



*LARGE DEMONSTRATION OF USER CENTRIC URBAN AND LONG-RANGE CHARGING  
SOLUTIONS TO BOOST AN ENGAGING DEPLOYMENT OF ELECTRIC VEHICLES IN EUROPE*

## Project Presentation



INCIT-EV Project Presentation

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LINKS Foundation



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Flexibility and New Markets

*Groupe Renault coordinates the INCIT-EV project, to improve the experience of electric vehicle (EV) driving with a consortium of 33 partners from eight countries*

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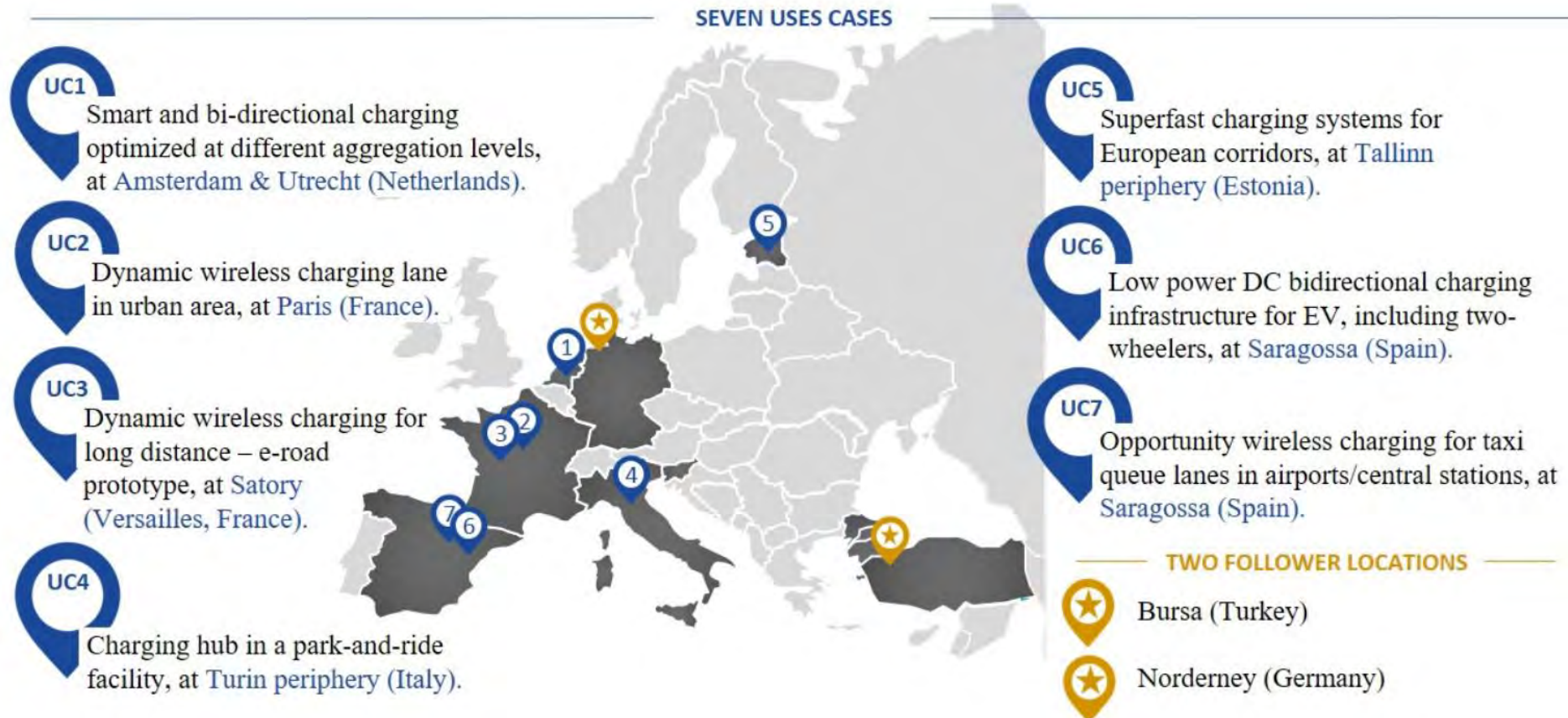
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INCIT-EV aims to demonstrate an innovative set of charging infrastructures, technologies and its associated business models, ready to **improve the EV users experience** beyond early adopters, thus, **fostering the EV market share** in the EU. The project will seek the emergence of **EV users' unconscious preferences** relying on latest neuroscience techniques to adapt the technological developments to the users' subjective expectations. **Five demonstration** environments at urban, peri-urban and extra-urban conditions will be ready for the deployment of **seven use cases**



**Goal 1:** To deepen the knowledge about users' expectations and concerns regarding EV adoption and charging infrastructure

INCIT-EV will develop a method combining different techniques from the neuroscience, social psychology, mathematical psychology and statistics in order to collect and analyze relevant data in relation to end-users conscious and unconscious expectations and needs. This method will help to establish how the design of the charging infrastructure and related technologies should be adapted to the users' actual demands. To this end, the project will directly **engage 3,475 private EV drivers, as well as 10 local communities, 4 Taxis cooperatives/associations, 4 car-sharing and 4 LEVs sharing companies**

**Goal 2:** To design a set of innovative and interoperable charging solutions in urban, peri-urban and extraurban areas following the users' expectations and looking for their seamless integration in the existing infrastructures (transport, energy grids, ICT and civil ones)

INCIT-EV will follow a user-centric approach to carry out the design of innovative and complementary charging solutions for urban, peri-urban and extra-urban areas, targeting mostly private end-users but also mobility services, including taxis, car sharing, and e-bikes and scooters renting. The following charging technologies will be developed along the project:

- Upgraded high-power DC superfast chargers able to provide grid services in different demand and power conditions.
- Scalable EV charging hubs for exploiting synergies between different technologies.
- Innovative low power V2X charging infrastructure allowing energy trading office/home installations and EVs.
- Smart charging technologies for optimizing the grid use at regional, community and local levels.
- Secure low power DC racks for LEVs like e-bicycles and scooters.
- Opportunity static wireless power transfer charging system for urban environments.
- Dynamic wireless power transfer charging solutions ready for urban environments and electric roads, with specific test methods to ensure their interoperability.

The solutions will be designed to satisfy most of the users charging preferences, while ensuring a smooth integration of the charging systems into the existing transport, grid, ICT and civil infrastructures.

**Goal 3:** To develop a Platform integrating a Decision Support System for mobility planners and a set of Applications to improve the EV user charging and driving experience

INCIT-EV will develop a DSS tool to support decision makers design and evaluate scenarios of charging infrastructure deployment using cost-benefit analysis (CBA) approach. This tool will be upgraded from the already existing solutions developed from the INCIT-EV ICT experts: FUSE, the Multi-Cloud Application Platform from ATOS, and GFX's White Label Platform. Three main aspects will be considered:

- **Electric infrastructure:** identifying the effect of sizing and sitting of charging points through specific KPI or providing an optimal sizing and sitting of the charging points after the selection of specific constraints.
- **Smart Energy:** identifying the effect of different scenarios (V2G, grid congestion, RES availability for EVs) in energy price and smart charging operation and the possibility to offer flexibility to the electrical grid, supporting as well power system long-term planning under the criteria of EV user satisfaction.
- **Urban Mobility:** identifying how EV penetration level, charging points location and technologies and grid constraints affect mobility and traffic, allowing the development of coupling solutions for optimal scheduling and real-time operation of electrical grid and traffic.

Moreover, several User Mobility APPs will be developed to gather and collect data per users and to foster a better charging experience. Specifically, the following APPs will be hosted in INCIT-EV platform:

- **Parking Reservation,** allowing to reserve a parking spot for a specific charging slot.
- **Interconnected and interoperable payment service** to simplify and improve the charging experience.
- **Smart Charging** using the potential flexibility of optimal charging scheme according to specific price signal, grid needs and user preferences.

**Goal 4:** To carry out a full demonstration campaign reaching TRL 8 at five demonstration environments involving seven use cases, and validate the INCIT-EV Platform at two follower locations

An integrated demonstration campaign will be designed to validate INCIT-EV approaches, considering complementary use cases highly representative of the different charging challenges. The selected technologies are already validated at TRL 5/6, with the aim of demonstrate them in real environment and thus to push their rapid uptake shortly after the project end. The demonstration locations have selected considering the following issues, that are tackled by the use cases:

- **Amsterdam / Utrecht:** highly populated region with a significant fleet of EVs already in place.
- **Paris:** big city with air pollution and traffic management challenges.
- **Turin:** medium city looking to improve the connections between the periphery and the city centre.
- **Tallinn:** lack of connection with remote areas facing the challenge of weak grids.
- **Saragossa:** Medium city considered as logistic centre with a large fleet of personal light electric vehicles

Moreover, an island in the North of Germany (Norderney) and a Mediterranean coastal city in Turkey (Bursa) are involved in the consortium to serve as validators of the INCIT-EV platform and the use cases replication.

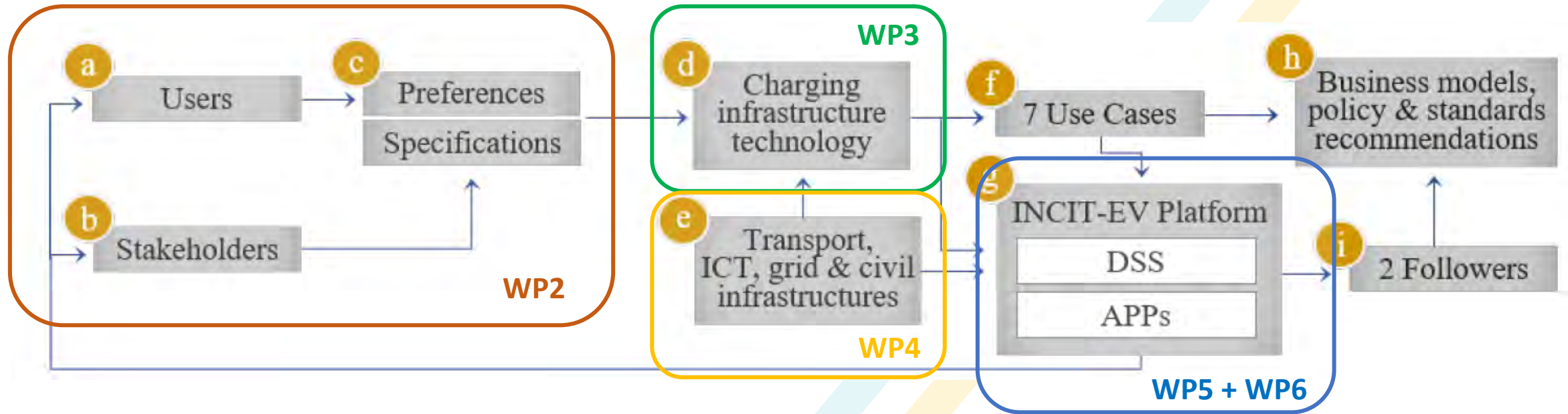


**Goal 5:** To promote the investment in charging infrastructure through attractive business models together with recommendations to solve regulatory and standardisation bottlenecks.

The users' perception will be the starting point in the development of **collaborative business models**, with the aim to foster the alignment between the project's relevant stakeholders and ensure the market and financial uptake of the developed solutions. For this purpose, the **value proposition** will be adapted considering the users' perspective and **net present value calculations including externalities** (like noise, GHG emissions, etc.) will be performed. **Value Network Models and Functional Analysis Methodology** will be used to ensure the attractiveness of the proposed models and to estimate the **penetration curve** at different territories for each technology. All in all, **INCIT-EV will mobilize directly a total investment on the use's cases of 8.872 M€**. Finally, the experience gained in the demonstration phase will serve to develop a set of recommendations for **regulations and standards** for the deployment of a charging infrastructure ready to foster the engagement of EV users beyond early adopters. Most part of INCIT-EV **partners work actively in national and international standardization committees** focused on electric vehicles charging infrastructures, like CEN-CENELEC, IEC or SAE, being ready to foster updates in the current standards based on the project developments

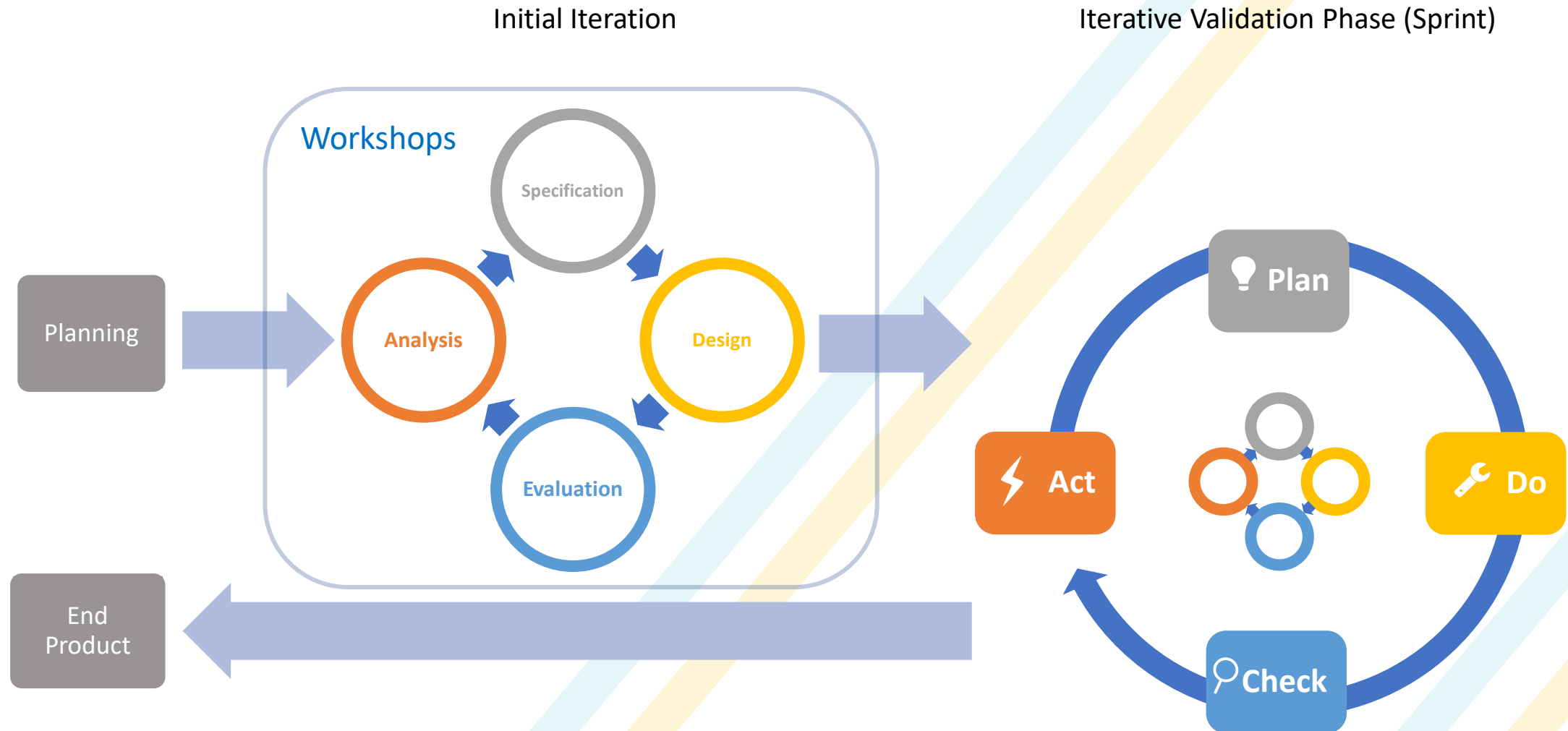
**Goal 6:** To engage mobility planners in new charging infrastructures adapted to the users' expectations, while promoting these solutions among the users, through communication and dissemination campaigns

In addition to the traditional dissemination activities, the five demonstration sites will count with devoted showcases supported at national level. Thus, at least **5 papers submitted, 6 conference presentations, 3 collaboration agreements with relevant networks, 3 open showcases** will be developed during the project. For instance, Saragossa city will promote INCIT-EV results taking advantage of the Spanish Mobility City project, established as national reference in Spain and whose promoters are supporting INCIT-EV within its Advisory Board. It is also relevant to emphasize that international and EU-wide stakeholders with key implications in the EV deployment as **ENTSO-e** or **TOYOTA** among others, have expressed their support to INCIT-EV and will take also part in its Advisory Board.



- WP2: User perception about charging infrastructure
- WP3: User centric EV charging solutions
- WP4: Grid, urban and road infrastructure upgrading for meeting users' expectations
- WP5: IT environment for improving the user charging experience
- WP6: INCIT-EV platform for charging infrastructure planning and services provider

### Requirements Engineering based on iterative approach



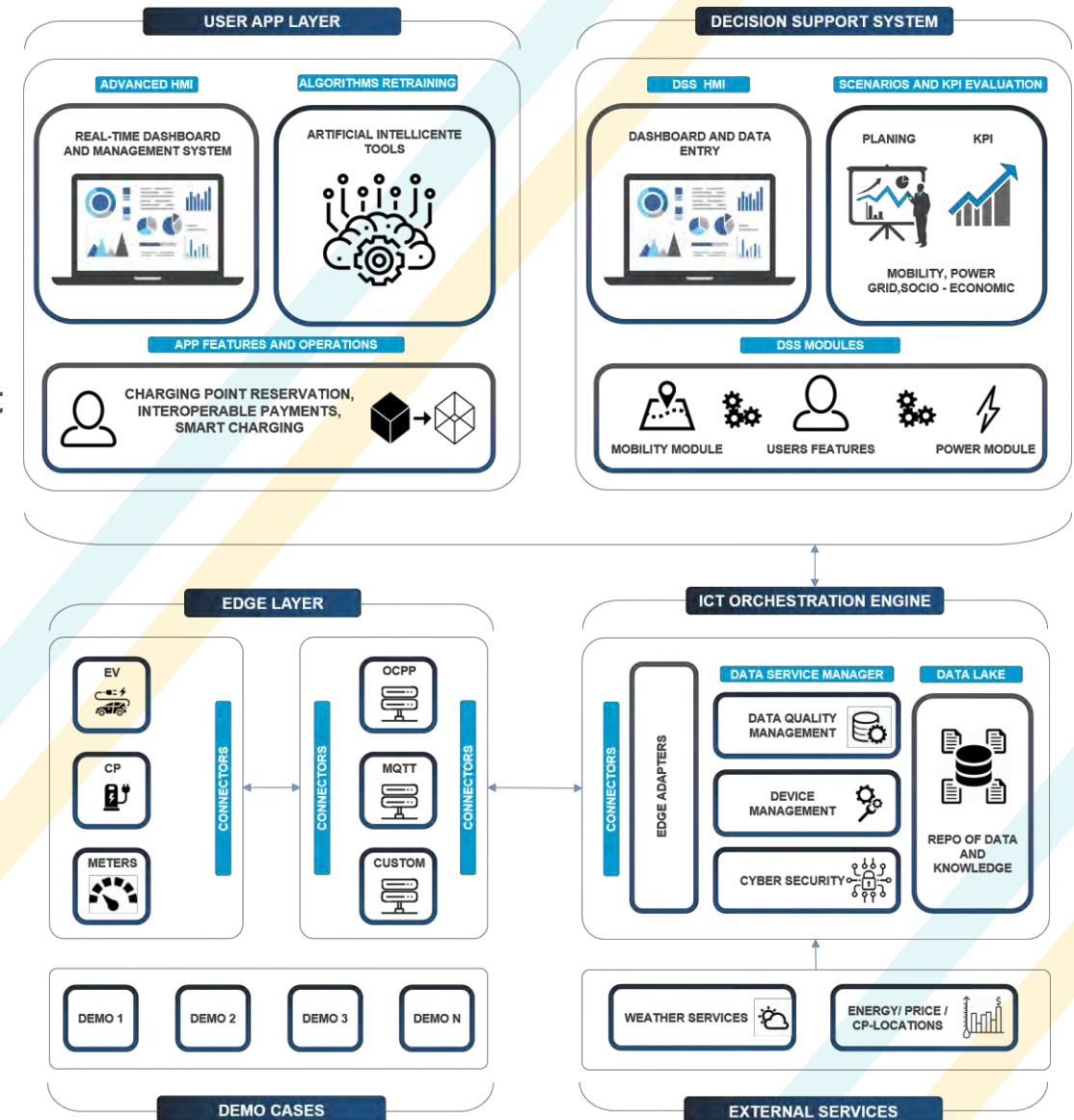


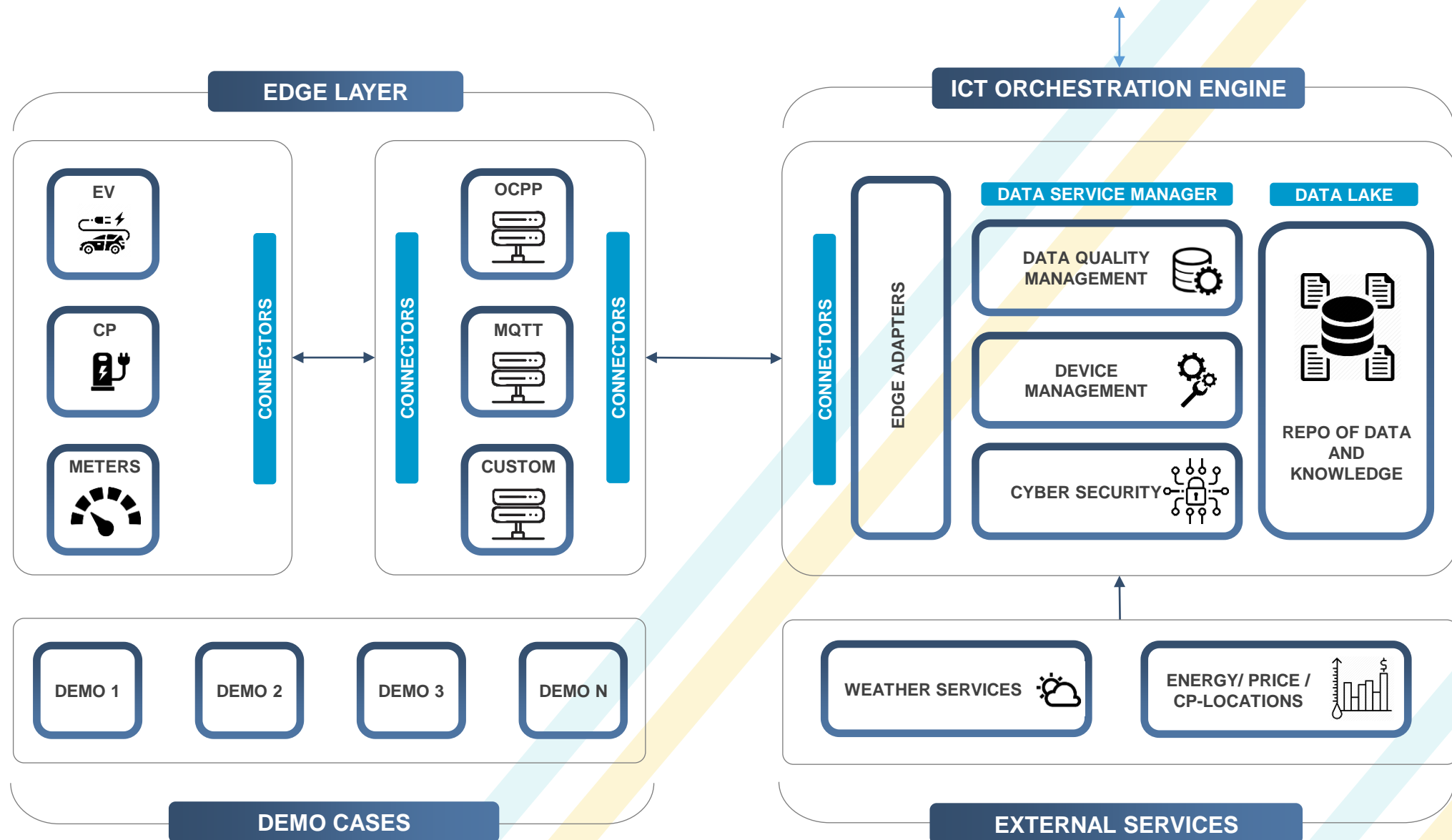
The INCIT-EV ICT platform will cover two main needs:

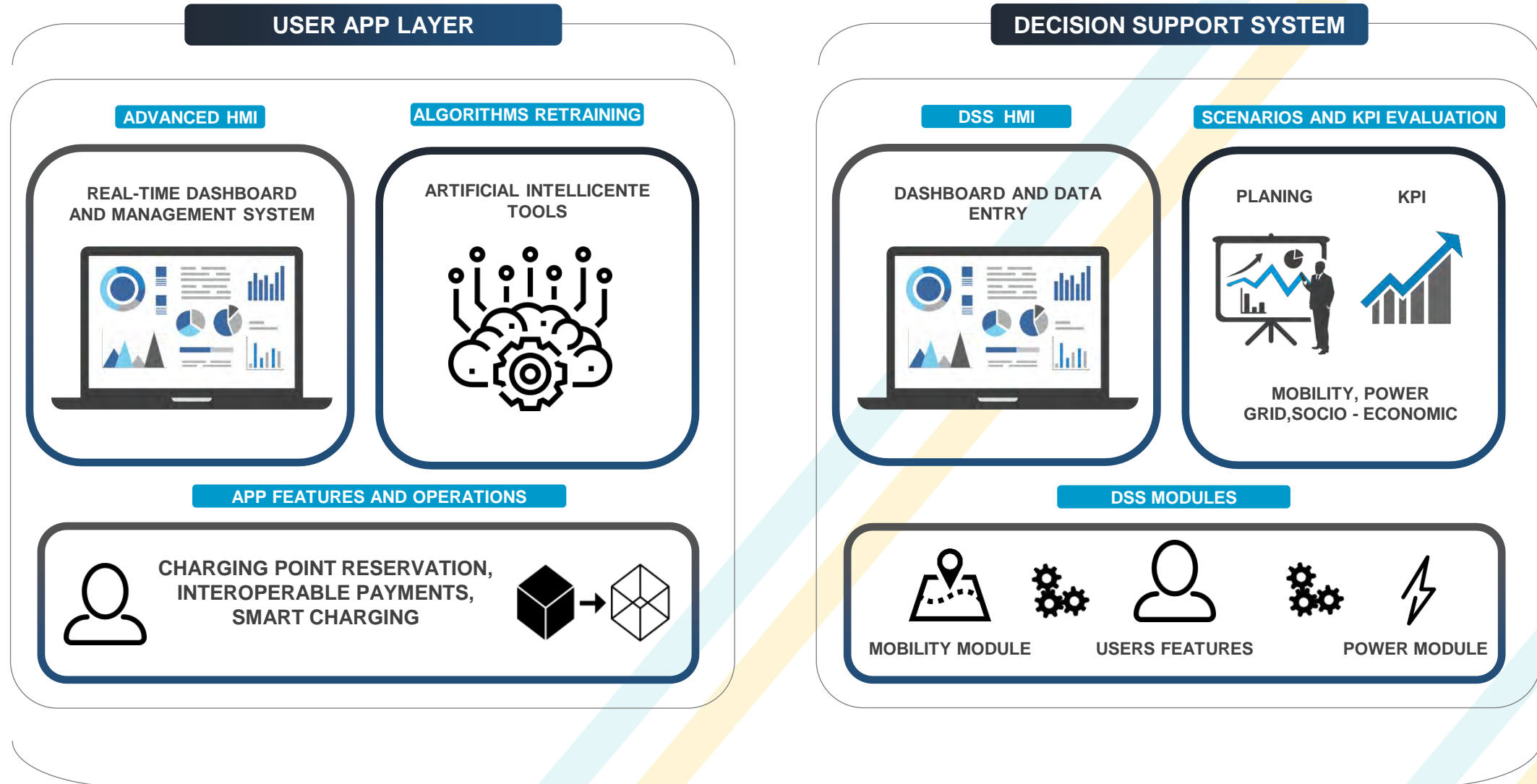
- a DSS will be orientated to support **Mobility planners and Policy makers** on the development of ad-hoc action plans to boost the penetration of electric vehicles in their area through the deployment of user-centric charging infrastructure.
- a set of applications, including **parking reservation, payment and smart charging**, will be focused on the improvement of EV drivers experience, providing them with relevant information and services related to the electric mobility

The INCIT-EV ICT platform will be interoperable with all end-users and technologies. Its architecture is split in 2 layers:

- Bottom layer, including the cyber-physical and third parties systems interconnection for managing and control operations in the demo sites including edge and cloud computing for data collection and platform orchestration
- Upper layer, as a market place framework where the DSS and the EV users APPs are hosted and delivered to the field. The following diagram represents the INCIT-EV ICT platform architecture:







- INCIT-EV aims to demonstrate an innovative set of charging infrastructures, technologies and its associated business models, ready to improve the EV users experience and foster investors to invest in charging infrastructure
- INCIT-EV will improve and develop new EV Charging Technologies considering 7 uses cases tested in 5 Demo sites.
- INCIT-EV will develop a Decision Support System to assist Mobility Planners (City Planner, DSO and TSO) on the development of ad-hoc action plans to boost the penetration of electric vehicles in their area
- INCIT-EV will develop a set of User Apps to improve or to enable new services connected to EV mobility and at the same time Improving interoperability of vehicle-to-charger and charger-to-infrastructure communication as well as Better grid integration of high-power chargers





Thanks for your attention!



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