Software Requirements Specification

For

Smart Citizen, Safe Journey

Prepared by

[*Md. Iftekharul Alam Efat*
Shouvick Ahmed Naim]

Department of Software Engineering

<27.09.2018>

Table of Contents

List of Figures

1. Introduction

The introduction of the Software Requirements Specification (SRS) provides an overview of the entire SRS with purpose, scope, definitions, acronyms, abbreviations, references and overview of the SRS. The aim of this document is to gather and analyse and give an in-depth insight of the complete **Smart Citizen, Safe Journey** system by defining the problem statement in detail. Nevertheless, it also concentrates on the capabilities required by stakeholders and their needs while defining high-level product features. The detailed requirements of the **Smart Citizen, Safe Journey** are provided in this document.

1.1 Purpose

The main purpose of this project named "Smart Citizen, Safe Journey" is to make an automation system which might be helpful for millions of users from different perspective by solving their a few problems. Therefore, we are going to develop such a project.

1.2 Project Scope

The main scope of this project is to develop an application based on smartphone device. As more than 80% users of smartphones are using Android operating based mobile device, so we are targeting to implement our system firstly for Android users. Our proposed system has six modules.

This SRS is also aimed at specifying requirements of software to be developed but it can also be applied to assist in the selection relation between the different stakeholders. The standard can be used to create software requirements specifications directly or can be used as a model for defining the system requirements.

1.3 Glossary

This subsection contains definitions of all the terms, acronyms, and abbreviations used in the document. Terms and concepts from the application domain are defined.

- BRTA – Bangladesh Road & Transport Authority
- GUI – Graphical User Interface
- API – Application Programming Interface
- RESTful – Representational State Transfer

- SRS – Software Requirement Specifications
- UI – User Interface
- SDLC – Software Development Life Cycle

1.4 References

IEEE. *IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications.* IEEE Computer Society, 1998

1.5 Overview

Today we have computers with large computing power and almost every business is going to take the advantages of using those technologies. But nowadays digital certifications itself becomes an essential component for every business infrastructure. Because it provides security and it can identify every unique individual. Besides, it also provides confidential communications to the users.

Nowadays paperless communication enables people to access to everything by their unique identity life fingerprints or passwords. It has also successfully reduced the clutters of disorganizations which may arrive from files related to papers. Digital papers reduce the office space that required for business and gives more ability to access to information. Digital collaboration or payment gateway seems to be possible by digitization also.

Smart citizens want safe journey. But at present the total number of vehicles is increasing instantaneously. But the problem arises when it happens that fitness of these vehicles is not appropriate for some reason. Besides, a large number of drivers are driving vehicles without having a proper driving license. Moreover, many vehicle owners are not conscious about making registration due to administrative complication.

Drivers are not making driving licenses. If we consider from the perspective of them, then we are able to find that, most of the drivers in our country are under matured. Or they are not matured enough to drive a car. Another reason might be they are not properly literate. Therefore, they don't understand the process for getting driving license or which initiatives need to be taken to get proper registration for driving a car.

Besides drivers, most of the vehicle owners sometimes are not interested enough to register their vehicles in a proper way. It seems to happen mostly for those peoples who are not using cars regularly. They use car rarely and for that reason it is quite tough to track them by traffic police.

For making people's journey safe, traffic police playing a vital role at every moment. They have to work hard all day long for only checking driving license or vehicle registration

related papers. It kills a lot of time and efforts for traffic police and passengers as well as drivers.

These are some common scenario across the country. And the reality is that, no one from out of this universe would come to solve our problem. We need to solve our own problem using our own resources as well. And the initiatives should come from us.

For that reason, we are going to make an application based on mobile devices especially for smartphones. By using this mobile application, drivers can be benefited as they would not face any hassles to make driving license. Or vehicle owners would be able to make registration related papers within a few days. Most importantly, the approach would be easier than past for traffic police to check driving license or registration papers. And the process would be done within a few seconds.

2. User Classes and Characteristics

There are six types of stakeholders in our "Traffic Police Module". Such as:

Traffic Police: Traffic police have an individual version of this application. They check vehicles one after another to check related papers whether everything is fine or not. If there is no problem then, police give them clearance. But if there happen something wrong, then police are allowed to impose case according to rules. Or they can give demerit points to the drivers.

Drivers: Drivers will also use our application to find trip. But before that they need to be registered by their own identity. And it is to be said that, everything would be verified according to National Identification Number (NID).

Car Owners: Car owner first of all apply for their vehicle registration process through our apps to the BRTA. Then after completing that, they might be able to hire drivers for a specific period of time. This app will also help car owner to know the exact location of their car at any time.

Bangladesh Road & Transport Authority: Bangladesh Road & Transport Authority BRTA would collect data for both vehicles and owners to complete vehicle registration. BRTA also be able to inform them any update through push notification. For these purposes, BRTA need to use our apps.

Insurance Company: After purchasing vehicles, owners need to make insurance. And these insurance related everything will be happening on our apps. By using this app, insurance company would be able to promote their business.

One Stop Fitness Centre: There are many one stop fitness centre across the country. And sometimes drivers need to go there for fitness purpose. But most of the time at unknown place drivers don't know where is exactly located the nearest fitness centre. They seem to be confused. But using our apps they can easily locate those fitness centre. Besides, fitness centre has an opportunity to broad their business through application system now.

3. Design and Implementation Constraints

Design and implementation constraints are those that we have used to implement this project make successful. It also describes tool that enables developers and testers to view and interact with the user interface (UI) elements of this application.

3.1 User Interface Technology

User interface (UI) is everything designed into a system view that which person's associates with this system may like the interface of this system.

3.1.1 Programming Language

For developing this system, we will use Java as a programming language. Java is a widely-used open source general-purpose programming language that is especially suited for Android application development. Java is a programming language, and a powerful tool for making dynamic and interactive mobile applications based on Android operating system.

3.1.2 XML

XML stands for Extensive Mark-up Language. It is a mark-up language that describes the style of a mobile application based on Android operating system. XML describes how elements of the application should be displayed. Build responsive, mobile-first projects on with the world's most popular component library.

3.2 Implemented Tools and Platform

Every business plan, campaign, or project comes down to Tactics, Tools, and Strategies. To conceive, develop, and implement a sound social media marketing strategic plan that will be successful needs to have those three critical components.

3.2.1 Web Server

A Web server is a program that uses HTTP (Hypertext Transfer Protocol) to serve the files that form Web pages to users, in response to their requests, which are forwarded by their computers' HTTP clients. Dedicated computers and appliances may be referred to as Web servers as well. We will use the Apache HTTP server to implement this project. We will use RESTful API to retrieve data from our server to mobile application. RESTful stands for Representational State Transfer. And API stands for Application Programming Interface.

3.2.2 Database Server

We will use MySQL database server to store all of the information of this system. The reason behind to choose the database server are given below:

- Security
- Reporting and Data Mining
- Replication
- Fault tolerance
- Performance diagnostics

4. Use Case Diagram

Figure 4.1: Use Case Diagram of "Smart Citizen Safe Journey" Project

5. Requirement Specification

The complete requirement specification based on the elicitation process is described in this section.

5.1 Functional Requirements:

Functional requirements refer to the functions which are mandatory to the system. Functional requirements must be able to perform on the software system. Every system must have some functional requirements. Now, we are going to mention functional requirements associating with our project.

5.1.1 Traffic police search for vehicles

Requirements 1	**Traffic police search for vehicles**
Description	After arriving a car, traffic police may need to check or verify whether everything is okay or not. For that reason, police stop the car and ask driver for related papers. But in our apps this verification can be done by using a search option. Traffic police need to search car by registration number which is unique. Now, no need to check manually.
Stakeholders	Traffic police

5.1.2 Traffic police see vehicle details

Requirements 2	**Traffic police see vehicle details**
Description	After searching through registration number, everything related to that vehicle will be visible to the police. And police can be able to know the condition of that vehicle also.
Stakeholders	Traffic police

5.1.3 Traffic police see the driver details

Requirements 3	Traffic police see the driver details
Description	When police search for a vehicle, then they will be able to see the driver profile assigned to that vehicle. And then police will see the driver's driving history, previous employment, driving license clearance, demerit points etc.

Stakeholders	Traffic police

5.1.4 Traffic police are permitted to impose case

Requirements 4	**Traffic police are permitted to impose case**
Description	If something happens wrong, then traffic police can be able to impose case to the vehicle.
Stakeholders	Traffic police, Drivers

5.1.5 Traffic police can give demerit points

Requirements 5	**Traffic police can give demerit points**
Description	If any violence occurs by the driver, then traffic police can give them demerit points also.
Stakeholders	Traffic police

5.1.6 Traffic update own profile

Requirements 6	**Traffic update own profile**
Description	Traffic police might be transferred to another area. Or they need to update their profile. For updating own profile, they need to log in to the system.
Stakeholders	Traffic police

5.1.7 Data retrieve from cloud server

Requirements 7	**Data retrieve from cloud server**
Description	Data must be retrieved from server as the whole system will be dynamic. It is also to be said that, all operational functionality will be occurred on server also.
Stakeholders	Traffic police

5.2 Data Requirements:

For defining data requirements, we need to build the model. For our application maximum data would be loaded from remote user. And for that purpose we need to focus on some major points.

Such as:

- Types of entity of the system
- Route data locations
- Capacity and resources of the data requirements
- Data source sequence
- Data availability schedules
- Quantity of data
- Availability of data

5.3 Performance Requirements:

It is very important to maintain performance of any software system. To ensure performance, we need to maintain some steps. Now, I will explain some perspective by which we are going to enhance the performance of our project.

5.3.1 Speed & Latency Requirements:

Speed and latency requirements must be ensured while retrieving data from the cloud server.

SLR-1	**Search result must be faster**
Description	When traffic police search for a vehicle, then the search result must show within seconds.
Stakeholders	Traffic police

5.3.2 Precision & Accuracy Requirements:

Results that is to be shown to the end user is need to be accurate. Because, wrong information might be ruined the whole business process.

PAR-1	**Search result must be accurate**
Description	When traffic police search for a vehicle, then the search result must be according to the input value given by traffic police.
Stakeholders	Traffic police

5.3.3 Capacity Requirements:

The developed system by us must be capable to handle user data, provide accurate information, handling database, manage http request etc.

CR-1	**The system will handle thousands of data**
Description	The system need to handle data thousands of data every moment.
Stakeholders	Traffic police

5.4 Dependability Requirements:

The term dependability is measured based on four dimensions. Such as:

- Availability
- Reliability
- Safety
- Security

If we want to say that our application system is dependable then it must fulfil the four dimensions. But there are other tasks. Like there is no way to make mistakes or our system should have the ability to detect and then remove errors. Besides that, it is also very important to limit the damage which might be caused by system failure.

5.4.1 Reliability & Availability Requirements:

Now, I will mention requirements which is related to reliability and availability.

RAR-1	**The system must be available on 24 X 7**
Description	Our system must be available all day long, every day in a week • The system must be updated regularly • System must be malware free
Stakeholders	Traffic police

5.4.2 Robustness or Fault-Tolerance Requirements:

To ensure robustness and fault-tolerance facilities to the end users, it is urgent to ensure 0% crush. Moreover, it must show accurate results.

RFT-1	**The system handles all user access without system errors**
Description	Thousands of user might hit our application system at a time. All their requests must be handled without any fault.
Stakeholders	N/A

5.4.3 Safety-Critical Requirements:

There are no safety-critical requirements in our project.

5.5 Maintainability & Supportability Requirements:

It is very important to provide after service or support to the end users.

5.5.1 Maintainability Requirements:

MR-1	**System helps to update user profile**
Description	It is very important to update user profile.
Stakeholders	Traffic police

5.5.2 Supportability Requirements:

Supportability requirements may have related to some extends. Like:

- Testability
- Extensibility
- Adaptability
- Maintainability
- Compatibility
- Configurability
- Serviceability
- Install ability

Our application meets all of the above requirements related to supportability.

5.5.3 Adaptability Requirements:

There are no adaptability requirements in our system software.

5.6 Security Requirements:

Making software security as a requirement is very important. Software security requirements should be its functional requirement. Software security enforces security of an application system.

Functionality related to software security can either be directly tested or observed. Some security related requirements is given below:

- Signing in a traffic police
- Get access according to logged in user
- Set points to the drivers without having any issue
- Signing out as a traffic police
- Handling encrypted passwords

While accessing to the system, each and every module must provide a central authentication mechanism. There is also a process to prevent entering into the system by ensuring hashed password for the unauthenticated users.

5.6.1 Access Requirements:

For accessing to our application system, there remains some authentication and authorization techniques. And every module of our system will provide it. Now I will provide an explanation below.

AR-1	**Application provides security mechanism**
Description	Every module is designed in such a way that it only give access to the authorized and authenticated users.
Stakeholders	Traffic police, Drivers

5.6.2 Integrity Requirements:

Integrity requirements refers to a security system which ensures an expectation of data quality. It also ensures that all data of the system would never be exposed to the malicious modification or accidental destruction. For that reason, we will store our user passwords as encrypted format which is impossible to decrypt. It is also called hashed password.

5.6.3 Privacy Requirements:

It is very important to ensure privacy of the system users. Privacy requirements enhances to protect stakeholder's privacy. In this way, all data or a partial part of data are going to be disclosed according to system's privacy policy. To ensure privacy, the central database should be protected by the anonymous. Users are permitted to get access to those data which are being associated by them which can be ensured by the user log in system.

5.7 Usability and Human-Interaction Requirements:

The main target of developing any system is to make the system user friendly and easy to usable for the end users.

5.7.1 Ease of Use Requirements:

Our application is easy to use and also easily understandable.

EUR-1	**Application must be usable for the end users**
Description	This app is enough usable to the traffic police by which they can operate this system easily.
Stakeholders	Traffic police, Drivers

5.7.2 Personalization and Internationalization Requirements:

There are not any personalization and internationalization requirements to our system. This maiden version of our application is only be operated by Bangladesh.

5.7.3 Understand ability and Politeness Requirements:

It is already said that the application which we are going to develop, is understandable enough. The system provides hints to users whether any error occurred or wrong. By reading those errors users can be able to operate the system easily.

5.7.4 Accessibility Requirements:

There are no specific accessibility requirements associated to our system yet.

5.7.5 User Documentation Requirements:

Documentation are mainly two types. One is internal documentation which is generally written by the application engineers. It is prepared to make development life cycle easier for the system engineers or system analysts.

UDR-1	**The system engineer documentation**
Description	To develop our application named smart citizen, safe journey, firstly we have make a system analysis team as well as documentation team.
Stakeholders	System analysts or software developers

5.7.6 Training Requirements:

Training requirements involved in after service of any application. It is very necessary to properly train up end users to the system so that they would be capable to operate easily. After launching the full package to the market, firstly we provide training to the different end users like traffic police, drivers, vehicle owners, insurance company, Bangladesh Road & Transport Authority, one stop service centres.

5.8 Look and Feel Requirements:

Look and feel requirements mainly refers how the system will look like and how the user interface or graphical user interface of our system will display to the user.

5.8.1 Appearance Requirements:

Traffic police and all other user must know which input fields are required and which are not. For that reason, we will use labels for all input fields. Input fields might be text type, radio, checkbox, spinner etc.

AR-1	**Labels of mandatory fields must be bold**
Description	The mandatory field's label must be bold and all input fields must have placeholder to make it easier for the users.
Stakeholders	Traffic police and Any other end users

5.8.2 Style Requirements:

After keeping all contents, it is very essential to load stylesheet to the application. For mobile application like android system, extensive mark-up language or xml is used. It is to be said

that we are going to develop our system at android platform. Style makes the system lucrative.

SR-1	**The appearance must be controllable using stylesheet file**
Description	For android application stylesheet files are xml. So, all stylesheet must be controllable by the xml file.
Stakeholders	Software developer

5.9 Operational and Environmental Requirements:

Operational and environmental requirement refers to the capabilities, performance measurements, process, measurements of effectiveness, measurements of performance, measures of sustainability, measurements of technical performances etc.

5.9.1 Expected Physical Requirements:

There are no expected physical requirements in our system.

5.9.2 Requirements for Interfacing with Adjacent Systems:

There are no requirements for interfacing with adjacent system for our project.

5.9.3 Release Requirements:

There are no specific release requirements in our system.

5.10 Legal Requirements:

Legal requirements normally refer to the terms and conditions or privacy policy of any organizations. The terms and condition of our application is that, no third party software or person are allowed to engage to use our data for their business purpose.

5.10.1 Compliance Requirements:

There are no specific compliance requirements for our system.

5.10.2 Standards Requirements:

There are no specific standards requirements for our system.

6. Requirement Engineering Process

Requirements engineering refers to the process of defining, documenting and maintaining requirements in the engineering design process. It is a common role in systems engineering and software engineering.

6.1 Requirement Elicitation Techniques

Requirement elicitation is the process of collecting and refining stakeholder's requirements. Projects are garbage-in-garbage-out meaning that poor quality requirements typically lead to project issues and failure.

6.1.1 Hold Elicitation Interviews

We hold interviews that can be performed one-on-one or with a small group of stakeholders. They are an effective way to elicit requirements without taking too much stakeholder time because we meet with people to discuss only the specific requirements that are important to this system. Interviews are helpful to separately elicit requirements from members in preparation for workshops where those members of this system come together to resolve any conflicts.

6.1.2 Perform Document Analysis

Existing documentation can help reveal how systems currently work or what they are supposed to do. Documentation includes any written information about current systems, business processes, requirements specifications, competitor research. Reviewing and analysing the documents can help identify functionality that needs to remain, functionality that isn't used.

6.1.3 Distribute Questionnaires

We conduct a survey to collect requirements for this system. Questionnaires are a way to survey large groups of users to determine what they need. Questionnaires are useful with any large user population but are particularly helpful with distributed groups.

6.2 Requirement Validation

Validation ensures that the requirements are correct and demonstrate the desired quality that you want from this system. Requirements that seem fine when you read them might turn out to have ambiguities and gaps when to try to work with them.

6.2.1 Review the Requirements

Peer review of requirements, particularly the type of rigorous review called inspection, is one of the highest-value software quality practices available. Assemble a small team of reviewers who represent different perspectives and carefully examine the written requirements, analysis models, and related information for defects.

6.2.2 Test the Requirements

We test constitute an alternative view of the requirements. We also conduct writing tests about how to tell if the expected functionality was correctly implemented. Derive tests from the user requirements to document the expected behaviour of the product under specified conditions.

6.2.3 Simulate the requirements

To simulate the requirements commercial tools are available that we have used to simulate a proposed system either in place of or to augment written requirements specifications. Simulation takes prototyping to the next level.

6.3 Change Management

We used a common set of web-based tools for handling change requests and tracking open issues is essential. Change always has a price, so using change management practices to control scope creep is vital in a contract-development situation. We will provide these following issues in change management.

- Evaluate and prioritize defect corrections and enhancement requests
- Dynamically adjust the scope of future releases or iterations
- Evaluate the impact of proposed changes on users and business processes
- Participate in making change decisions

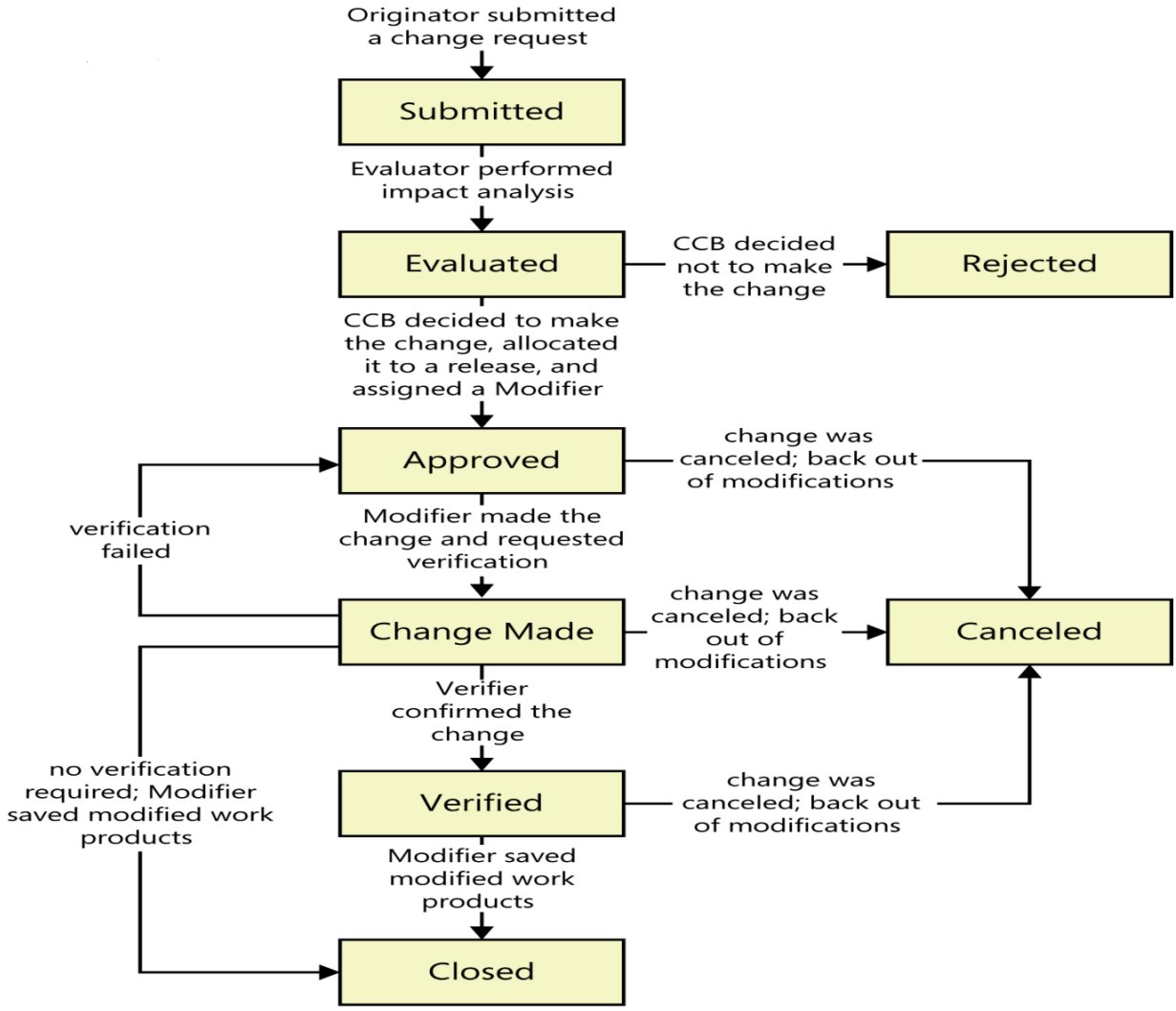

Figure 6.1: State Diagram of Change Request