to run on all versions of all Android mobile devices.
Rationale: Android makes up 69.74% of the mobile device market (statcounter). The product being built is a mobile application, so in order for the large majority of mobile device users to use the app, it must run on and Android. Furthermore, we are developing in Java which will only run on Android.

5.6 Security Requirements

5.6.1 Access Requirements

SR-AC1. General users of the application must not have access to identifying and private information of users that would allow them to be identified or hacked.
Rationale: The app is designed to be used by any member of the general public, members of the general public should not have access to private or sensitive information about other users or about the taxi services

SR-AC2. Special users who are administrators and work for the company are the only users who have read-only access to sensitive user information
Rationale: For testing, debugging and management purposes, users with higher access to sensitive data are needed. The users with this access are only people who are trusted who work for the company in an authoritative, high-ranking position.

5.6.2 Integrity Requirements

SR-INT1. The system must not be able to be infiltrated by outside threats that look to access/change the data by having security measures such as encryption and proper authentication.
Rationale: All software systems come with the threat of external hackers. We must ensure that the system is secure and cannot be hacked, otherwise data can be changed and it will no longer be consistent, violating data integrity

5.6.3 Privacy Requirements

SR-P1. The product must make the user aware that they are entering private information whenever they must so the user can make an informed decision on whether they want to include that information.
Rationale: The user should be aware whenever they are entering personal or private information so they can make an informed decision on whether they want to enter that information.

SR-P2. The product must guarantee that all private information is kept secure
Rationale: Any private information from the user such as their password, address and other sensitive information should be secured through verified security measures, hashing, locking, encryption and authentication.

5.6.4 Audit Requirements

SR-AU1. All releases of the product must conform to the guidelines of the Android mobile app store (found here: https://play.google.com/about/developer-content-policy/)
Rationale: Whenever an app is released to the app store, whether brand new or an updated release, it must go through the app store's review process. Audits must be done within the company before the app is released to ensure the app passes all guidelines.

5.6.5 Immunity Requirements

SR-IM1. The product must implement security measures such as encryption and authentication to make it immune to infection from unauthorized malicious attackers
Rationale: There are many types of malware that can attack software, SQL injections, trojan horses, viruses. The system must be immune to infection from all of these, to ensure data privacy and security is maintained at all times.

5.7 Cultural and Political Requirements

5.7.1 Cultural Requirements

CP-C1. All numbering systems, road systems and any other systems must use the Canadian standard
Rationale: The app will initially be launched in Canada only, so all systems will use the canadian standard. Metric system for numbering and measurements, Canadian road systems, everything that requires a national standard will use the Canadian standard.

5.7.2 Political Requirements

CP-P1. The product must not use any emojis, language or symbols that could be considered offensive
Rationale: Given that our app is designed to be used by anyone in the general Canadian population, we must ensure that no controversial language or emojis are used. Many cultural, ethnic

and religious groups will exist within the userbase and some words or symbols or emojis might be offensive to a certain group, which must be prevented.

5.8 Legal Requirements

5.8.1 Compliance Requirements

LR-COMP1. The product must comply with the Data Protection Act, meaning no user data should be visible nor accessible
Rationale: Any Canadian product that deals with personal information from users. This app deals with lots of personal user information, so it must be implemented in a way that complies with the Data Protection Act

5.8.2 Standards Requirements

LR-STD1. The development and implementation of the product must conform to the IEEE and ISO software development standards
Rationale: Both the IEEE and ISO are well-defined, internationally acclaimed standards for engineering projects. The development of this product will follow the standards defined in IEEE and ISO to ensure consistency across the team.

A Division of Labour

Include a Division of Labour sheet which indicates the contributions of each team member. This sheet must be signed by all team members.

B Creative Features

Below is a list of creative/innovative features that were brainstormed by the team. The features that were ultimately chosen for implementation are bolded.

- Friends (preferred to carpool with friends)
- Pre-book (pre book carpools with others for big events)
- **Prompts + social games in the car (add preferences on what kind of level of socialness you want)**
- **Emergency button**
- In app payments (integrate with PSP's)

IMPORTANT NOTES

- Be sure to include all sections of the template in your document regardless whether you have something to write for each or not
  - If you do not have anything to write in a section, indicate this by the *N/A*, *void*, *none*, etc.
- Uniquely number each of your requirements for easy identification and cross-referencing
- Highlight terms that are defined in Section 1.3 (**Definitions, Acronyms, and Abbreviations**) with **bold**, *italic* or underline
- For Deliverable 1, please highlight, in some fashion, all (you may have more than one) creative and innovative features. Your creative and innovative features will generally be described in Section 2.2 (**Product Functions**), but it will depend on the type of creative or innovative features you are including.