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OpenADR in Europe (and other places)

June 27, 2023
Rolf Bienert

OpenADR Progression

Japan

Korea

Europe
China

Research initiated by LBNL/ CEC

Official OpenADR specification (v1.0) by
LBNL/CEC*

1. **DR 2.0 Pilots** and field trials
- Wholesale markets, ancillary services
- Dynamic pricing, renewable, EVs
- International demonstrations
2. **All end-uses and sectors**

OpenADR 1.0 Commercialization
(PG&E, SCE, and SDG&E)

OpenADR 3.0
in process

Pilots and field trials
Developments, tests (Utilities)

2002	to	2006	2007	2008	2009	2010	2011	2012	2013	2014	2018	2023...

EI 1.0 standards
- OpenADR profiles**

1. OpenADR Standards Development
   - OASIS (EI TC), UCA, IEC
2. NIST **Smart Grid**, PAP 09

OASIS

California

1. **OpenADR 2.0** specifications
 - International standards (**IEC**)
 - **OpenADR 2.0 products/deployments.**
2. **USGBC** national pilots
3. **Codes** (CA T24)

USA

IEC

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1. Foster Adoption
2. Test/Certify (v2.0)

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European Market in general

- Largely unbundled, as per EU regulation
  - Generation
  - Transmission System Operators
  - Distribution Network Operators
  - Retailers
  - Independent Aggregators
- Uneven access of DR to market mechanisms
  - Varies by country, much as it does by RTO in the US
  - Technical requirements are often still aligned with traditional generators
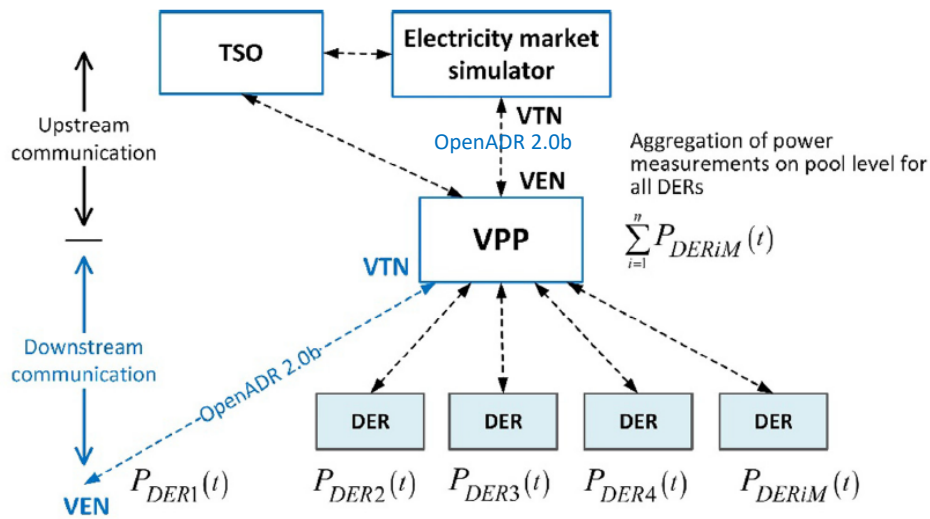 - Stronger focus on aggregation for TSO markets
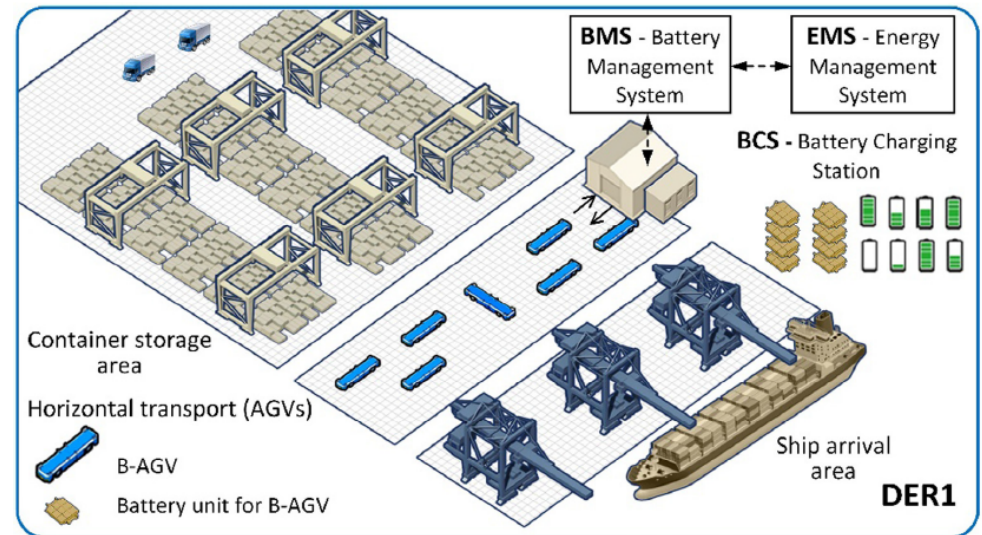
A long long time ago – Pre COVID
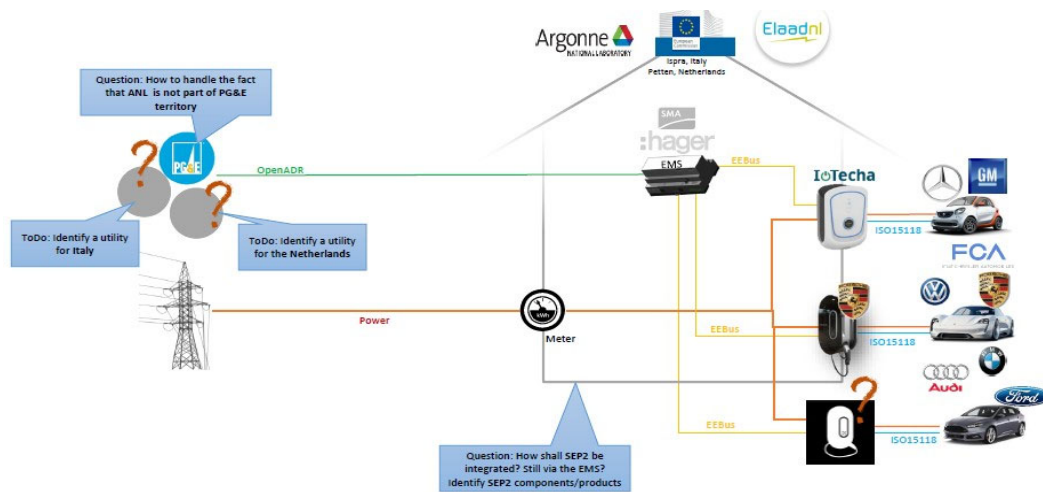
- Global Grid Integration Project
- How can we achieve an optimum in Smart Charging?
- Good initial tests and proof of concept
- No final report – COVID?

Europe - Slovenia & Germany

Virtual Power Plant (VPP)

https://www.sciencedirect.com/science/article/pii/S0142061517311560?via%3Dihub

PROJECT ELBE - Hamburg Energie, Stromnetz Hamburg, Vattenfall and ChargePoint

- Lab testing with 6 Charging Point Operators (CPOs) in 2019

- Field testing began in 2020 with more than 100 connected ports. Field tests included information exchange with all customers for daily load reductions of 30 minutes with 50% participation. The number of charging points has since increased to 389

https://www.openadr.org/assets/OpenADR%20Case%20Study%20Stromnetz%20ChargePoint.pdf
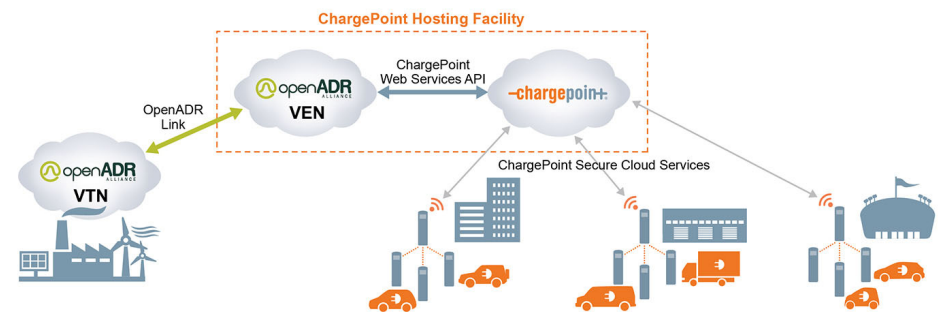
Intertrust – E.ON - DigiKoo

- Load balancing for efficient EV charging management

- Utility needed an efficient way to balance load spikes caused by mass EV charging

- Ability to consolidate and intelligently control the supply and demand for performance and flexibility from e-mobility charging processes

https://www.intertrust.com/products/energy-data-ops/

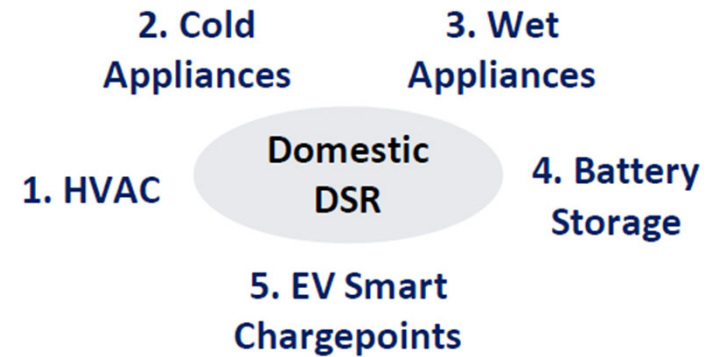https://www.openadr.org/assets/Intertrust%20Platform-Case-Study-EV-Charging-Load-Management.pdf

The United Kingdom

- PAS 1878 and 1879 standards (2021) and the Interoperable Demand Side Response (IDSR) program – Department for Energy Security & Net Zero
  - Energy Smart Appliances Standards for Demand Side Response
- Objectives were –
  - Standardization helps to lower costs and promote innovation in technologies, while accelerating the uptake of secure and interoperable smart products and services
  - Develop technical specifications which could be referenced and required by future regulations and would enable certification
  - Demonstrate UK leadership on the international stage, by promoting published standards for international adoption
- The IDSR programme is part of the up to £65m Flexibility Innovation Programme within the Department for Energy Security and Net Zero's £1 billion Net Zero Innovation Portfolio

The United Kingdom (2)

- Alignment with existing international standards (e.g. OpenADR)

Policy Principles	
1. Interoperability	the ability of an ESA to work seamlessly across any DSR service operated by any system player.
2. Data privacy	the secure storing of data on the device or with any controlling party.
3. Grid-stability	the prevention of outages on the grid caused by erroneous operation of ESAs.
4. Cyber-security	the prevention of unauthorized access to an ESA by third-parties.

2. Cold Appliances   3. Wet Appliances

1. HVAC   Domestic DSR   4. Battery Storage

5. EV Smart Chargepoints

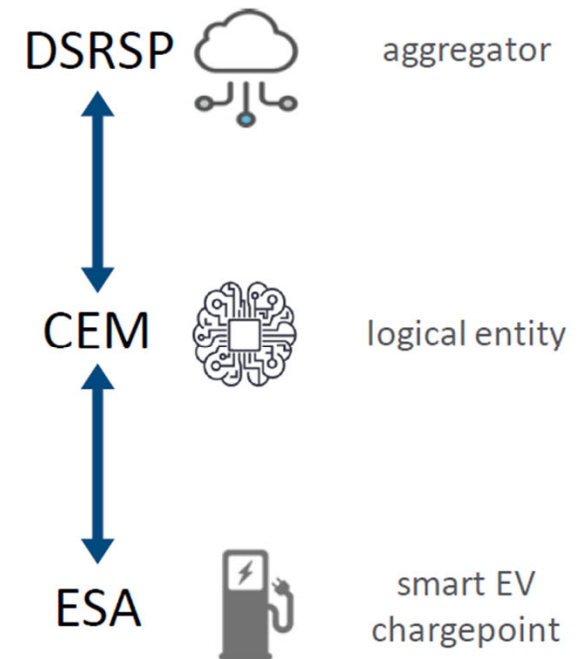# The United Kingdom (3) - Definitions

DSR Service Provider (DSRSP)
- An organization providing **demand-side** related **energy management services** to electricity system operators, electricity utilities and electricity generators

Consumer Energy Manager (CEM)
- A **logical entity**, that can be **physical or virtual**, which deals with **flexibility information** and requests
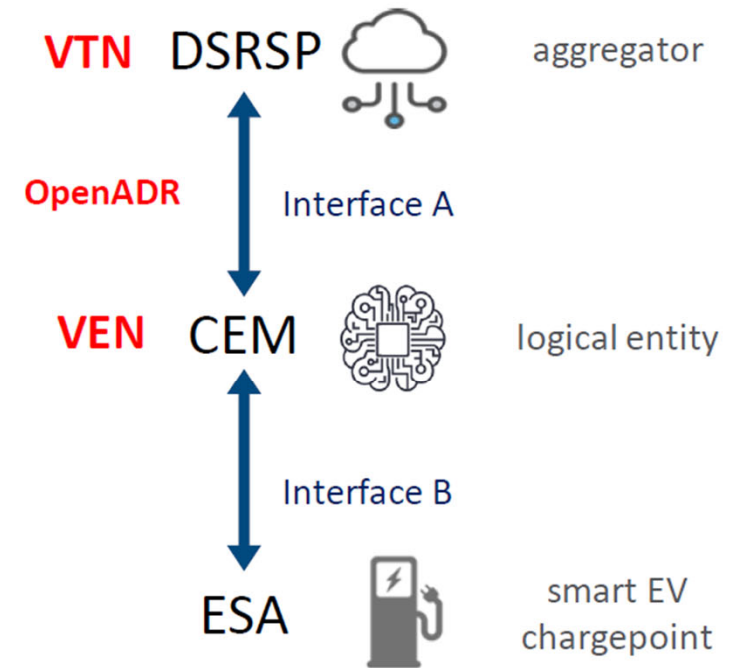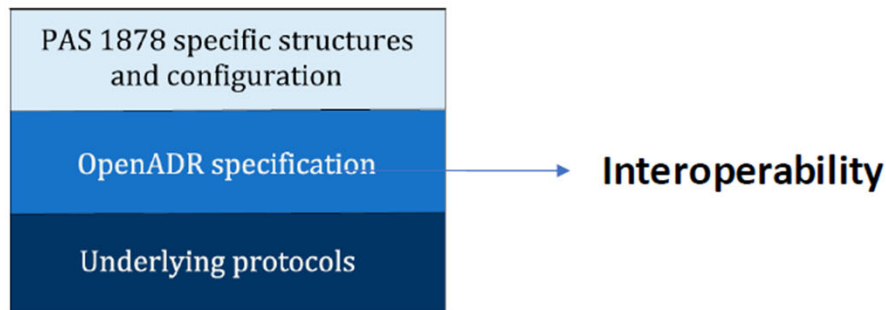- **Translates** between the **DSRSP** and the **ESA**

Energy Smart Appliance (ESA)
- An internet **connected** device that can **modulate or shift** its **electricity** consumption in **response** to **signals**.

DSRSP — aggregator

CEM — logical entity

ESA — smart EV chargepoint

The United Kingdom (3) – Interface A

- PAS 1878 mandates that any implementation of Interface A shall support the use of **OpenADR**

- The use of OpenADR guarantees interoperability and therefore **enables consumer choice**

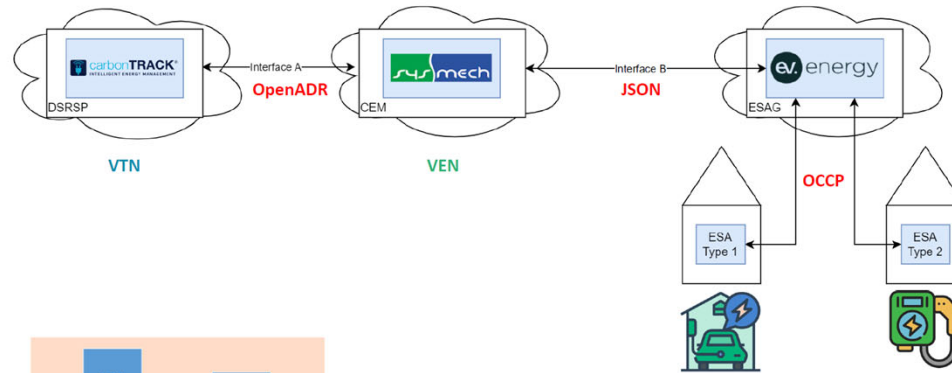- PAS 1878 provides a structure that is mapped on to the OpenADR protocol

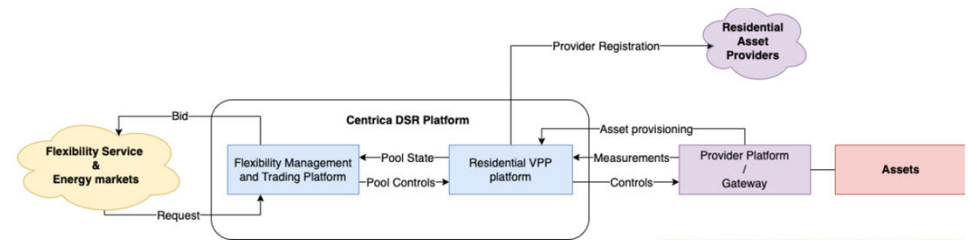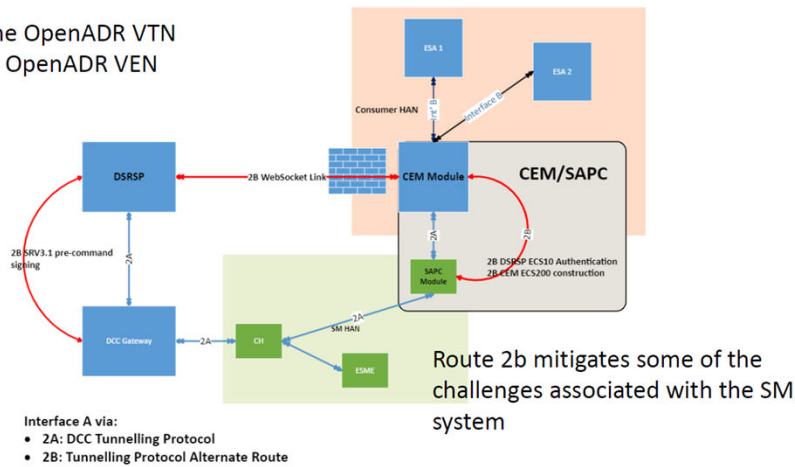| PAS 1878 specific structures and configuration |
| OpenADR specification | → **Interoperability** |
| Underlying protocols |

VTN DSRSP ☁   aggregator

OpenADR   Interface A

VEN CEM   logical entity

Interface B

ESA   smart EV chargepoint

The United Kingdom (4)

- Program use cases

IDSR Programme Use Cases	
A	Consumer registering DSR appliance with CEM (where not integrated)
B	Consumer registering with the appointed DSRSP
C	Consumer defining DSR preferences
D	Routine DSR mode of operation based on preferences tariff (ToU)
E	Sending power profiles from ESA to CEM and to DSRSP
F	Response DSR mode of operation
G	Consumer over-ride of DSR response mode and routine mode
H	DSRSP maintaining DSR service delivery despite availability changes
I	Consumer de-registers ESA from CEM and DSRSP
J	Change of incentive information
K	Consumer changes DSRSP

The United Kingdom (5) – Some early implementations

The DSRSP is the OpenADR VTN
The CEM is the OpenADR VEN

Route 2b mitigates some of the challenges associated with the SM system

Interface A via:
- 2A: DCC Tunnelling Protocol
- 2B: Tunnelling Protocol Alternate Route

Other emerging efforts

- SmartGridready Switzerland – Label in preparation, evaluating OpenADR
- EU Horizon series of projects – Demand Response
- Austria evaluating Demand Response and OpenADR
- Nordic market evaluating protocols. OpenADR and general CIM

Thank you!

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