



NeMo

# HYPER-NETWORK FOR ELECTROMOBILITY

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# NeMo at a glance



**Call identifier:** H2020-GV-2015

**Topic:** GV-8-2015 Electric vehicles' enhanced performance and integration into the transport system and the grid

**EC funding:** € 7.8 million

**Duration:** October 2016 – September 2019

**19 partners**

**5 test sites & 1 cross-country demonstration**

**Coordinator:** by ICCS (Institute of Communication and Computer Systems), Greece (Dr. Angelos Amditis, [a.amditis@iccs.gr](mailto:a.amditis@iccs.gr))

**Website:** <http://nemo-emobility.eu>

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# What are the challenges for NeMo?



Limitation in Electric Vehicle range  
lack of interoperability in electromobility services



Diverse eRoaming  
platforms



Impact to the Electric grid  
network



Lack of common data exchange and  
commercial framework



# NeMo's approach



Develop a **Hyper-Network of tools, models and services**, which will enable the provision of **seamless and interoperable electromobility services** creating an open, distributed and widely accepted ecosystem for e-mobility



- ✓ improved accessibility to charging infrastructure and ICT services through a **pan-European Inter-Roaming framework**



- ✓ facilitate increased availability, better planning and more secure electric grid operation



- ✓ create business opportunities (increased B2B connectivity)





# Expected impact



- Enhanced driver satisfaction: “**Charge anywhere & anytime**” across Europe via a single identification, authorisation & payment method
- Easy creation and delivery to a wide audience of innovative, interoperable electromobility services via an **open cloud marketplace**



- ✓ Improved **attractiveness of electric vehicles**
- ✓ **Facilitation of EVs mass adoption**



# Expected impact



- ❖ Enable **Information exchange** among all involved actors
- ❖ **Integration of smart-grid applications and services**, to support the EVs integration in the electricity grid, by optimisation of electricity supply compared to demand.











# Planned NeMo services








## Horizontal Hyper-Network services:

-  Electromobility actors' monitoring and profiling
-  Finder and optimiser
-  Brokerage
-  Service pricing (static and dynamic)



## EV driver / owner services:

-  Smart navigation and journey planning
-  Wireless authentication solution

## Grid related services:

-  Navigation to Charging Point based on user and grid requirements
-  Global customer charging behaviour
-  Grid load management
-  Load forecasting due to EV charging
-  Local energy management

## EV and battery related services:

-  Adaptive State-of-Charge limit
-  Capacity calculation; Load management; etc.

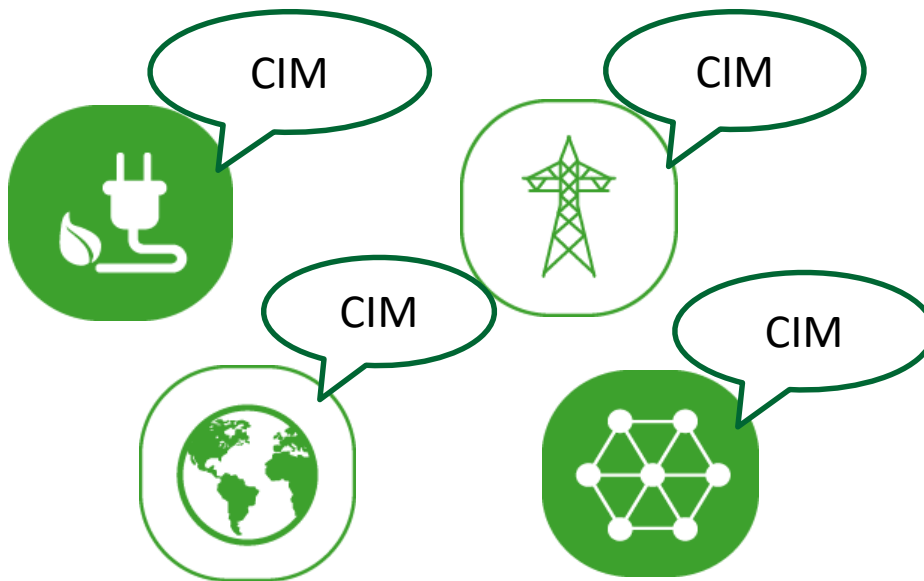




# NeMo Common Information Models



- One of the pillars of NeMo Hyper-Network is the possibility to exchange data using a common NeMo meta-language



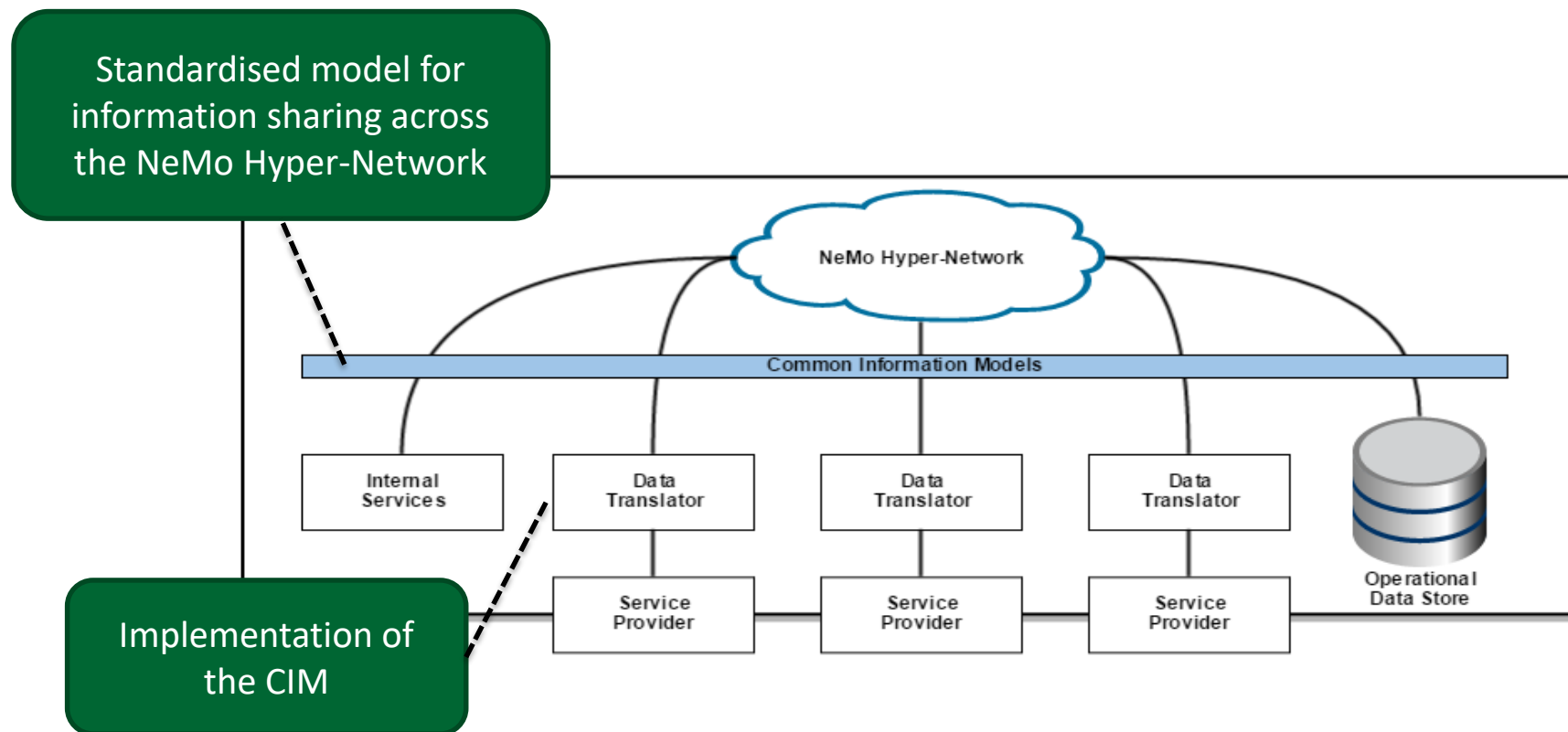
- Common Information Models (CIM)
- Data translators and common interfaces
- Smart Processing and Data Management algorithms



# Location in the Hyper-Network



- New services will generate and exchange data according to the CIM
- Data translators will enable the translation of data to the NeMo CIM



# Business Objects categorisation



- Electric Vehicle
- Charging Infrastructure
- Final User
- Charge Session
- Smart Charging Functionalities
- Marketplace for service creation and delivery
- Grid loads
- Vehicle preparation for drive-off
- Support Business Objects



# CIM examples



- Battery
  - BatteryID, VIN, BatteryType, BatteryCapacity, SoC, SoH, BatteryFault, ChargeCompletionEstimatedTime, ChargingStatus
- Vehicle
  - VIN, Manufacturer, VehicleModel, ChargingMode, MaxPower, VehiclePower, VehicleRange, VehicleSpeed, VehicleODO, VehicleConsumption, VehicleRemainingDistance, CurrentLocation, DestinationLocation, ExternalTemperature, VehicleHeatingStatus, VehicleACStatus, PreconditioningFunctionalities



# NeMo Common Information Models



Support the interoperability of electromobility services



- Discussed in the NeMo First Stakeholder Forum Conference
- Models have been submitted to eMi<sup>3</sup> group for their consideration in future activities
- Will be submitted to other Stakeholders groups
- CIM is continuously updated according to electromobility needs

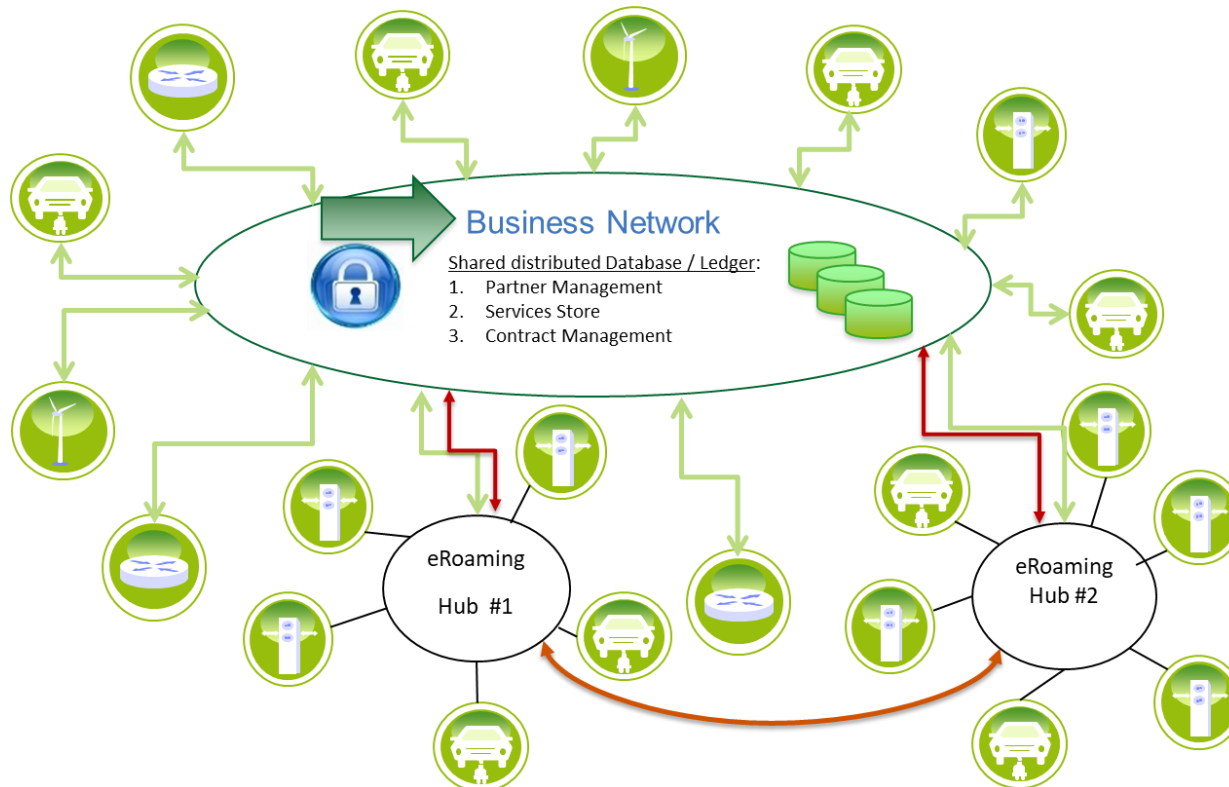


# NeMo Inter-roaming protocol



The NeMo Inter-Roaming protocol is a functional protocol that enables:

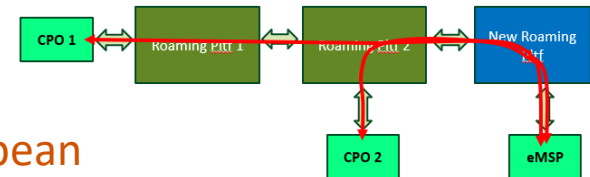
- the **direct communication** between eRoaming platforms
- publishing of eRoaming platforms' services to the NeMo Hyper-Network, providing **eRoaming features**, like any other NeMo service.



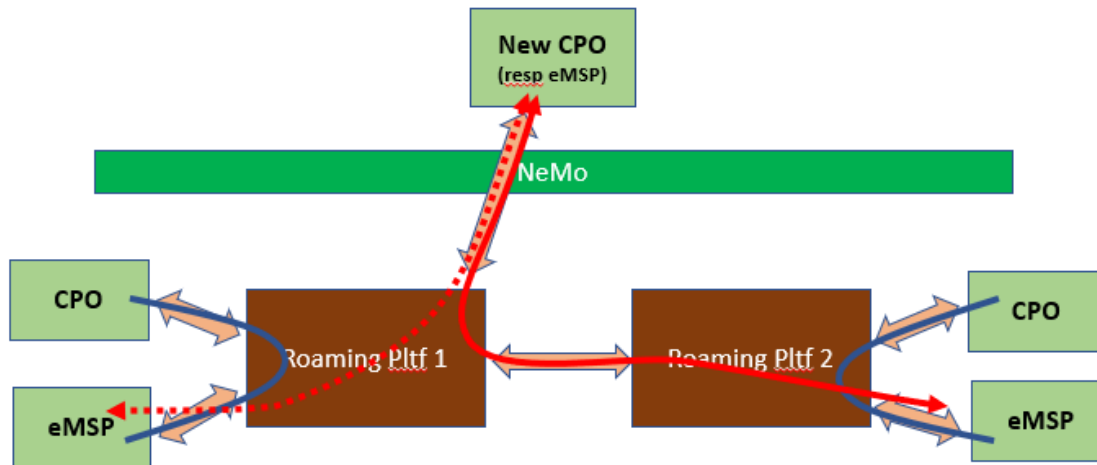
# Pan European eRoaming framework



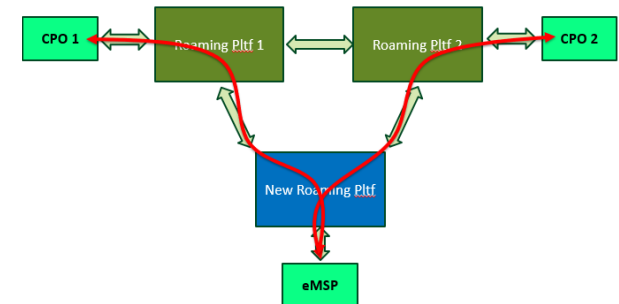
- The interfaces served by the Inter-Roaming protocol are:
  - POI handling (static and dynamic),
  - authorization processes,
  - exchange of charge detail records (CDRs)
- The Inter-roaming protocol contributes to the **pan European eRoaming framework**, by linking existing eRoaming platforms.



Single versus multiple connections of a new eRoaming platform to other platforms via Inter-Roaming



Functional architecture, enabling visibility of other's platforms connected actors



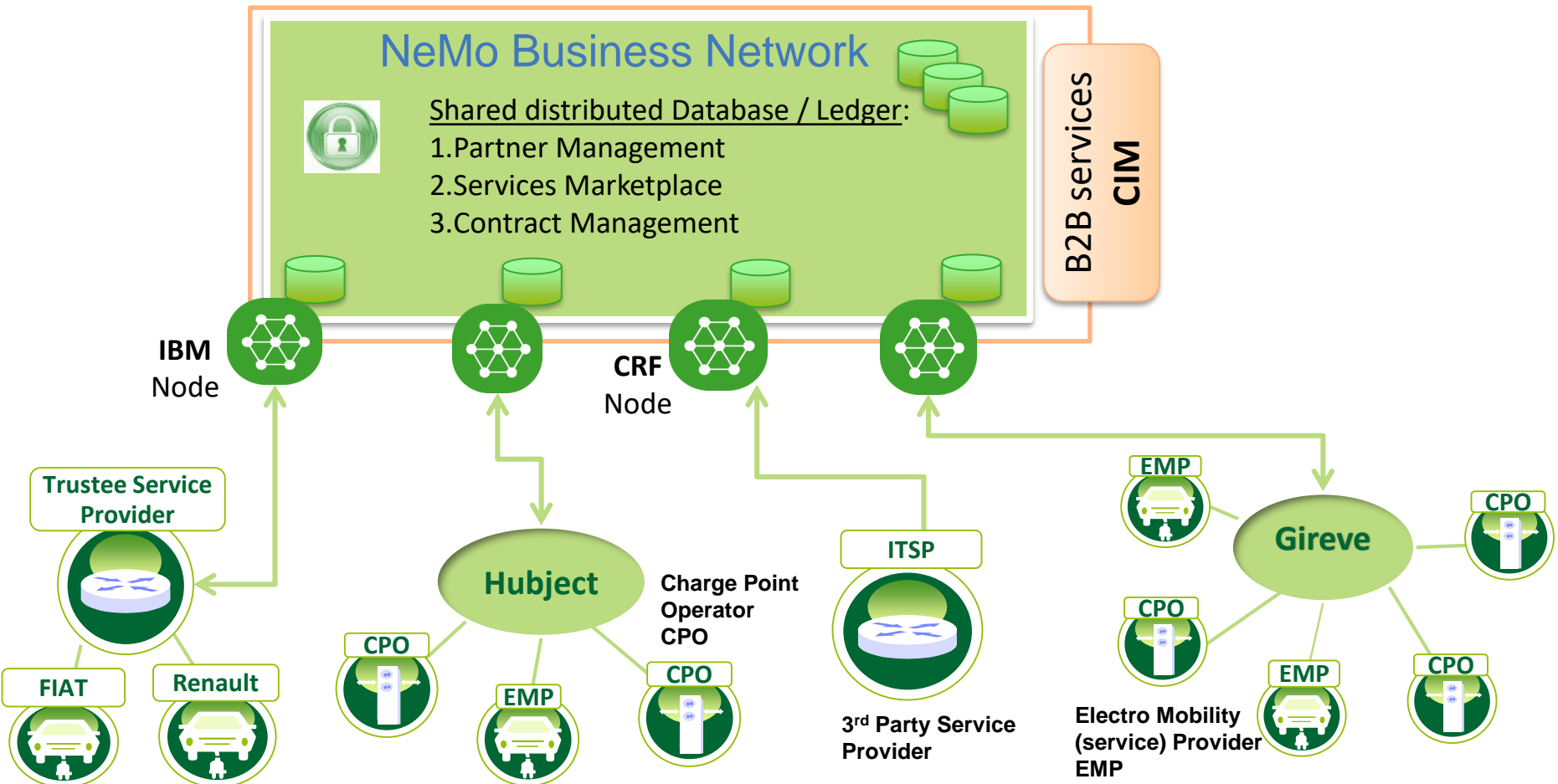


# NeMo Hyper-Network

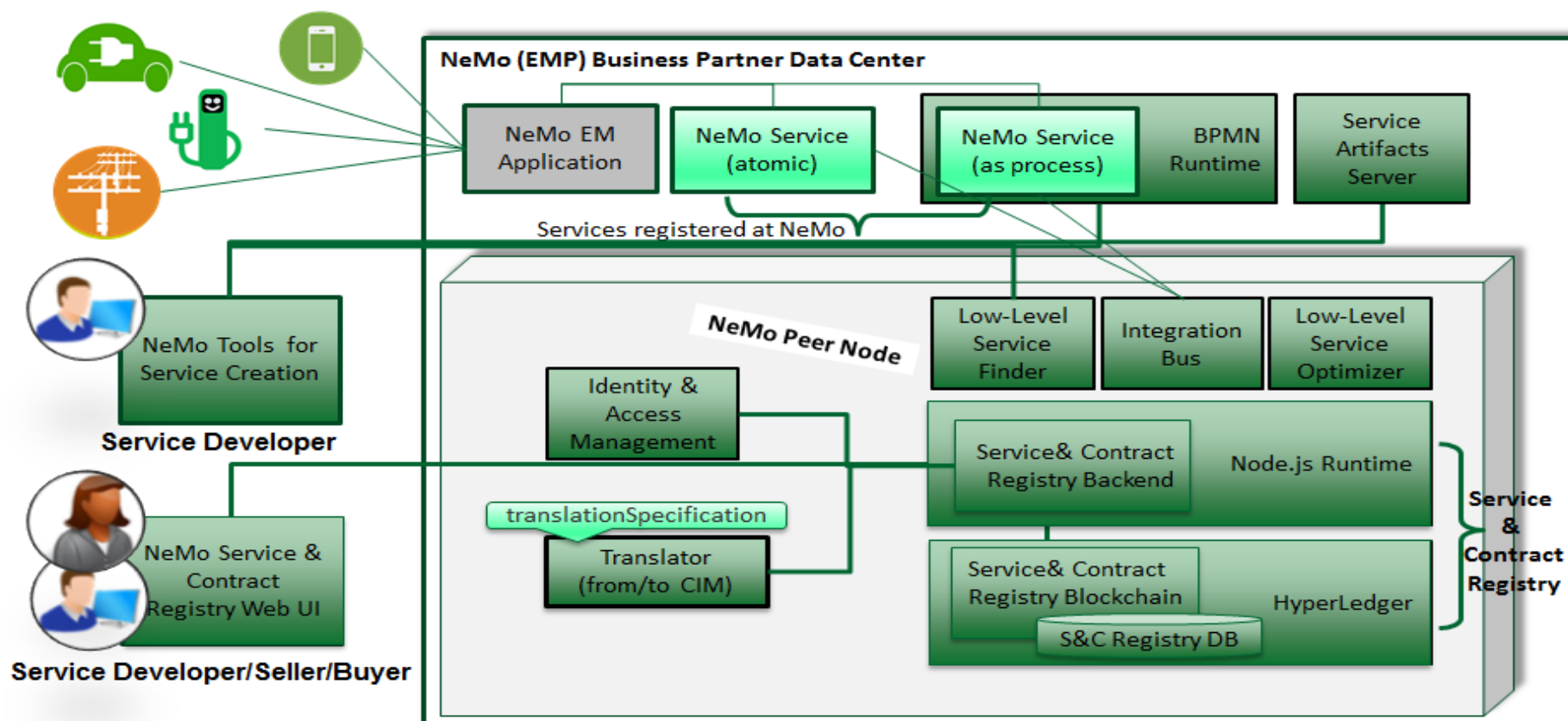
Common data-set stored in distributed databases / Ledger

All participants have access to same data.

**Nemo Nodes to be installed by Business partners.**



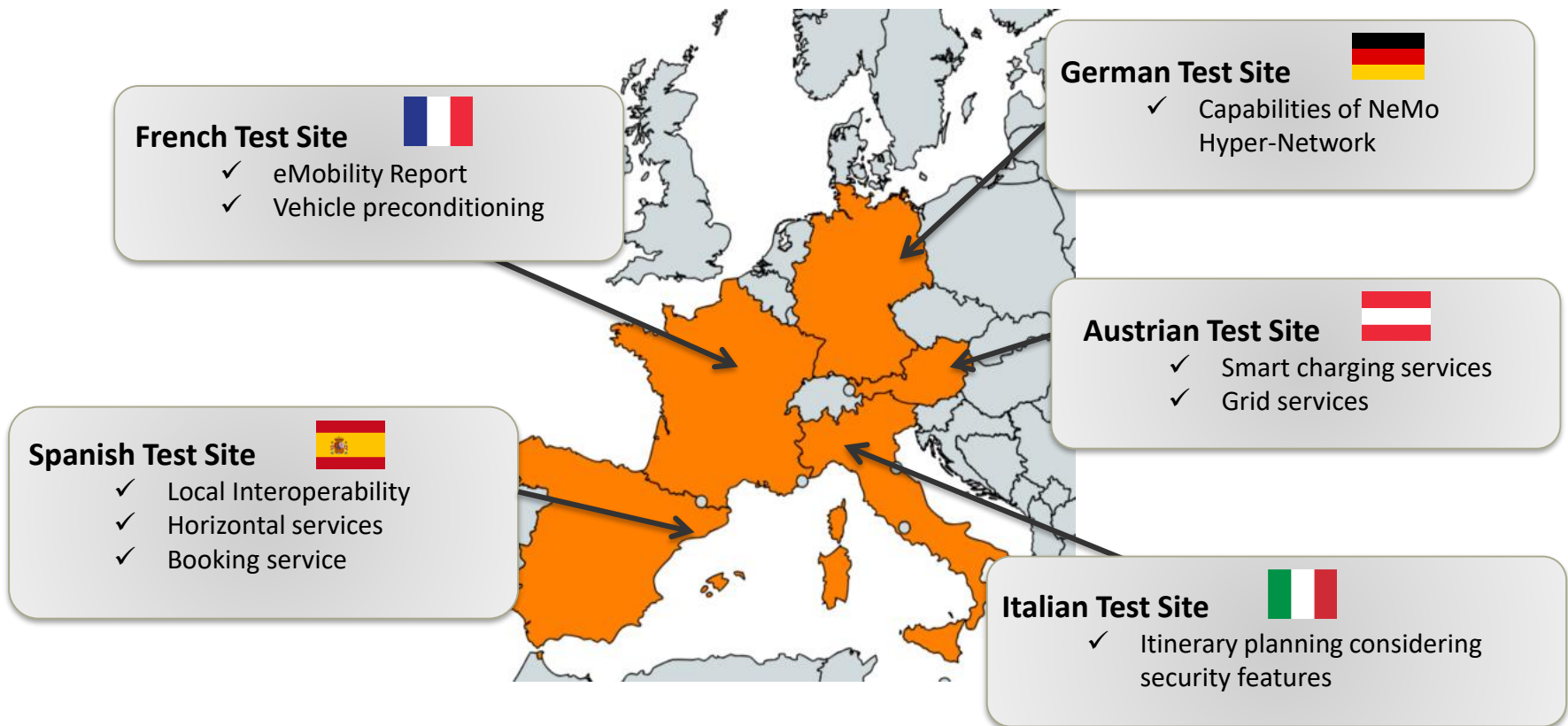
# NeMo IT environment



# NeMo Test sites



- **Five test sites** across Europe to evaluate the results



# NeMo Test sites



- Cross-country demonstration test drive 2019
  - Evaluation of the post-NeMo situation for real users
  - ✓ Itinerary Planning
  - ✓ Cross-provider border booking authorization and payment management





# First cross-country test drive (2-4 October 2017)



- Identified issues affecting long distance travel in electric vehicles
- 2 EVs (4 NeMo drivers) followed different routes covering a distance of over 950km from Turin to Barcelona (Italy-France-Spain)



# Invitation to NeMo



- JOIN the NeMo Stakeholder Forum
  - Register via <https://nemo-emobility.eu/nemo-forum/> or the NeMo LinkedIn group
  - Be updated on all project news, results and events
  - Register your interest in joining the Hyper-Network as a developer, provider or user of services
- 2nd Stakeholder Forum Conference in October 2018
  - Learn of the latest developments, experience the first version of the Hyper-Network, provide feedback
  - Learn about the proposed **Business Environment for Electro-Mobility** (BAEM) and what you can gain from it
  - Join us in setting up the BAEM as a founder member, to ensure sustainable management of the Hyper-Network after 2019





Thank you for your time!



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