Software Requirements Specification

For

Car Sharing

Version 1.3 approved

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Contents

1. Introduction

1.1 Purpose

The purpose of the Car Sharing 1.0 application is to provide a service to help people who for a variety of reasons, might not access to a car. Some examples are: young people (especially students) who do not have enough money to buy a car, people in big cities who only need a car occasionally, people who have just moved to a new city and want to rent a car， people who come to the city temporarily or people who may want to use a car but do not want to pay for the price of buying a car plus insurance, repairs and parking fees. The company will own the car and design the application that provides a car sharing experience for the user.

1.2 Document Conventions

The document provides information about the project, including information that stakeholders need to know about the app such as fonts (italics, font names eg. Arial and Calibri). Special highlighting is going to be described in the book and indicate how the client should use the app in order to achieve their objective. Diagrams will be included with more details in the final phase of the project. Furthermore, the diagrams will provide reviews, scope, references and use cases.

1.3 Intended Audience and Reading Suggestions

The document is intended for all stakeholders such as developers, project managers, users and testers in order to inform everyone who is involved in the process.

1.4 Product Scope

Car sharing is an application that provides car rental service. The company will purchase the cars, the user will download the application and register it in the system if they need a temporary car.

Also, a GPS service is included to help the users with the location and payment service will be linked to the application. In addition, there are two systems for user android and iOS. The main customers are people who have driver's licenses, but they could not buy the cars for any reason.

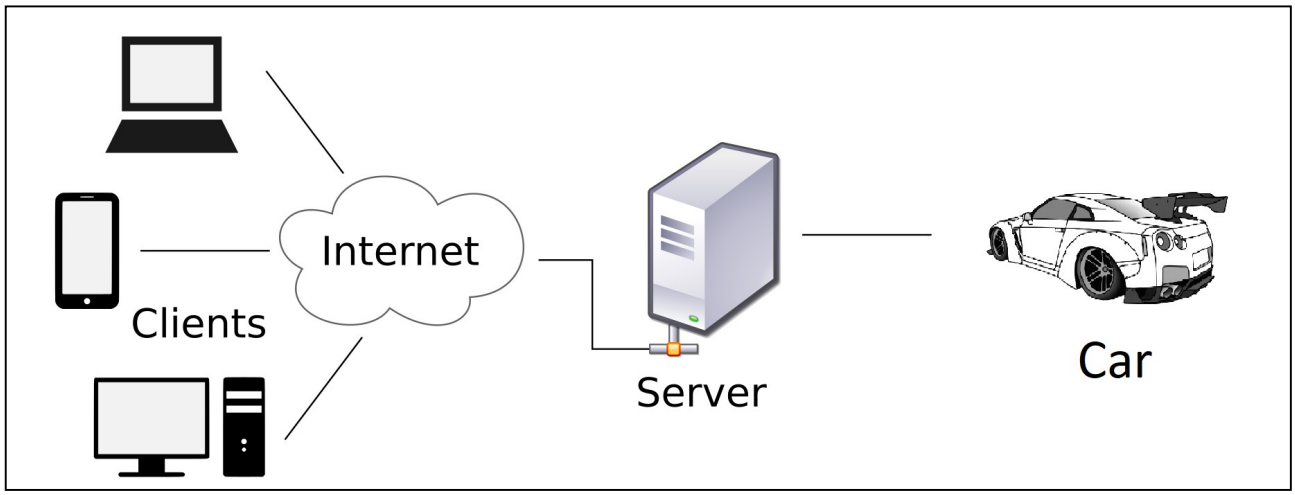
1.5 References

830-1984 — IEEE Guide to Software Requirements Specifications
Similar solutions available to the public are:

- Rent a car: https://turo.com/
- *Sharing a car: https://www.zipcar.com/*

2. Overall Description

Car Sharing 1.0 is a mobile application created to aid drivers that do not own a car and need the automobile for a quick distance drive. Many drivers are not able to purchase their own car, or do not want to buy one for many reasons such as paying for insurance. This application will help them by providing car sharing similar to an Uber service but with the customers being their own drivers.



The application is similar to a car rental application with an easy interface and it provides different car options to customers for easy access.

2.1 Product Functions

Car Sharing 1.0 provides the following functions/features to the users:

- **Car rental** – service to rent a car for quick service and distance.
- **Reservation details** – information about every reservation made in the app.
- **Timed reminders and updates** – auto messages about the reservation sent to customers.
- **Fast cancellation of a previous-made reservation**
- **GPS**
- **Payment** – reservation will be paid inside the app
- **Security** – customer protected information and also the code to unlock the cars inside the app.

2.2 User Classes and Characteristics

External (Customers) - Young drivers that have recently received their license will probably be most of the users of the application because they may be starting their career and do not have enough income to purchase their own car but want to drive for many reasons. Also, customers who need the car by chance.

Internal (Company employees) – Most of the company will be involved in the project, especially because this is their main product, including the CEO, sales, call center, marketing and security departments.

2.3 Operating Environment

Car Sharing 1.0 will be a mobile application used on IOS and Android devices. It also could be used as a web application with an easy interface.

2.4 Design and Implementation Constraints

The organization will be responsible for any insurance issues.

2.5 User Documentation

A Manual and Frequently Asked Questions (FAQs) would be created in a help area inside the application to help users.

2.6 Assumptions and Dependencies

The application would be a similar mix of the Uber application combined with a car rental app. When a user accesses the Car Sharing 1.0 application, they will be able to interface with the user driver profile, put in their destination, make requests, see the costs, confirm reservations and cancel any previous reservation made and scope document or the project plan.

3. External Interface Requirements

3.1 User Interfaces `

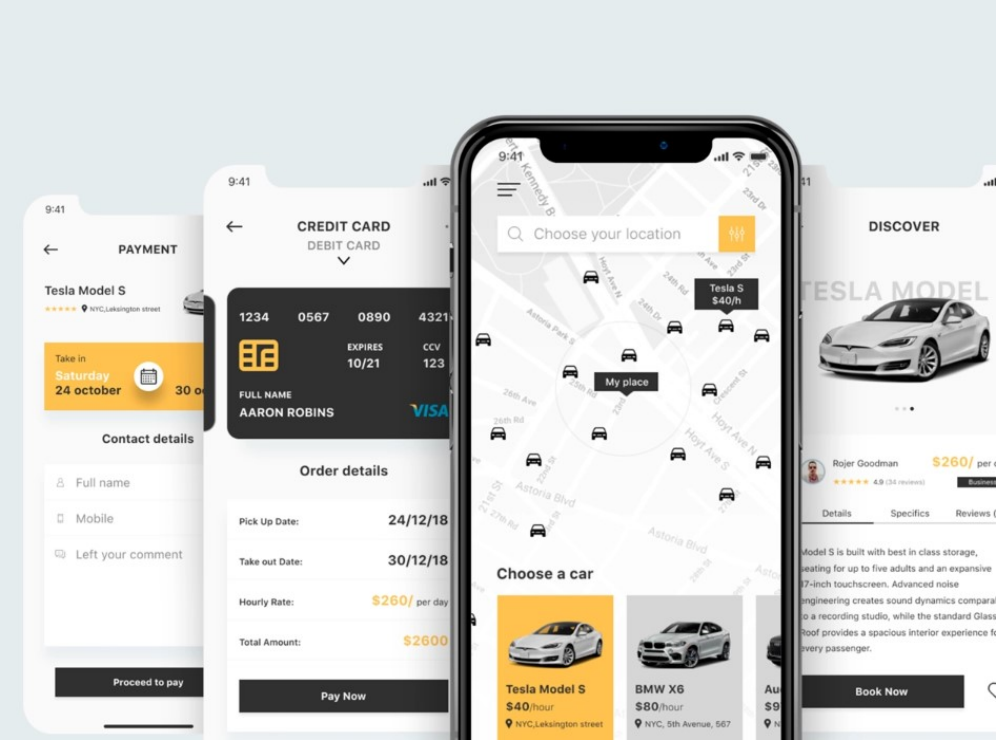


Figure 1: Interface (dribbble.com, 2019)

Login Interface

User Interfaces include many pages. The first page of the app is the user`s login interface which requires the user to log into their personal account.

All of the operations in the application can be completed after logging in.

The login interface consists of 2 methods.

1. Direct logging in------ logging in with a Car Sharing 1.0 account directly in the app.
2. The third-party logging in----- logging in with a social media account such as Google, Twitter or Facebook

Registration Interface

If the user is logging in for the first time a “registration” link will be sent to transfer the user to the registration interface.

The user’s registration interface requires the basic personal information (name, email address etc.), but also verifies the qualification of being a legal driver (including a valid personal driver license).

The registration interface asks the user to provide a third-party payment method (exp. Debit /Credit card or PayPal /Google Pay/Apple Pay).

If the user hasn`t completed registration procedure, then the user cannot use the application.

Using the Application

After the user has registered, the next page is a dynamic map that allows users to look for a car. The map will show the available car’s location and information in detail (distance, model info and price info). There is also a menu for completely registered users.

The second step is after the user has found the car, the user will go the specified location and scan the code to unlock the car.

The third step is starting the vehicle. The user will enter the destination that they want to go to and the map will track the distance and time and then calculate the total cost. The app will show the user available parking spots where they can park the car they are using. When the user has arrived at their destination, the app will remind them to pay the fee immediately or postpone it later.

3.2 Payment interface

Users can choose if they want to using their credit card such as Visa, MasterCard and American Express or with their PayPal account; after the payment confirmation, the application will show the reservation on screen and also send the confirmation the email provided inside the customer profile.

3.3 Company employee interface

The login interface is going to be similar as the user. The first page of the app is the employee`s login interface which requires the employee to log into their work account. All of the operations in the application can be completed after logging in.

Call centers

The call center employees account is going to have extra activities than a regular user. They will access to emails to receive information about the client problems. In addition, they will be able to chat with clients.

3.4 Hardware Interfaces

Not applicable.

3.5 Software Interfaces

In this case we will design the application to suit two systems, android and iOS.

3.6 Communications Interfaces

There are two sides for this communication, the first side is that the user will use the application to look for locations, and second, the user will have to enter their destination. They will have to pay for the drive by clicking on a button for the payment application.

3.7 Communication Protocols

The app will be integrated with third parties such as Facebook, Google or PayPal. It will use several communication protocols such as:

- Electronic mail transport: Simple Mail Transfer Protocol (SMTP)
- Networking support: Domain Name System (DNS)
- Secure Sockets Layer (SSL) / Transport Layer Security (TLS)

3.8 Goal Use Cases

Use cases			
Use Case name	**List of related Requirements ID**	**Actor (s)**	**Brief Description**
Search for Vehicle	FR03	Customer	The customer will search for a vehicle and the app will use the GPS and show options in a map or grid
Set up payment	FR05	Customer	The customers will set up their payment methods linking their credit card in payment area interface. The system will record up to 3 different credit card number information on each profile. The system will allow VISA, MasterCard and American Express brands. Also, the Customer will have the option to use credit card or their PayPal account.
Set up Reservation	FR10	Customer	The customers will use the app interface to create, modify and cancel their car reservations. The app will update the reservations.
Find Location	FR11	Customer	The app allows the customer to use the GPS to arrive at their destination. The Customer will type keywords and press a button to search. The app will show their

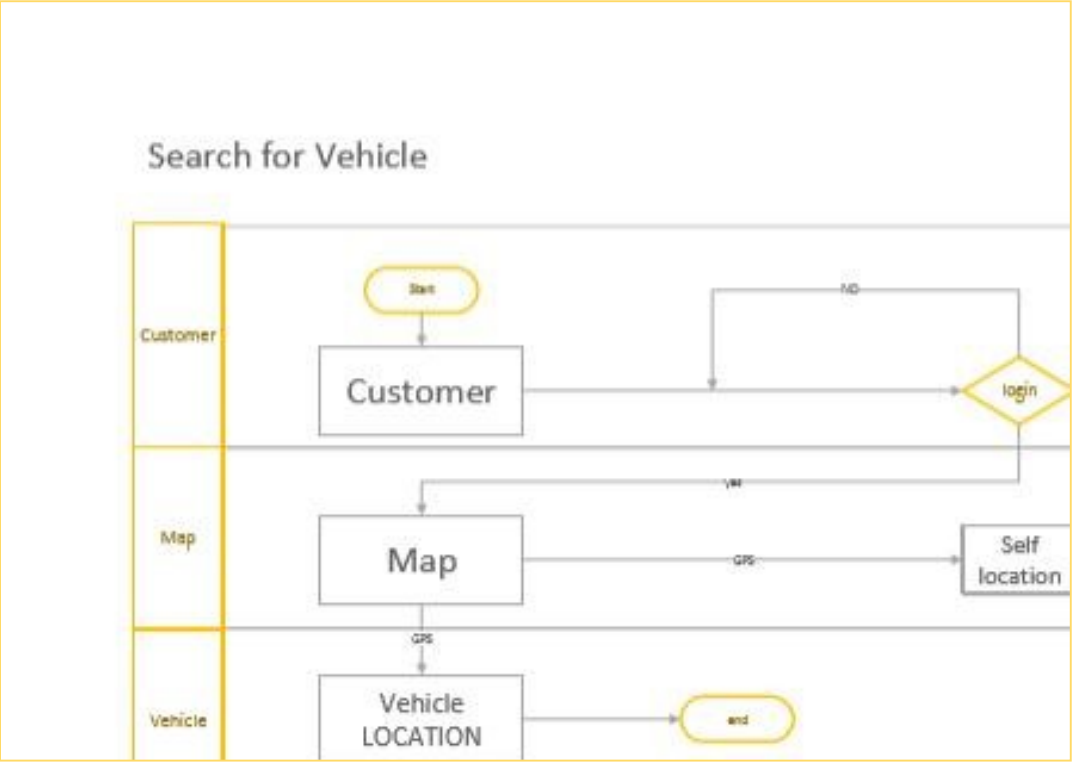
			location in the map to the customers.
Chat with customer service	FR04	Customer and Call center operator	Customers will have access in the app to live chat with call center if or when they need assistance. The Call Center will receive messages from customers and respond.
Login using fingerprints	FR06	Customer	Customers will log in the app using their fingerprints instead of passwords. After fingerprints confirmation the app will open the interface to the customers to manage their profile and reservations
Set up Account	FR01 FR06	Customer	Customers to create an account to log into the system. The customer can create an account using an email account, username and password and including information in a form. The app will save the information in a database.
Unlock Car using QR Code	FR02	Customer	The app will have a QR Code interface. The customer will open it and confirm with the code in the car so he can unlock it.
Give feedback	FR12	Customer	Customers can fill a form to give a feedback related about their experience inside the app. Also, other customers can read it.
App User Authentication	NFR02		The app should confirm customer log in information
Send Alerts	FR09		The app will send the customer message text and a notification alert updating their reservation

4. System Features

Requirements ID	Requirement Title	Short Description	Priority	Requestor
FR01	Register	The app should allow customers to create an account to log into the system. The customer can create an account using an email account, username and password.	High	Customer
FR02	Log in	The app should allow customers to log into the system using username/ email and password they provided to register.	High	Customer
FR03	Search for vehicle	The app should allow customer to search for available cars near them.	High	CEO
FR04	Live chat	The app should allow customers to have a live chat with call center if or when they need assistance.	Medium	CEO
FR05	Payment	The app should allow the customers to set up their payment methods. (link their credit card)	High	Director of sales
FR06	Log in using fingerprint	The app should allow customers log in using their fingerprints instead of passwords as it is more efficient and secure.	Medium	Security Manager
FR07	Staff Log in	The system should allow staff to log into the system.	High	Sales Officer
FR08	Update and Refresh	The app should update and refresh the list of available and unavailable cars	High	Customer
FR09	Alerts	The app should send the customer a message or a notification updating their reservation	High	Customer
FR10	Reservation	The app should allow	High	CEO

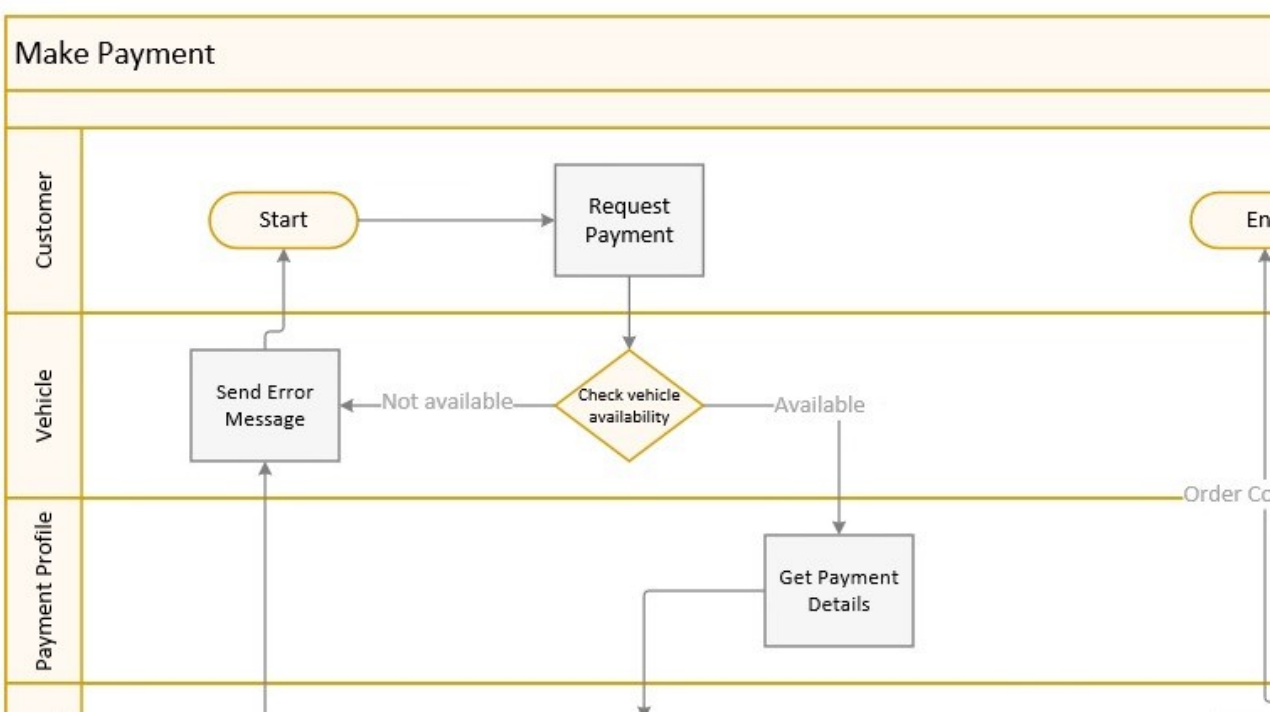
		the customers to create and cancel their car reservations.		

4.1 Swim Lane Activity Diagram



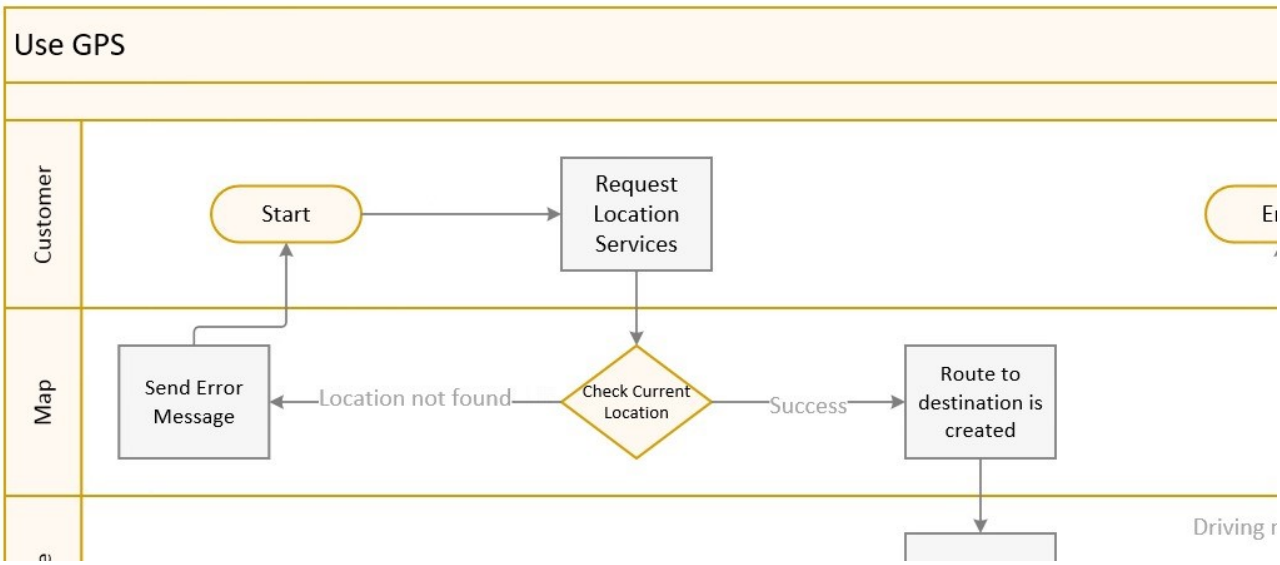
Use Case Name	**Search for Vehicle**	
Primary actor(s)	Customer	
Goal in context	The actor wishes to find a vehicle as soon as possible, and also the actor wishes the vehicle as nearly him as possible	
Preconditions	The actor would be downloading the application and already registered	
Trigger	To find a vehicle to use the actor has to has this application and	

	account.	
Scenario details	**Actor**	**System**
	1. The actor logging in the app by directly or logging by the third-party such as Google, Twitter or Facebook. 2. Located their location by GPS 3. The application will show the vehicles which around the actor.	1. System get the actors' location by GPS. 2. System get the map information around the actor from internet. 3. System connect the network to get information of the vehicle's locations.
Exceptions	If the actor forgets to connect the internet the application will not access the location of the vehicle, this would be an exception.	
Priority	High	
When available	Is available when connect the internet.	
Frequency of use	Frequent-every time when actor needs a car	
Channel to actor	The user will have access to this functionality by click the screen.	
Secondary actors	- Internet – connect the system to the application - GPS-to get the accurate location.	
Channel to secondary actors	- connect the internet with application - input the information of the location.	



Use Case Name	**Make Payment**	
Primary actor(s)	Customer	
Goal in context	The actor is setting up their payment details and using that information to pay for the car they wish to rent.	
Preconditions	The actor would be looking for a vehicle to rent before this use case is initiated.	
Trigger	To pay for a vehicle to rent the actor must request a vehicle.	
Scenario details	**Actor**	**System**
	1. The actor chooses a car they would like to rent 2. The actor enters their payment details 3. Payment is made and request for the car goes through	1. System connects the actor to a car to rent 2. The system processes payment for the car 3. The request for the car is verified.

Exceptions	If the actor's payment information is incorrect and the payment does not go through, this would be an exception.	
Priority	High	
When available	Is available when purchases are ready to be made	
Frequency of use	Frequent - every time a car is rented.	
Channel to actor	The user will have access to this functionality via a pop-up on the screen when they request a car to rent.	
Secondary actors	- Bank - for payment verification - Location services - to connect the customer to a car in their area.	
Channel to secondary actors	- Bank verifies payments through secure payment methods - The user will be asked at the initial download of the app to verify that they allow the system to have access to their phone's location services.	



Use Case Name	**Use GPS**	
Primary actor(s)	Customer	
Goal in context	The actor is using their GPS to help them arrive at their destination.	
Preconditions	The actor has been connected with their car and may begin using it.	
Trigger	The actor starts driving the car and may begin using the GPS.	
Scenario details	**Actor**	**System**
	1. The actor is connected to the GPS system. 2. The actor inputs their destination. The actor begins to drive with direction from the GPS.	1. The system registers the actor's current location. 2. The system registers the actor's destination. 3. The system creates a route from their current location to their destination.
Exceptions	If the address the user has input into the GPS does not exist, this	

	would be an exception.	
Priority	High	
When available	Is available when connect the internet	
Frequency of use	Frequently	
Channel to actor	The actor connect the interment and input the information of the location or use GPS locating automatically.	
Secondary actors	- current location information - the information of the destination - time counted	
Channel to secondary actors	- GPS acquire the actor's location. - GPS acquire the destination.	

5. Other Nonfunctional Requirements

Requirements ID	Requirement Title	Short Description	Priority	Requestor
NFR01	Portability	The software should be portable. So, moving from one OS to another OS does not create any problem. (Android, iOS)	High	Software project team
NFR02	Privacy	The System should protect sensitive information by encryption (Customer information, billing details.)	High	Security manager
NFR03	Documentation	The app should have an embedded manual showing the user how the system works(instructions)	High	Software project team
NFR04	Cost	System will be free to use.	High	CEO
NFR05	Language	The system should	Medium	Software project

		have French language as well as English.		team
NFR06	Security	The app should have security checks to protect the user from reading wrong, dangerous or malicious QR-codes.	High	Software project team
NFR07	Performance	Supporting two thousand users per hour must provide five seconds or less response time in a mobile application, including the rendering of text and images, over an LTE connection.	Medium	Software project team

6. Other Requirements

6.1 Appendix A: Glossary

1. **Android -** Mobile operating system designed for touchscreen mobile devices like mobile phones and tablets.
2. **CEO (Chief Executive Officer) -** Highest ranking person in a company who is responsible for most management decisions.
3. **Dynamic -** continuously changing, active, and making progress.
4. **GPS (Global Positioning System) -** A satellite-based navigation system.
5. **Interface -** a place where two systems, objects, etc. meet and are able to communicate and interact with each other.
6. **iOS -** an operating system specific to devices manufactured by Apple.
7. **Stakeholders -** an individual, group or organization that has a stake in any business.
8. **Third-party -** a person or group who are not primarily involved in a situation.
9. **Uber (application) -** A platform where drivers can connect with individuals who need to be driven somewhere. Clients are able to pay money to be driven somewhere by the company's drivers.

6.2 Appendix B: Team Minutes of meeting

Minutes of meetings log between team members					
Meeting #	**Date** 30/01/2020	**Duration** minutes	**Names of attendees**	**Type** (in person, over the phone, over the internet)	**Key actions agreed upon**
1	08/01/2020	1:00:00	1.Cai Zhang	In person	1. The idea of the project.
			2.Fabio Santiago	In person	2. Benefits of the product.
			3.Luana Tavares	In person	3.Contact information
			4.		4. Deliveries
			5.		5. setting work tasks
2	10/01/2020	10:00	1.Cai Zhang	Internet	1. Project functions
			2.Fabio Santiago	Internet	2. Interface
			3.Luana Tavares	Internet	3. Documentation
			4.		4. Software requirements
			5.		5. References
3	21/01/2020	1:00:00	1.Cai Zhang	In person	1. Stakeholder positions
			2.Fabio Santiago	In person	2. Interview questions and answers
			3.Luana Tavares	In person	3. Documentation review
			4. Barsa Tserendavaa	In person	4. Setting work tasks
			5. Zhangir Assybekov	In person	5. Setting work tasks
4	29/01/2020		1.Cai Zhang	In person	1. Stakeholders list review
			2.Fabio Santiago	In person	2. Management
			3.Luana Tavares	In person	3. Meeting sheet
			4. Barsa Tserendavaa	In person	4. System Features
			5. Zhangir Assybekov	In person	5. Nonfunctional Requirements
			6. Caitlin Smith	In person	6. Review
5	03/02/2020		1.Cai Zhang	In person	1. User case descriptions
			2.Fabio Santiago	In person	2. Management and develop user cases
			3.Luana Tavares	In person	3. User cases
			4. Barsa Tserendavaa	In person	4. User case diagram
			5. Zhangir Assybekov	Absent	5. None
			6. Caitlin Smith	In person	6. User case descriptions

6	6/03/2020		1. Cai Zhang	In person	1.Fix the mistakes of the User case descriptions
			2. Fabio Santiago	In person	2.Management and fix the User cases
			3.Luana Tavares	In person	3.Arrangement the project
			4. Barsa Tserendavaa	In person	4.Review the questions
			5. Zhangir Assybekov	Absent	5.None
			6. Caitlin Smith	In person	6.Fix the mistakes of the User case descriptions
7	11/03/2020		1.Cai Zhang	In person	1.Fix part A (payment user interface)
			2. Fabio Santiago	In person	2.Management and fix part A problems
			3.Luana Tavares	In person	3.Fix the user case decryptions
			4. Barsa Tserendavaa	In person	4.Fix the User case diagram
			5. Zhangir Assybekov	Absent	5.None
			6. Caitlin Smith	In person	6.Fix the mistakes of the User case descriptions
8	18/03/2020		1.Cai Zhang	In person	1.Fix part B
			2. Fabio Santiago	In person	2.Management and fix part B problems
			3.Luana Tavares	In person	3.Fix part B
			4. Barsa Tserendavaa	In person	4.Fix part B
			5. Zhangir Assybekov	Absent	5.None
			6. Caitlin Smith	In person	6.Fix part B
9	25/03/2020		1.Cai Zhang	In person	1.Start working on sequence diagram
			2. Fabio Santiago	In person	2.Developing state diagram
			3.Luana Tavares	In person	3.Developing state diagram
			4. Barsa Tserendavaa	In person	4.Start working on power point presentation
			5. Zhangir Assybekov	Absent	5.None
			6. Caitlin Smith	In person	6. Start working on sequence diagram
			1.Cai Zhang	In person	1.Developing sequence diagram
			2. Fabio Santiago	In person	2.Fix state diagram
			3.Luana Tavares	In person	3.Fix state diagram
			4. Barsa	In person	4.Develping power point

10	01/04/2020		Tserendavaa		presentation
			5. Zhangir Assybekov	Absent	5.None
			6. Caitlin Smith	In person	6.Developing sequence diagram
11	08/04/2020		1.Cai Zhang	In person	1.Fix state diagram
			2. Fabio Santiago	In person	2.Management and fix project to final uoload
			3.Luana Tavares	In person	3.Fix ER diagram
			4. Barsa Tserendavaa	In person	4.Fix Use Case Diagram
			5. Zhangir Assybekov	Absent	5.None
			6. Caitlin Smith	In person	6.Fix state diagram

6.3 Appendix C: Stakeholder Register

Stakeholder Register					
Stakeholder Name	Stakeholder Position	External/Internal	Stakeholder contact details	Operational/ Executive	Interest (high, medium, lox)
Gary Doole	CEO	Internal	647-819-5878 gdoole@carsharing.com	Executive	High
Karen Mars	Sales Manager	Internal	647-819-5879 kmars@carsahring.com	Operational	High
Katrina Barns	VP Marketing	Internal	647-819-5880 kbarns@carsharing.com	Executive	Medium
Ron Moore	Director of Sales	Internal	647-819-5890 rmoore@carsharing.com	Executive	High
Ken Adams	Quality Assurance	Internal	647-819-5905 kadams@carsharing.com	Executive	Medium
Regina Falange	Call Center Agent	Internal	647-819-5907 rfalange@carsharing.com	Operational	High
Kelvin Turner	Security Manager	Internal	647-819-5892 kturner@carsharing.com	Executive	Medium
Peter Klain	Sales Officer	Internal	647-819-2345 Perter_klain@hotmail.com	Operational	High
Amanda Murphy	Customer	External	647-819-3487 Am2018@gmail.com	Operational	High
Matt Durval	Customer	External	647-819-2245 gdurval_p231@gmail.com	Operational	High

6.4 Appendix D: Interview questions

Ken Adams - Interview Questions		
Question	Stakeholder position	Answer
1. How to know what and when the application has a problem?	Quality Assurance	Our application has an induction system that will report any problems to headquarters
2. If the cars are not working during the way when the customers are driving, what the company would do?	Quality Assurance	1. Customers can connect the car service centre with the application. 2. The car service centre will arrange the worker to check and fix it. 3. In advance, we can send a new car to replace it.
3. If the application has problems, what the company would do?	Quality Assurance	We Connect our trained IT Department to try to solve it. If not possible we would contact the software development team.
4. Will you invest a lot amount of your budget to guarantee the product's quality?	Quality Assurance	Yes, we do believe that we need to invest in this area to guarantee the quality of our product to ensure the best experience for our customers.

Peter Klain - Interview Questions		
Question	Stakeholder position	Answer
1. Do you believe in the financial success of this application?	Sales officer	Yes, I do believe that it will be very convenient for our customers.
2. Who do you think are our main (target) customers?	Sales officer	I think most customers are young people because they just graduating or working, they do not have enough money to buy a car.
3. What are the ways do you believe is the best to connect with your customers?	Sales officer	I hope they connect me by the application, and I can gather the information and data by the downloading from the application.
4. Do you use web application frequently or mobile application?	Sales officer	It depends on the situation, for example, if I am in my company I will use the computer. Other times I use my phone.

Amanda Murphy - Interview Questions		
Question	Stakeholder position	Answer
1. What kind of transportation do you usually take?	Customer	Usually, I take public transportation.
2. Have you ever rented a car?	Customer	I often rent a car to travel by myself.
3. Do you think rent a car by the traditional way is convenient or not?	Customer	I think it is not convenient because I have to spend much time on talking with the Car rental companies, and I also need to sign many documents.
4. If there is software application that can help you rent a car automatic; will you adopt it?	Customer	Yes, I will try because it can save my time, I guess it is convenient compare to rent a car in person.

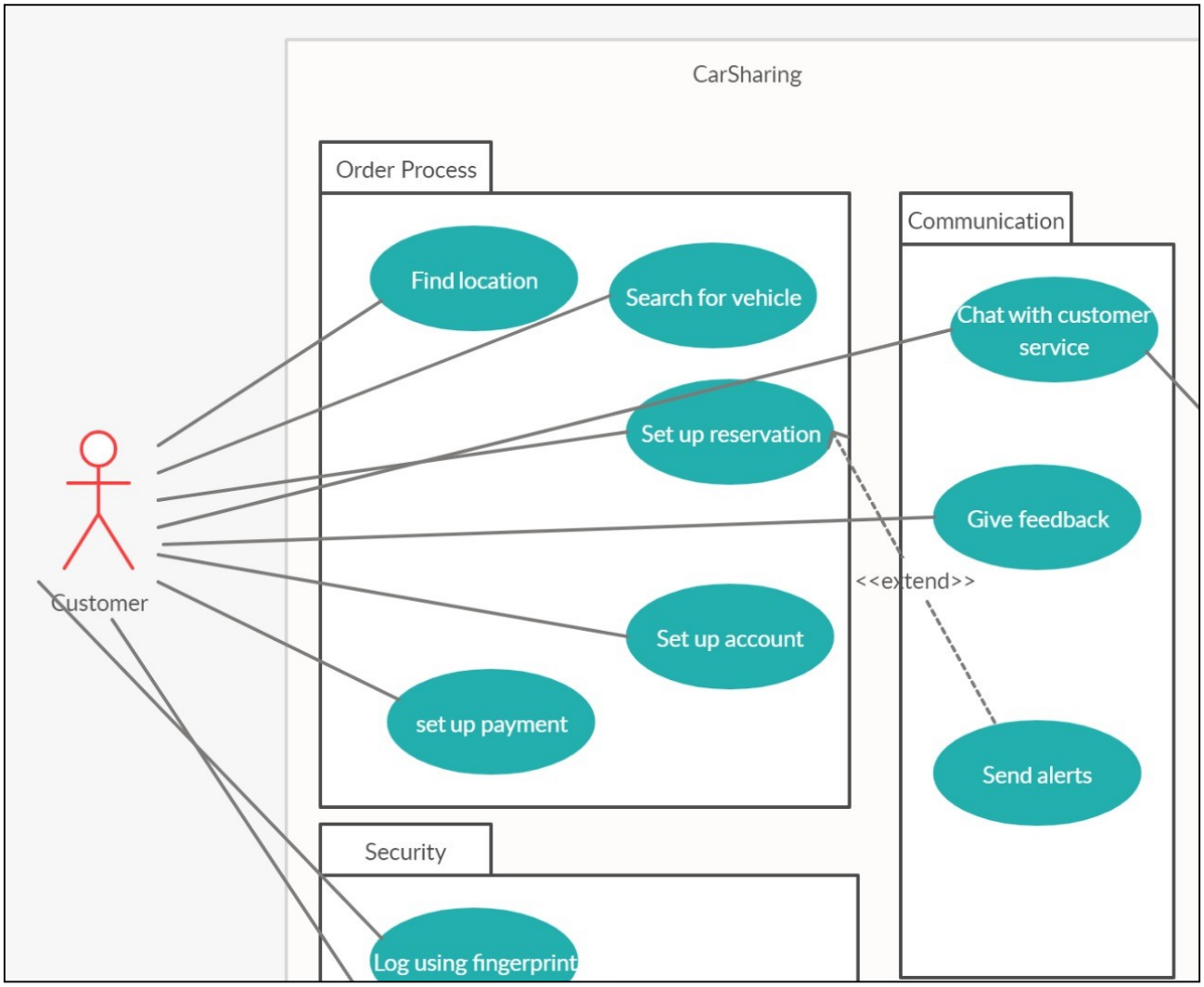
Katrina Barns - Interview Questions		
Question	Stakeholder position	Answer
1, Who is the main object group of the preliminary research?	VP Marketing	Young people
2. How to do market research?	VP Marketing	We will adopt the online research.
3. How do you track how often people use it?	VP Marketing	We will design one part about the customer record and keep it for research.
4. What kind of styles do you think the young people would like?	VP Marketing	I guess simple and easy to operate, clean interface these style the young customers will like.

Security Manager - Interview Questions		
Question	Stakeholder position	Answer
1. What information will the software be taking from clients?	Security Manager	The app will need information such as the client's name, email, address, and current location.
2. How will you be sure the rented cars are treated well?	Security Manager	Rented cars should be checked before and after they are used so we can evaluate any damage related changes. As well as that, a log will be kept of clients renting what cars and when.

3. Is the customer information safe?	Security Manager	Nobody outside the company will be able to view our customer personal information.
4. What should the customer do in the event that a car rented out has been damaged?	Security Manager	If a car rented out returns damaged, we will look for the last client and contact them about the incident. We take these matters very seriously.

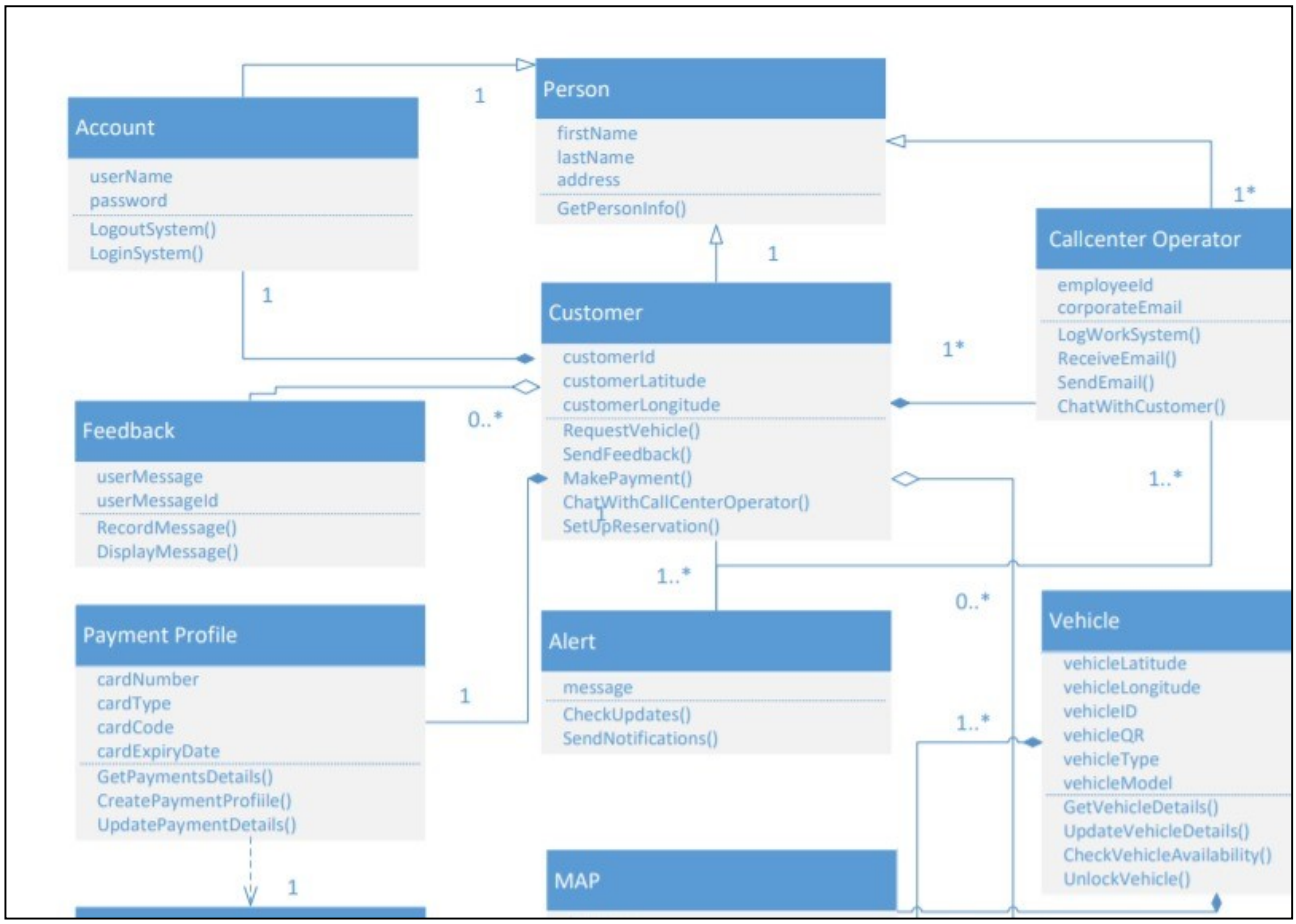
6.5 Appendix E:

6.5.1 Use Case Diagrams



6.5.2 Class Diagrams

6.5.2.1 Domain Class Diagram



6.5.2.2 CRC cards

Account	
Responsibilities	Collaborator
Create a customer profile	Customer

Customer	
Responsibilities	Collaborator
Create Payment Profile	Payment Profile
Get Customer Details	
Update Customer Details	

Payment Profile	
Responsibilities	Collaborator
Get Payment Details	
Update Payment Details	
Validate Payment Details	

Payment Transaction	
Responsibilities	Collaborator
Confirm Payment	Payment Profile

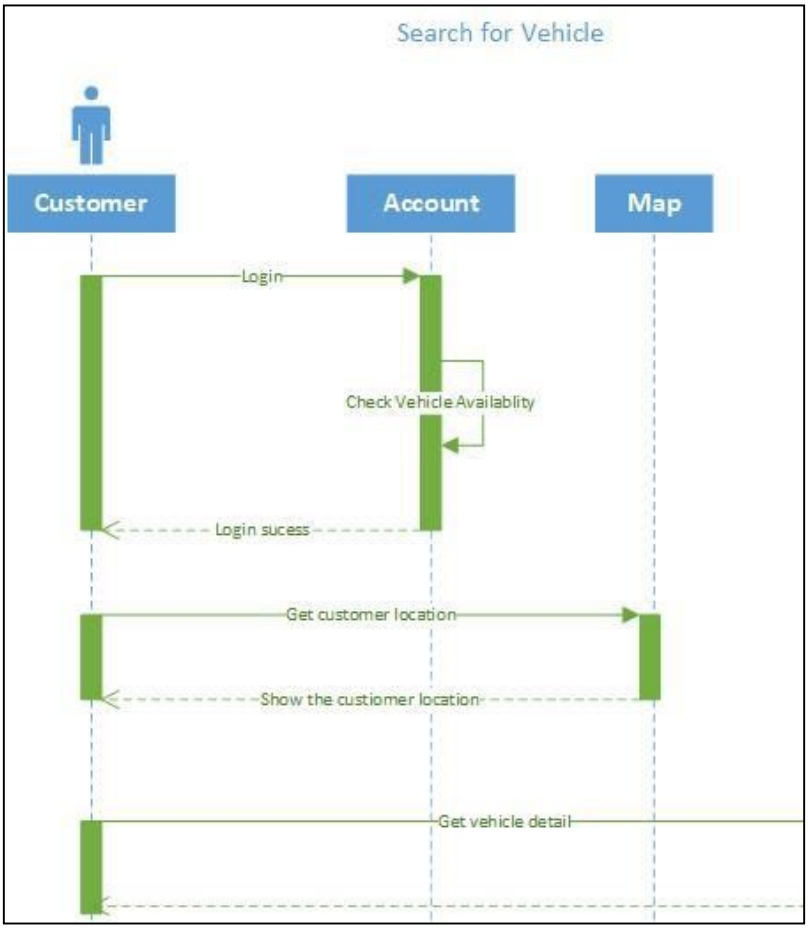
Vehicle	
Responsibilities	Collaborator
Get Car Details	
Update Car Details	
Check Car Availability	

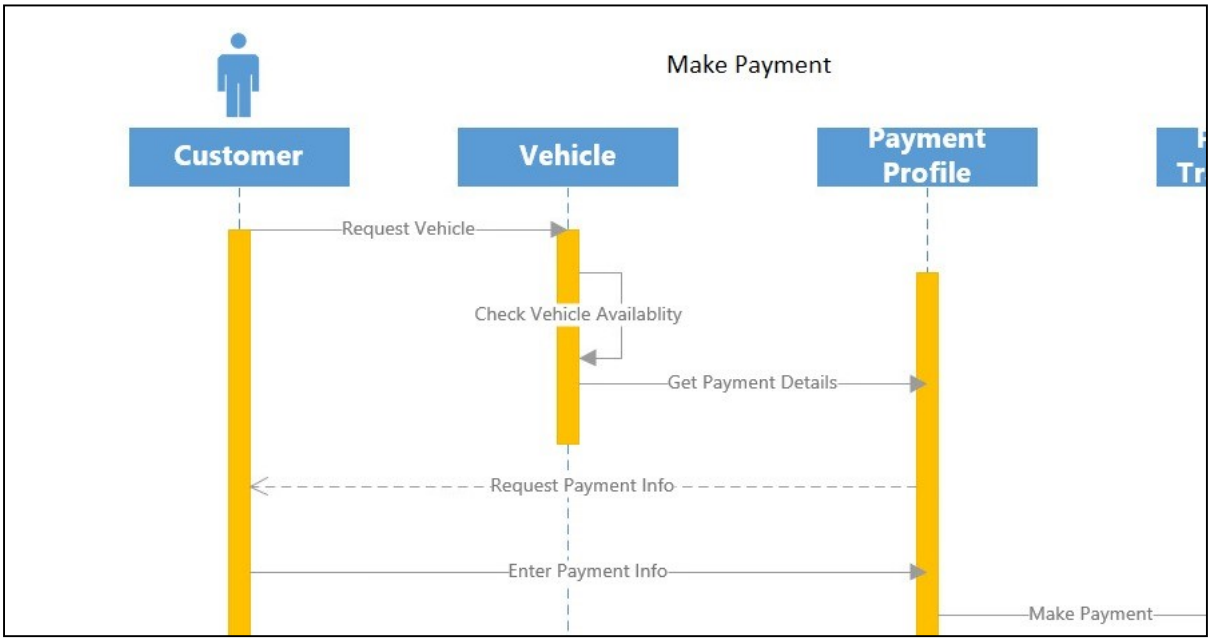
Map	
Responsibilities	Collaborator
Get Car Location	Vehicle
Get Customer Location	Customer
Set Destination	Customer
Display Map	

Chat	
Responsibilities	Collaborator
Live chat between Customer and Call Center	Customer, Call Center Operator

Alerts	
Responsibilities	Collaborator
Check Updates	Customer, Vehicle
Send notifications	Customer

6.5.3 Sequence Diagrams





6.5.4 State Diagrams