Improving user accessibility to public charging network:
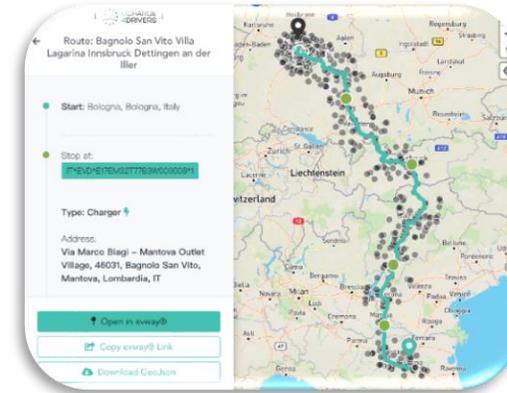## *Enhanced routing and booking services*

Mauro Dell'Amico (ICOOR)

eCharge4Drivers Final Event
Barcelona, 7 November 2024
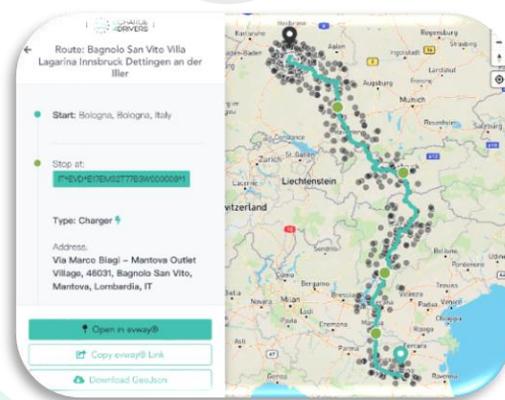
The services

1. Enhanced route planner and real time navigator

2. Booking service for charging stations and battery swapping services

Enhanced route planner and real time navigator
(ICOOR-EvWay)

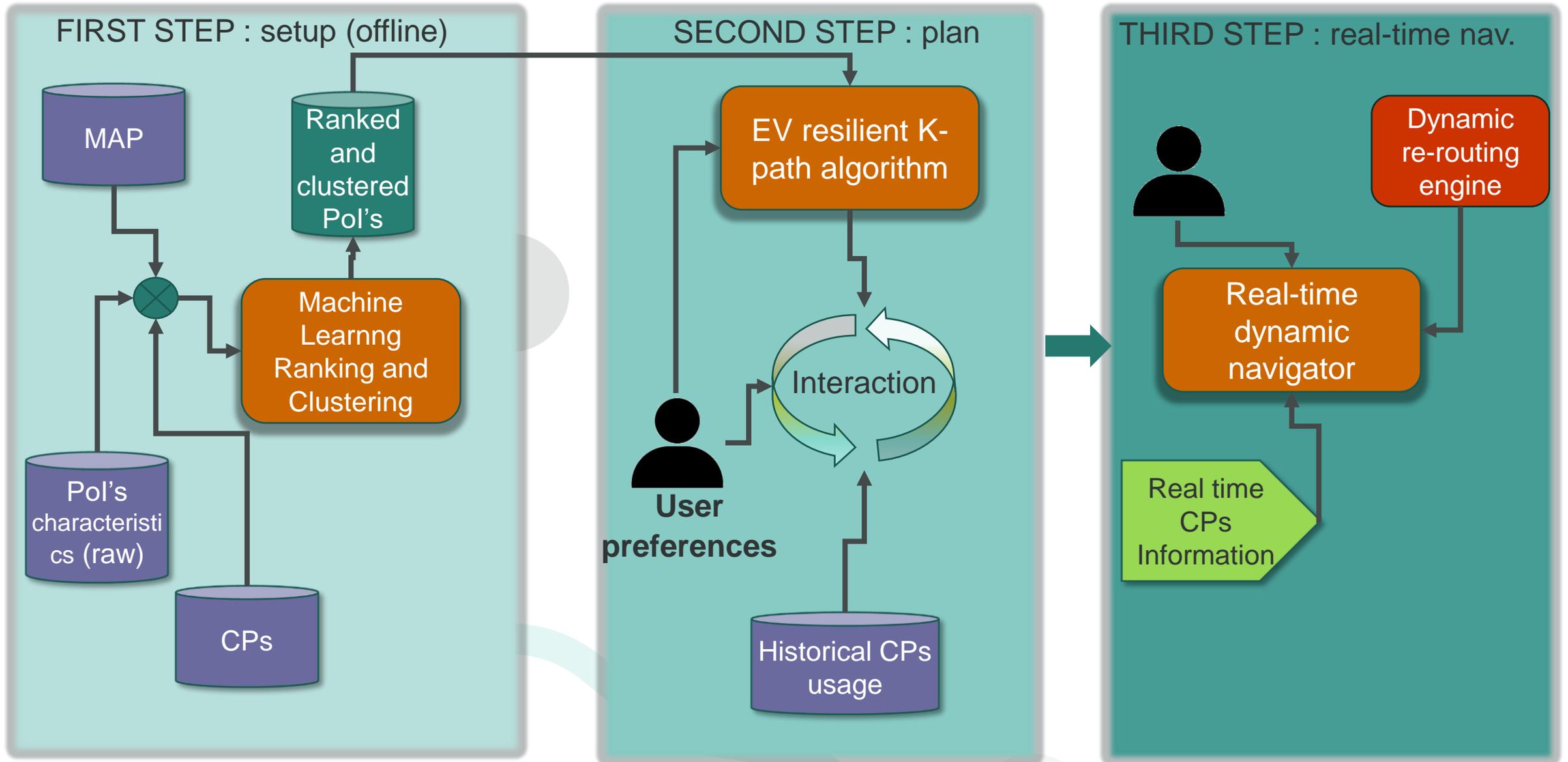# Enhanced route planner and real time navigator (ICOOR-EvWay)

Route Planner

✓ For **long trips** with **multiple charging**

✓ **Takes into account <u>user preferences</u> and charging station availabilities**

✓ **It includes several <u>user specific requirements, wishes and habits</u>**, such as: the type of plug, type of charging station (fast, super-fast**),** RES characteristics, vicinity to restaurants, commercial villages, cultural site, etc.

✓ It maximise the **<u>resilience</u>** of the route with respect to CPs occupancy and the **<u>score of users preferences</u>** based on Points of Interest
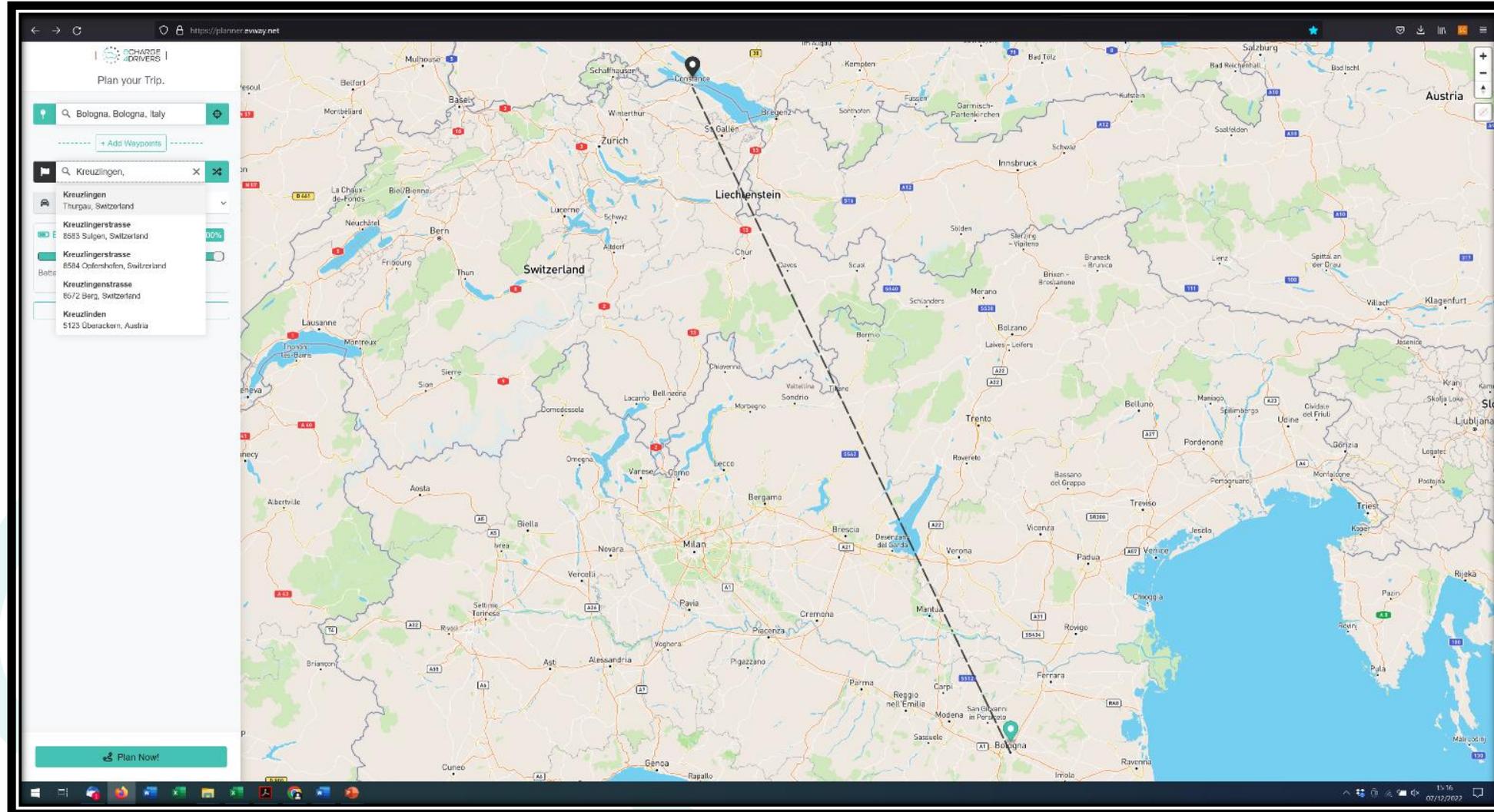
Real Time Navigator

✓ Assists the driver along the route providing **real-time information on the CPs**

✓ Implements **dynamic re-routing** based on real-time information

# Route planner and real-time navigator structure

FIRST STEP : setup (offline)

- MAP
- Ranked and clustered PoI's
- Machine Learnng Ranking and Clustering
- PoI's characteristics (raw)
- CPs

SECOND STEP : plan

- EV resilient K-path algorithm
- Interaction
- User preferences
- Historical CPs usage

THIRD STEP : real-time nav.

- Dynamic re-routing engine
- Real-time dynamic navigator
- Real time CPs Information

Web planner usage:
1) Select origin, destination and car model

Web planner usage:
2) Set Preferences
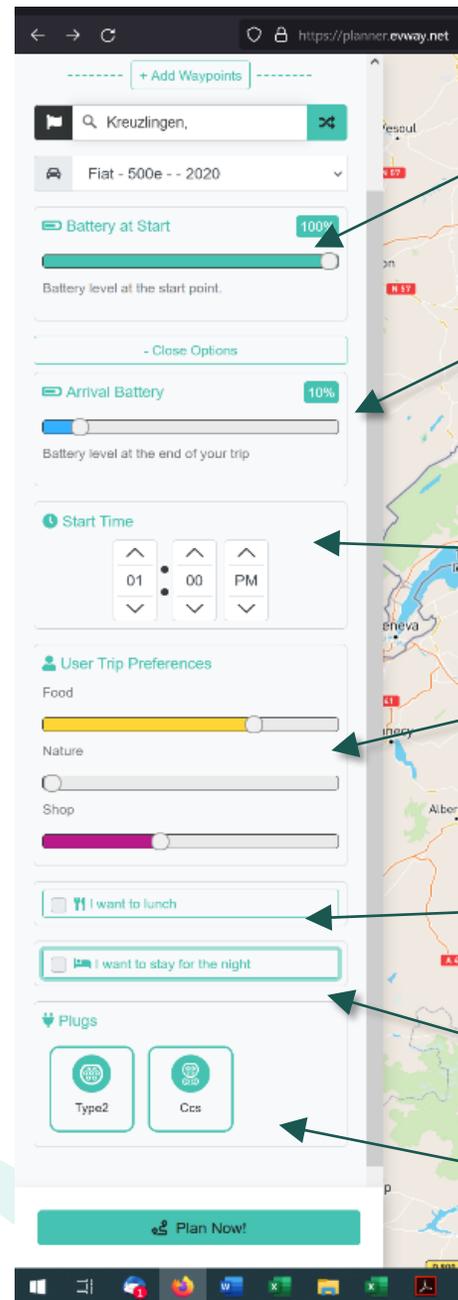
Battery charge at start

Battery charge at arrival (min)

Starting time

User preferences

Stop for lunch ?

Night rest ?

Preferred plug
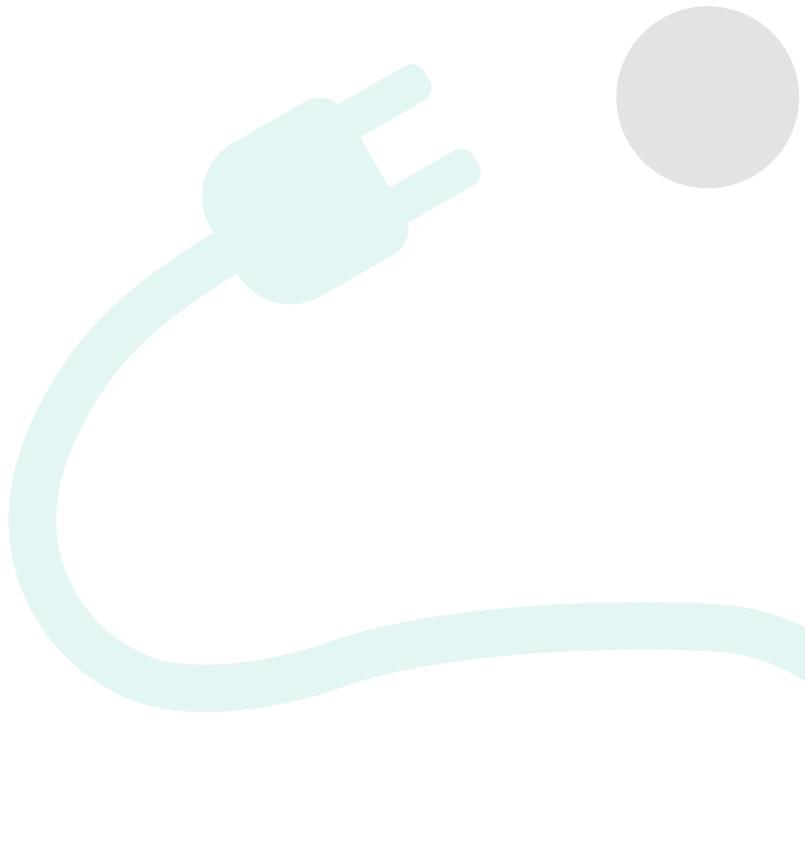
Web planner usage:
3) Analyze the proposed routes

Choose the travel option.

Via: Route 1: Bagnolo San Vito Villa Lagarina Innsbruck Dettingen an der Iller

Duration: **13h 13m**
Distance: **730.89 km**
Number of Stops: **4**
Soc at Arrival: **20%**

Via: Route 2: Parma Milano Biasca Winterthur Aldingen

Duration: **18h 20m**
Distance: **750.99 km**
Number of Stops: **5**
Soc at Arrival: **20%**

Via: Route 3: Bagnolo San Vito TRENTO Innsbruck München Jettingen-Scheppach

Duration: **14h 05m**
Distance: **765.89 km**
Number of Stops: **5**
Soc at Arrival: **20%**

Route: Bagnolo San Vito Villa Lagarina Innsbruck Dettingen an der Iller

Start: Bologna, Bologna, Italy

Stop at:
IT*EVD*E17EM32T77B3W000008*1

Type: Charger ⚡

Address:
Via Marco Biagi – Mantova Outlet Village, 46031, Bagnolo San Vito, Mantova, Lombardia, IT

📍 Open in evway®

⤴ Copy evway® Link

☁ Download GeoJson

Web planner usage:
4) Refine the route in detail

Stop at:
IT*BEC*EE002106*1

Type: Lunch 🍴

Address:
Via San Siro, 60, 29100, Piacenza,
IT

Connector: type2 | 22 kW
Time: 12:01
Start SoC: 20 %
Charge Time: 01h 24m
End SoC: 60.8 %

Show Alternatives

Occupation Data:

45% 40% 78% 74% 71% 30% 21%

📍 Open in evway®

↪ Copy evway® Link

⬇ Download GeoJson

Stop at:
AT*HTB*E1001438

Type: Night 🛏

Address:
Via dils Larischs, 7180,
Disentis/Mustér, Bezirk Surselva,
Graubünden, CH

Connector: type2 | 22 kW
Time: 19:43
Start SoC: 20 %
Charge Time: 12h 46m
End SoC: 100 %

Show Alternatives

Occupation Data:

76% 52% 40% 38% 60% 80% 13%

📍 Open in evway®

↪ Copy evway® Link

⬇ Download GeoJson

Web planner usage:
last step-Send route to real-time navigator

Real time navigator usage

1. The route preview is shown as in the web version
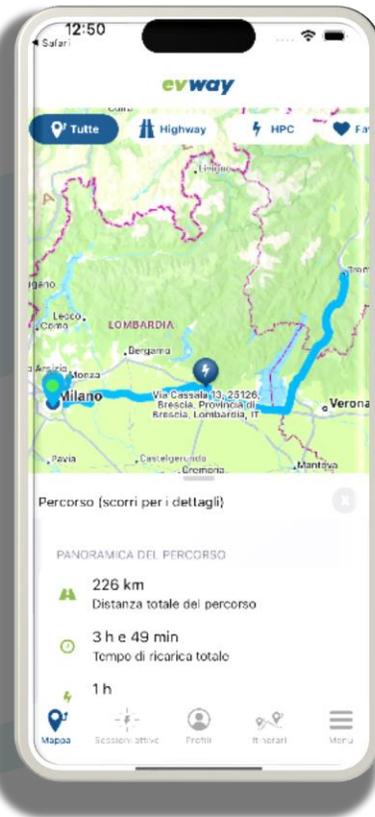
2. The turn-by-turn interface gives detailed instructions to the driver

User Position

CPs real state – through Hubject

Evway app   Evway Server   Hubject   Charging Station
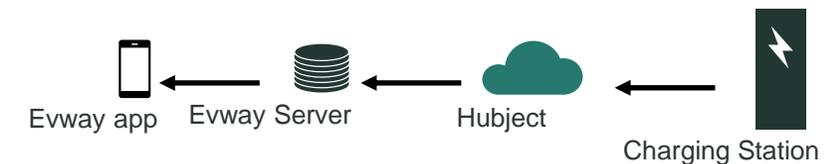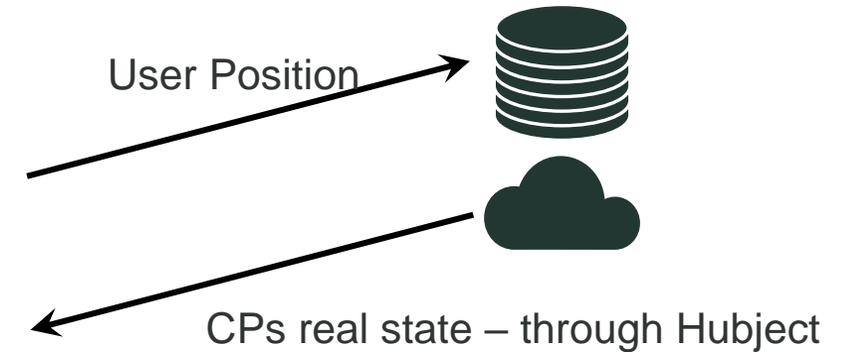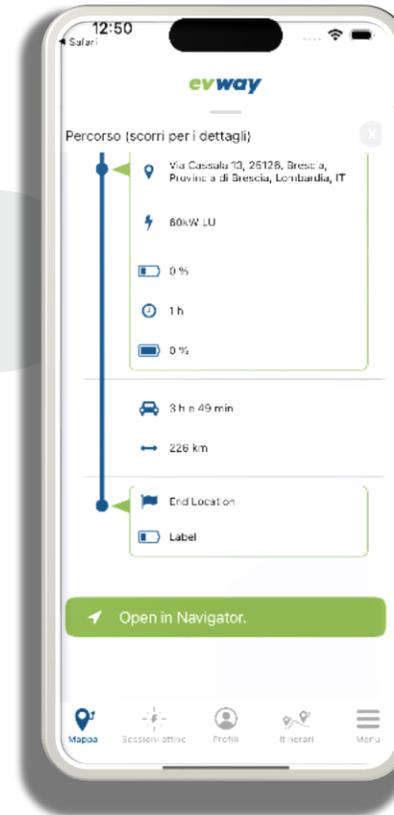
Real time navigator usage: dynamic re-routing

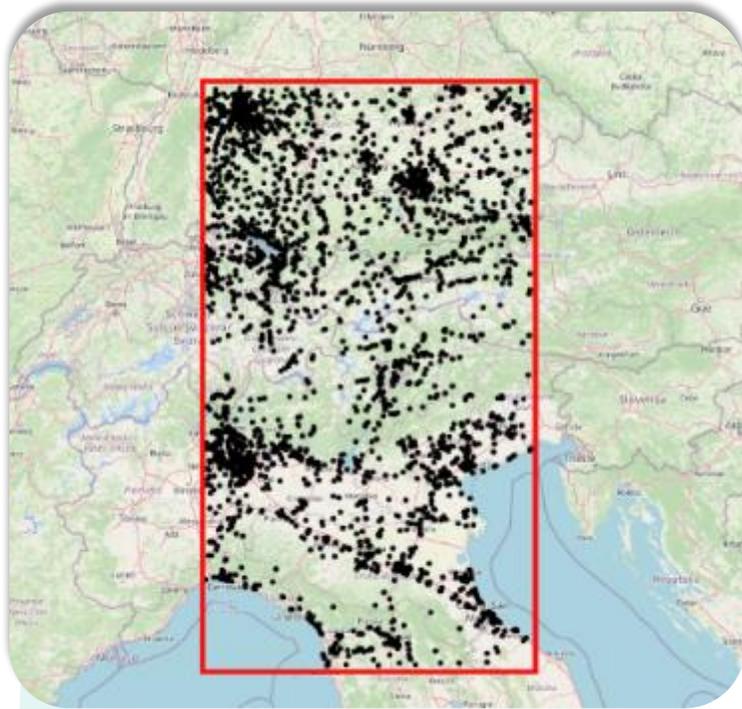The algorithm **alerts the user** that it is about to arrive in the planned CP vicinity and in case will **suggest alternative charging stations.**
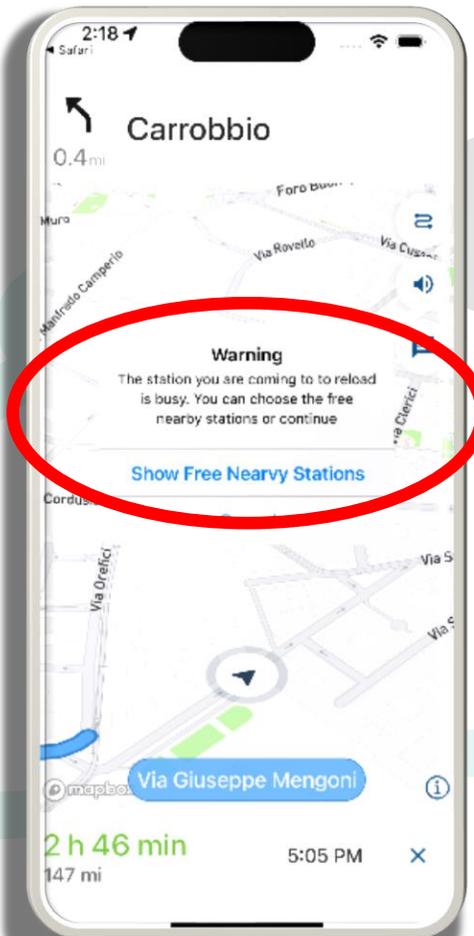
The user will be able to **choose the available alternatives** and then, the route will be relaunched via the new station
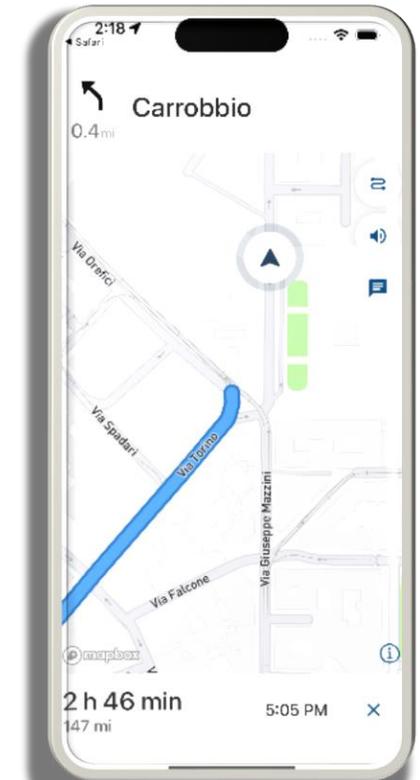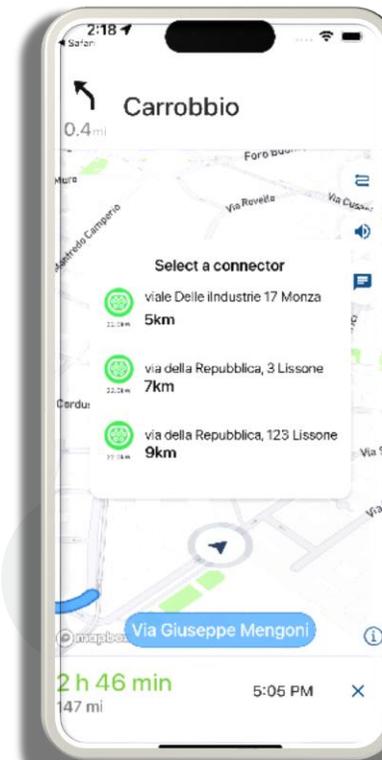
Pilots

Northern-Italy / South-Germany

Greece
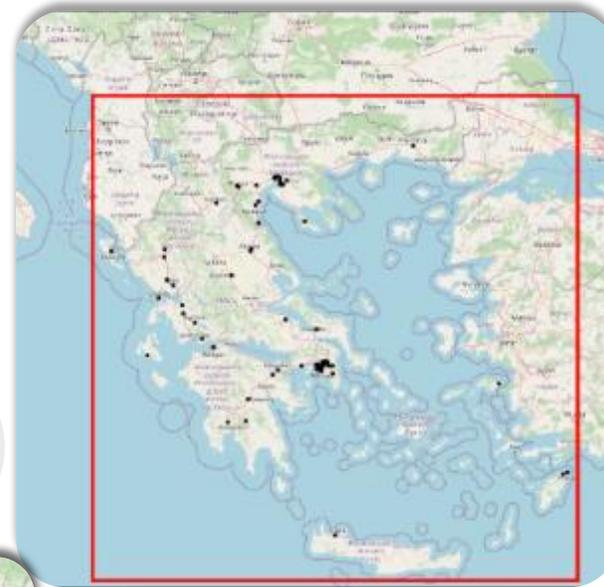
Turkey

Puglia
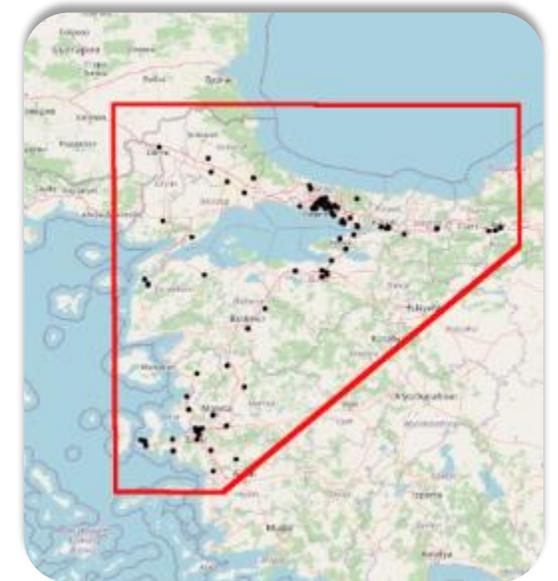
Booking service for charging stations and battery swapping services

(Poliba, Zes, Scutum, Swobbee)

Objectives

- To develop a booking service for the **charging stations** with a interfaces to the CPOs back-end to get the **real-time or predicted occupancy** of the charging station and of the parking bay and **enhanced information** like estimated price, use of RES in the mix, waiting time.

- The **pre-booking services for battery sharing** hubs will be further developed to meet the needs of private end users

Enhanced booking services

1. Booking of conductive charging stations (*Barcelona, Bari, Austria, Zellik, Greece, Turkey*)

2. Booking of battery swapping stations (*Barcelona, Berlin*)

POLIBA app (Bari)
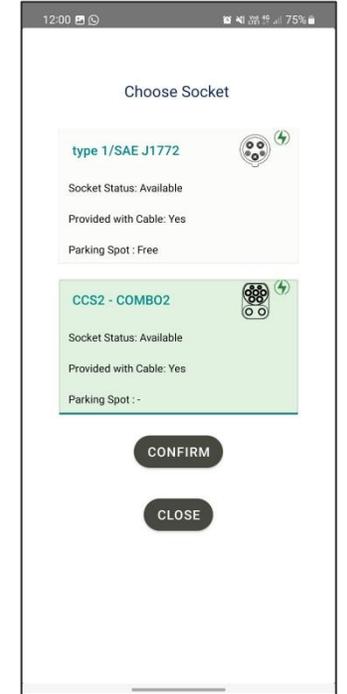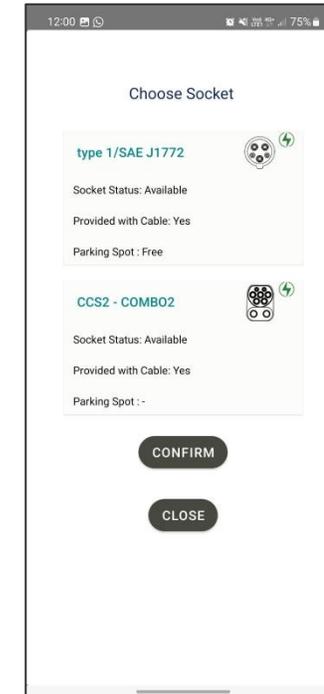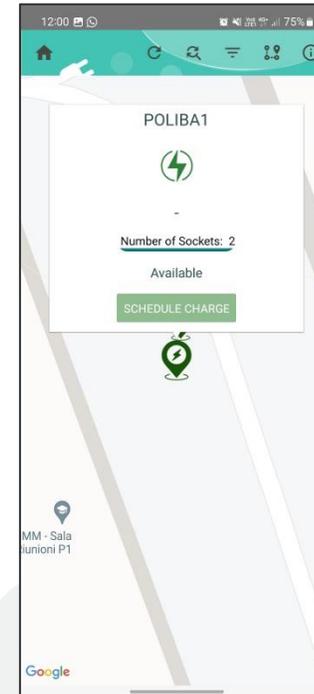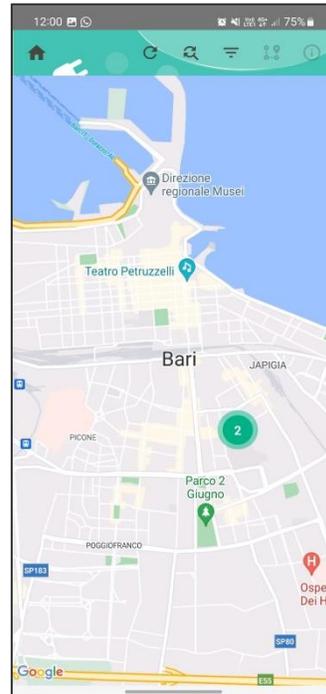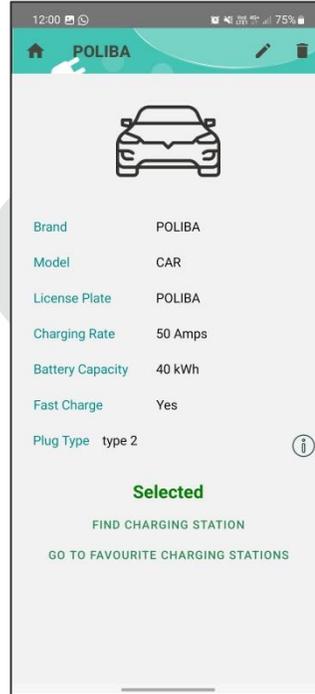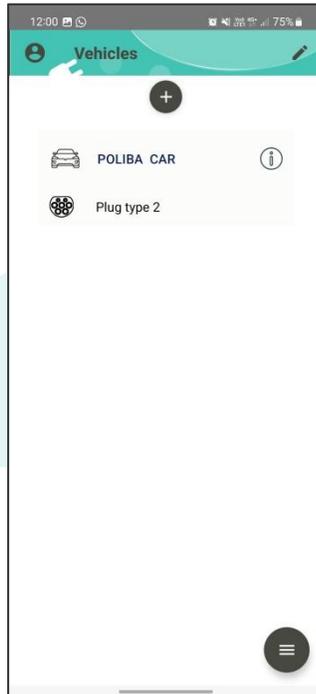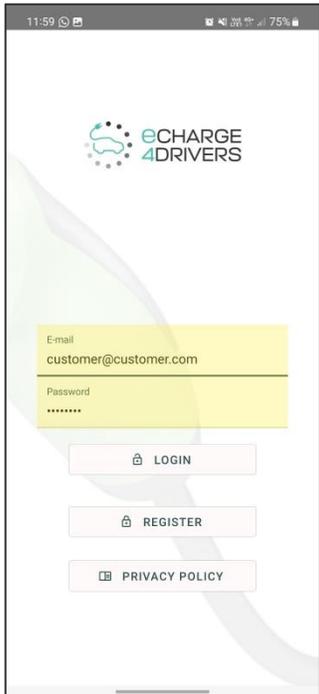
Authentication, User and EV profile, CP and socket selection
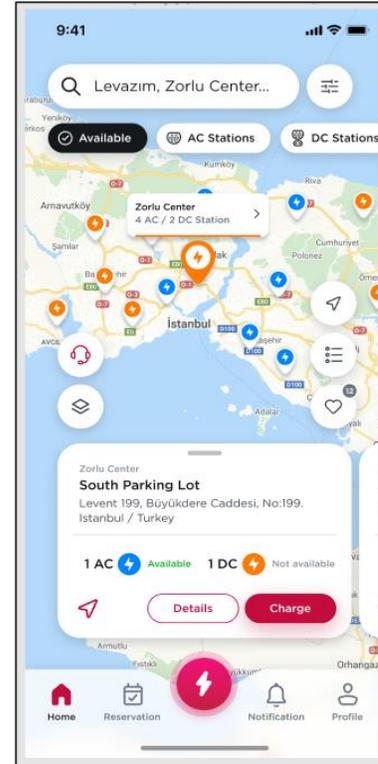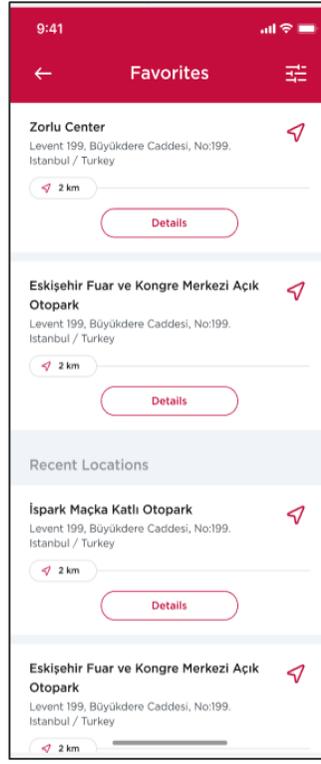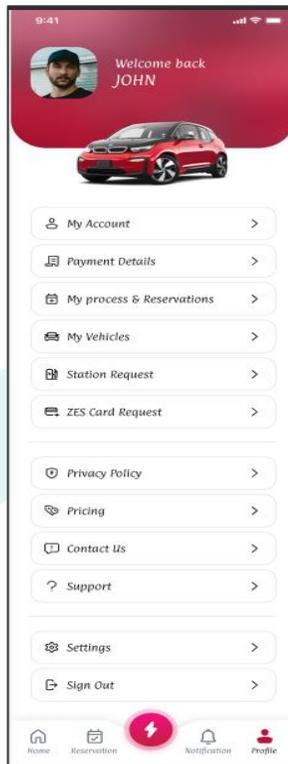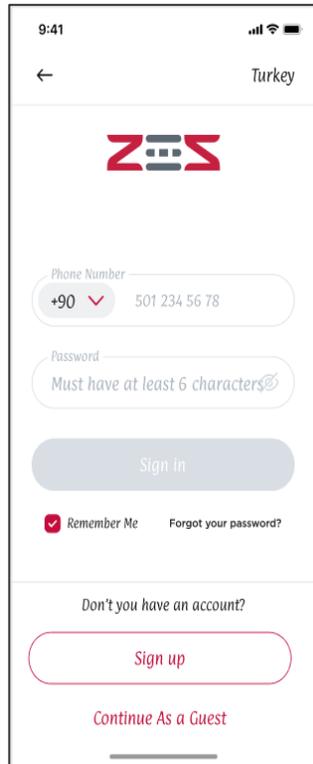
POLIBA app (Bari)

eCHARGE4DRIVERS

Book now or long term?
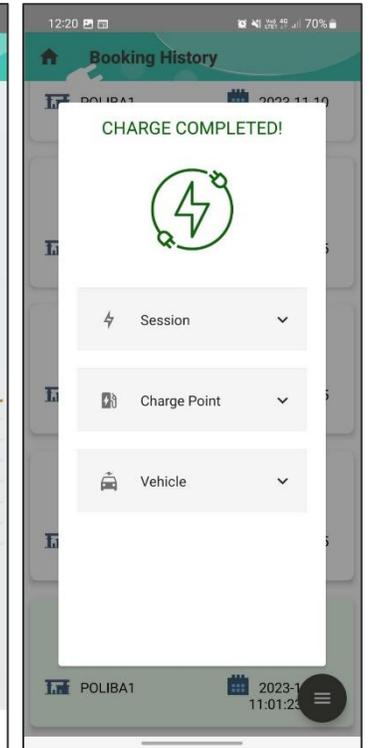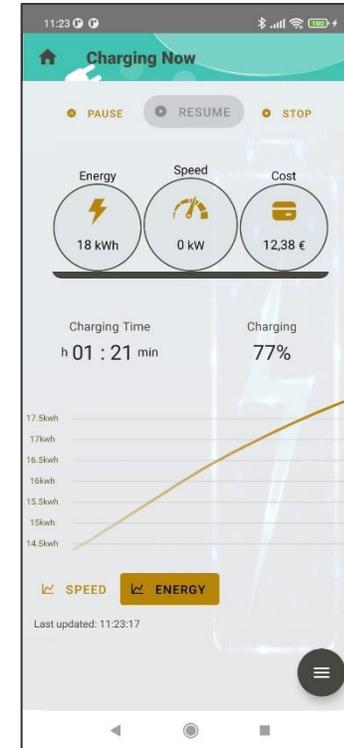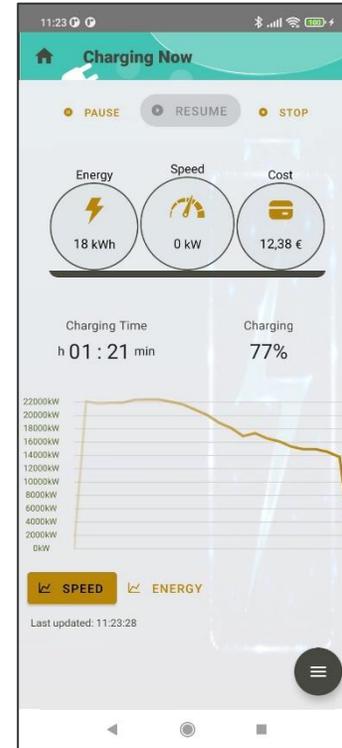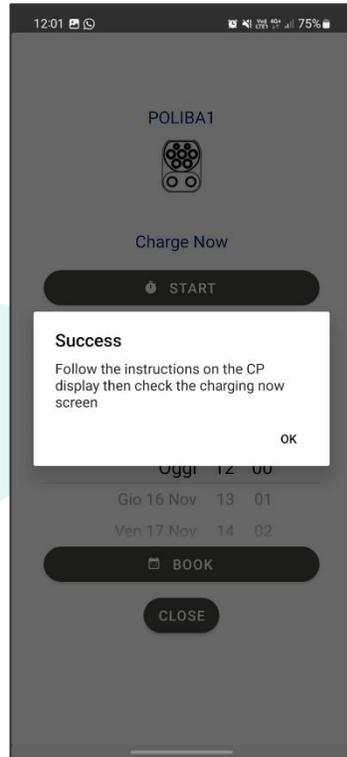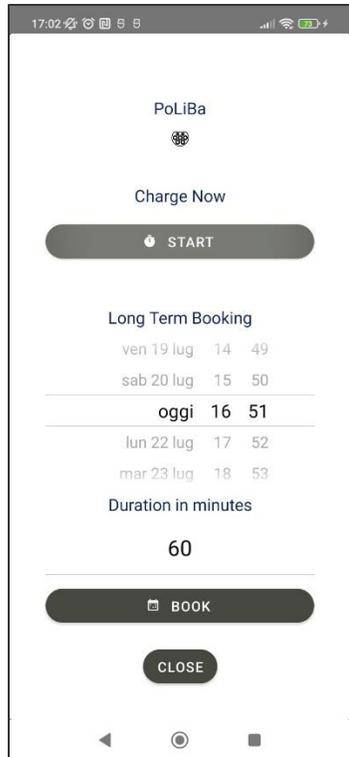
Start booking and charge session

Charging session enhanced information
(delivered energy, charging cost, etc.)

ZES app (Turkey)

eCHARGE 4DRIVERS
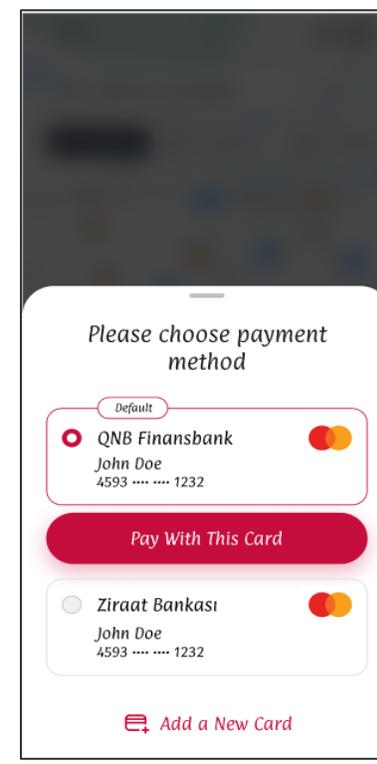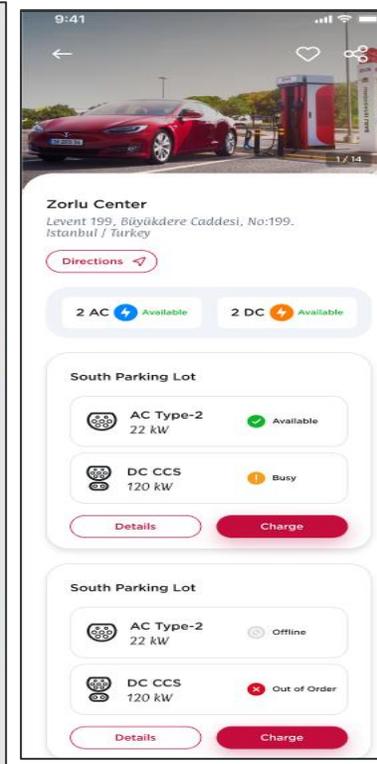
Authorization Login Page

General User Profile

User Vehicles

Favourite List

CP Map Details

CP Details

Payment Details

ZES app (Turkey)
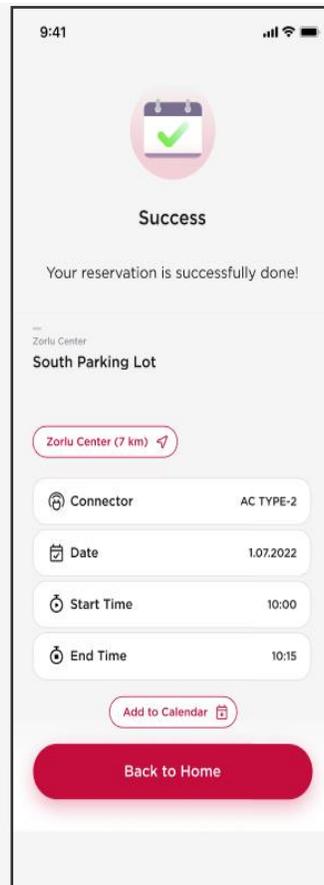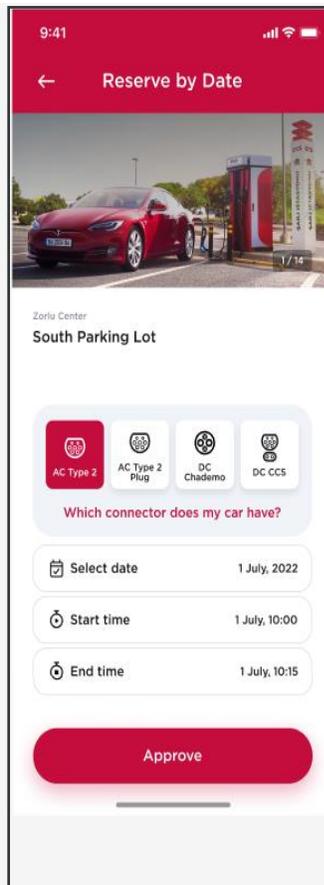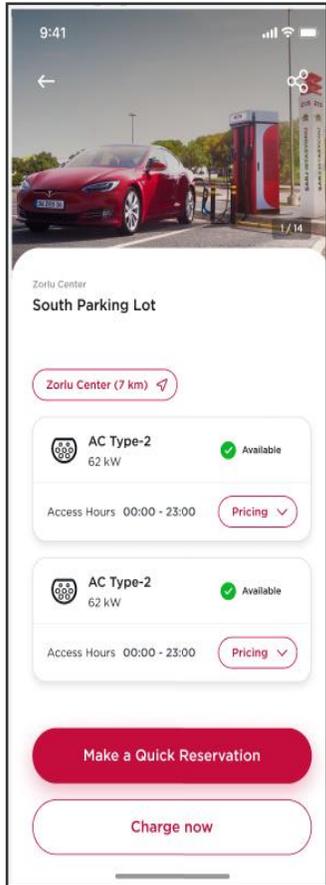
Short Term Booking Option
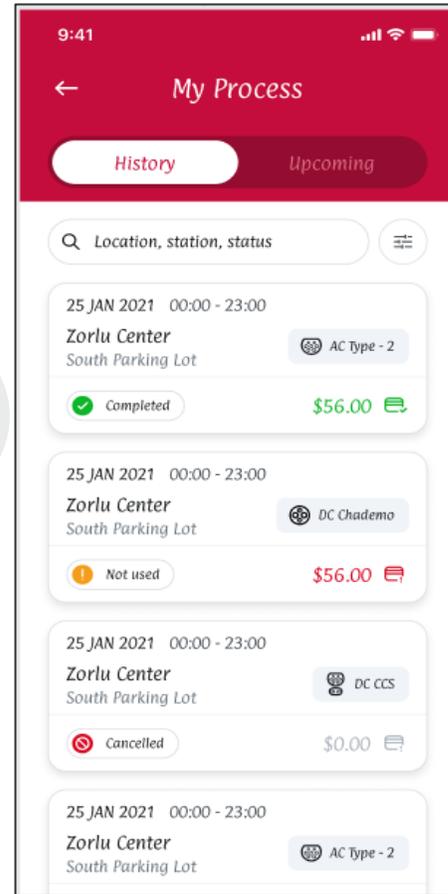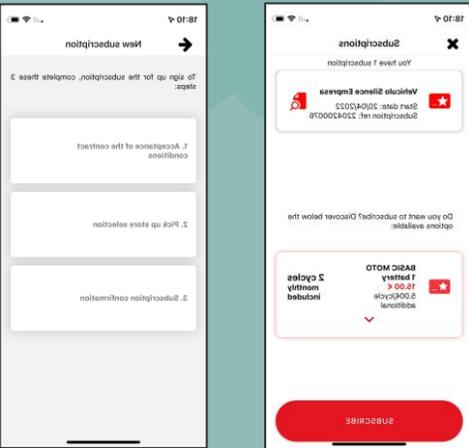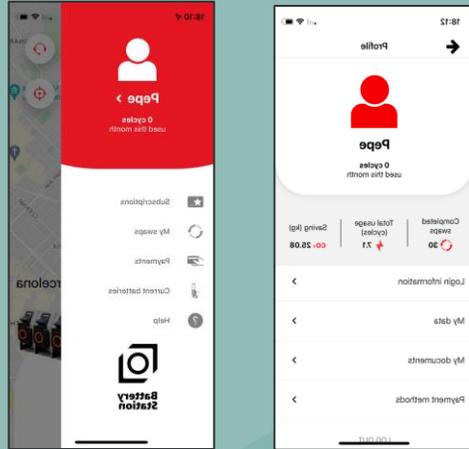
Booking History
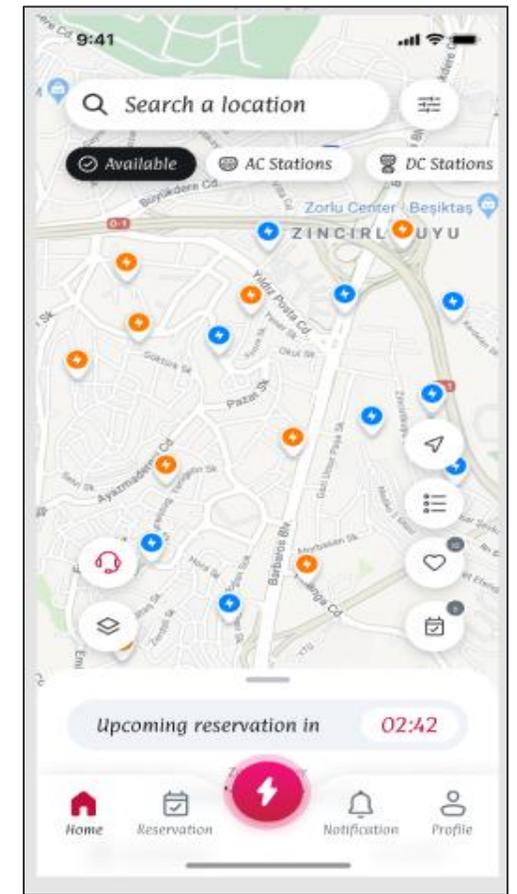
Booking Reminder

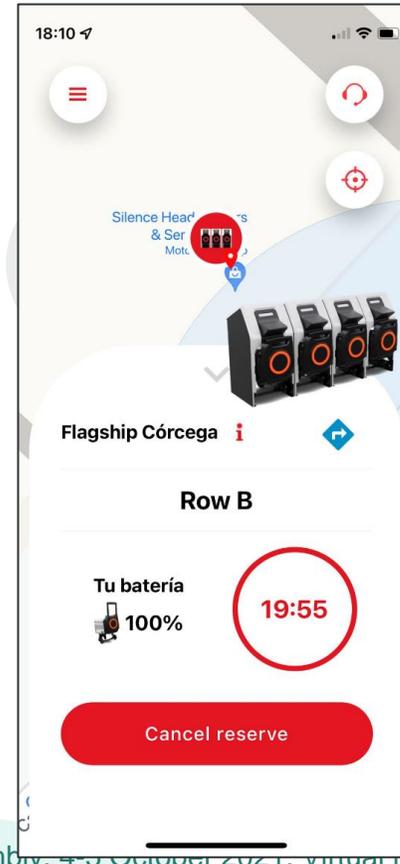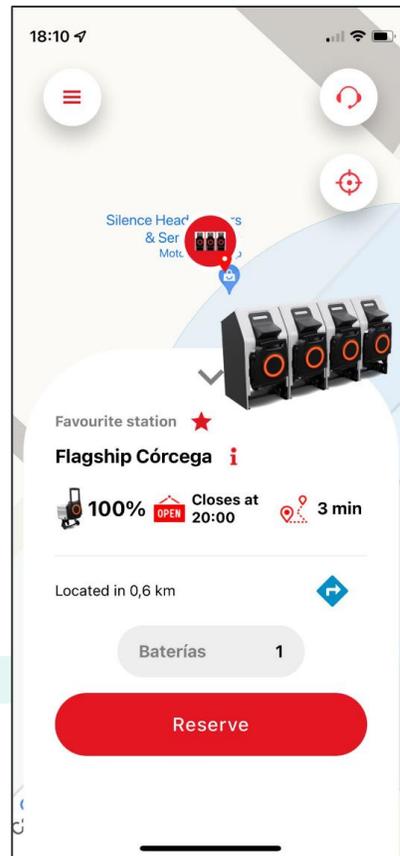# Booking services for battery swapping stations
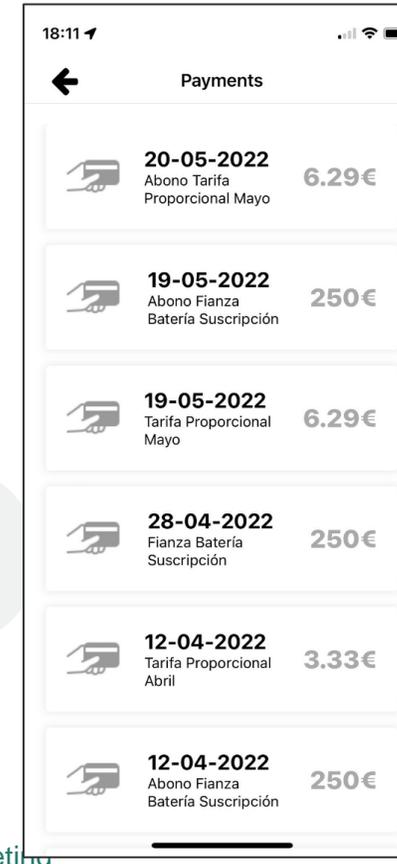
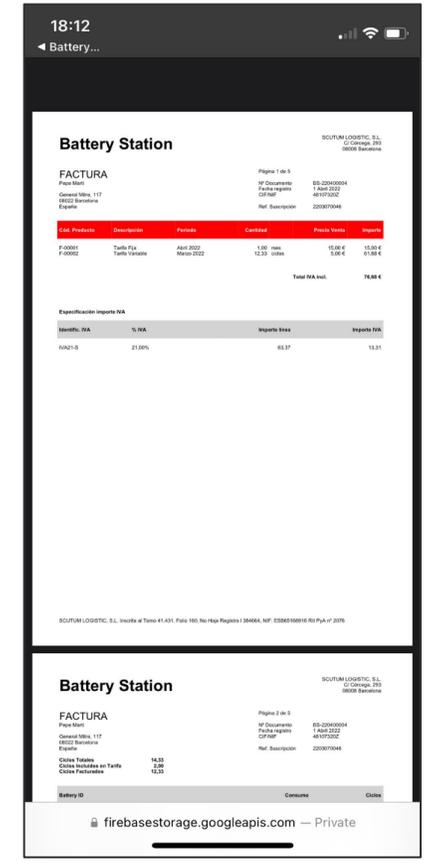# SCUTUM app (Barcelona)

Login, contract acceptance, etc.

Manage bookings

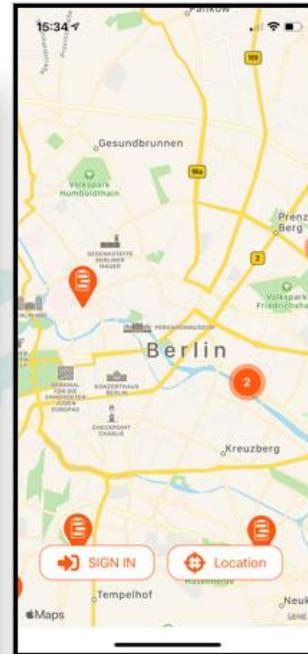## Booking log

Payment, invoice
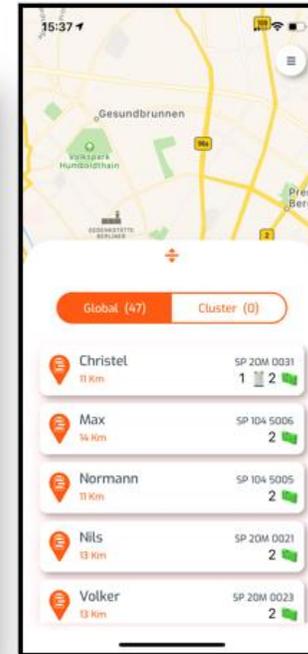
SWOBBEE app (Berlin)

Mobile app for battery swapping reservation
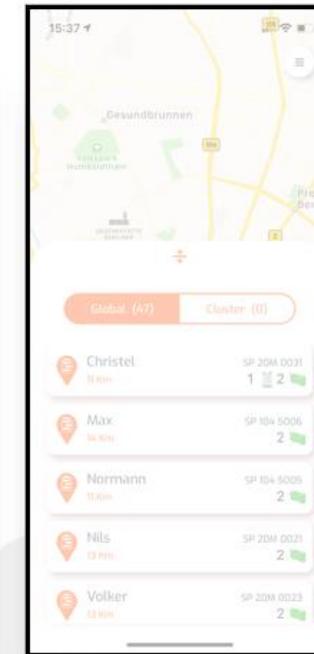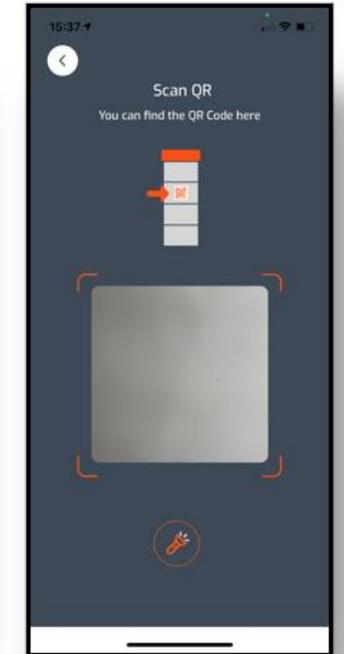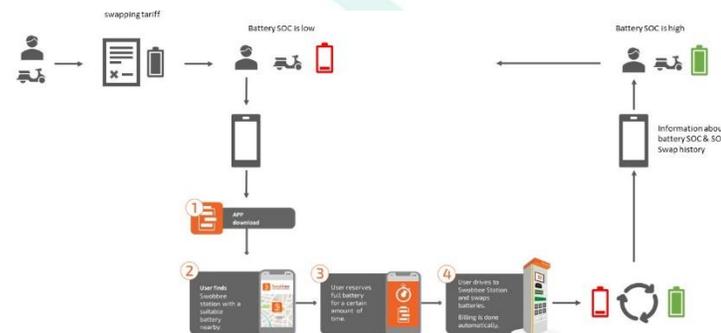
| Login | Location Finder | Batteries Available | Battery Reservation ongoing | Identification at Station via QR Scan |

Thank you for your attention

Mauro Dell'Amico - ICOOR
dellamico@icoor.it

eCHARGE 4DRIVERS

Charge4E

https://www.linkedin.com/company/echarge4drivers-project/

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www.echarge4drivers.eu