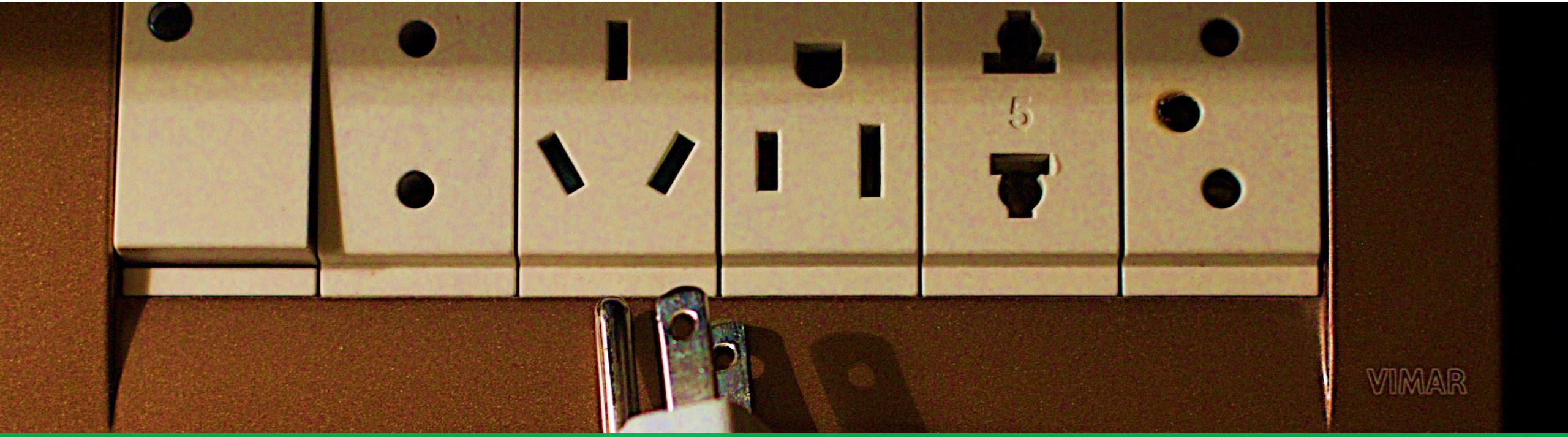
e-MOTICON

e-MObility **T**ransnational strategy for an **I**nteroperable **CO**mmunity and **N**etworking in the Alpine Space.

Training « Interoperability»

European Regional Development Fund



CONCEPT AND DIFFERENT SOLUTIONS FOR INTEROPERABILITY AND ROAMING

THE CONTEXT

In the last ten years, e-mobility experienced an extremely important growth, passing from a “niche” solution, to an actual alternative for drivers and a promising industrial opportunity.

Despite that, analysing the current situation in the Alpine Space it is possible to observe that the overall “framework” is still inadequate to allow a rapid and remarkable diffusion of electric vehicles in the short period.

AN IMPORTANT ISSUE

Infrastructure availability and accessibility
More than 10.000 charging stations are today installed in the Alpine Space. The number itself is starting to be significant and the service provided to EV users could potentially be satisfying.

Nevertheless, the uneven localization and the adoption of multiple business models and systems to access/pay, sensibly limit the possibility to use the charging network, still generating “range anxiety” feelings for the drivers.

AN IMPORTANT ISSUE

Infrastructure availability and accessibility

By the side of “physical” access, the e-CS are becoming more and more standardized and easy-to-use, being mostly equipped with the so-called “Type 2” plug/connector for AC charging and with “Chademo” and “CCS Combo 2” connectors for DC charging. The issue of plug/socket incompatibility, very critical in the first years of e-mobility development, is now becoming solved and cannot be considered an “open point” anymore.

More critical, instead, is the aspects of access and payment…

AN IMPORTANT ISSUE

In the last years, the choice of the technical mean to access the charging station and of the payment method and related business model was completely in the hands of the charging point operators (or e-mobility service providers). Considering that hundreds of providers exist in the Alpine Space is easy to understand how variable and multifaceted the situation can be with regards to access and payment systems.

Despite the current effort in “connecting” the different networks, looking for “interoperability” and “roaming”, it is still extremely common to have many networks in the same area, each based on different access methods and on the need to enter into contracts with the providers.

This can create significant hurdles to EV drivers, which would be forced to sign many contracts or, on the other hand, to choose only one provider and to use only a small part of the overall number of charging stations. This situation, already critic in a small area, can become a real barrier when crossing borders and moving to other countries…

AN IMPORTANT ISSUE

Despite the good number of installed e-CS, EV drivers still have to carefully plan their travels in the Alpine Space, gathering information both on the localization and the access/payment method of the needed charging station.

These difficulties undoubtedly slow down e-mobility diffusion in AS countries.

The possibility for the customers to access the EV charging infrastructure in a seamless and valuable way and receive transparent information for service payments is often referred to as **Interoperability**, although the word itself can include different meanings and several aspects…

LET’S BE INTEROPERABLE!

WHAT IS INTEROPERABILITY?

IEEE Standard Computer Dictionary:

“the ability of two or more systems or components to exchange information and to use the information that has been exchanged.”

Even if not referring directly to e-mobility, this definition clarifies the existance of two main aspects of interoperability:

- The ability of two or more systems to exchange information
- The ability of those systems to use the information that has been exchanged

Smart Grid Coordination Group:

“the ability of two or more networks, systems, applications, components, or devices from the same vendor, or different vendors, to exchange and subsequently use that information in order to perform the required functions”

e-Mobility Information and communications technology Interoperability Innovation group (eMI3):

“the ability to enable various systems to work together”

For the e-mobility market:
“Interoperability leads to non-discriminatory e-mobility services, such as charging and navigation, and makes it available throughout a defined territory without limitation and with a coherent service quality level at an optimized price”

From customers’ point of view:
“Interoperability is the ability to use the *Electric Vehicle Charging Infrastructure* wherever it is located, whichever EV the customer uses, whoever operates the charging point.”

From an operator point of view:
“Interoperability is the ability of an e-mobility service provider to deliver its own services to its customers, using the infrastructure of any charging operator under the umbrella of a B2B relationship at negotiated prices”

e-MOTICON partnership:

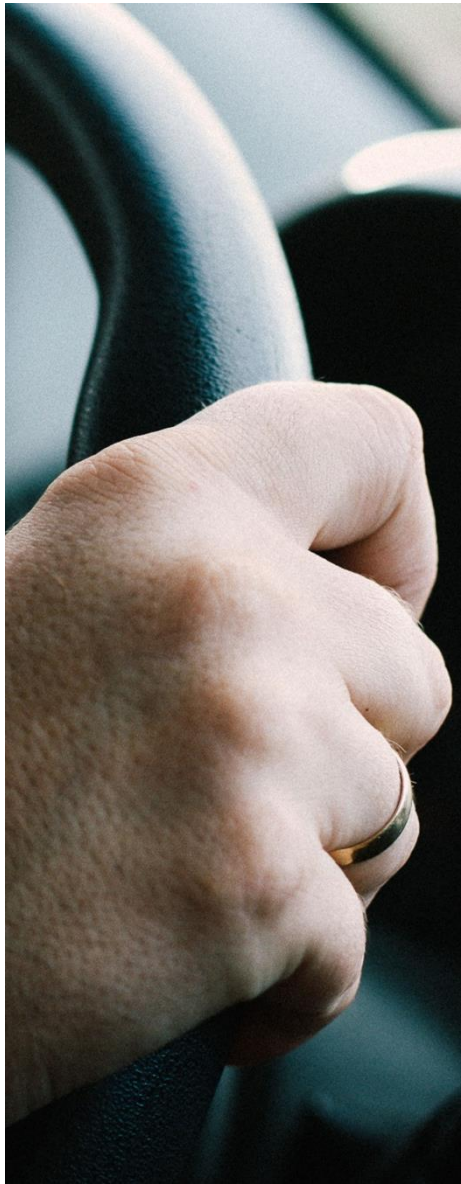
“a characteristic of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, in either implementation or access, without any restrictions”

THE USER PERSPECTIVE: INTEROPERABILITY AS A FUNCTIONALITY ISSUE

“the ability to access to all the charging points without restrictions, or discrimination”

More in detail, the final user needs 5 functions:

- Finding
- Informing
- Reservation
- Payment
- Roaming



FINDING

FINDING

The need to find a charging station while driving or while planning a trip is a common issue for any EV driver in the Alpine Space. Nowadays, different solutions are co-existing:

- mapping tools provided by each e-mobility service provider, listing their own infrastructure via web or via mobile-app;
- mapping tools provided by car manufacturers and available on vehicles navigation systems;
- mapping tools provided by third parties (mainly private companies or no-profit organizations), collecting data of multiple service providers also thanks to crowd-sourcing;
- mapping tools provided by networks of operators linked through “roaming platforms” (e.g. Plugsurfing, Hubject or Freshmile).
- official national mapping tools provided by Ministries or National Istitutions.

FINDING

None of the existing solutions yet represents the perfect answer to EV driver's needs, as they commonly include only a partial representation of the complete infrastructure or partial/not verified information. Most of them also lack "real-time" information.

e-MOTICON partners agree that the best way to obtain a complete and reliable mapping tool is to create an official "National Register" and to compel each operator to provide real-time data of their infrastructure, at least with regards to publicly accessible EV charging points.

These national databases will provide EV drivers with the location of the charging points and possibly indicate whether they are free or occupied, out of order, or momentarily not accessible, for each country in the Alpine Space.

e-MOTICON partners agree on the need that PAs, both on a local and a national level, highlight the importance of this issue and put some political pressure on National Bodies responsible for the realization of the National Registers

INFORMING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INFORMING

Besides the location of the charging stations, EV drivers also need to find other important information:

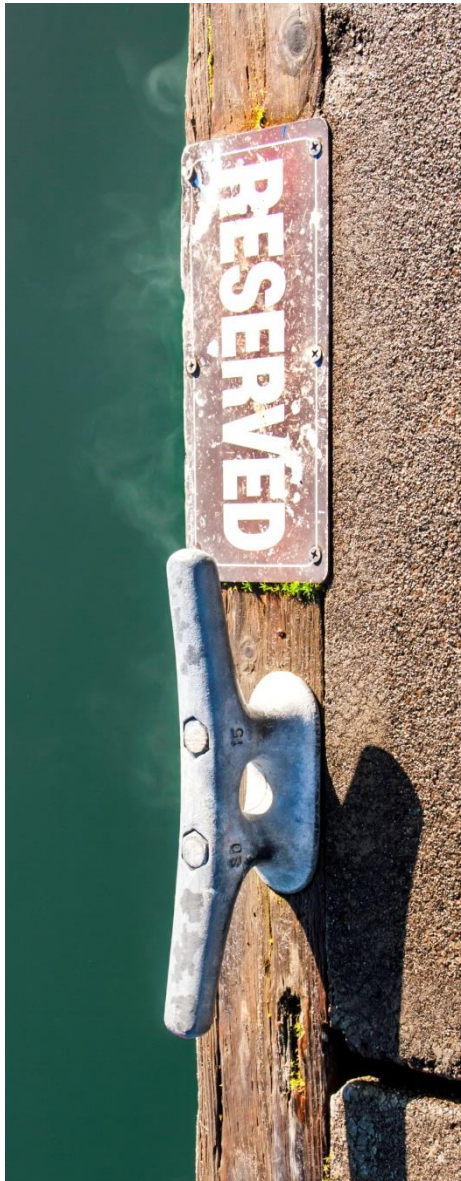
- Authentication and identification methods;
- Payment methods;
- Opening times;
- Available charge-solutions (Power, Modes of charging);
- Charging connectors (plugs, sockets, …);
- Real-time availability (available, out of order …);
- Occupation status (free, occupied, …);
- Price of the charging service;
- Contact details of the operator/owner of the E-CS
- Directions of how to get to the E-CS/Tips for locating, if the charging infrastructure is difficult to find
- If necessary: costs for parking at the E-CS (parking fees)

INFORMING

The information should be provided not only in the local language but also internationally understandable (in English) in order to provide information about the charging infrastructure also to foreign EV drivers (e.g. tourists).

All important information must also be provided on-site at the charging station (e.g. signage of the charging station and the associated parking lots, authorization and payment methods should be found directly at the charging station, etc.).

RESERVATION

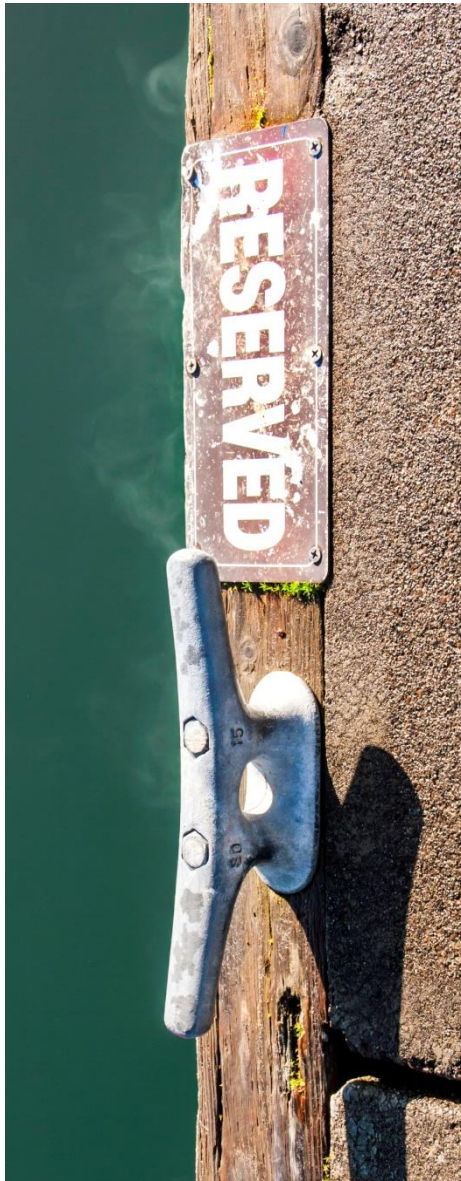


RESERVATION

The users should be able to easily reserve the charging station via app or via website.
If a charging point is reserved by a driver and is therefore “blocked” for other users, the driver should be able to easily recognise the corresponding charging point/plug booked especially at a site with many charging points.

Today, some platforms in Europe (as for example Freshmile) give the possibility of reserving a charging point through the payment of a fee via App or website, without the need of prior enrolment and thanks to an activation code to use upon arrival.

More commonly, the possibility of reserving a charging point is offered by the provider exclusively to its customers, using a dedicated app (normally including both the mapping tool and the reservation option). In this case, the possibility to “reserve” a charging point is considered as a “premium” service for the customers.



PAYMENT and ROAMING
…the hot topic!

A BIG ISSUE…

The issue of access, identification and payment is today one of the biggest open points with regards to EV charging infrastructure. Even if most of the charging processes will probably happen at home through domestic apparel, the possibility to charge on public stations while traveling long distances is indeed a key enabler for e-mobility diffusion. And to perform a charging process, a procedure of access, (identification) and payment needs to be executed.

The complete absence of regulation on this aspect (especially till the AFI Directive) generated a proliferation of different solutions and technical means to perform these phases.

Due to this, it is still extremely common to have many networks in the same area, each based on different access methods and very often on the need to enter into contracts with the providers. EV drivers would so need to plan very carefully their trips, actually studying their possibilities to access to one or another part of the infrastructure and considering the time and effort to sign up to different schemes and services.

The difficulties increase when crossing borders and moving to other countries.

TWO POSSIBILE SOLUTIONS…

In order not to hinder the drivers' experience, and therefore the EV market development, it is crucial to simplify this process and to make sure that drivers can easily access to all charging points.

Two main solutions have been proposed in the last years and are presented in the remainder of this training course:

- "Ad-hoc" access, according to 2014/94/UE;
- Roaming among e-mobility operators.

THE «AD-HOC» SOLUTION 1/4

The already mentioned 2014/94/EU, AFI Directive states that:

"All recharging points accessible to the public shall also provide for the ***possibility for electric vehicle users to recharge on an ad hoc basis without entering into a contract with the electricity supplier*** *or operator concerned."*

Ideally, that means that to access and use *any* charging station it would be sufficient to reach it and to follow the instruction to launch the charging process, without worrying about who is the owner and who is the provider.

In practice, the fact of avoiding a "contract" considerably simplifies the usability, but still some effort could be required to the driver, depending on the technical solution chosen to provide the "ad hoc" access. On the other side, the need to provide a compulsory alternative to classic "contract based" solutions, could create a cost increase for the e-CS operators, which could be critic especially for "low usage" charging stations.

The still open challenge is to identify the best methods which are both customer friendly and cost effective for operators.

THE «AD-HOC» SOLUTION 2/4

- The simplest solution for the driver is to use something that he already possesses and commonly uses, without the need to download nor fill-in anything:
  - **Money**
  - **Credit/debit cards**
  - **SMS**

A reference example for this kind of access/payment systems are the machines commonly installed in self-service fuel stations or in big parking lots, which include both the possibility to use cash and credit/debit cards. Given the low economic volume of each transaction for EV charging, these systems are addressed as too expensive by the operators, both as capital and operational costs. The use of money, in particular, requires efforts to physically recollect it, while credit card readers could suffer from high costs both for the equipment and for bank transactions. The SMS, despite being quite used in some countries, are suffering from being linked to an "old" technology and from being often unusable by travellers from foreign countries.

An interesting innovation on this field is coming from the diffusion of NFC technology, allowing **"contactless" payment**. The cost of credit card contactless readers is lower than the one of traditional "POS" and they also allow payment with "mobile-based" payment solutions as Apple pay or similar by Samsung, Google and other providers.

THE «AD-HOC» SOLUTION 3/4

- Slightly more “complex” for the user but also more innovative is the possibility to pay through **“mobile based” solutions** that works not on NFC, but on **“peer-to-peer” or “peer-to-business” money transfer**. Many examples are starting to spread, based on the possibility to have a personal “wallet” connected to the bank account and to transfer money to other users simply entering their phone number or scanning a QR code.

  The number of Apps and services providing this possibility is continuously increasing, including both smaller players (Satispay, Jiffy, QRpay,…) and well-known societies (PayPal, Facebook, Google, international banks,…). The advantage for the user is the ability to pay with the only requirements to have a smartphone, an internet connection and one single app for all the networks.

  By the operator point of view, it would be possible to avoid any “card reader” at the e-CS, replacing it with a simple QR code. Some transaction costs could anyway be applied by the “payment providers”.

THE «AD-HOC» SOLUTION 4/4

- A third option, also based on a **QR code**, is the one actually proposed by some European providers (e.g. Freshmile). In this case, the QR code is not directly used to perform the payment, but is used as a **link to the website** of the e-CS operator, where drivers can activate the charging and pay by their credit cards. This solution can guarantee a small cost for the operators (no card readers) and implies a medium effort by the user, which needs every time to access the website and perform a typical on-line payment, providing its data. No download is anyway required by this solution.

- Probably the preferred solution by the operators, but also the worse for the user, is the one becoming common in this period: paying using the **credit card through a dedicated app** developed by the service provider. Today, most of e-mobility service providers already have an app, used to provide services to their own customers, as well as to perform marketing. Given the “ad-hoc” requirement introduced by AFID, providers are progressively including in their app the possibility to perform the payment without entering into a contract with them. Despite completely fulfilling the AFI requirements, allowing access and charging to everyone, this solution could be not comfortable for the user, that would need, for any operator they come across, to download the specific app and (very often) to fill-up registration forms.

CONTRACT BASED SOLUTIONS AND ROAMING 1/5

The need for “ad-hoc” payment invites to parallel EV charging to traditional “refuelling”, performed as a “spot” service and accordingly paid “on-site”.

Another vision, very strong in the e-mobility field especially in the first years of development, considers EV charging as a “continuous” service that has to be provided to drivers, similarly to mobile phone services. In order to use this service, the best solution is to enter into a contract with a preferred provider and to pay periodically (e.g. monthly) after the emission of a comprehensive bill.

The selected provider will then propose different means to access the charging station and to be identified, from simple RFID cards/tokens to mobile-based solutions

CONTRACT BASED SOLUTIONS AND ROAMING 2/5

Considering this vision, where the driver is connected to a single service provider, to have access to the charging stations of different networks will require agreements and money compensations among the service providers.

There must be created a “roaming” scheme that allows customers of “provider A” to easily access and use the network of “provider B”, avoiding any contact with B and maintaining the normal billing system with A.

Again borrowing the mobile phone example, it’s the typical scheme of mobile phone services when travelling to foreign countries.

CONTRACT BASED SOLUTIONS AND ROAMING 3/5

The creation of “roaming” can happen through two main options:

- Bilateral agreements between providers;
- “Roaming platforms”.

In the first case, each operator must get in contact with all the others and define the technical and economical details of the roaming process. It is exactly the case of telephonic industry, where the low number of operators makes this scheme feasible.

Given the high number of operators in the e-mobility field, this scheme would need thousands of B2B contracts and is progressively being abandoned, in favour of the second option.

CONTRACT BASED SOLUTIONS AND ROAMING 4/5

The so-called “roaming platforms” are digital platforms that works as “market place” and enable mobility operators to easily build partnership among them. In practice, by connecting to the platform, one operator includes its charging stations into a broader network, allowing its own customers to use the e-CS of all the other connected operators.

The platform itself is able to perform “clearing” services, managing the billing process and the economic compensation among operators. No direct contacts or agreements are therefore needed among operators. As a payment for the service, a fee is required to each operator, which can be fixed as a percentage of the transaction, as a periodic fee or as a “registration fee” depending on the platform.

Today in the Alpine Space a few number of roaming platforms exist, with different sizes. In particular, two German platforms (Hubject and Plugsurfing) have reached a remarkable dimension, becoming the first examples of “international platforms”, together with the French Gireve and Freshmile. The number of operators connected to these platforms is continuously increasing, even if the cost for the operators can be considerable.

CONTRACT BASED SOLUTIONS AND ROAMING 5/5

It has to be noticed that practically putting in place this scheme is not trivial, as it requires a thorough communication among operators and the sharing of sensitive amounts of data, expressed with a common protocol.

A first challenging issue is to identify and agree upon the technical requirements needed to make the system fully operational across Europe, in this “roaming” vision. Among others, the following requirements need to be considered:

- Equipment of charging points with communication capability to be able to share dynamic data and commercial information.
- Adoption of common protocols for roaming between commercial entities and between charging Point and Software Backend.
- Standardization of the ID handling and setting up of a European framework for these commercial entities IDs (Service Provider ID, Operator ID).
- Identification of a single technology for RFID access.

E-MOTICON suggestion on PAYMENT and ROAMING

E-MOTICON SUGGESTION AND POINT OF VIEW

Within the project development, many debates and discussions were carried out about the issue of access and payment, directly related to interoperability and roaming. The analysis of the actual situation in the Alpine Space (and in all Europe) and the practical experience of both the PAs and the operators involved in the discussion, led to identify the following key points, agreed by e-MOTICON partners:

1. “Ad-hoc” acess/payment systems will have to be present in all the charging stations, as required by law. This, coupled with a reliable mapping system, will guarantee a total and immediate accessibility to the complete network installed in the Alpine Space.
2. The technical solution chosen to perform the ad-hoc payment should carefully consider both the additional cost for the operator and the comfort for the user. It is suggested to look for the most up-to-date technologies, as mobile-based universal payment solutions, avoiding the need to download specific apps or fill-in complex registration forms.

E-MOTICON SUGGESTION AND POINT OF VIEW

3. E-mobility service providers can maintain the possibility to offer “contract-based” solutions to their customers, including premium services or special rates. What merits special attention is that the deployment of the contract-based systems is done in good harmony with the “ad-hoc solution” and without unnecessary duplication of efforts and costs. The prices must be fair in both cases.
4. In order to allow wide network accessibility to their customers, e-mobility service provider are suggested to adopt a “roaming” scheme, at least on a local level. The use of a roaming platform (and of which one) is a free choice of the providers.
5. It will be interest of e-mobility service providers to look for agreements on technical solutions and standards needed to perform roaming (e.g. OCPP, different RFIDs, common ID handling,…).

E-MOTICON SUGGESTION AND POINT OF VIEW

6. EV drivers will be free to judge whether the contract-based service is in line with their usage patterns and expectations, and then decide if they want to go through the expense of purchasing it or if they want to simply perform charging with ad-hoc payment.
7. All the charging stations must be equipped to have comprehensive connectivity, essential to fulfil access/payment procedures both in “ad-hoc” and in “contract based” schemes.
8. As the access/payment process could require the exchange of a sensitive amount of data, it is recommended to put a particular care in “protecting” the drivers, developing/applying an effective privacy legislation and providing user education about this issue.

THE OPERATOR PERSPECTIVE: INTEROPERABILITY AS A TECHNICAL ISSUE

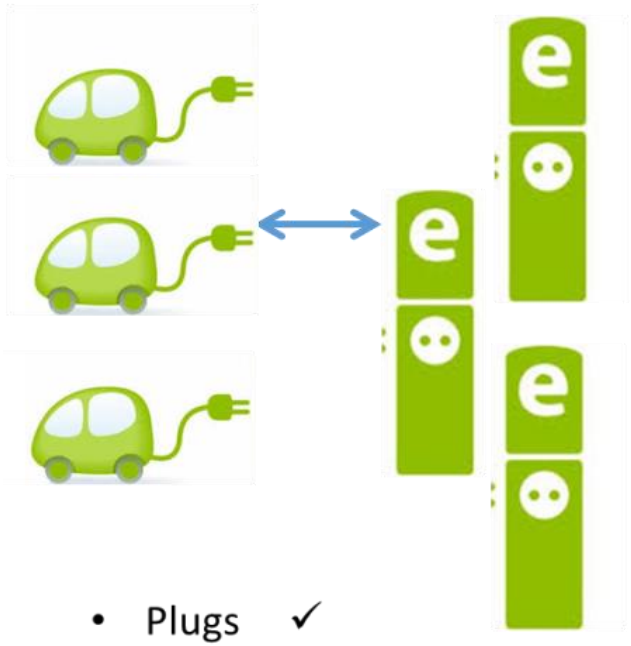
In order to obtain an “interoperable” charging infrastructure, there are some key technical issues that need to be considered.

In the first years of e-mobility deployment there was a lack of rules on these technical aspects and often different networks were not compatible to each other (in other words, not interoperable), with the result that the first owners of electric vehicles had difficulties in accessing different charging systems.

In the last years, many aspects have been standardized, but still some technical issues are open or not completely solved, from an operator perspective.

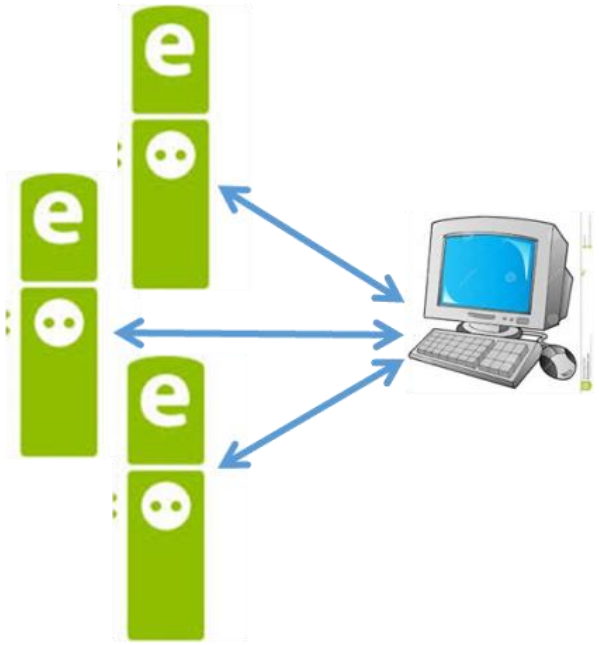
FOUR “AREAS” AND FOUR “INTERFACES”

EV- e-CS



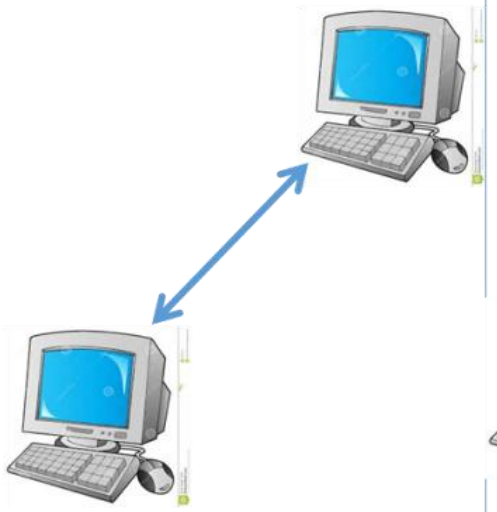
- Plugs ✓
- Identification ✓
- Charging management) ✓

e-CS - Backend



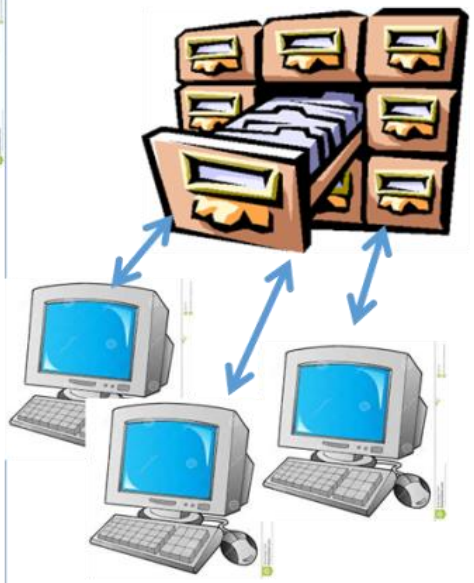
Open issue:
Proprietary protocols or OCPP??

Backend - Backend



Open issue:
Roaming??

Backend – National Platform



Open issue: all countries??

1. INTERACTION BETWEEN THE CAR/USER AND THE CHARGING STATION

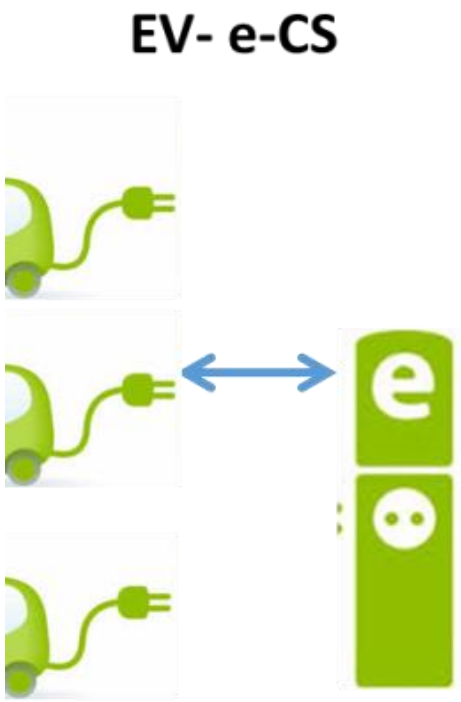
Issue of Plugs/Connectors

The topic of plugs/connectors was highly critical in the past years, but was solved with the already mentioned Directive 2014/94/EU.

In Annex II, it establishes that the recharging points for EVs (from 18 November 2017), shall be equipped, for interoperability purposes at least with:

- *Normal power recharging points in AC:*
  - *Type 2* sockets/outlets as described in standard EN 62196-2.
- *High power recharging points:*
  - *Type 2* vehicle connectors as described in standard EN 62196-2 *for AC charging*
  - *Combined charging system 'Combo 2'* as described in standard EN 62196-3 *for DC charging*

AFID does not cover the field of L-category motor vehicles for which different standards are still adopted across Europe (e.g. Schuko socket-outlet in Germany and Type 3A in Italy).



Plugs ✓
Identification ✓
Charging management) ✓

1. INTERACTION BETWEEN THE CAR/USER AND THE CHARGING STATION

Identification/authentication

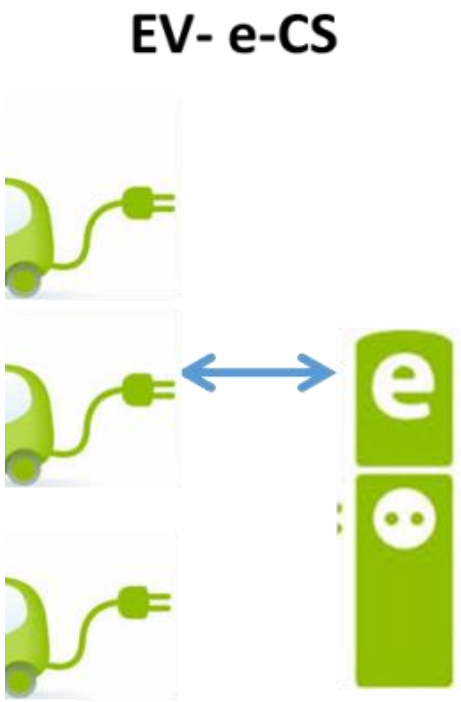
The process of charging in publicly accessible infrastructure begins with the identification-authorisation phase. This phase can be not uniform, due to different technological solutions chosen by different CPOs/EMPs, and this makes the issue of identification still open.

There are two main specific media for the identification/authorisation of the driver accessing an E-CS:

- Local authorisation, commonly thanks to a RFID card;
- Remote activation, mostly done by the EV driver thanks to an App, a SMS or other.

The RFID card technology has many different versions and has been introduced during the initial phase of the setting-up of the charging infrastructure; it is anyhow still very widespread. To increase the technical interoperability, it is really important to adopt a common technology for RFID identification. This implies the harmonisation of access interfaces in terms both of:

- RFID cards
- RFID readers (e.g. able to support both MiFare and Calypso versions)



Plugs ✓
Identification ✓
Charging management) ✓

1. INTERACTION BETWEEN THE CAR/USER AND THE CHARGING STATION

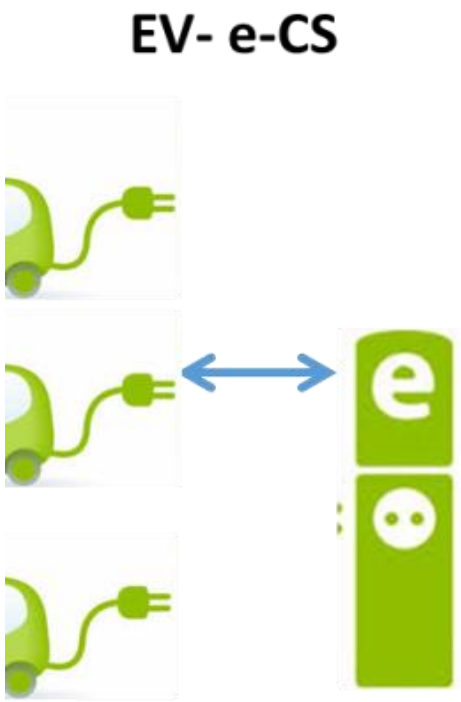
Charging management

To operate the charging process itself, intended as the flow of energy by the grid to the car, some specific standards need to be followed. These are today well known, and no issues should arise, till new kind of charging procedures will come up.

More in particular:

- AC charging:
  - Communication EV-EVSE: PWM according to IEC 61851-1 (mode 3);
  - Plug/connector: IEC 62196-2 Type 2
  - AC electric vehicle charging station: IEC 61851-21-1
- DC CCS Combo 2 charging:
  - Communication: PLC according to DIN SPEC 70121 (ISO 15118);
  - Connectors: IEC 62196-3 – Combo2
  - DC electric vehicle charging station: IEC 61851-23
- DC CHAdeMO charging:
  - Communication: CAN according to IEC 61851-24
  - Connector: IEC 62196-3 CHAdeMO
  - DC electric vehicle charging station: IEC 61851-23

Notice that in the near future EV-EVSE communication the standard ISO 15118 will be more widely adopted.



Plugs ✓
Identification ✓
Charging management) ✓

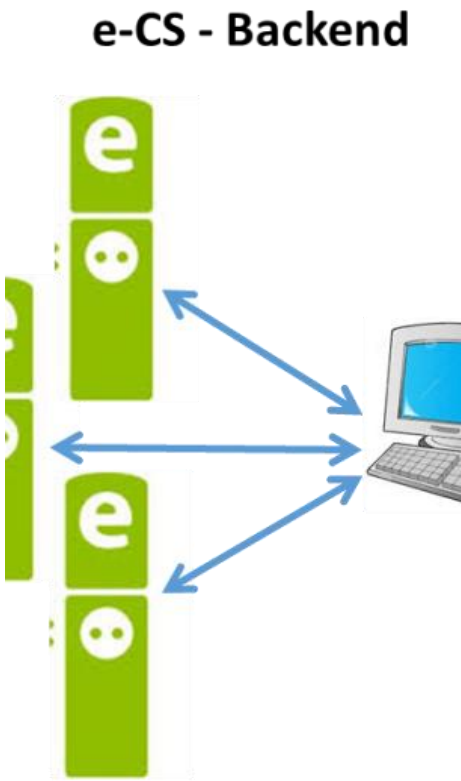
2. INTERACTION BETWEEN THE CHARGING STATION AND THE BACKEND SYSTEM

A common choice on protocols and formats to communicate with the backend system is still lacking, but is extremely important to ensure interoperability.

Currently many operators that offer the charging services and at the same time possess both the charging points and the backend use proprietary protocols.

As an alternative, a widely adopted protocol is the so-called OCPP (Open Charge Point Protocol) promoted by the consortium “Open Charge Alliance” (OCA). It is an open protocol used for the exchange of data and information between a charging point and the IT central system (backend). The adoption of OCPP permits any charging point of any manufacturer to be simply integrated by the backend.

In 2016 the communication standard IEC 63110 “Management of electric vehicles charging and discharging infrastructure” has been launched to standardise this aspect. The standard will most likely be similar in the scope to OCPP 2.0 standard.



Open issue:
Proprietary protocols or OCPP??

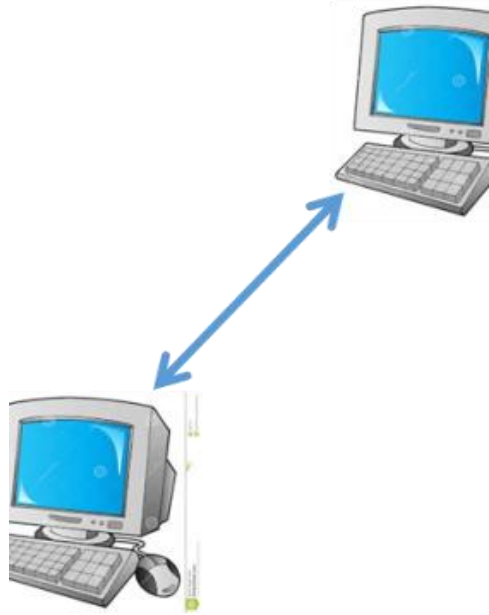
3. INTERACTION BETWEEN THE BACKEND AND OTHER BACKENDS

The interaction among different backends is crucial when a “roaming” scheme is set-up. In this case, in order to give EV drivers the possibility to charge their vehicles on charging points managed by different providers keeping a single contract, there is the need that the different ICT backend systems can exchange information directly or through a roaming platform.

Today, the communication backend-backend is still an open point; different protocols are available but there is the lack of an official choice. The adoption of a unique protocol in the short period will be essential to reach a complete interoperability and to enable roaming.

Examples of potential basic protocols are OICP (Open InterCharge Protocol) used by Hubject platform and OCHP (Open Clearing House Protocol) adopted by Ladenetz Platform. Through these protocols the individual networks communicate with each other to exchange user data and to take care of financial transactions.

Backend - Backend



Open issue:
Roaming??

4. INTERACTION BETWEEN THE BACKEND AND THE NATIONAL PLATFORM

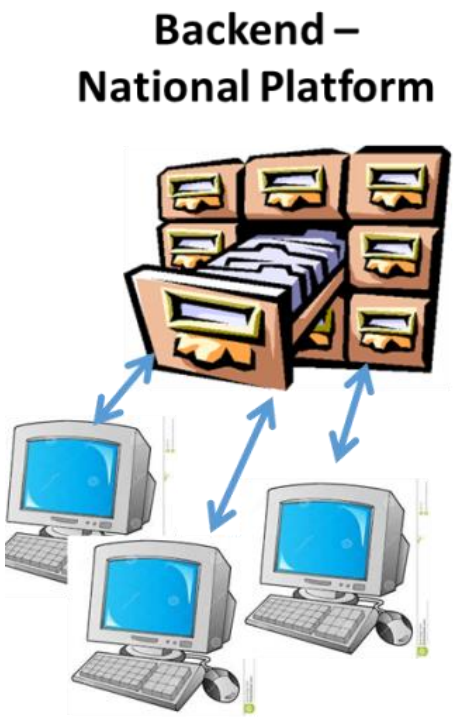
As already described in the “Finding” section, e-MOTICON partners agree that the best way to obtain a complete and reliable mapping tool is to create an official “National Register” and to compel each operator to provide real-time data of their infrastructure.

These databases in addition to static information (e.g. location of charging points) should possibly indicate also real-time data (e.g. whether the charging points are free or occupied, out of order, or momentarily not accessible).

Two aspects are still open on this issue:

- Which is the best format and protocol to be adopted in order to transmit data from CPOs/EMPs backend to the national database?
- How to urge CPOs and EMPs to provide dynamic data to the National database?

In some countries the Registers already exist while in many others, e.g. in Italy, the debate on these aspects is ongoing and official answers are expected by the Central Institutions in a medium-short period.



Open issue: all countries??

FINAL REMARKS: HOW TO BE INTEROPERABLE TODAY?

The main key points for the development of a European interoperable charging infrastructure, can be so summarized:

- Respect **compulsory standard** and, in particular, the requirements set down in the **Directive 2014/94/EU**;
- Ensure **connectivity**: the publicly accessible charging infrastructure has to be equipped with an internet connection;
- Guarantee **non-discriminatory usage of E-CS**: the charging infrastructure has to be open to the end user in a non-discriminatory way, through the **“ad-hoc access”** (no contract) and also through a **contract** with a service provider (potentially linked to an **e-roaming scheme**).
- Adopt technical and organisational solutions aimed to interoperability: for all the aspects that are still not covered by EU official requirements, the different players involved in the charging process should **avoid the adoption of proprietary protocols** choosing, instead, **open and already widely diffused solutions**.

Fostering interoperability through web-based payment via QR code

The E-CS operator Freshmile, along with other means, allows users with an internet link to launch and pay for the charge through online payment.

The corresponding web page is directly accessible via a label with a QR code stuck on the E-CS.

Advantages :

- Anybody with an internet access may use the E-CS : fully interoperable without any need to contract roaming agreements, no need for an RFID card or a specific app.
- No need to pay for a credit-card access for each E-CS, only one centralized system on the web site.

© Freshmile

Contact for the best practice:

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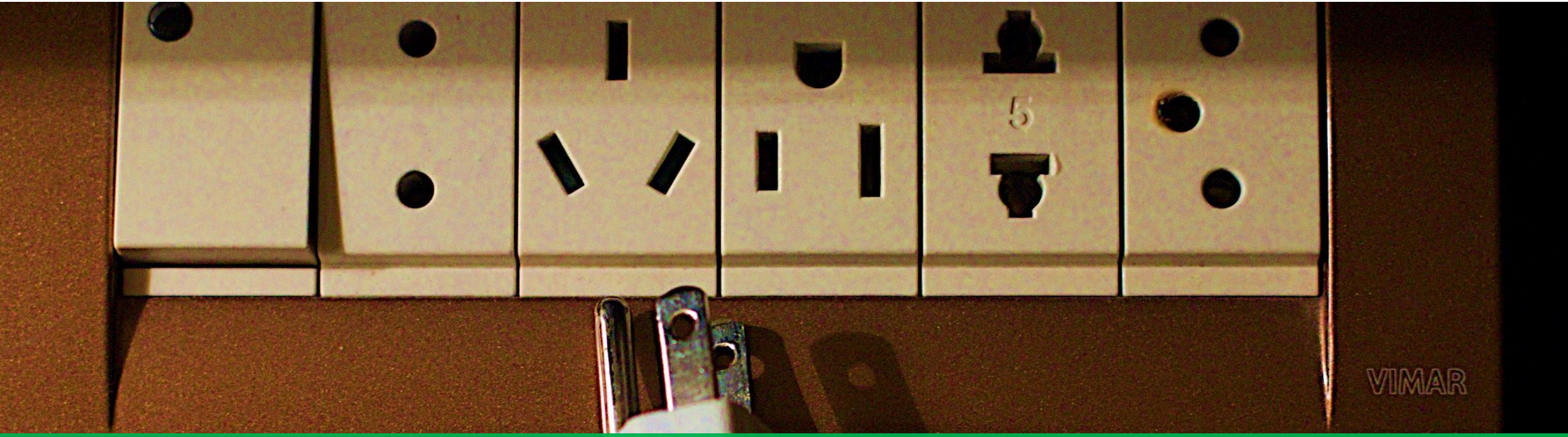
#interoperability



THANKS

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