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# 1 Introduction

## 1.1 Purpose

Paragrafetto che spiega il progetto

- G1 The e-Mobility Service Providers (**eMSP**) shall help the user to select the station; [W1,W2] [S1,S5]
- G2 The **eMSP** shall allow the user to book a charge; [W1,W2] [S4]
- G3 The **eMSP** shall allow the user to perform a charge; [W1,W2,W3] [S2,S6]
- G4 Charge Point Management Systems (**CPMSs**) shall handle the car charging cycles; [W1,W5,W6] [S7]
- G5 **CPMSs** shall manage the car charging stations; [W4,W5,W6] [S3, S7]

## 1.2 Scope

- W1 People charge electric cars;
- W2 People use web calendar;
- W3 People pay for the charging service;
- W4 Distribution System Operatorss (**DSOs**) supply energy to Charging Point Operatorss (**CPOs**);
- W5 Some **CPOs** own batteries;
- W6 **CPOs** decide whether to use batteries or **DSO** supplied energy;
- S1 The **eMSP** suggests the user to charge the vehicle;
- S2 The **eMSP** notifies the user when the charging process is finished;
- S3 **CPMSs** acquire information about energy prizes from **DSOs**;
- S4 The user books a charge using the **eMSP**;
- S5 The user asks the **eMSP** for suggestions about charging station;
- S6 The user pays for the service using the **eMSP**;
- S7 **CPOs** gather the energy source through the **CPMS**;

## 1.3 Definitions, Acronyms, Abbreviations

<b>eMSP</b>	e-Mobility Service Providers	<b>DSO</b>	Distribution System Operators
<b>CPO</b>	Charging Point Operators		
<b>CPMS</b>	Charge Point Management System	<b>API</b>	Application Programming Interface

## 1.4 Revision history

## 1.5 Reference Documents

## 1.6 Document Structure



with a link to confirm the activation of the account, if the link is clicked within the first 15 minutes the account is activated and the sign up is successful, otherwise it is considered failed and the process must be repeated.

S2 User Logs in:

Jay, after signing up, opens the app and he is prompted to insert his email and password, if the given information are correct the login is successful and he obtain access to his account and the service of the apps, otherwise the login is unsuccessful and it must be repeated.

S3 User searches for stations:

Robert, once logged in, inserts the location and the time frame to search for charging stations. Once submitted a list of available charging station is displayed, the list is ordered by the distance of the station from the desired location. Via a menu Robert can choose to order the station either via distance or price, or to display unavailable station and set the maximum distance from the chosen location. Robert chooses a station obtaining more detailed information.

S4 User books a charge:

Jessica, after choosing a station, decides to book it, the station location and booked time frame are displayed and she is asked to confirm the booking via a popup. Jessica then receives a confirmation email with the details of the charge (Location, time frame, socket id) and a confirmation pin to insert at the station.

S5 User charges the car:

Mary, after booking a charge, arrives at the station, she parks her car at the designed socket and plugs her car in, Mary then inserts the confirmation pin in the socket to start the charge. The socket displays on a monitor the status and the finishing time of the charge. Once the charge is finished Mary receives a notification of finished charge, she gets her car and complete the charge.

S6 User gets charging suggestion based on his calendar:

Josh is a very busy man, is also an avid google calendar user, setting up every event with correct time and locations. The service accessing his calendar finds the closest available charging station to each car movement, it estimates the battery level trough the gps data and once the battery is below fifty percent Josh gets notified about the possibility to charge his car. Josh liking the idea open the app and confirms the booking.

S7 Cpo subscribes to the system:

S8 Cpo updates info about its charging stations:

S9 Cpo decides the policy to be applied:

S10 Cpo checks internal info about the selected charging station:

## 2.3 User characteristics

## 2.4 Assumptions dependencies and constraints

### 2.4.1 Assumptions

A1 Users insert correct data in the forms

A2 Le persone non trollano

## 3 Specific Requirements

### 3.1 External interfaces requirements

#### 3.1.1 User interfaces

- R1 The **eMSP** must allow the users to register (providing email, password, payment method and his infos);
- R2 The **CPMS** must allow the **CPOs** to register (providing email, password, id-station, partita iva, number of possible charging slots);
- R3 The system must allow the **CPOs** to modify the possible charging slots in their stations;
- R4 The system must verify the correctness of the identification data for the **CPOs**;
- R5 The system must allow the user to login;
- R6 The system must allow the user to choose a specific station, a timeslot;
- R7 The system must notify the user when the charging process is finished via a notification;
- R8 The **CPMS** must allow the **CPOs** to choose the mode (manual or automatic) of operation

#### 3.1.2 Hardware interfaces

#### 3.1.3 Software interfaces

#### 3.1.4 Communication interfaces

### 3.2 Functional requirements

- R1 The system must provide information () about the stations nearby;
- R2 The system must reserve a position for a user who registered for a charge through the application;
- R3 The system mustn't have collisions in the booking of charges; (non si possono registrare più di X user per timeslot sovrapposti)
- R4 The system must take the service money from the user payment method after the charging is finished;



### **3.3 Performance requirements**

### **3.4 Design constraints**

#### **3.4.1 Standards compliance**

#### **3.4.2 Hardware limitations**

#### **3.4.3 Other constraints (TODO MAYBE)**

### **3.5 Software system attributes**

#### **3.5.1 Reliability**

#### **3.5.2 Availability**

#### **3.5.3 Security**

#### **3.5.4 Maintainability**

#### **3.5.5 Portability**

### **3.6 Requirements**

#### **3.6.1 External Interface Requirements**



## 4 Formal Analysis Using Alloy

## 5 Effort Spent

### 5.1 Effort Spent

- 15/11/2022: 15:00 - 18:00 (all 3 same time)
- 16/11/2022: 08:30 - 10:00 (only 1) Emilio
- 17/11/2022: 21:00 - 23:00 (all 3 same time)
- 18/11/2022: 10:00 - 12:00 (2) Emilio, Federico
- 21/11/2022: 19:00 - 20:00 (only 1) Matteo
- 22/11/2022: 14:30 - 16:00 (only 1) Matteo
- 23/11/2022: 10:30 - 11:30 (only 1) Matteo
- 24/11/2022: 21:30 - 22:30 Matteo and Federico
- 25/11/2022: 09:00 - 09:30 Federico
- 25/11/2022: 19:00 - 19:30 Matteo
- 26/11/2022: 08:30 - 09:00 Federico
- 26/11/2022: 16:00 - 17:00 (all 3 same time)