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# Specifying Inter-Operation of Systems Toward Interoperability

**DiPS4EV@work – Integration Profiles for smart EV Charging**

**KLIEN – Zero Emission Mobility – 5<sup>th</sup> Call**

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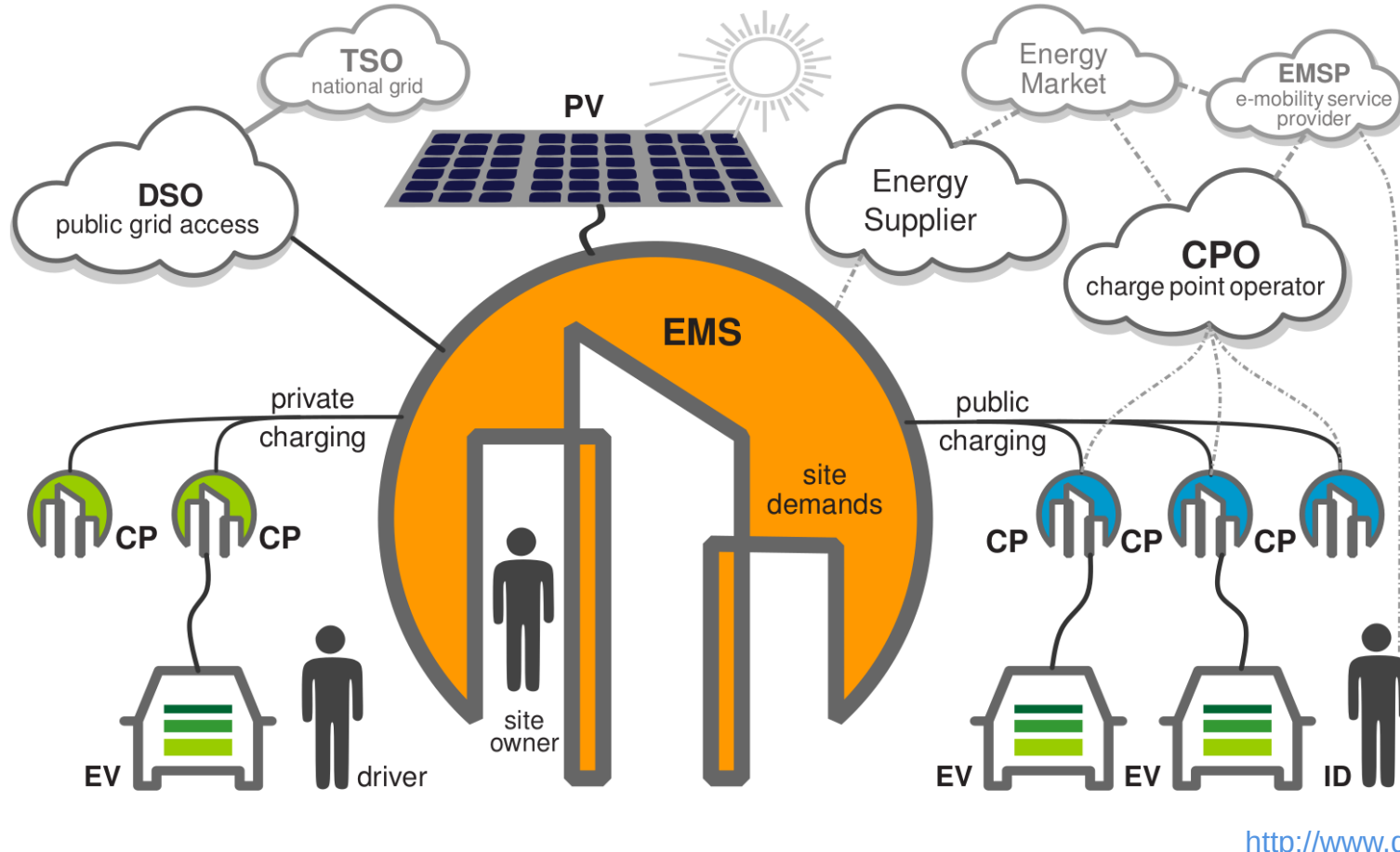
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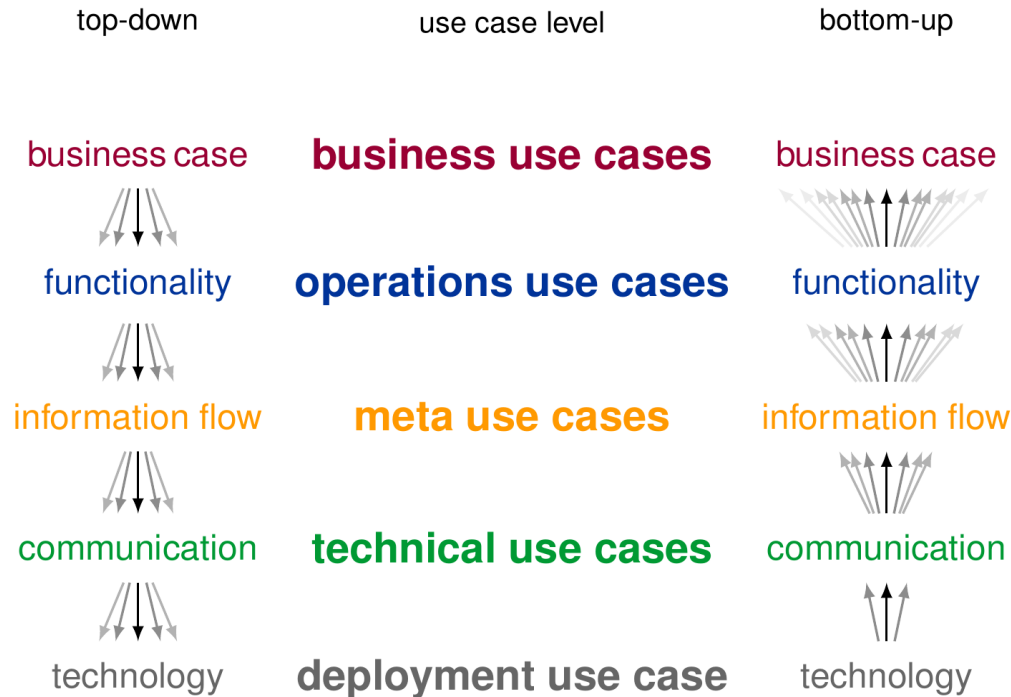
The presented work achieved financial support via the R&D project DiPS4EV@work, funded in the 5<sup>th</sup> call of the KLIEN Zero Emission Mobility program, managed by the FFG as project #899909. [www.dips4ev.work](http://www.dips4ev.work)

# DiPS4EV@work – Basic Scenario

- **business case** > meta use case > technical use case > requirements
- **subject needs** > process & interface needs > technical requirements



# Top-Down Specification of Needs



## Interoperability

cooperation capability of linked systems

## Legal (Business) Layer:

defines legal and economic constraints

## Operations Layer:

defines functional needs and processes

## Information Layer:

defines info needs, names, and meaning

## Communication Layer:

defines interfaces and data formats

## Implementation Layer:

defines plugs and transport channels

**System Inter-Operation needs are always Use Case specific  
only the fulfilment of needs can be generic (standardised)**



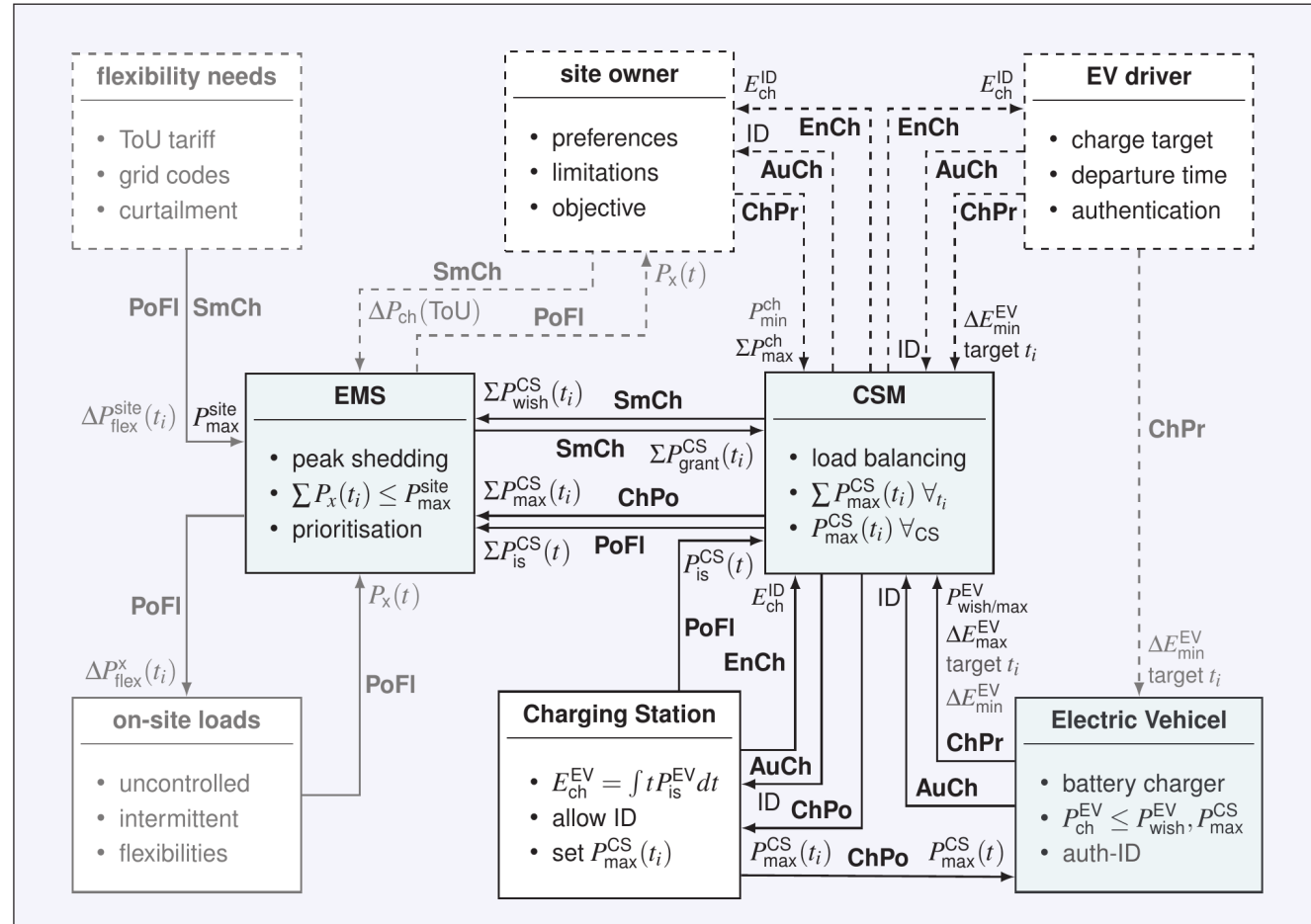
# Actors-Transactions-Diagram incl. Information Flows

## Business Use Cases:

- Billing
- Accounting
- Optimising

## Operations Use Cases:

- Get Charging Preferences  $\Leftarrow$
- Authenticate Charging
- Record Charged Energy
- Assign Charging Power
- Monitor Power Flow
- Smart Charging  $\Leftarrow$



# Integration Profiles – Specify Inter-Operation Needs

selected use cases:

## BEMS <> CSMS

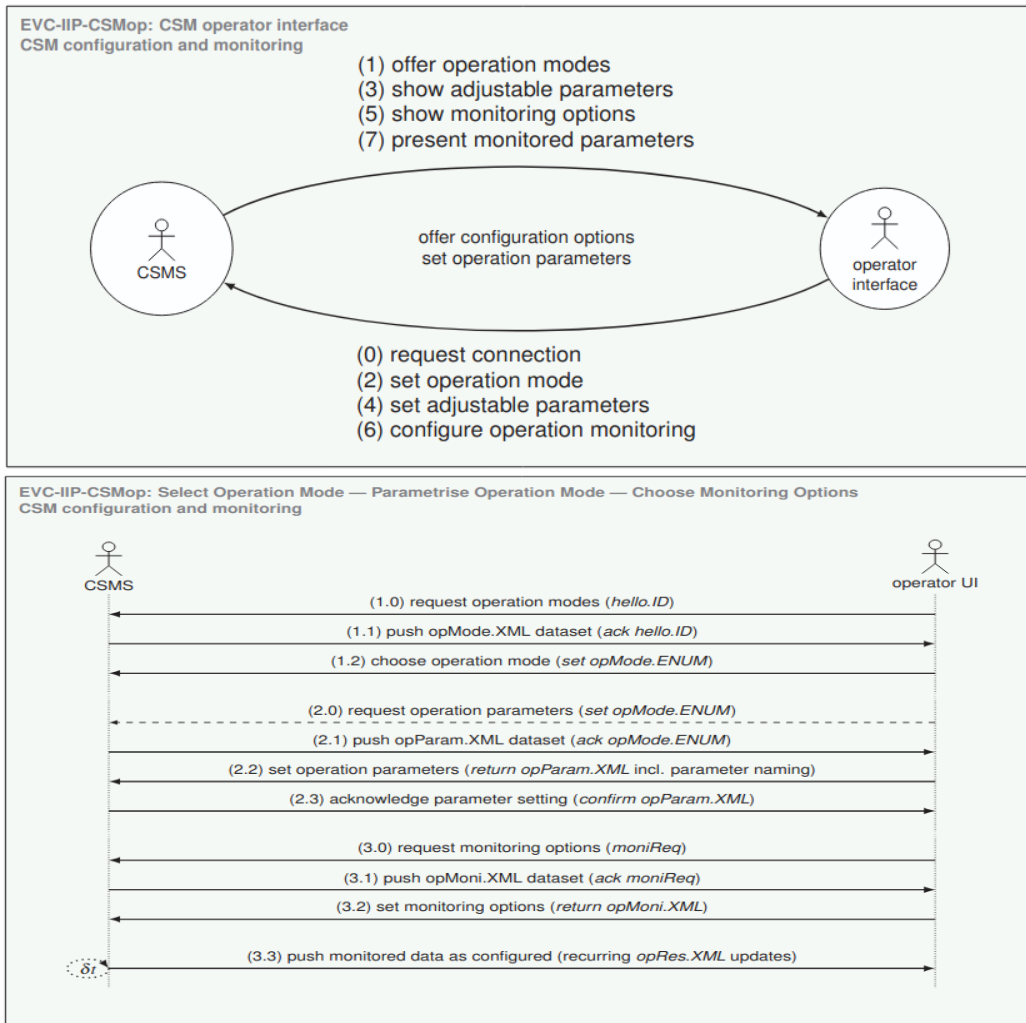
- coordination & cooperation

## Site owner UI

- set the optimisation aim

## EV driver UI

- state the charging demand



# Technical Framework on Electric Vehicle Charging



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EN 

Search

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## Classification

interoperability

integration profiles

smart energy systems

Following objects are referencing this object (3)



o:4529 Technical Framework on Electrical Vehicle Charging



o:3673 Technical Framework on Virtual Power Plant



o:3668 Technical Framework on Local Energy Communities

[Collection members \(5\)](#)

## Object links

Dublin Core  
University of Vienna  
Metadata

Show full metadata

## M3.2 Vol.1: Informative description of the inter-operation

Chapter 1: Domain Overview: description of **needs** and environment

Chapter 2: Description of the operational **functions** (operations use cases)

Chapter 3: **M6.1 Integration Profiles**: Hierarchic description of a **use cases**

## D6.1 Vol.2: Normative specification of transactions and actors

Chapter 4: **Transactions**: flow and content of messages, triggers, timing, ...

Chapter 5: **Actors** (modules): data, interfaces, encryption, authorisation, ...

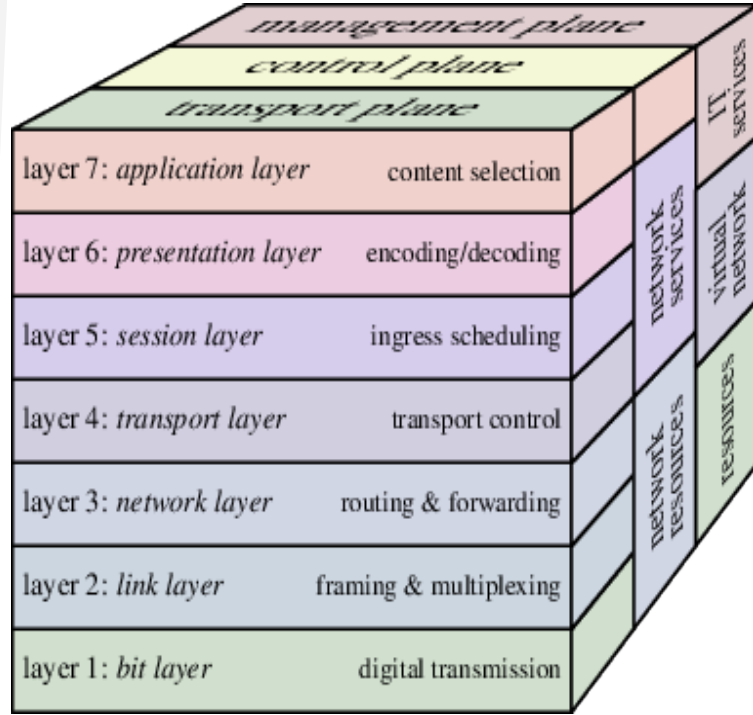
Chapter 6: **Solution Building Blocks**: formats, protocols, standards, ...

<https://door.donau-uni.ac.at/detail/o:3661>

TF-VPP / TF-LEC / TF-EVC



# Stack vs. Mesh of Standards



ITU-T X.200: The OSI model for digital communication  
(Open Systems Interconnection model)

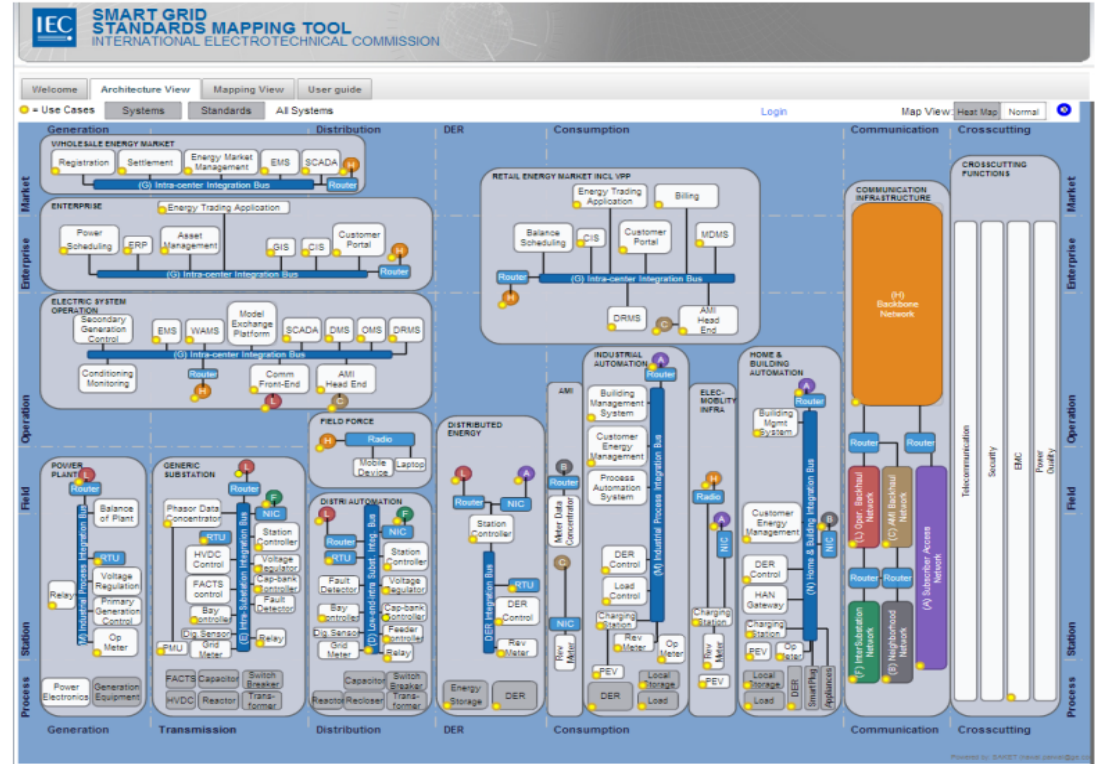


Figure 14: IEC Smart Grid mapping tool (Source: <http://smartgridstandardsmap.com/>)

**Layering => lower layer “serves” upper layer**

enables per layer **exchangeable solutions** => makes smooth innovation possible



# Standards can support innovation

- Standardising **digital interfaces and services** is the basis for the digitalisation but **does not guarantee interoperability** -> they **support the digitalisation**; but **reliable access** to **correct data** and **expectable responses** are difficult to assure.
- Interoperability covers:
  - legal** → what is allowed / enforced / needed
  - operational** → required quality / sequence / timing
  - semantic** → mutual interpretation of shared information
  - syntactic** → equal digital encoding / framing / encryption
  - technical** → same communication medium / channels / protocols
- Variety of stackable tools** (bricks) shall flexibly **support diverse Smart Grid services and use cases**
- Open<sup>2</sup> environment** (house) needed to integrate and support **technical and operational opportunities**



laws & regulations  
**operation** standards  
**ontology** standards  
**technical** standards  
best practice



*holistic or layered  
static or flexible  
where to go...*



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# Thank you!

...time for Q&A

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