AY 2022/2023

POLITECNICO
MILANO 1863

RASD: Requirement Analysis and Specification Document

Marcello De Salvo   Riccardo Grossoni
Francesco Dubini

Professor
Elisabetta Di Nitto

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Contents

1 Introduction

Electric mobility (e-Mobility) is a way to reduce the carbon footprint caused by motorized vehicles in urban and sub-urban areas.
Comfortably knowing how to fit the charging process into one's daily schedule is a fundamental step towards that goal.

1.1 Purpose

In the last 3 years the number of electric vehicles has doubled and, with the proposed european legislation on banning diesel fuel by 2035, the future seems to be full-electric. This rapid change requires a better and more efficient infrastructure to serve this ever increasing demand.

eMall (e-Mobility for all) aims to ease the charging process for the users through the *e-Mobility Service Provider's* (eMSP) platform, providing all the needed end-users' services and by actively communicating with multiple *Charging Point Operators'* (CPOs) *Management Systems* (CPMS).

1.1.1 Goals

User goals

- **(G1) Know about the charging stations nearby, their cost, any special offer they have.**

- **(G2) Book a charge in a specific charging station for a certain timeframe.**
  description

- **(G3) Start the charging process at a certain station.**

- **(G4) Notify the user when the charging process is finished.**

- **(G5) Pay for the obtained service.**

1.2 Scope

Shared Phenomena

ID	Phenomenom
S1	User registers through the application
S2	User logs into the application
S3	User gets notified by the system about the status of the charge
S4	User is suggested by the system to go and charge the vehicle, depending on the status of the battery, his daily schedule and the charging type
S5	User is presented with special offers made available by some CPOs
S6	User checks the availability of charging slots at nearby stations
S7	User pays the cost of the charge through the application

World Phenomena

ID	Phenomenom
W1	Power outage in a station nearby area
W2	Physical problem in the charging station
W3	Physical problem in the electric vehicle
W4	Unexpected changes in the user daily schedule
W5	Person other than the user is driving the car
W6	Text
W7	Text

1.3 Definitions, acronyms, abbreviations

Definitions

- **User**: any electric car owner.

- **e-Mobility Service Providers**: company offering an electric vehicle charging service to drivers by providing access to multiple charging points around a geographic area.

- **Charging Point Operator**: charging point stations owner.

- **Charge Point Management System**: charging Point Operator's IT infrastructure. Handles the acquisition of energy from external Distribution System Operators and distributes it to the connected vehicles. It can also makes automatic decisions, such as the amount of energy to be used for each connected vehicle.

- **Distribution System Operator**: entity responsible for distributing and managing energy from the generation sources to the final consumers.

Acronyms

- **EV**: Electric vehicle

- **eMSP**: e-Mobility Service Providers

- **CPO**: Charging Point Operator

- **CPMS**: Charge Point Management System

- **DSO**: (3rd party) Distribution System Operator

- **API**: Application Programming Interface

- **UML**: Unified Modeling Language

1.4　Revision history

- Version 0.1: Setup

  - Created first layout

1.5　Reference documents

- Specification document: "Assignment RDD AY 2022-2023"

- Alloy documentation: https://alloytools.org/documentation.html

- Data on number of electric vehicles: https://www.iea.org/data-and-statistics/charts/global-electric-car-stock-2010-2021

1.6　Document structure

- **Section 1**: introduces the problem, describes every goal of the project and gives an analysis of the world and shared phenomena.

- **Section 2**: gives an overall description of the project and all the interactions that will occur between the system and the final users, including a list of possible scenarios and a description of all the actors involved. It provides also an UML class diagram that will be used as a reference point for the developers.

- **Section 3**: includes all the project's requirements and an in-depth description everything presented in Section 2.

- **Section 4**: shows the Alloy model defined for this project.

2 Overall Description

2.1 Product perspective

Text *Product Functions (2.2)* section.
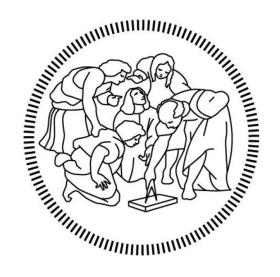
2.1.1 Scenarios

1. Person1

   - Action1

2.1.2 Class diagram

Text *daily plan* footnotemark[1].

- **Type of Data 1**
  Text

- **Type of Data 2**
  Text

Image of the class diagram

---

[1]Text

Figure 1: High-level UML

2.2 Product functions

2.2.1 Sign-up and shared functions

- **Sign-up:** let the user sign-up thorugh an email and a password.

Figure 2: Sign Up BPMN

2.2.2 Other function 1

- **Text:** text

---

[1]Text

[1]text

2.3 User characteristics

The application has been thought for the three different user categories that follows:

- **text** explains text

- **text** explains text

- **text** explains text

2.4 Assumptions, dependencies and constraints

- D1: ass. 1

- D2: ass. 2

- D3: ass. 3^2

- D4: ass. 4%

- D5: ass. 5

- D6: ass. 6

- D7: ass. 7

- D8: ass. 8

- D9: ass. 9

- D10: ass. 10

- D11: ass. 11

- D12: ass. 12

- D13: ass. 13^2

- D14: ass. 14

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[2]footnote