D5.6: INCIT-EV User Interfaces

Date of document – 12/2021 (M24)

D5.6:

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Technical References

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Project Title	Large demonstration of user centric urban and long-range charging solutions to boost an engaging deployment of electric vehicles in Europe
Project Coordinator	CIRCE mzarzuela@fcirce.es
Project Duration	01/2020 – 12/2023

Deliverable No.	D5.6 – INCIT-EV User Interfaces
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[1] PU = Public

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Document history		
V	**Date**	**Beneficiary partner(s)**
V1.0	3 November 2021	Atos
V1.1	11 November 2021	GreenFlux
V1.2	22 November 2021	GreenFlux
V1.3	25 November 2021	EVBox
V1.4	27 November 2021	GreenFlux
V1.5	8 December 2021	EV Box review
V1.6	15 December 2021	GreenFlux – Consolidated version following review (Atos, EVBox, GreenFlux)
V2.0	21 December 2021	CIRCE – Final Quality Review

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CONTENT

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0 EXECUTIVE SUMMARY (GFX)

This document is the DEM deliverable “D5.6 INCIT EV user interfaces” of the H2020 project INCIT-EV (project reference: 875683). This is the first deliverable in relation to task 5.6 (T5.6) which commenced in April 2020. An update is due in twelve months time, to be submitted in December 2022. The update will be named ‘’D5.12 Second stage of INCIT EV user interfaces”.

The main objective of project INCIT EV is to demonstrate an innovative set of charging infrastructures, technologies and associated business models to improve the EV user experience beyond those of early adopters whilst fostering the EV market share in the EU. In relation to this, the main objective of T5.6 is to provide suitable Human Machine Interfaces (HMIs) to project stakeholders that may then be viably used within the EV sector. Existing HMIs are to be used or adapted.

This Deliverable demonstrates an indicative outline of the HMIs considered to be of most effective use across the project. The HMI’s may be implemented on specific project use cases demonstrating applicability in real world scenarios. Over the next twelve months, the HMIs indicated in this deliverable will be further developed and tested in order to produce final HMI designs by December 2022.

Consideration has been given as to how the HMI may improve either the end user experience or those of key industry stakeholders or decision makers who may have the capacity to improve the end user experience via their work, such as CPO’s or city planners respectively. Genuine viability is an important aspect of HMI development in order to help move the EV sector into a mass market, consumer friendly one beyond that of early adopters alone. The frontend HMIs in this deliverable act as a bridge linking backend solutions to real world stakeholders.

The delivery of this deliverable is done in accordance with the description in the Grant Agreement Annex 1 Part A with no time deviation or content deviation from the original planning.

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0.1 Acronym table

Table 1 - Acronym table

Acronym	Definition
DSS	Decision Support System
HMI	Human Machine Interface
CSS	Cascading Style Sheets
HTML	HyperText Markup Language
End User	Electric Vehicle Driver (These terms may be used interchangeably)
EV	Electric Vehicle
CPO	Charge Point Operator
EMSP	Electro Mobility Service Provider
SFDCC	Super-Fast Direct Current Charger
WP	Work Package
DSO	Distribution System Operator
T5.6	Task 5.6
SaaS	Software as a service
OCPP	Open Charge Point Protocol
OCPI	Open Charge Point Interface
EVSE	Electric Vehicle Service Equipment
App	Mobile phone application
TSO	Transmission System Operator

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0.2 Index of Tables

0.3 Index of Figures

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1 INTRODUCTION

This deliverable provides images and information concerning the preliminary HMIs considered to be of most effective use across the project. Work has been undertaken to determine which HMIs are required by various project stakeholders and in which use case they may be implemented. This is with the exception of the DSS which does not have a use case. Over the next twelve months, the HMIs indicated in this deliverable will be further developed and tested in order to produce final HMI designs by December 2022.

Key stakeholders for whom HMIs are being developed are:

- The end user (EV driver)
- Charge point operators and electromobility service providers
- Distribution system operators
- The city planner / mobility planner
- INCIT EV platform user

The figure on the next page provides an overview of key stakeholders in the electric vehicle sector who provide services to the EV driver either directly or indirectly. Electricity is distributed throughout the electricity grid by Transmission System Operators (TSO) and then distribution system operators (DSOs), provision of electricity to the EV driver is indirect. Charge point operators (CPOs) provide the EV driver with access to the charging points. Both CPOs and electro mobility service providers (EMSPs) provide access to the EV driver for the charging sessions including payment. The city or mobility planner may also play a role as part of a council or municipality (public sector, local authority or local government) responsible for short, medium and long-term infrastructure planning in a specific city or region. Depending on the structure of a country's local government system, planning for EV charge stations may be included within a department for mobility planning, energy infrastructure planning or a wider remit of overall infrastructure planning.

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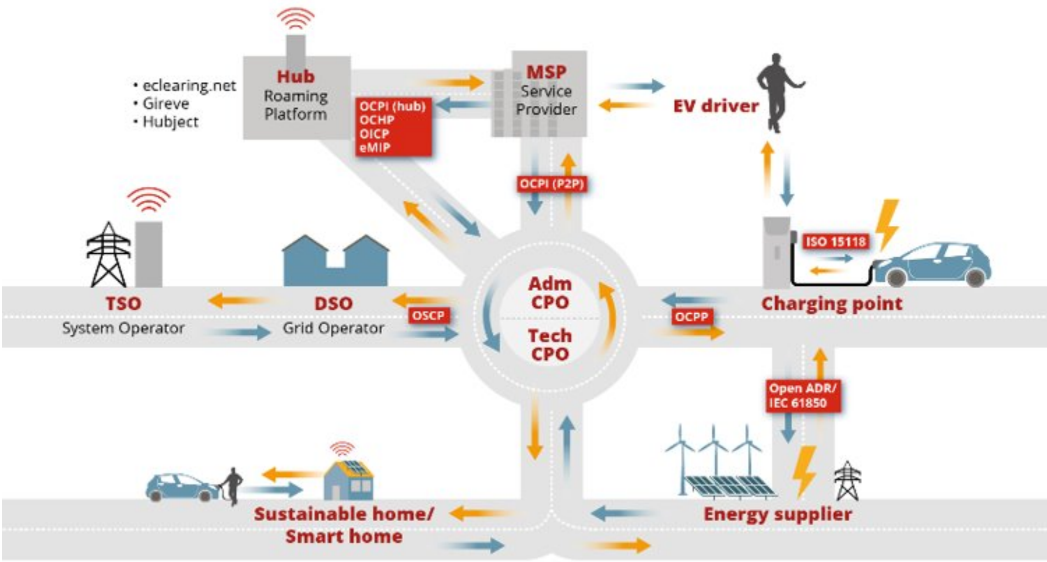

Figure 1 Overview of key stakeholders within EV market[1]

1.1 Structure of the document

This document consists of the following sections:

- Section 1 is the introduction
- Section 2 covers the HMI for the city planner, implemented on the DSS
- Section 3 covers the HMI for the overall platform for the INCIT EV project
- Section 4 covers the HMI for the CPO
- Section 5 covers work undertaken for the EMSP
- Section 6 covers the HMI for the end user (EV driver)
- Section 7 covers the HMI for the DSO
- Section 8 provides conclusions for the work undertaken in this deliverable

1.2 Relationships with other tasks

- GreenFlux are task leader for T5.3, T5.6, T6.4 and T7.2 across the INCIT EV project

[1] Source: EV Roaming Foundation

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- Task 5.6 intersects with T6.4. A core aspect of T6.4 is development of services to be accessed by the EV driver via a mobile phone application (app) which can be used on the EV driver's smart phone when undertaking charging sessions, on public charge stations. T6.4 requires a QR code (quick scan tool) be available to the EV driver along with charge point location and availability and payment functionality. Payment functionality is led by GreenFlux in T5.3
- T5.6 and the app development part of T6.4 intersect with T7.2 which is the task responsible for managing use case 1. Use case 1 is based in the Netherlands and is comprised of three sections, UC1a, UC1b and UC1c in accordance with specific partner focus such as aggregated smart charging (UC1a, GreenFlux), V2G and car sharing (UC1b, We Drive Solar) or apartment blocks in the residential sector (UC1c, MRAe)
- It is currently anticipated that the EV driver app will be actively implemented on UC1a with GreenFlux as the app provider and TotalEnergies as the CPO
- Depending on the results, aspects of research from WP2 (end user surveys and research on end user behaviour) may inform aspects of work undertaken for T5.6 in 2022. It cannot yet be known if WP2 research results will definitely be incorporated, they can however be considered
- The HMI provided for the DSS is the frontend solution to the DSS which is being developed across a number of tasks in WP6
- The overall INCIT EV platform is being developed across a number of tasks in WP5 with the HMI being produced as part of T5.6
- T8.4 is the task responsible for developing and managing use case 5

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2 CITY PLANNER HMI, DSS

This section is referred to the first delivery of the DSS HMI interface in M24.

2.1 Methodology development

Decision Support System (DSS) is a component for the mobility planners intended to facilitate the evaluation of charging infrastructure deployment scenarios and a set of applications addressing the users and main e-mobility needs.

At this stage of the project the requirements are not totally defined but the development can advance through the collaboration between LINKS and ATOS through the description of mock-ups. Furthermore, workshops are being held between ATOS and LINKS in order to have a better understanding of the different graphical components.

Therefore, this delivery is focused on the front-end, which is the visual part. The backend (the logic and data layer) of the development and the integration between front-end and back-end will be addressed through the next deliverable “D5.12, Second stage of INCIT-EV user interfaces”.

2.2 Background Knowledge

The DSS HMI interface is developed in React[2]. This is JavaScript[3] library for building user interfaces intended to facilitate the development of interactive user interfaces. The main features of react are the following.

- **Declarative**: the declarative programming describes the objective of the program, rather than how to accomplish this as a sequence of language primitives [4]
- **Component-based**: React allows the developer to divide the final product in various components which manage their own state. Once the components are built, the final result is the composition of the components in a complex User Interface.
- **Reconciliation**[5]: This process allows the programmer to write code as if the entire page is rendered on each change, while react libraries only render subcomponents that actually changes. This selective rendering improves the performance.

Regarding the development of the styles of the visual interface, it is important to mention that the DSS HMI interface uses **Tailwind**[6], which is a CSS framework to ease the agile development. This is based on classes which can be applied in the HTML improving the performance.

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[2] https://reactjs.org/

[3] https://en.wikipedia.org/wiki/JavaScript

[4] https://en.wikipedia.org/wiki/Language_primitive

[5] https://en.wikipedia.org/wiki/React_(JavaScript_library)

[6] https://tailwindcss.com/

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2.3 Source code of the release

2.3.1 Code Location

The source code of the first development of the mock-ups in react are hosted in ATOS server with the tag "D5.6-DSS-FRONT-END-M24".

2.3.2 Installation Guide

2.3.2.1 Prerequisites

React is a library in JavaScript that uses node.js[7] as a backend runtime environment.

To install node.js download the version for your operating system from the official site. We use the windows version; the installation process is like any other ".exe" application. This installation of node includes the npm (node package manager).

The project, like any other React project, has many dependencies, packages that are needed in our code, like react and react-dom that are literally all on which we will be building our application. All these dependencies are managed by a package manager, by default with the node installation, npm but we are using yarn.

Install yarn with npm:

```
C:\>npm install --global yarn
```

2.3.2.2 Installation

To start the project, we have to install all the dependencies that are in the project file package.json:

```
C:\ProjectFolder>type package.json

"dependencies": {
        "@testing-library/jest-dom": "^5.11.4",
        "@testing-library/react": "^11.1.0",
        "@testing-library/user-event": "^12.1.10",
        "apexcharts": "^3.29.0",
        "craco": "^0.0.3",
        "leaflet": "^1.7.1",
        "leaflet-draw": "^1.0.4",
        "react": "^17.0.2",
        "react-apexcharts": "^1.3.9",
        "react-dom": "^17.0.2",
        "react-hook-form": "^7.15.3",
        "react-leaflet": "^3.2.1",
```

[7] https://nodejs.org/es/

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```
            "react-leaflet-draw": "^0.19.8",
            "react-router-dom": "^5.3.0",
            "react-scripts": "4.0.3",
            "web-vitals": "^1.0.1"
    },
    "devDependencies": {
            "autoprefixer": "9",
            "postcss": "7",
            "tailwindcss": "npm:@tailwindcss/postcss7-compat"
    }
```

These dependencies are the ones that the project needs to start properly, to install them use:

```
C:\ProjectFolder>yarn
yarn install v1.22.5
[1/4] Resolving packages...
…
```

Once installed we start the development server using:

```
C:\ProjectFolder>yarn start

…

Compiled successfully!

You can now view incit-ev in the browser.

Local:            http://localhost:3000
On Your Network:  http://172.19.0.1:3000

Note that the development build is not optimized.
To create a production build, use yarn build.
```

Then we can enter the web interface on http://localhost:3000.

2.3.3 Requirements Coverage

The following table describes status of the requirements of this version. These requirements are partially achieved due to these are not totally defined but it is convenient to enumerate the requirements addressed in the release.

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Table 2: Requirements Addressed

Req. ID	Description
DSS-1	User login front-end
DSS-2	User Registration front-end
DSS-3	Projects List front-end
DSS-4	Project Creation front-end
DSS-5	Project Edition front-end
DSS-6	Project Analysis Configuration front-end
DSS-7	Project Analysis Result front-end
DSS-8	Project KPI list

2.3.4 Interface description

The following page is referred to the DSS-1 requirement, the User Login front-end.

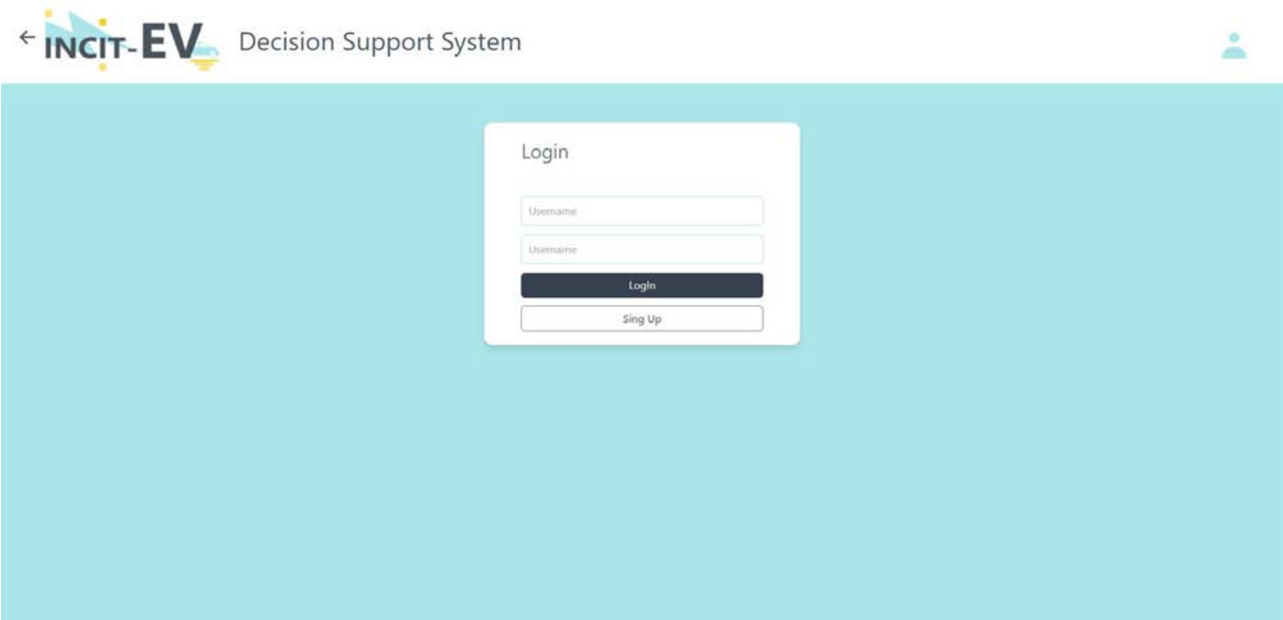

Figure 2: DSS-1-User login front-end

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This is the typical page where the user has to provide the username and the password to login. In case the user is not registered, the sign-up button is for registering as new user.

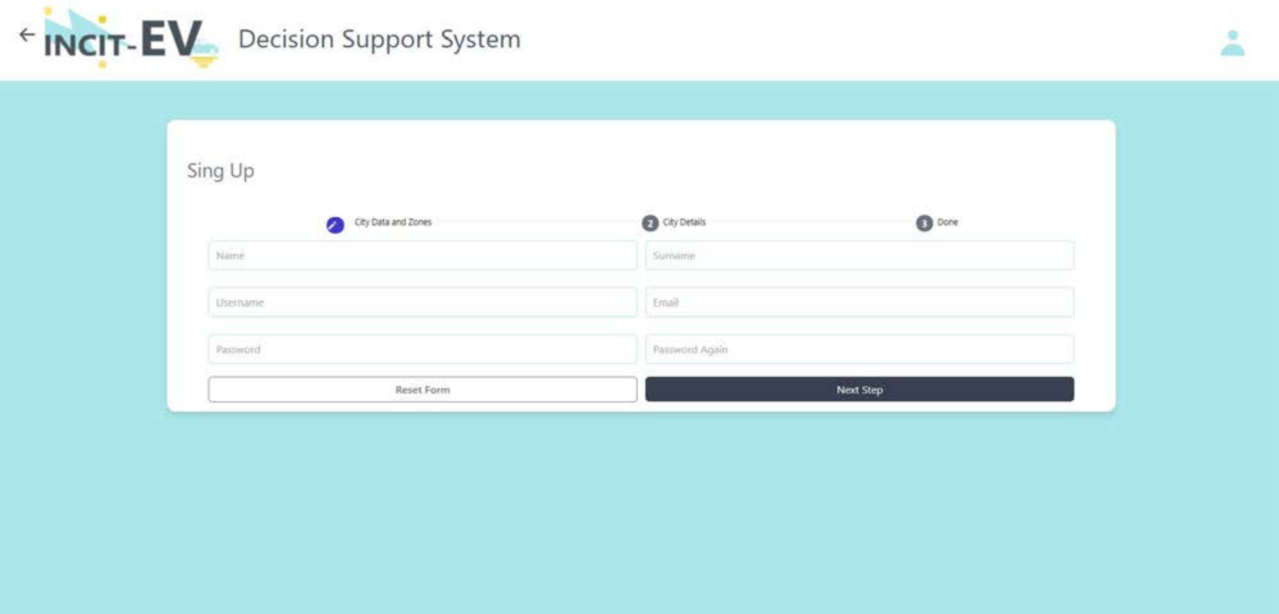

Figure 3: DSS-2: User Registration front-end

The picture above is referred to the information that must be provided related to the new user. At this stage, very basic information is expected to be provided such as name, username and mail. This information is not final and will be reviewed in the next version.

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Figure 4: DSS-3 Project List front-end

The picture above shows the management of the Project List, where the user can “Edit Project”, “Create Project” by clicking in “+” symbol and run Analysis.

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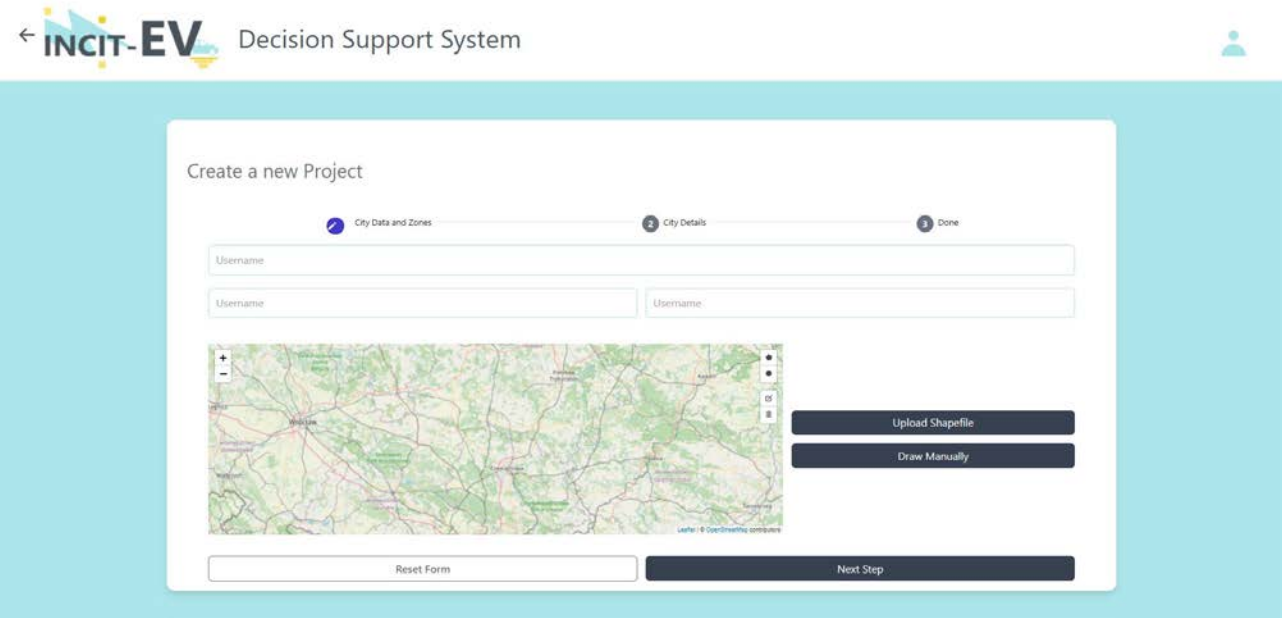

Figure 5: DSS-4 Project Creation

The picture above refers to the requirement DSS-4 where the user can create a Project providing the information and selecting various areas in the map.

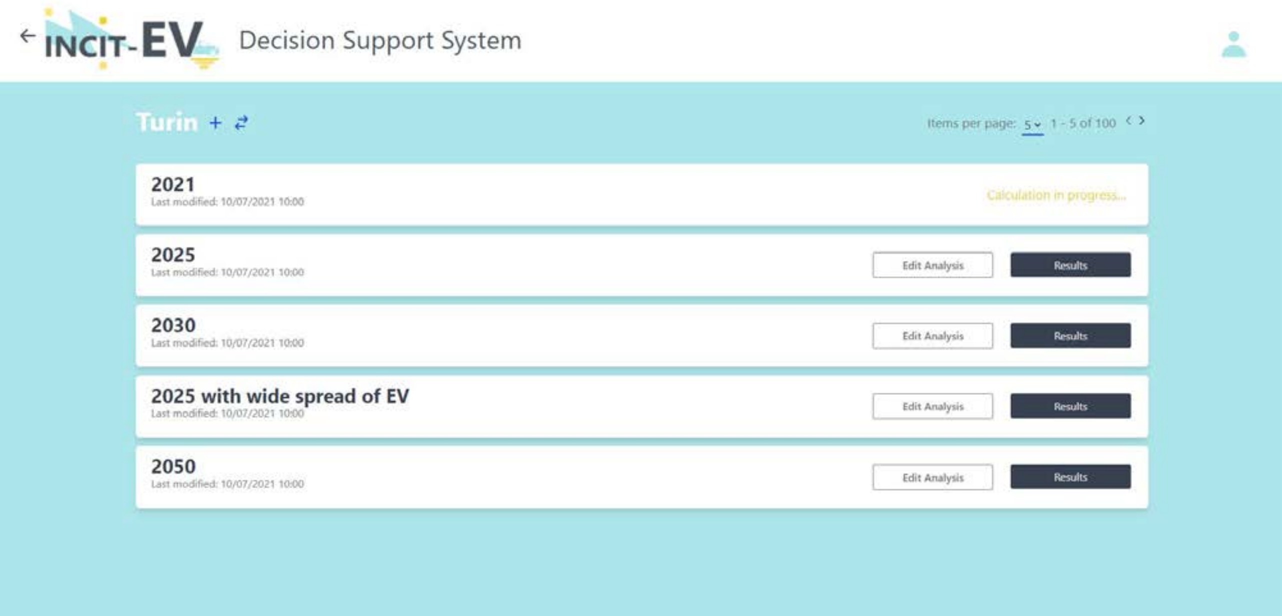

Figure 6: DSS-5 Project Edition front-end

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The picture above refers to the requirement DSS-6 “Project Edition front-end” where the user can edit the information of the project and consult the results of the analysis. Therefore, from this page, the requirements DSS-6 and DSS-7 are addressed.

Figure 7: DSS-6

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3 PLATFORM MANAGEMENT HMI

3.1 Background Knowledge

FUSE platform management HMI is based on Rancher [8] as it is described in Deliverable D5.8_INCIT-EV_ICT Reference Architecture. According to the Official Rancher Page [9] "Rancher is a complete software stack for teams adopting containers. It addresses the operational and security challenges of managing multiple Kubernetes clusters across any infrastructure, while providing DevOps teams with integrated tools for running containerized workloads".

Kubernetes [10] is an open-source container-orchestration system for automating computer application deployment, scaling and management.

3.2 Source code of the Release

The first version of the Platform Management HMI is tagged in internal ATOS gitlab [11]platform with the same tag as DSS (see section 2.3) and includes the development Kubernetes files which are changing a lot at this moment.

3.3 Requirements Coverage

Req. ID	Description
PM-1	Monitoring of the CPU status
PM-2	Monitoring of the Memory status
PM-3	Monitoring of Pods (the most basic deployable objects in Kubernetes[12]
PM-4	Keycloak[13] monitoring for access control

[8] https://rancher.com/

[9] https://rancher.com/why-rancher

[10] https://en.wikipedia.org/wiki/Kubernetes

[11] https://about.gitlab.com/

[12] https://cloud.google.com/kubernetes-engine/docs/concepts/pod

[13] https://www.keycloak.org/

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PM-5	MongoDB[14] monitoring
PM-6	Generic API Adaptor monitoring
PM-7	FTP Adaptor monitoring

3.3.1 Screenshots and Requirements Mapping

The following screenshots are related to the requirements in each caption.

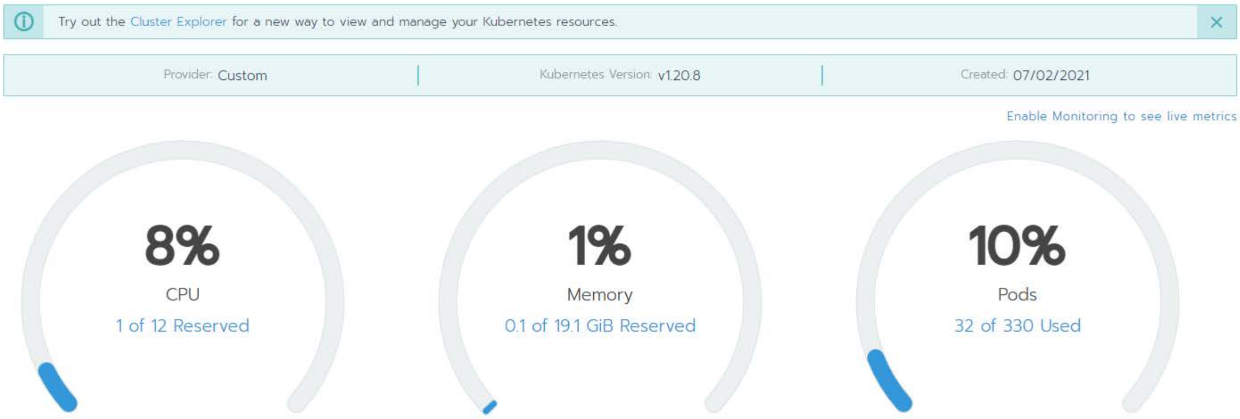

Figure 8: PM-1, PM-2 and PM-3 HMI requirements

[14] https://www.mongodb.com/

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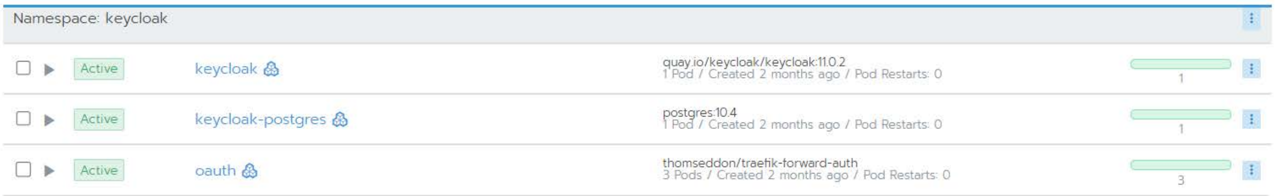

Figure 9: PM-4 HMI requirement

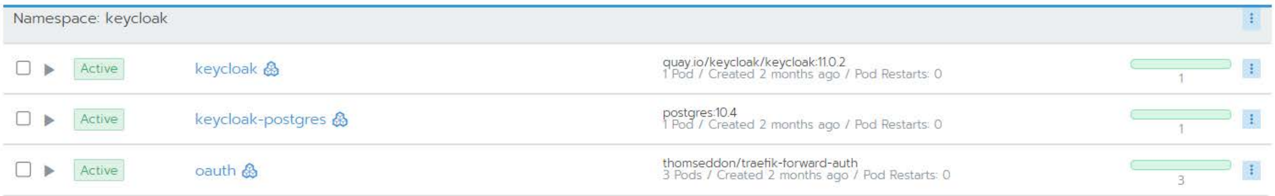

Figure 10: PM-5 HMI requirement

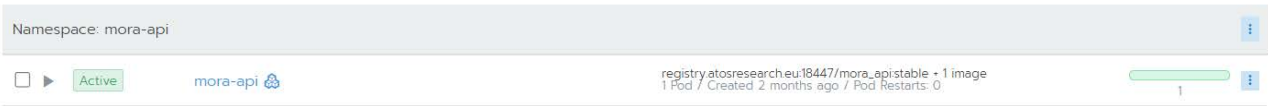

Figure 11: PM-6 HMI requirment

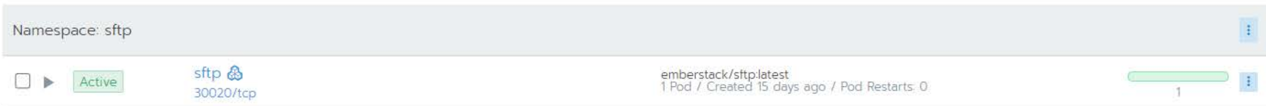

Figure 12: PM-7 HMI requirement

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4 CHARGE POINT OPERATOR HMI

Historically, businesses in the EV charging industry have taken up one of two roles: that of charge point operator (CPO) or e-mobility service provider (EMSP). No matter the service model a business pursues, these two roles fulfil distinct functions in the EV charging market. The CPO looks after charging hardware, while the EMSP maintains driver relationships and sets up charging service agreements. However, as the market matures, these roles are becoming more interconnected, and many businesses now offer a mix of CPO and EMSP services.

A charge point operator installs and maintains charge stations so drivers can charge their electric vehicles. CPOs can either own and operate a set of charge stations, or simply operate them for third parties. The tasks of a charge point operator can be broken down into two categories:

- **Operational –** purchasing charge stations, installing hardware and maintaining the network connection.
- **Commercial –** setting prices for charging infrastructure use and managing the connection to e-mobility service providers.

4.1 Methodology development

This SaaS (Software As A Service) platform will be used by TotalEnergies as the CPO managing the charge stations on UC1a and may also be used by other use cases. Interaction between GreenFlux and TotalEnergies for UC1a will occur as part of T5.6 and T7.2 in 2022. An iterative approach will be followed whereby TotalEnergies will provide feedback in terms of user experience and usefulness of platform features designed and implemented by GreenFlux.

4.2 Interface description

The CPO is able to log into a SaaS platform (central system/backend system) which controls and monitors EV charge stations remotely via the industry standard, open protocol OCPP 1.6 (Open Charge Point Protocol, version 1.6)[15]. A CPO employee inputs information concerning the charge station (hardware) into the platform such as:

- Charge station details: Manufacturer; model; name of CPO; features e.g., remote manageable
- Location details: Name of location; address; country, location type

[15] Open Charge Alliance; https://www.openchargealliance.org/protocols/ocpp-16

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- EVSE details: EVSE identification; connectors; socket type e.g., capacity 11 kW / 16A / AC3 / 230 V

A number of services may be implemented by the SaaS platform such as smart charging or wholesale prices that the CPO may wish to offer the eMSP. The platform may also indicate on-line and off-line behaviour of the charge stations. The CPO user signs into the central system using a single sign-on. The following sections indicate work that has been undertaken by GreenFlux since task commencement in April 2020 (month four of the project).

4.2.1 Location Management

Location management includes:

- Location information
- Point of Interest (POI) information – this is also relevant to an EMSP who can receive this information from the CPO and then feed this information through to the end user via a mobile app
- Site specific instructions e.g., for access and maintenance purposes
- Enable imposing opening times on specific locations – relevant to public and semi-public locations

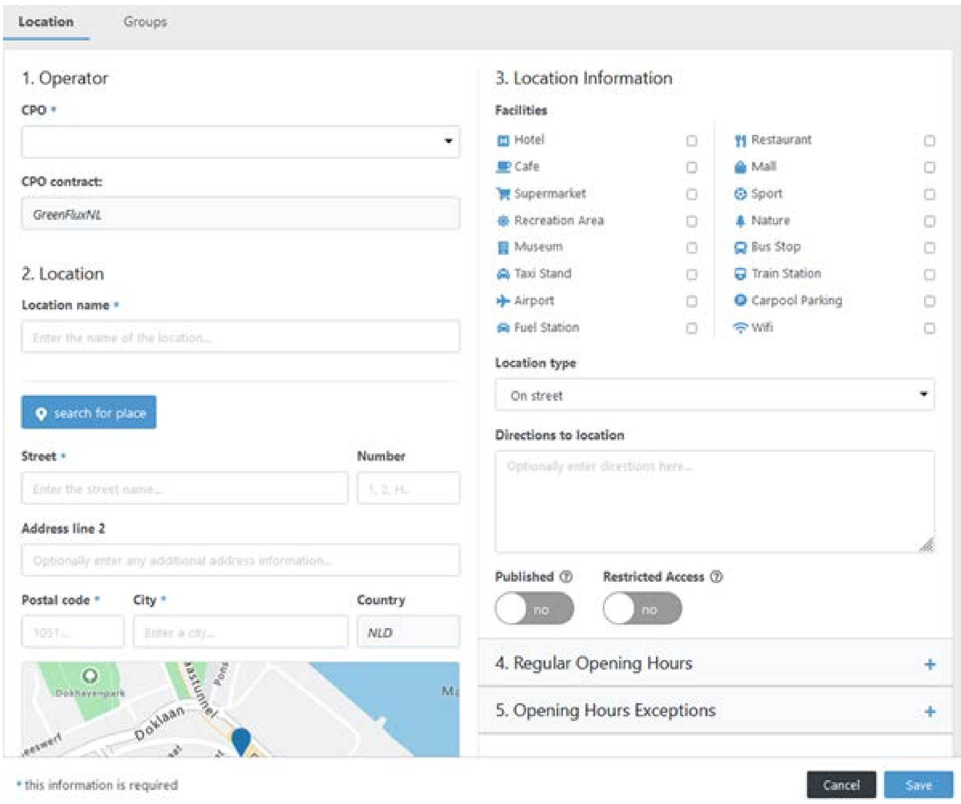

Figure 13: Screenshot, Location management Source: GreenFlux

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4.2.2 Network Status

The HMI below provides a dashboard (visual overview), for immediate insight into the status of a group of charge stations. The four categories that the dashboard covers are charge station connection status, online electric vehicle service equipment status, last OCPP message received and charge station status.

Figure 14: Screenshot, Network Status of a group of charge stations Source: GreenFlux

4.2.3 Asset Management

Asset management includes configuration and firmware management of the charge stations. This is relevant to the initial configuration of the charge stations when testing in partnership with the charge station manufacturers as well as addressing on-going operational needs.

Figure 15: Screenshot, charge station configuration management Source: GreenFlux

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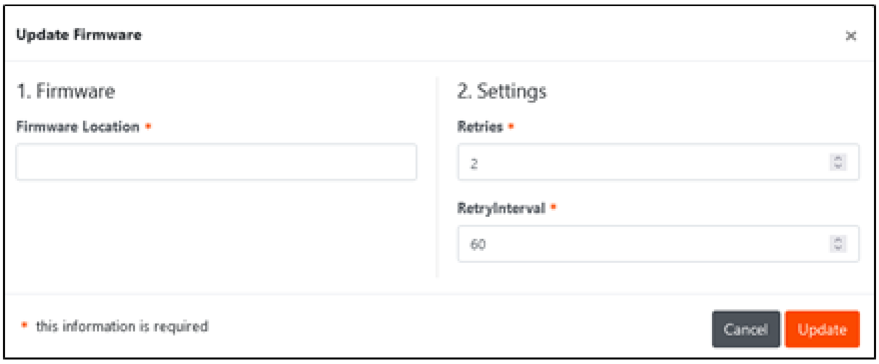

Figure 16: Screenshot, charge station firmware management Source: GreenFlux

4.3 Planned work for next deliverable

Future planned work for inclusion in ''D5.12 Second stage of INCIT EV user interfaces" to be delivered in December 2022 includes:

- Improving the visualizations of the smart charging to be implemented in UC1a
- Further improvements to platform requirements as the testing on UC1a indicates may be required

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5 EMSP HMI

As mentioned in section four, there are two main roles in the EV charging industry: charge point operator (CPO) and e-mobility service provider (EMSP). Broadly speaking, CPOs install and maintain charging hardware, e-mobility service provider enter into contracts with EV drivers for charging subscriptions. However, both of these roles increasingly begin to overlap as the EV market matures and key players expand their business models. Nonetheless, the main focus of EMSPs is to make EV charging easier for drivers. To accomplish this, they:

- **Give drivers access to a large network of charge stations** – usually via a single charge card or app. This allows EMSPs to standardise transactions and make billing and payments as easy as possible for the driver.

- **Improve the driver experience –** EMSPs can differentiate themselves through add-on features, like roaming, finding charge stations and personalised charging recommendations.

5.1 EMSP data provision to end user

EMSPs share charge station data with drivers. This data can include the availability status of charge stations (free/occupied/out-of-service) and charge station type (AC/DC and supported plug types). The work that GreenFlux has undertaken for the EMSP has been backend work on a POI (point of interest) database to facilitate EMSPs providing improved front end locations information to the end user. For this reason, the relevant HMI for the EMSP offering is the EV driver HMI covered in the next section. The POI database is part of the GreenFlux CPO/EMSP SaaS platform for remotely managing charge stations.

5.2 Planned work for next deliverable

Over the next 12 months GreenFlux will work to improve HMI requirements for EMSPs where requirements may become apparent as a result of testing on UC1a. Much of GreenFlux's work for EMSPs is included in T5.3 for payments provision including roaming.

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6 END USER HMI

Two key HMI's will be available to the end user. First, a mobile app, some features of which are developed by GreenFlux as part of T6.4 and implemented on UC1a. Second, a screen will be available on a superfast DC charger, as delivered by EV Box and to be implemented on UC5. Delivery of these two different types of end user HMIs is valuable as they offer different aspects to the end user journey.

Screens on charge stations are considered necessary to make the interface with the EV driver for sessions (start, stop and also financial transactions) and may provide an alternative to use of a mobile phone app.

6.1 End user mobile charge app

The main objective of project INCIT EV is to demonstrate an innovative set of charging infrastructures, technologies and associated business models to improve the EV user experience beyond those of early adopters whilst fostering the EV market share in the EU. As such, provision of a mobile charge app for the end user is a key aspect of HMI provision on the project. The app for use on INCIT EV will be available on both Android and iOS platforms.

6.1.1 Interface description

The end user downloads a charge app into their smart phone and can use an app to digitally connect the car to the charge station, select a payment method, start the session, have the session complete, end the session and provide payment information. A QR code may provide convenience to the EV driver where s/he simply scans the QR code on the side of the charge station as a way of commencing the session once the cable has been plugged into the car.

Figure 17, End User Experience on a Mobile Charge App with a QR Code. 1) Scan QR Code 2) Select Payment Method, 3) Charging Session Commences. Source: GreenFlux

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6.1.2 POI locations

Prior to the charging session commencing, key aspects to an end user app are locations (finding the available charge stations for immediate charging and also journey planning). Locations data can include the availability status of charge stations (free/occupied/out-of-service) and charge station type (AC/DC and supported plug types).

GreenFlux has worked on providing point of interest information adding roaming locations to the INCIT EV app. Locations from roaming partners beyond those on the GreenFlux network are now visible in the app. This improves the offering to the end user and also to an EMSP wanting to offer app services to end users.

The POI information provides a better indication of the whole EV network available to the end user. This helps to improve the end user experience by increasing the number of charge stations s/he can view in the app thus aiding better planning of a journey in terms of charging session location. A QR code is visible in the app to facilitate a prompt charging session which is convenient to the end user.

Further information in relation to payments is provided in D5.3. Work on payments and payment transparency has been undertaken as part of T5.3.

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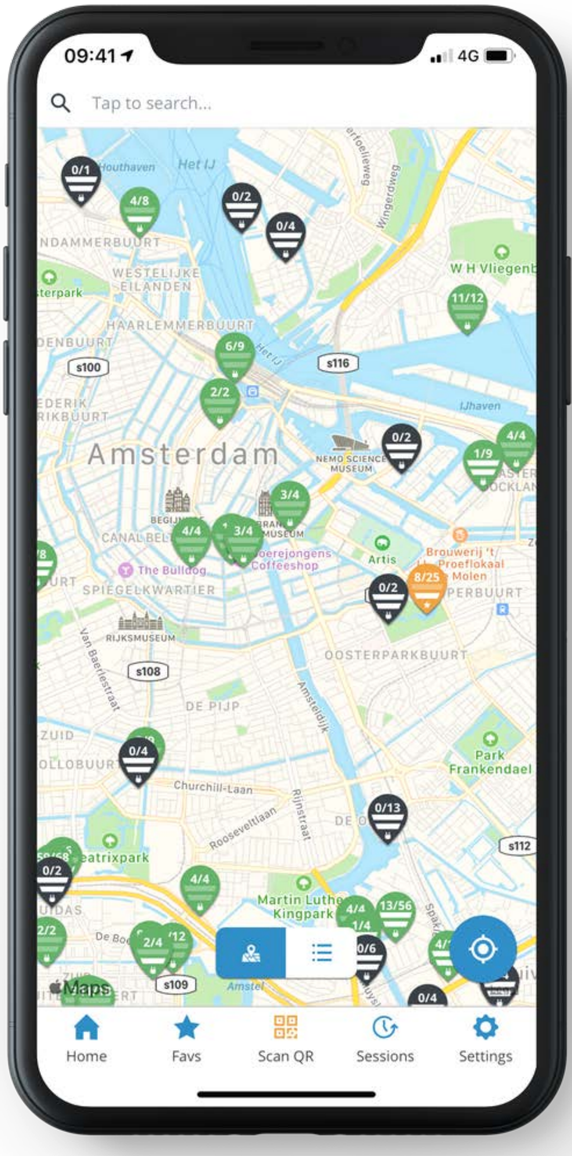

Figure 18 End User Mobile App HMI, showing charge stations in Amsterdam. Figures such as 4/4 indicate that four out of four connectors are available for charging. Figures such as 0/4 indicate that 0 connectors are available for charging as all of the connectors are in current use. Source: GreenFlux

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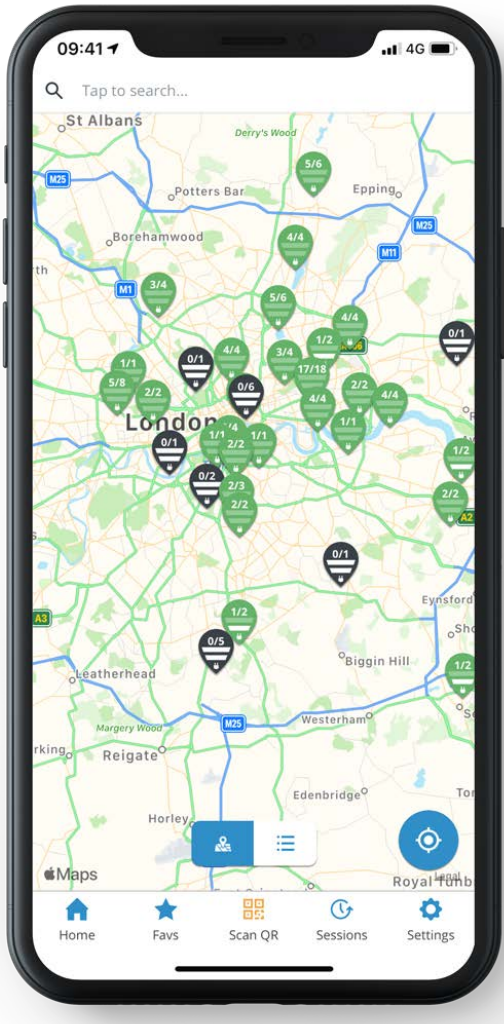

Figure 19 End User Mobile App HMI, showing charge stations in London. Figures such as 4/4 indicate that four out of four connectors are available for charging. Figures such as 0/4 indicate that 0 connectors are available for charging as all of the connectors are in current use. Source: GreenFlux

6.1.3 Planned work for next deliverable

Future planned work for inclusion in ''D5.12 Second stage of INCIT EV user interfaces" to be delivered in December 2022 includes:

- Improved payment HMIs for the end user building upon work undertaken for payments in T5.3
- Further improvements to app requirements as the testing on UC1a indicates may be required

6.2 Screen on SFDCC

EVBox developed advanced Energy Meter display showing more information to EV Driver like energy meters (Voltage, Current, Battery State of Charge). The SFDCC (superfast DC charger) is to be implemented as part of use case 5.

On the screen of 175kW User Unit, the objective is to show:

- DC Current: going in the battery
- DC Voltage: at the output of the gun
- DC Power: at the output of the gun
- DC Energy Power: going in the battery
- SoC: State of Charge of the battery
- Session time: Time elapsed since beginning of charging
- AC Reactive Power: Compensation of Reactive power (V2G functionality developed in WP3.2 to support grid)

The Final Display in the customer journey will be:

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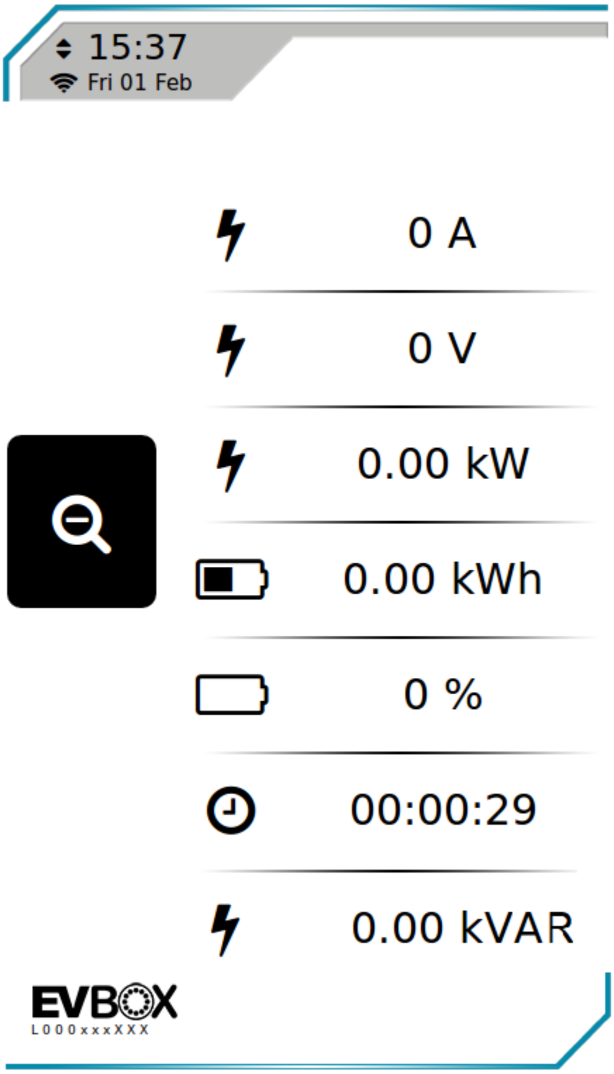

Figure 20 EV driver HMI for use case 5 Source: EV Box

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7 DSO HMI

This section describes the HMI used by a DSO (Distribution System Operator) to access and control the charging station status. This section is a draft of the specification still in progress and represents work undertaken by EV Box as part of use case five.

7.1 Interface Description

The DSO corresponds to the entity which distributes the power on the grid, it distributes to the charging station its setpoints. The DSO HMI aims to present an easy-way for the user to interact with a charging station. This HMI allows the current status of the charging station to be presented via the various signals received by the DSO and the value of the control data to be changed as desired by the user.

The HMI is also capable to help the user to analyse the charging status evolution by drawing the evolution of the signals through time.

To access to all HMI functionalities, an authentication is asked to the user.

The proposal of this HMI is composed by 3 parts:

- Authentication page: To access to the HMI an authentication is asked
- Current station status: The current status of each data represented in a table.
- Data Analysis: The graph of the evolution of a single data through the time

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7.2 Proposed HMI

7.2.1 Authentication

Figure 21 - Authentication page (draft)

The page above shows the authentication page which requires the user authentication before using the HMI.

7.2.2 Current Status

The figure below presents the first page of the HMI. This page aims to presents each signal with the following relevant info of their current status:

- Signal ID
- Direction: Input/output
- Data description
- Data value
- Quality: the data is valid or not
- Timestamp: time of last update

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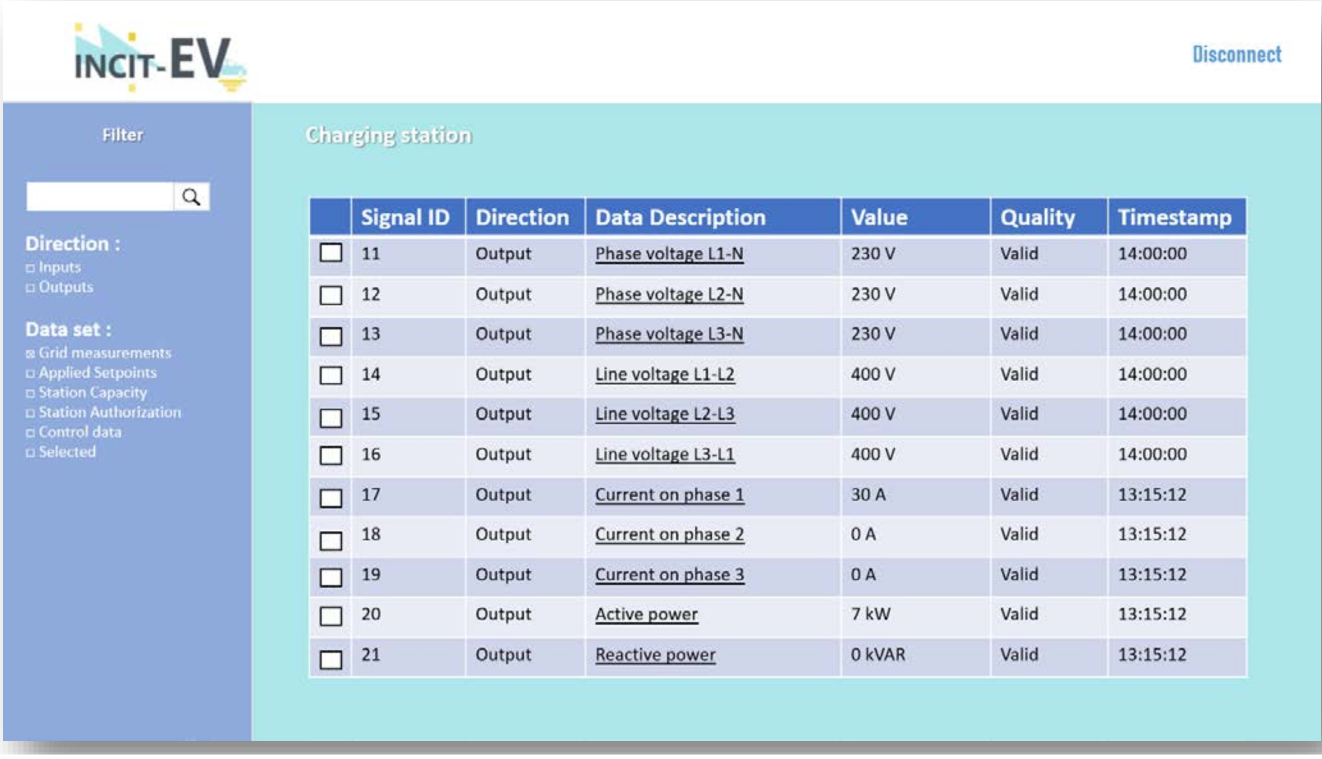
The control/input data value can be modified directly in the table by clicking on value and by writing the new value of the signal.

An additional plugin is implemented to filter the different data in the table.



	Signal ID	Direction	Data Description	Value	Quality	Timestamp
☐	11	Output	Phase voltage L1-N	230 V	Valid	14:00:00
☐	12	Output	Phase voltage L2-N	230 V	Valid	14:00:00
☐	13	Output	Phase voltage L3-N	230 V	Valid	14:00:00
☐	14	Output	Line voltage L1-L2	400 V	Valid	14:00:00
☐	15	Output	Line voltage L2-L3	400 V	Valid	14:00:00
☐	16	Output	Line voltage L3-L1	400 V	Valid	14:00:00
☐	17	Output	Current on phase 1	30 A	Valid	13:15:12
☐	18	Output	Current on phase 2	0 A	Valid	13:15:12
☐	19	Output	Current on phase 3	0 A	Valid	13:15:12
☐	20	Output	Active power	7 kW	Valid	13:15:12
☐	21	Output	Reactive power	0 kVAR	Valid	13:15:12

Figure 22 - Current station status table page (draft)

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7.2.3 Data analysis

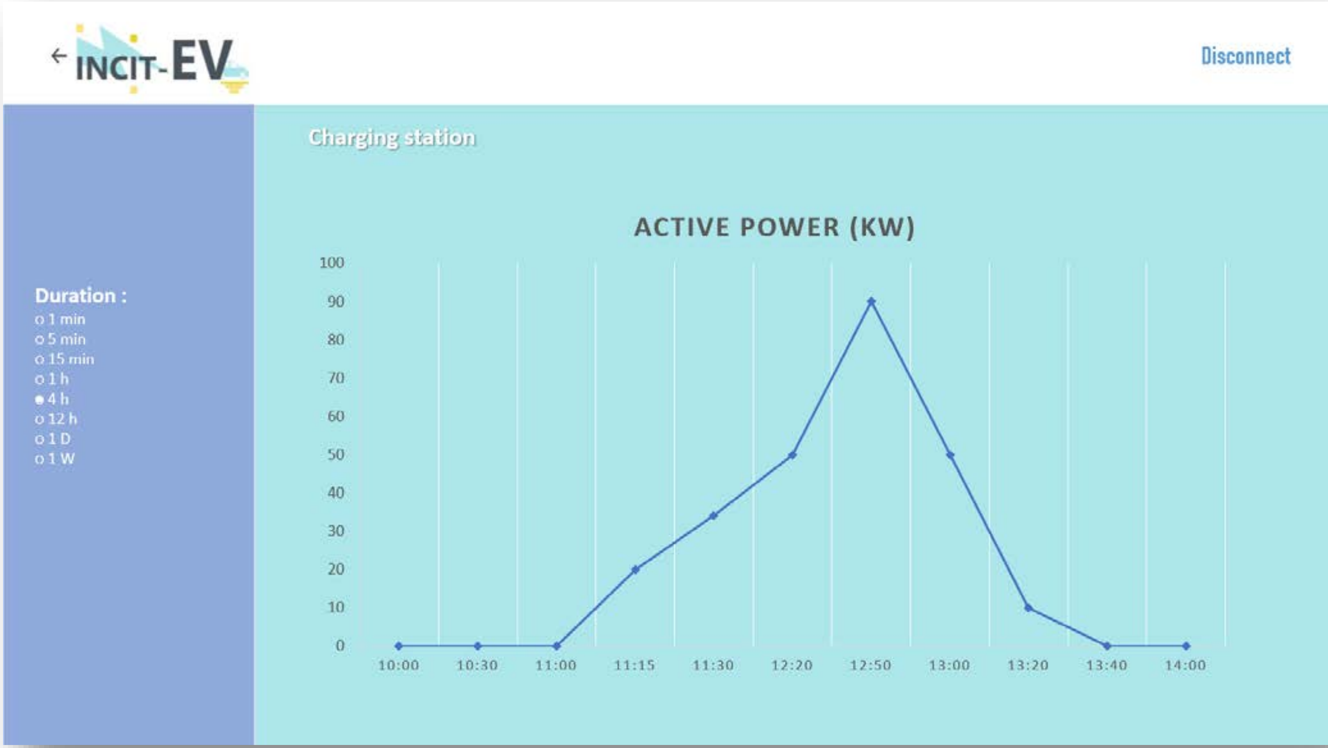

Figure 23 – Data analysis page (draft)

By clicking on a data description, you access to the page above, it represents the evolution of the value of a signal through the time. The scale can be modified by zooming in/out or by clicking on a time duration on the left board.

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8 CONCLUSIONS

A number of HMIs have been produced in outline form for the INCIT EV project that may have application on use cases and real-world scenarios. The HMIs discussed in this deliverable will be improved over the next twelve months with final specifications made available in December 2022 for ''D5.12 Second stage of INCIT EV user interfaces". In a number of cases, further development of backend solutions is required in order to refine and test via an iterative process for the final HMI design.

Key stakeholders for whom HMIs are being developed are:

- The end user (EV driver)
- Charge point operators and electromobility service providers
- Distribution system operators
- The city planner / mobility planner
- INCIT EV platform user

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