Layers of interoperability

About interoperability for EV charging
and a practical application in Latin-America

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Introduction
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- Steering Committee - National Charging Agenda
- Founder and Board member -
- EVRoaming Foundation (OCPI)
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The Netherlands Knowledge Platform for Charging Infrastructure

Nationale agenda Laadinfrastructuur

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EVRoaming Foundation

Realising cross-border charging

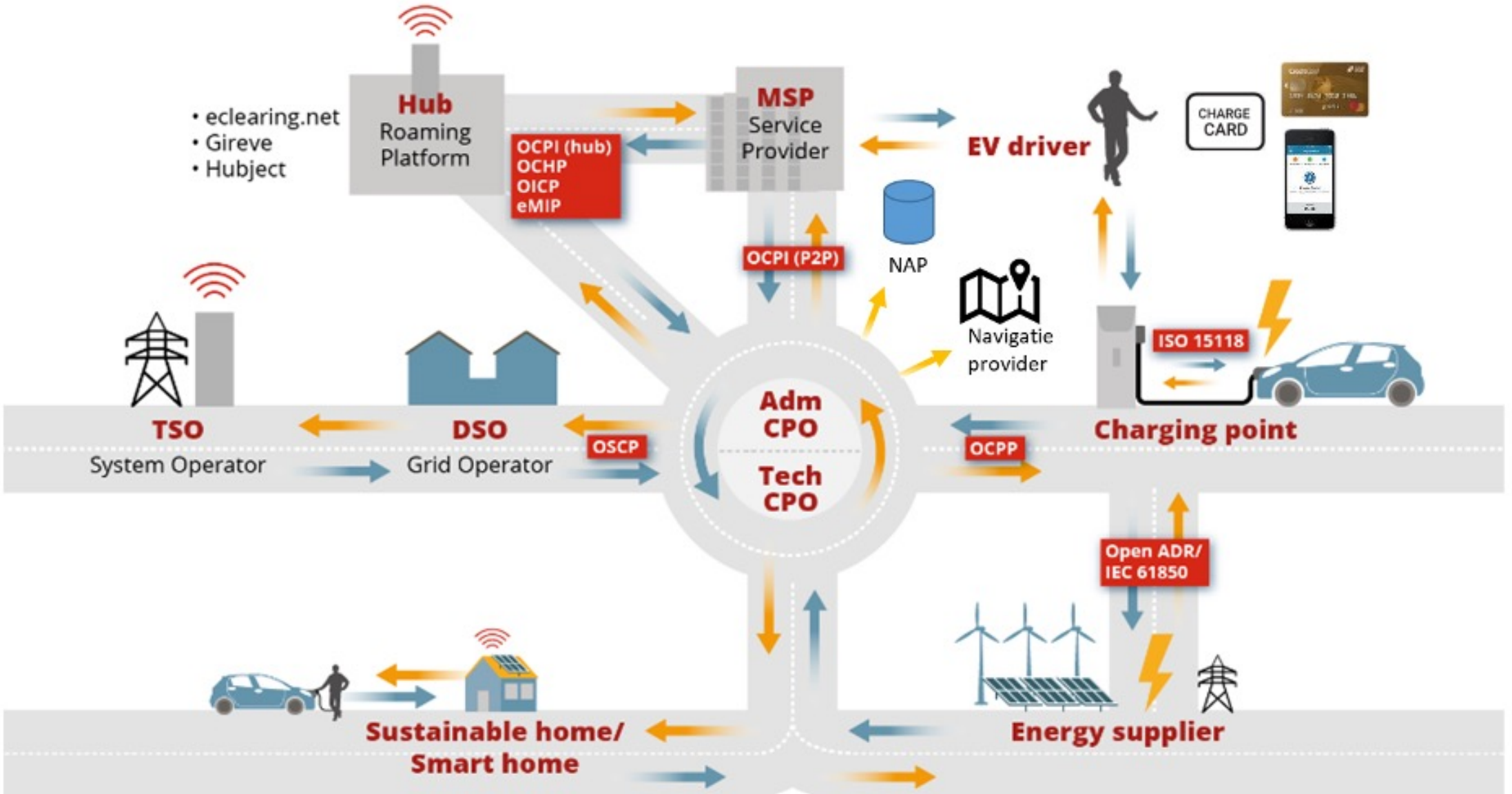
The management organization for the open roaming protocol OCPI

Board members: Freshmile, Chargepoint, Google, Last Mile Solutions, EVBOX, Gireve, NKL

Contributors are welcome to join => www.evroaming.org

- ✓ Open, free-to-use, community driven
- ✓ Connecting charge point operators, service providers, aggregators, platforms
- ✓ In order for EV drivers to charge at every charging station
- ✓ For any interoperable charging data transaction

EVRoaming Foundation
Realising cross-border charging

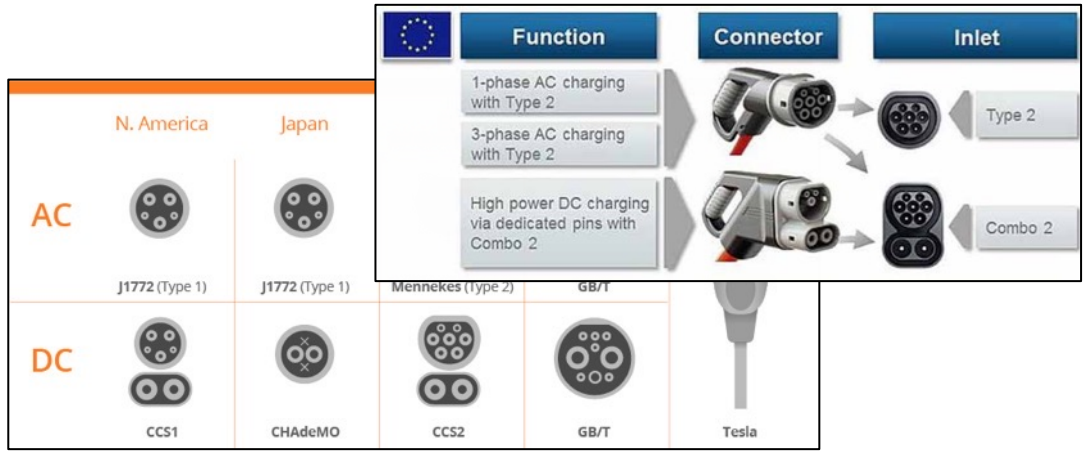


Advantages of interoperability

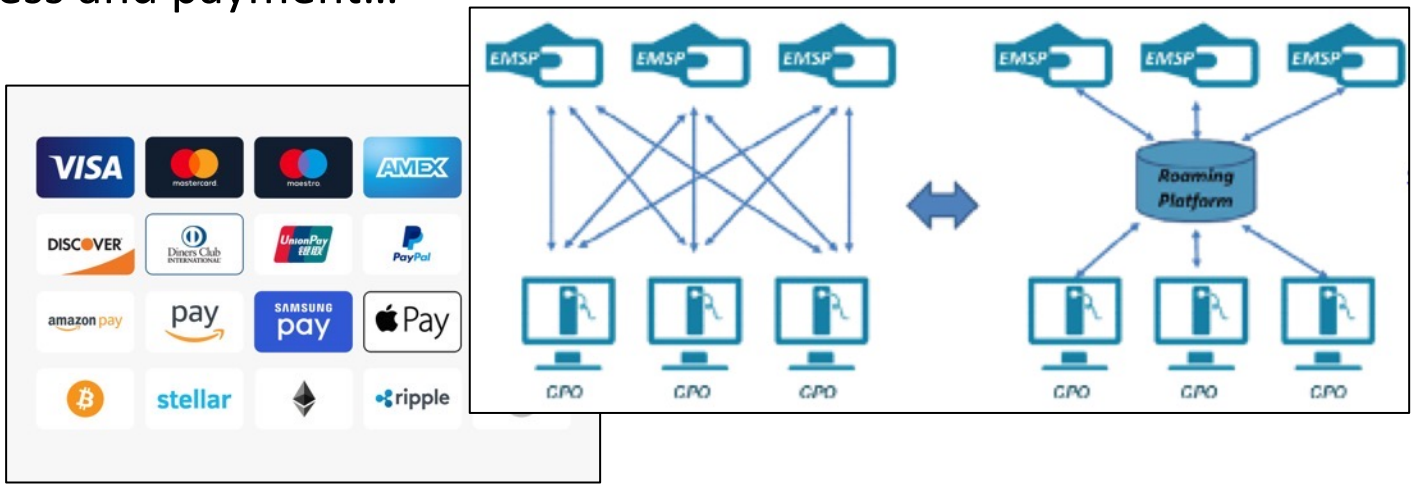
No conversion/translation		Reduction of installation and integration costs
Reuse of components		Efficient scale-up of services
Limited dependencies on third parties		Efficient development of new services
No technology ‘lock-in’		Better competitive environment
A more equal playing field		A shift towards price, transparency and reliability

What is interoperability for EV charging ?

Connectors and plugs…



Access and payment…



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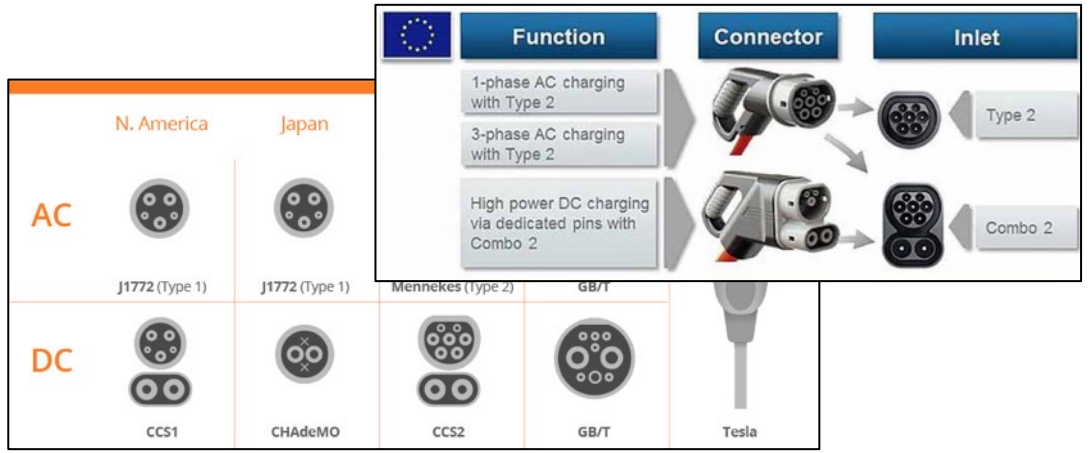
Connectors and plugs…



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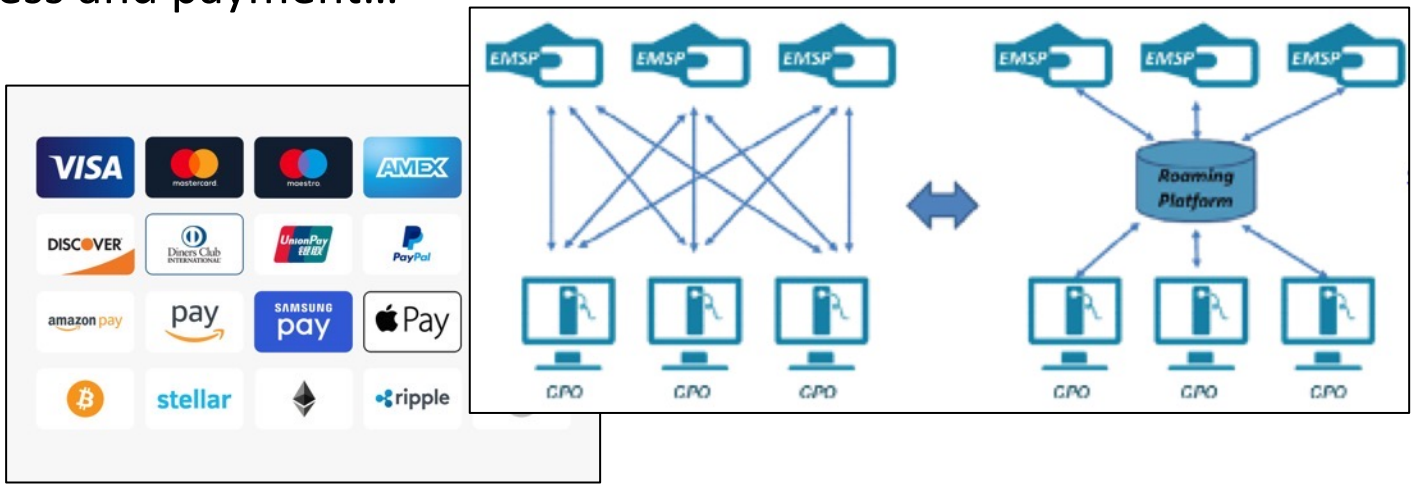


Business layer (Market and government)

The market configuration, policy and regulatory framework.

Service layer (EV Roaming)

EV charging services, functions, and their relationships are described in use cases.

Information layer

Information objects, underlying data models and protocols that are being used for information exchange

Communications layer

Connections between hardware and software systems, via ethernet, wireless or via charging cable

Hardware layer

Hardware of the ecosystem

Layers of interoperability

The hardware layer

The connectors and plugs of electric vehicles and charging stations need to be interoperable

The communication layer

All hardware and software systems, that are steering and controlling the hardware, need to communicate seamlessly with each other

The information layer

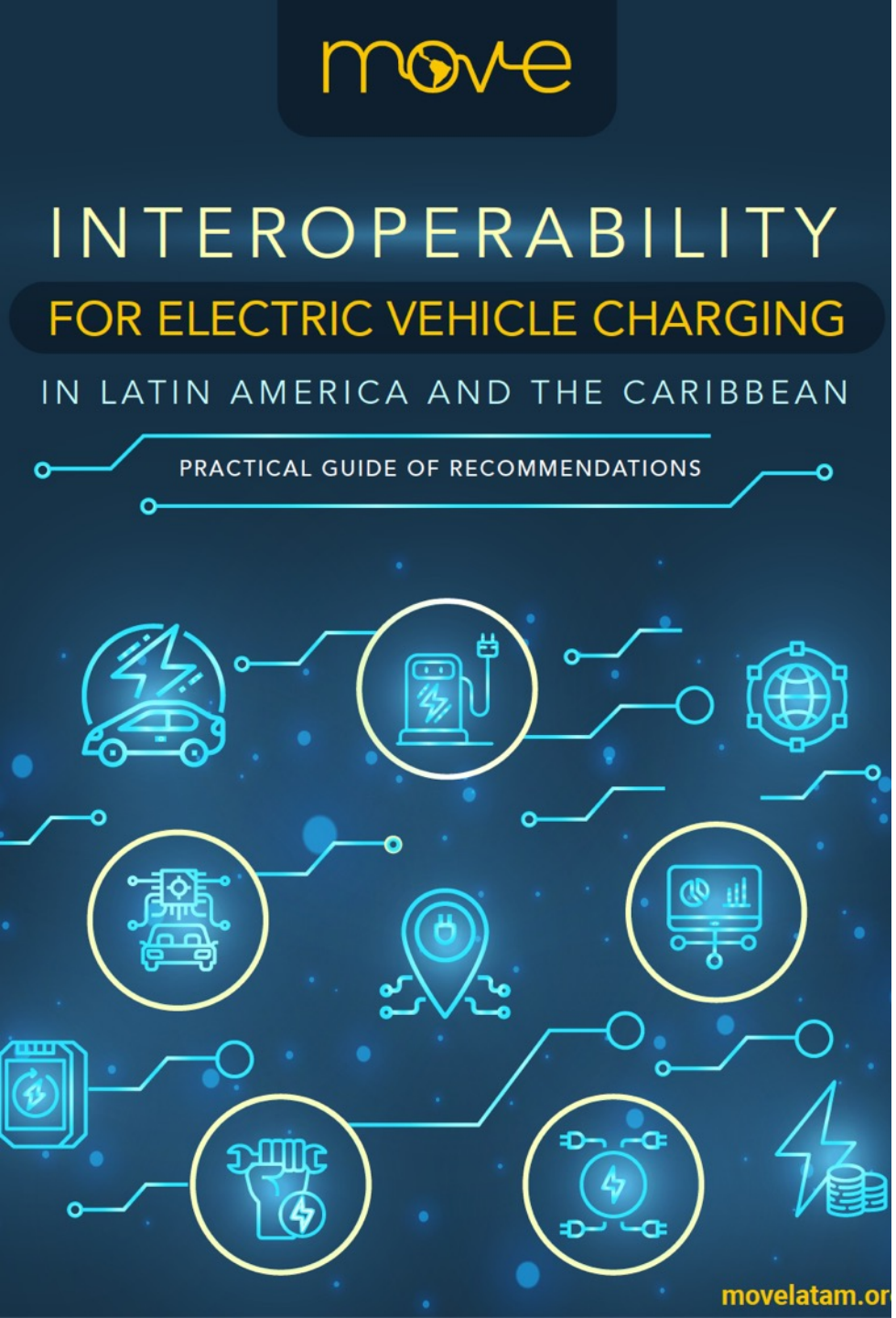
The information that is being exchanged between actors and systems needs to be recognized and interpreted to be meaningful

The service layer

Business processes and services between actors need to be aligned to provide seamless and user-centric services

The business layer

A clear regulatory and business framework needs to be defined to provide a predictable context for governments, businesses, grid operators, and EV drivers, among other actors, to develop and grow interoperable EV charging services



Practical application: How to develop interoperability in Latin-America?

Organized by the United Nations Environment Programme (UNEP)

In collaboration with MOVE and with OLADE, with support from Euroclima+

- Identify EV charging and energy market configuration
- Layers of interoperability characteristics
- Minimum and optimal requirements
- Recommendations and next steps

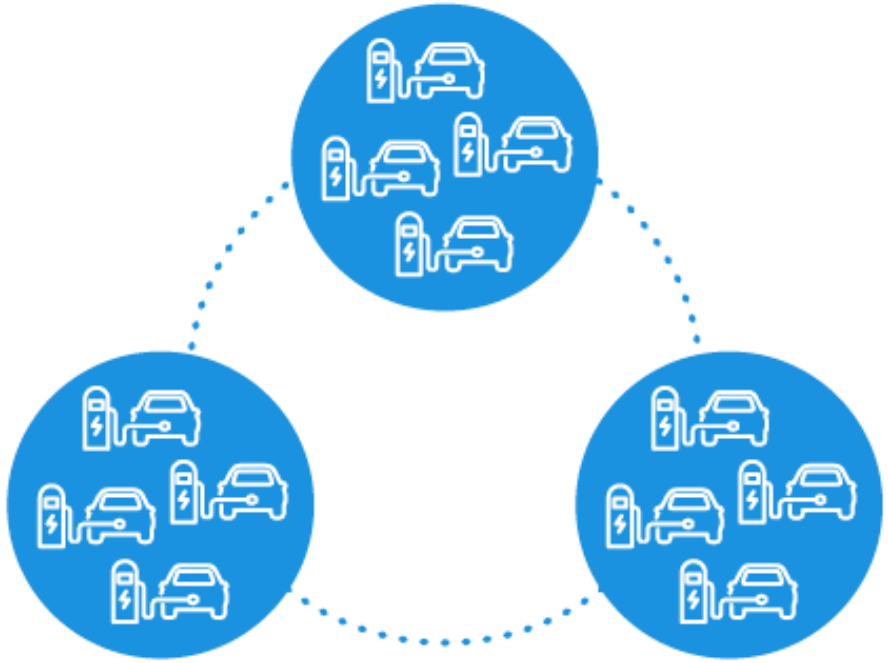
move
MOVILIDAD ELÉCTRICA
LATINOAMÉRICA Y EL CARIBE

UN environment programme
50 1972-2022

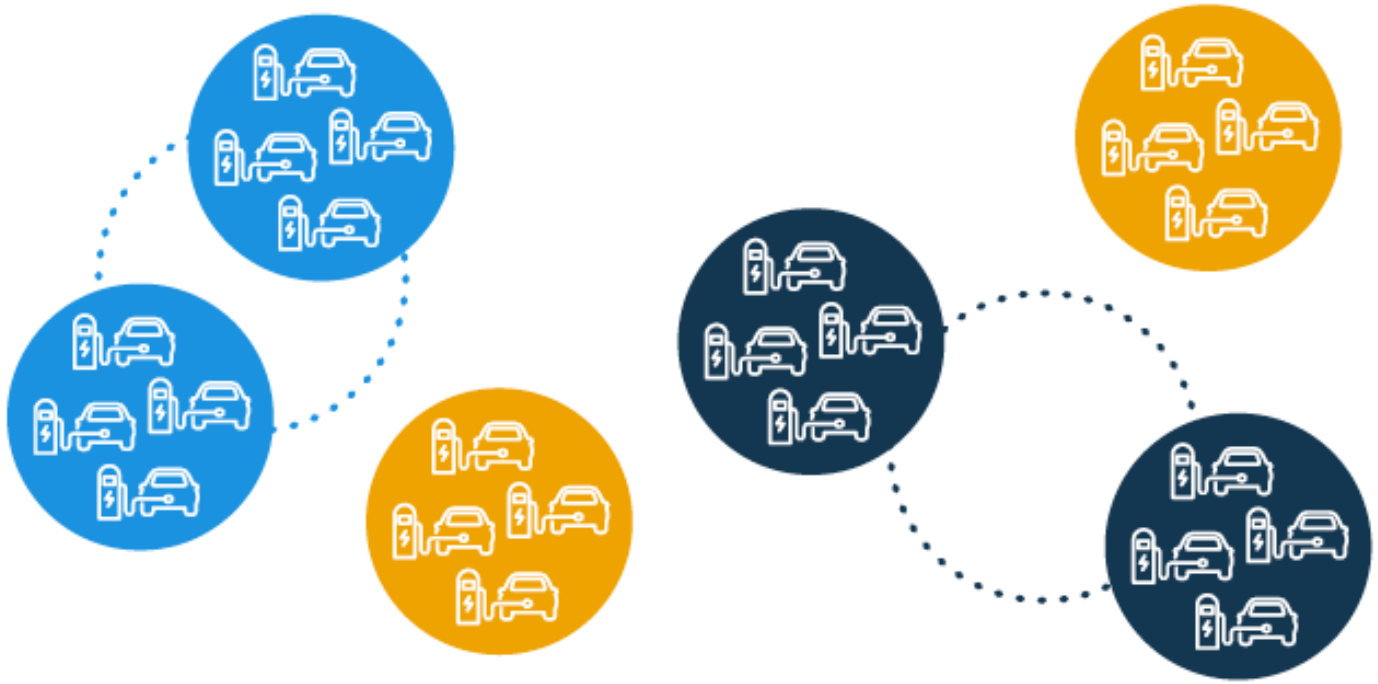
EV charging in Latin-America: Energy market topologies

Country	National & Vertical	Sub-National & Closed	Open Market
Argentina			■
Chile			■
Colombia			■
Costa Rica	■	■	
Dominican Republic		■	
Ecuador		■	
El Salvador			■
Guatemala			■
Honduras	■		
Mexico	■		
Nicaragua		■	
Panama		■	
Paraguay[19]	■	■	
Uruguay	■		

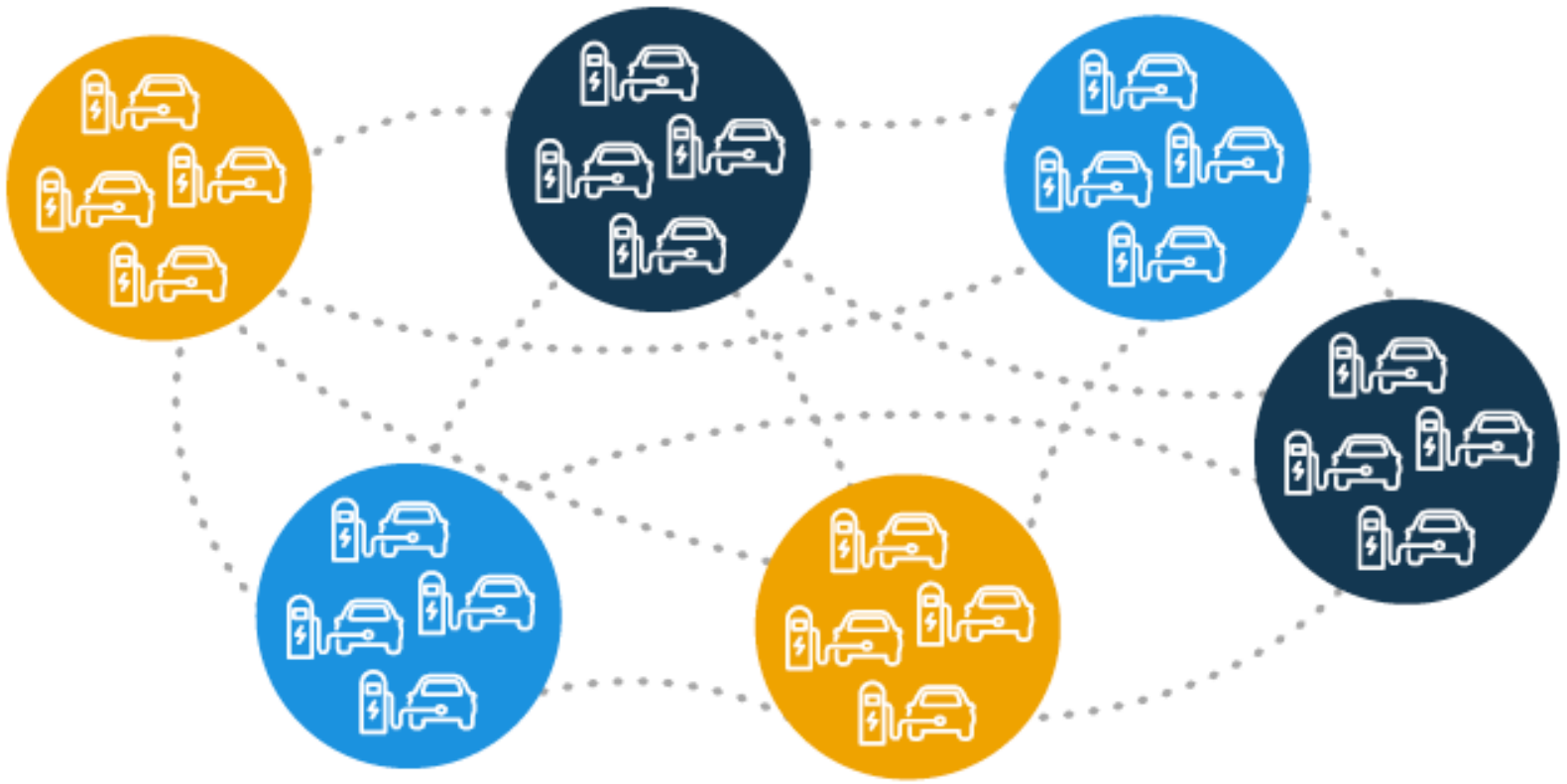
Charging in a closed energy market configuration



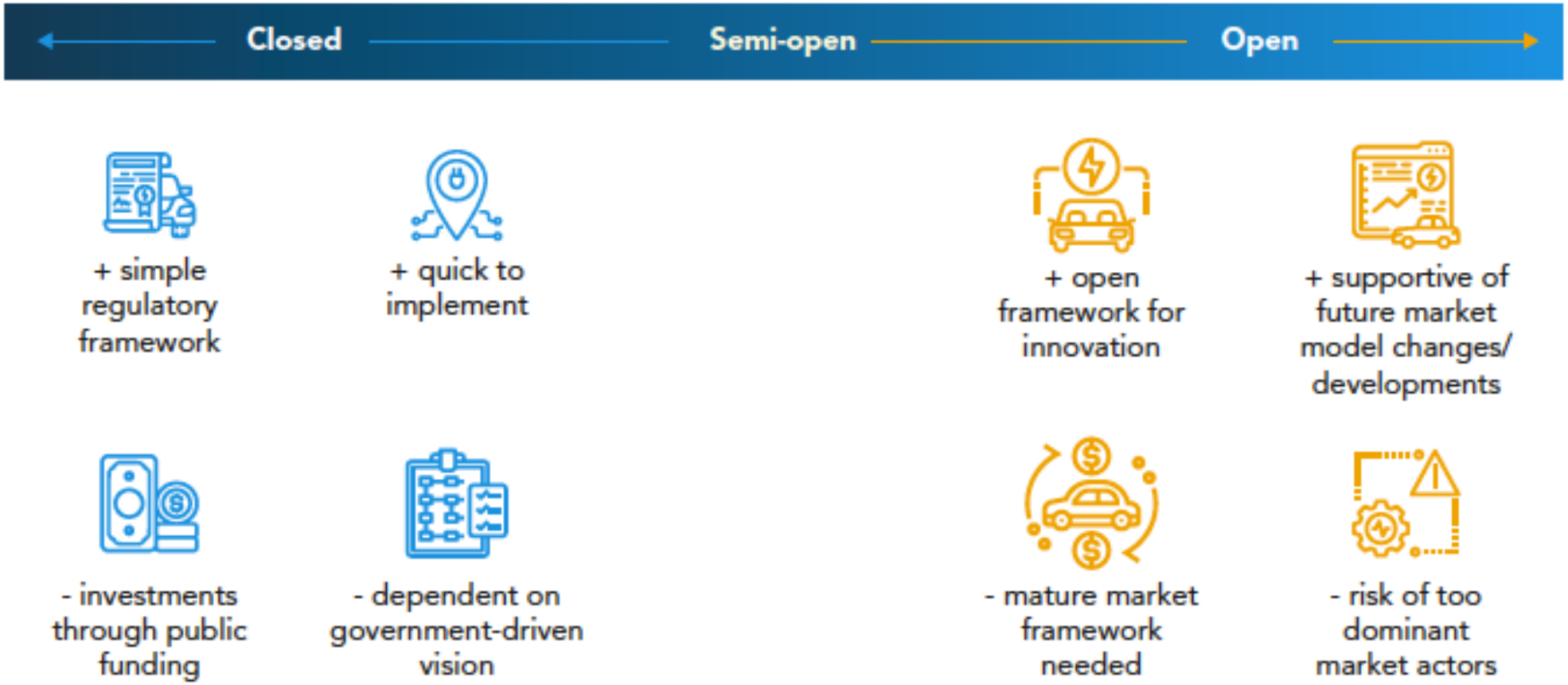
Charging in a semi-open energy market configuration



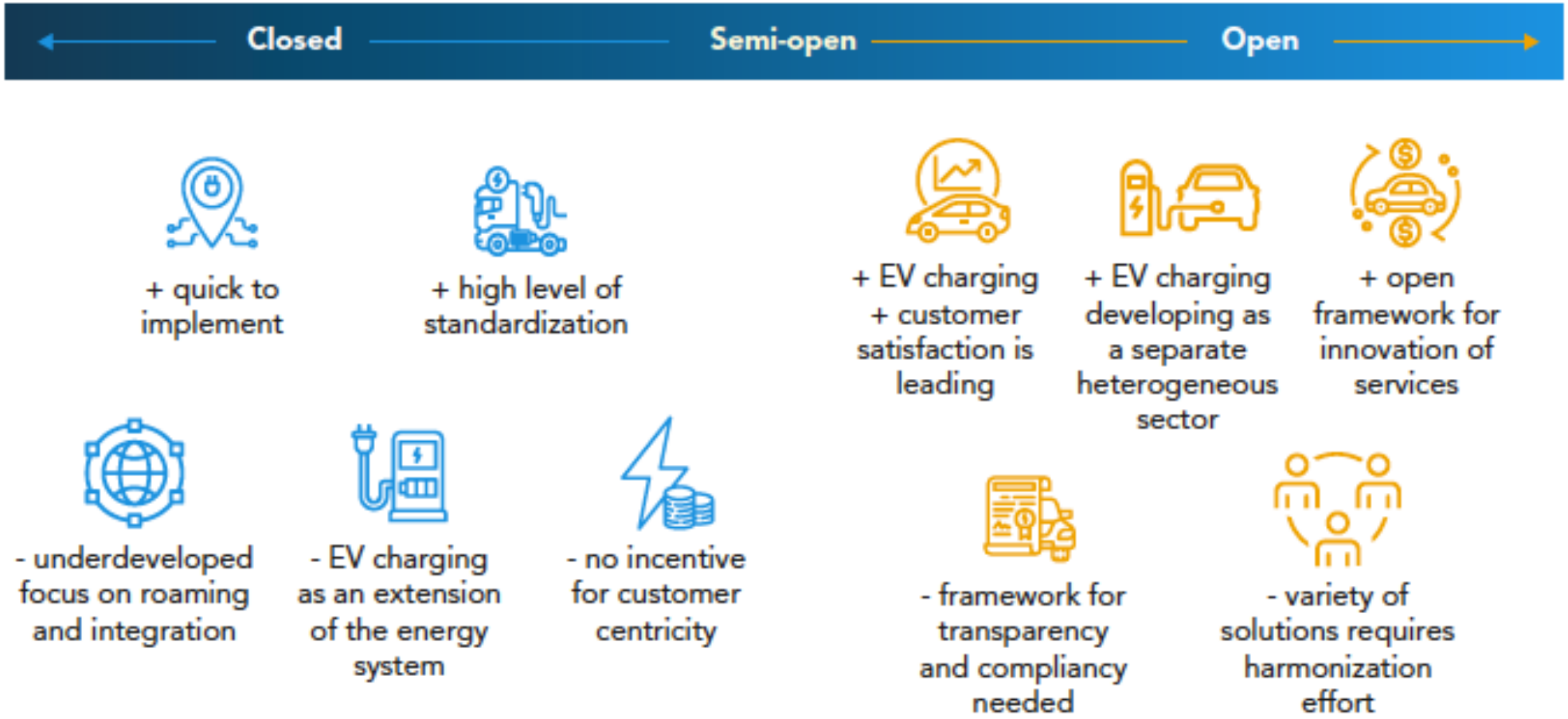
Charging in an open energy market configuration



Interoperability recommendations: Business layer



Interoperability recommendations: Service layer



Interoperability recommendations: Information layer

+ quick to implement

+ high level of standardization

+ development of information services as a separate business model

- connection with international developments

- often proprietary services and protocols in use that limit growth and diversity

+ Open, neutral protocols provide flexibility developing as a separate heterogeneous sector

Interoperability recommendations: Hardware layer

+ government sets a clear standard, allowing for long-term hardware investment

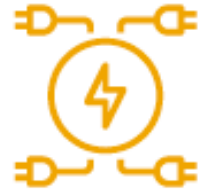
- hardware interoperability is confined to national borders

+ market standards are adopted that are supportive of future developments

- too much flexibility in hardware standards may hamper customer centricity

Summarizing…

- Interoperability is a well-established property of mature ecosystems in adjacent sectors
- There is a strong relationship between the energy market configuration and the market design of EV charging services
- The starting point for developing an EV charging market is therefore different per country
- The layers of interoperability support an integral approach towards interoperability, and are useful to address specific measures and interventions for a specific situation





Thank you !

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