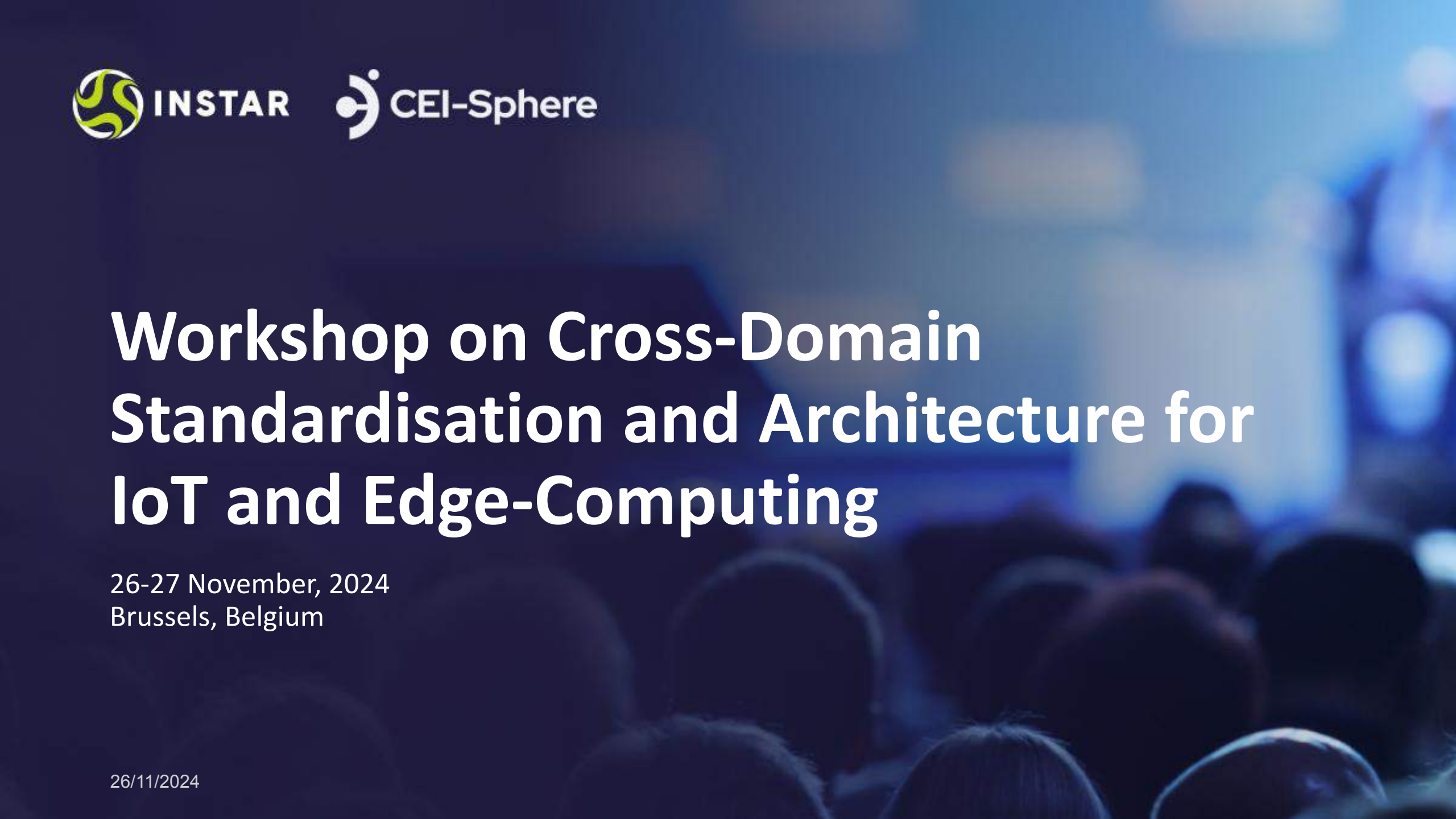


Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26-27 November, 2024
Brussels, Belgium

Morning Agenda

9:00 - 9:10 | Session introduction

9:10 - 9:25 | Welcome

9:25 - 9:35 | Intro role of standards Cloud-Edge-IoT

9:35 - 9:50 | International Standardisation and EU partnerships

9:50 - 10:30 | Panel: International view on key actions on standards for Cloud-Edge-IoT

10:30 - 11:00 | COFFEE BREAK

11:00 - 11:45 | Priority Horizontal Standardisation Actions for Cloud-Edge-IoT

11:45 - 12:15 | Assessing conformity. A new European trust label for Cloud-Edge-IoT

12:15 - 13:15 | NETWORKING LUNCH

Join the discussion!

You can participate both on-site and online

1. Go to slido.com
2. Use the code #4259442 or use the QR code
3. For on-site participants: state in your question if you would like to ask your question live

WiFi network: Sparks Meeting Guest
WiFi password: Rockyourmeeting!

Session Introduction

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Tanya Suarez

BluSpecs | INSTAR & CEI-Sphere Coordinator

INSTAR overview

Tanya Suarez, BluSpecs

November 26th, 2024

Supporting the implementation of the Digital Partnerships and the EU-US TTC through international common ICT Standards

Geographical scope

7

USA JAP
CAN ROK
SGP AUS
TWN

Technological scope

Key actions

- Common vision & roadmap with like-minded partners to promote ICT standards in the target foundational technologies internationally
- Effective stakeholder engagement across existing and new communities
- Studies and analyses on ICT standardisation in key HE technologies
- Monitoring effective implementation of trade agreements.

Consortium

- **BluSpecs (coordinator)**, Fraunhofer, Fortiss, AIOTI, Trialog, TU Delft, Trust-IT, COMMpla, NCSRD, AIT

Start: January 2024	**Duration:** 30 months
Budget: €1,500,000	Learn more here.

CEI-Sphere overview

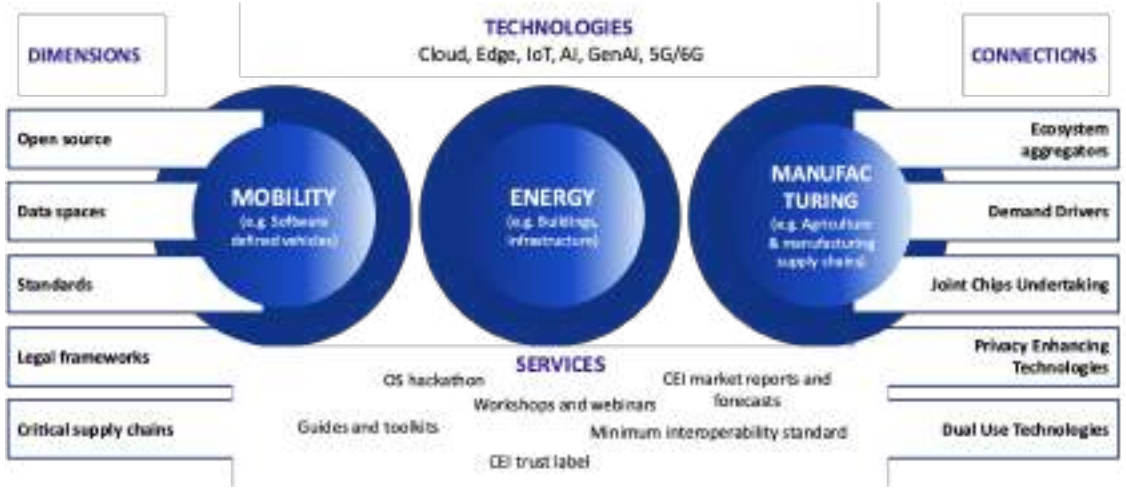
Tanya Suarez, BluSpecs

November 26th, 2024

Our scope

- Objective: Support the development of an open, interoperable, and competitive ecosystem for Cloud-Edge-IoT Large-Scale Pilots (LSPs) through the Horizon Europe project portfolio.
- Focus: Scalable, next-generation Cloud to Edge IoT solutions.
- Target: Address specific demands of key European industries to enhance global competitiveness.
- Key Technologies:
  - Meta-OS architectures
  - Decentralised intelligence
  - Swarm computing
- Implementation:
  - Provide opportunities to regenerate the supplier base to include startups and SMEs.
  - Encourage new entrants to test solutions and ensure robustness and fitness for purpose.

Our 'spheres'



Project details

Start: 01/10/2024

Duration: 30 months

Budget: €2,001,625

More information here

The partners

Welcome

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Max Lemke

Head of Unit for Internet of Things | DG CNECT, E4

Intro Role of Standards Cloud-Edge-IoT

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Svetoslav Mihaylov

Policy Officer for the European Commission | DG CNECT, E4

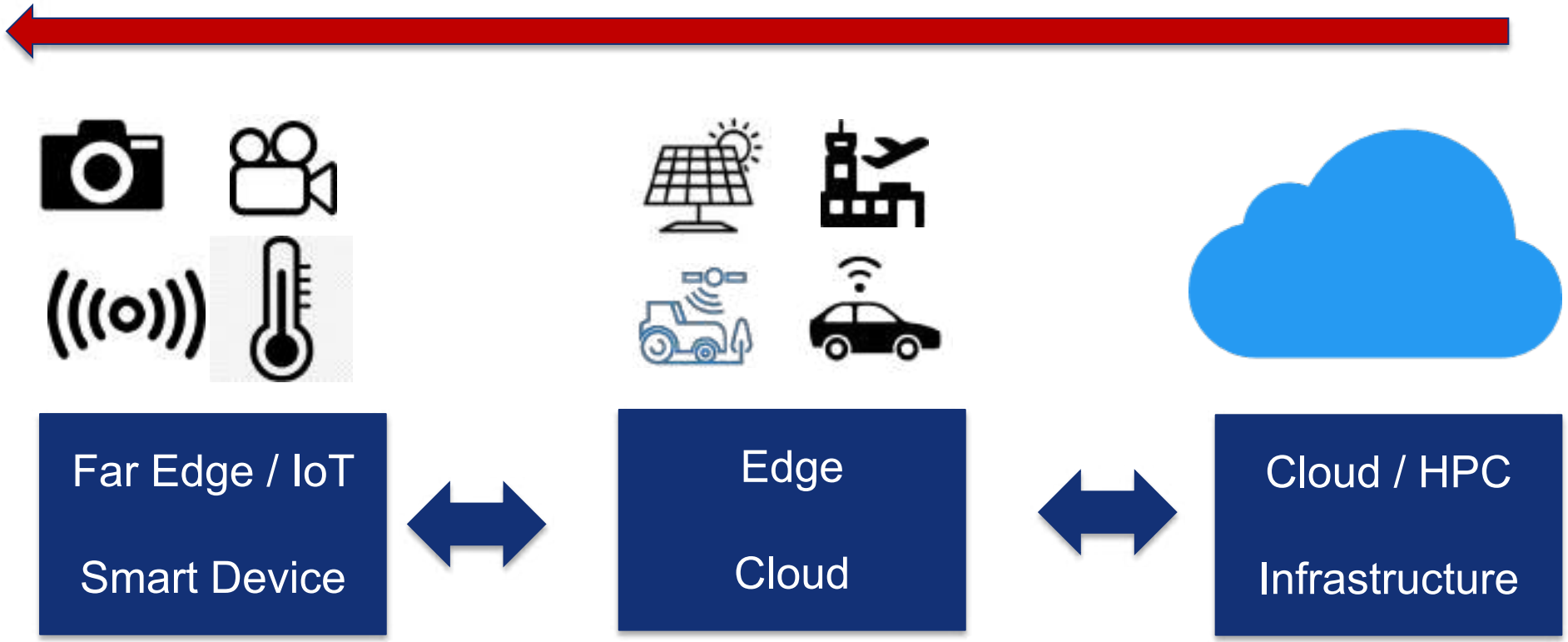
EU perspective on standards for Cloud-Edge-IoT (CEI)

Svetoslav Mihaylov
Policy Officer
Internet of Things
European Commission

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge Computing, Brussels, 26/11/2024

Cloud to Edge to IoT

Trend/Paradigm Shift: from Cloud to Edge
Bringing computing resources closer to the data



Federating far edge resources to provide cloud resources close to the edge – real time processing

European Commission

Factors impacting the CEI standardisation

New technological developments – AI, Digital Twin, 5/6G

Involvement of the verticals (many and diversified stakeholders) and cross-sectorial interoperability

Autonomy – e.g. independence from US hyper-scalers

Address the « side » requirements – security, sustainability, trust, privacy

European initiatives - Data spaces(DSSC), AI factories/Apply AI, 3C - Connected collaborative computing networks

Impact of legislation - Data Act, DGA, DSA, DMA, AI Act, Cybersecurity Act

Decreased involvement of international partners (e.g. US, Japan in OneM2M)

Focus on Minimum Interoperability Mechanisms (MIMs)

Define gaps, use and improve existing standards and create new standards only if none are available, align with international standards

European Commission

SDOs and related

- ESOs – ETSI (MEC, SmartM2M, etc.), CEN/CENELEC
- International SDOs – ISO/IEC (e.g. JTC1 SC 41), ITU-T(e.g. SG20), W3C, IEEE, OMA, IETF, TMF
- International initiatives – OneM2M, 3GPP
- Other – AIOTI, GSMA, Gaia-X
- Open Source
  - Eclips foundation, Eclips research labs
  - GitHub, GitLab, HyperMAS, OpenAirInterface, DockerHub, ArtifactHub, LiQo, OpenDev, OpenTofu, Maven repositories
- Need to further increase collaboration among SDOs and other stakeholders
- Need to speed up the standardization process and make it more agile

European Commission

EC Standardisation – instruments

Standards and interoperability are very important for European Commission

Rolling plan for ICT standardisation

- Multistakeholder platform
- Chapters on IoT, Cloud and Edge computing, Smart grids, etc.

Annual Union Work Programme

- Action grants (examples: SAREF extensions, SAREF European Norm and digital twins)
- Selection for a new action grant - Enabling standardized interoperability and access to data in IoT Edge and swarm computing environments – evaluation completed

European Commission

European projects and standardisation

- Standardisation is integral part of EU projects in Horizon Europe, DIGITAL Europe, Connecting Europe Facility – scope and outcomes
- EU projects cover all relevant areas e.g. preparation and depoyment for data spaces, digital twins, large scale IoT pilots, edge computing (MetaOS, swarms), continuum, AI-IoT edge, Operational Digital Platforms, etc.
- Projects engage with and contribute to major SDOs
- Initiatives for combined input from (clusters of) EU projects e.g. a workshop at the ISO/IEC JTC 1 SC41 in May (Workshop on data spaces, digital twins, and the cloud-edge continuum) and common representation by project ICOS
- Other instruments – studies, procurement, etc.
- Active support and collaboration with stakeholder groups such as AIOTI

More initiatives and support

European Code of Conduct on Smart Appliances

European Norm standards

Digital Commissionner Mission letter – “You will work to promote EU digital norms and standards internationally…”

Reports commissioned by the Commission on topics such as competitiveness highlight the need for investments in state-of-the-art high-speed, low-latency IoT/M2M, edge and AI and opening the network capabilities/services to third parties via standardised APIs. This should go hand-in-hand with close coordination of technical standards for edge computing, network APIs, and IoT at the EU level.

EC support e.g. participation in ETSI IoT week, JTC1 SC41 meetings, ITU-T, etc.

Thank you

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European Commission

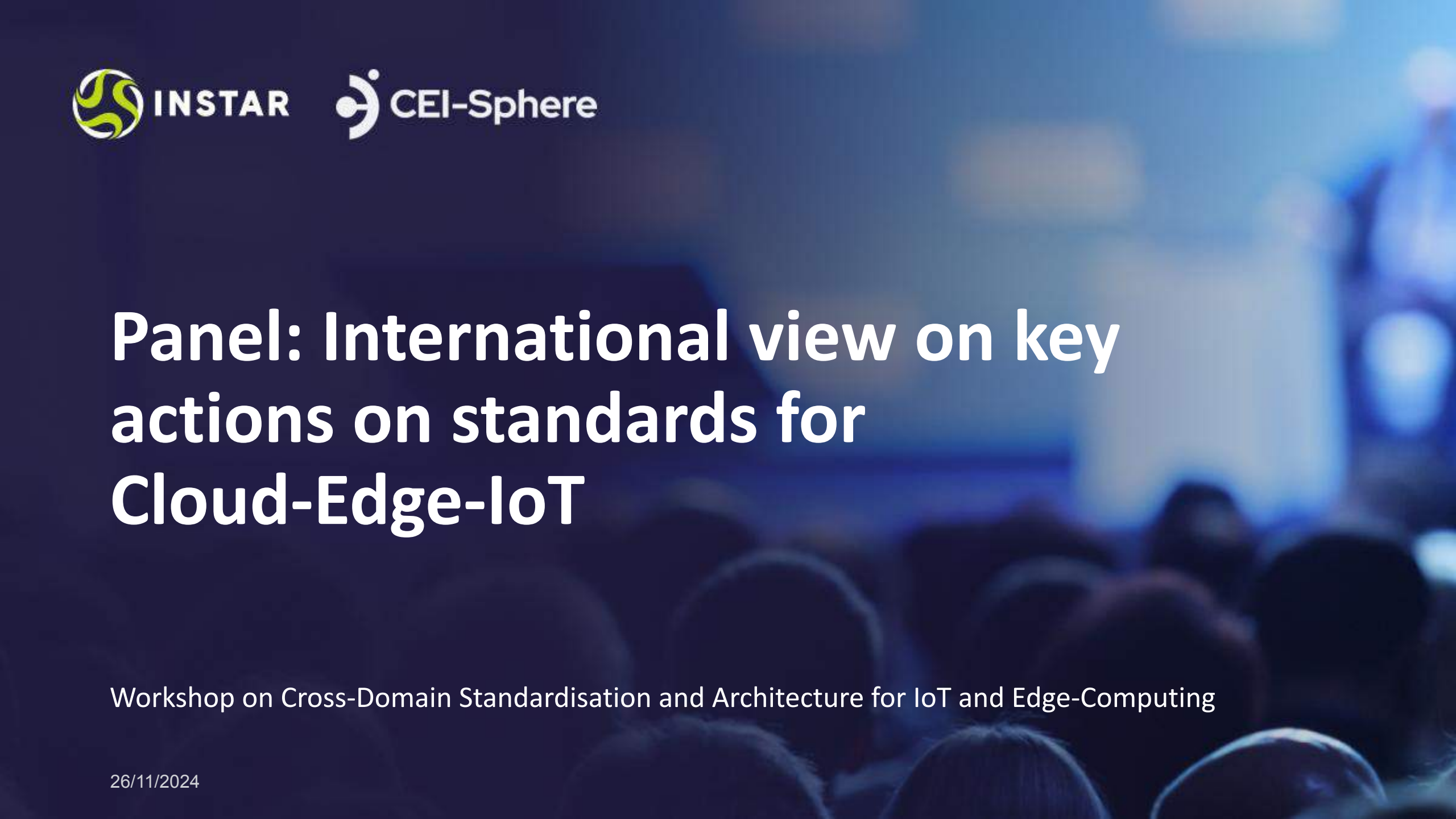
International Standardisation and EU partnerships

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Carlos López-Rodríguez

Policy Officer for the European Commission | DG CNECT, D3



Panel: International view on key actions on standards for Cloud-Edge-IoT

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Panel discussion

slido.com
#4259442

Tanya Suarez
BluSpecs

Dr. Seungyun Lee
Telecommunications
Technology Association

Emilio Dávila González
DG CNECT D3

COFFEE BREAK
10:30 - 11:00

Next Session at 11:00
Priority Horizontal Standardisation Actions for Cloud-Edge

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Priority Horizontal Standardisation Actions for Cloud-Edge-IoT

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Panel discussion

slido.com
#4259442

Antonio Kung
Trialog

Dario Sabella
xFlow Research and
Standards, Chair ETSI MEC

Christian Diedrich
IEC/SMB SG 12

Priority Horizontal Standardisation Actions for Cloud-Edge-IoT

- Chair: Antonio Kung, Trialog
- Dario Sabella, xFlow Research and Standards, Chair ETSI MEC
- Christian Diedrich, IEC/SMB SG 12

Domain interplay

Horizontal domain: technology

IoT	Digital twin	Brain Computing
Cloud	AI	Quantum
Edge	Mobility	Virtual world

Horizontal domain: cross-cutting characteristic

Security	Privacy	Trustworthiness
Resilience	Safety	…
Sustainability	Interoperability	

Vertical domain: application area

Health	Energy
Transport	Manufacturing
Finance	…

Vertical domain: ecosystems

Smart cities
Conformity
…

Standardisation Committees

Horizontal domain: technology

IoT SC41	Digital twin SC41	Brain Computing SC43
Cloud SC38	AI SC42	Quantum JTC3
Edge??	Mobility ETSI	Virtual world

Horizontal domain: cross-cutting characteristic

Security SC27	Privacy SC27	Trustwor-thiness WG13
Resilience TC292	Safety	…
Sustainability	Interoperability	

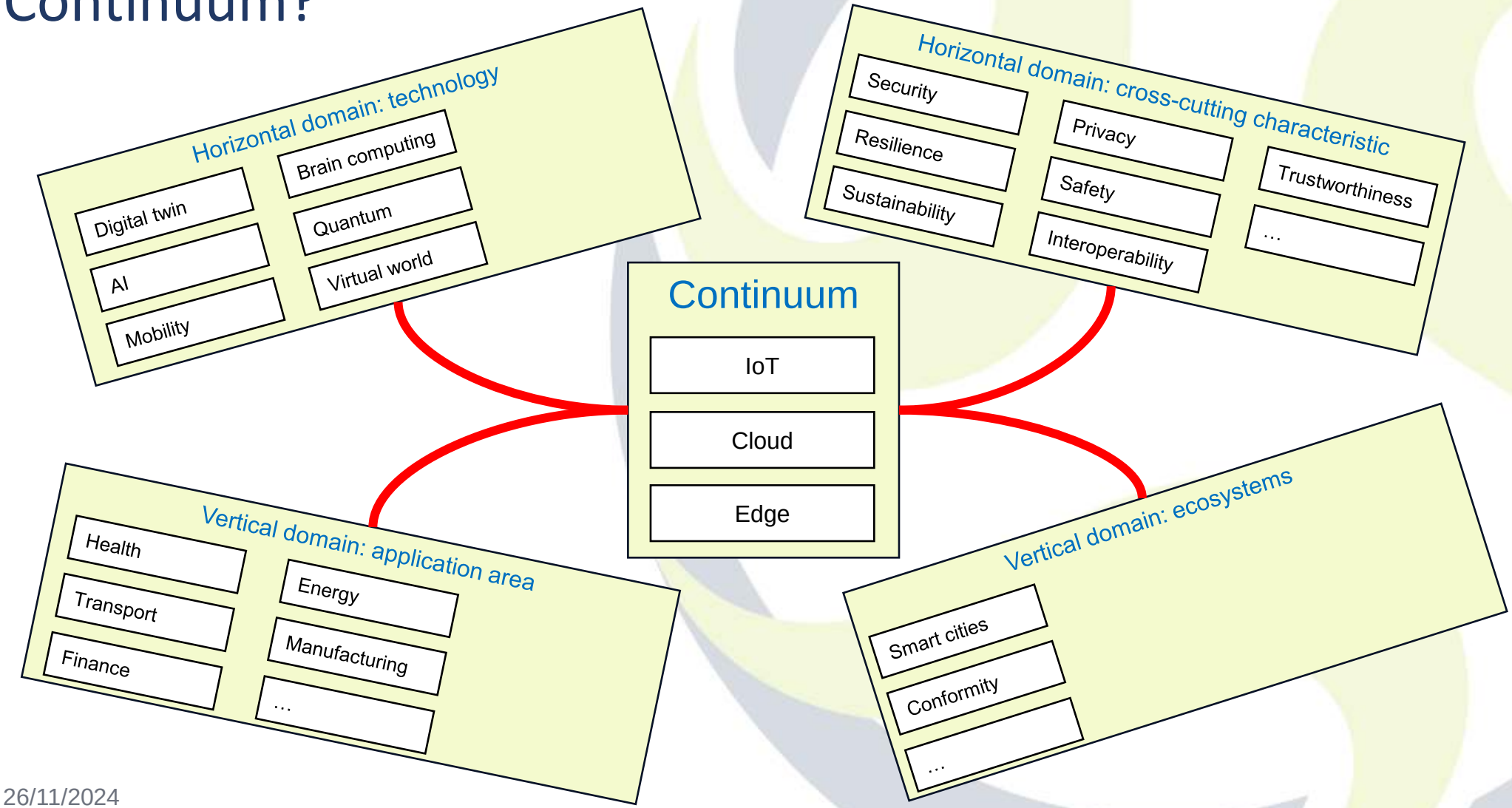
Vertical domain: application area

Health TC215	Energy IEC
Transport TC204	Manufact-uring TC184
Finance TC68	…

Vertical domain: ecosystems

Smart cities JTC4?
Conformity Casco
…

Continuum?


Horizontal domain: technology
Digital twin
AI
Mobility
Brain computing
Quantum
Virtual world
Horizontal domain: cross-cutting characteristic
Security
Resilience
Sustainability
Privacy
Safety
Interoperability
Trustworthiness
…
Continuum
IoT
Cloud
Edge
Vertical domain: application area
Health
Transport
Finance
Energy
Manufacturing
…
Vertical domain: ecosystems
Smart cities
Conformity
…

Floor is given to panelists

- Dario Sabella
- Christian Diedrich

Questions

- Horizontal aspects
- Standardisation gaps
- Where should edge computing be standardised?

Paper on interoperability to be published by AIOTI - Evolution of interoperability standards. *Submitted to SC41*

DOCUMENT JOINTLY PRODUCED BY

INT:NET	int:net
AIOTI	Alliance for IoT and Edge Computing Innovation
StandICT	standICT.eu 2026 ICT Standardisation Observatory and Support Facility in Europe

CONTENTS

Paper on interoperability to be published by AIOTI - Information models coordination and governance: standardisation recommendations. ***Submitted to SC41***

CONTENTS

https://instarstandards.org/events/workshop-cross-domain-standardisation-and-architecture-edge-computing

ETSI MEC Overview

Updates and perspectives for edge IoT standardization

Dario Sabella

VP at xFlow Research, ETSI MEC Chair

Brussels (Belgium), 26/11/2024

ETSI MEC: Enabling *Edge* through *Standardization*

Foundation for Edge Computing – Fully standardized solution to enable applications in distributed cloud created by ETSI MEC + 3GPP

Watch the new video on MEC

https://www.youtube.com/watch?v=crnPWql-0oo

Application Life Cycle Management

RESTful based APIs for Runtime Application Services

3GPP WiFi broadband forum

ETSI: The Standards People
producing globally applicable standards for ICT-enabled systems

ETSI ISG MEC

ISG: Industry Specification Group
open to all of industry, regardless of ETSI membership and focused on all industry needs

MEC: Multi-access Edge Computing
Cloud Computing at the Edge of the network.

ETSI MEC The Standards People

ETSI NFV The Standards People

MEC Application Development Community

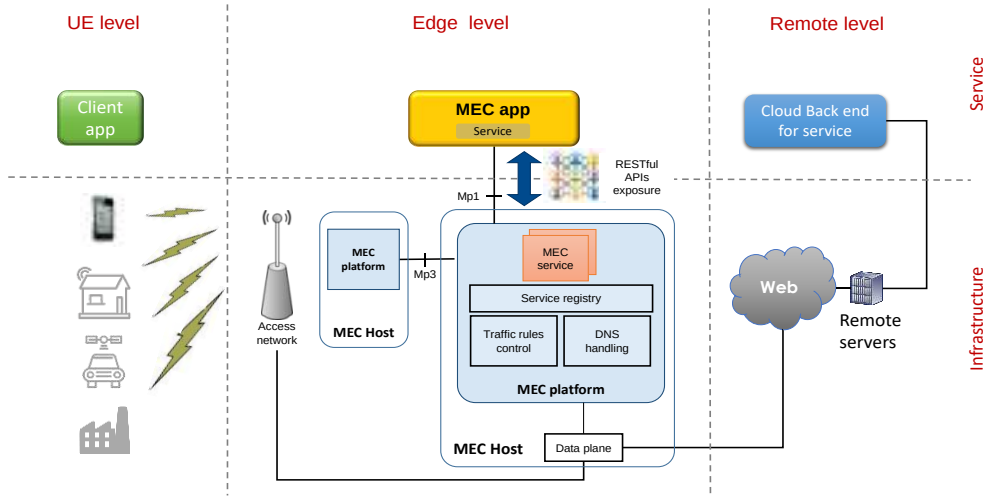
Now 180+

- **Continuously growing MEC membership:** 124 (updated Dec 2022); e.g. in June 2021 it was 114
- **Diverse ecosystem:** Operators - Technology Providers - IT players - Application developers - Startups - …

Renewed webpage: **ISG MEC Leadership Team, LS officers for Vertical Industries** and **MEC Support Team:** https://portal.etsi.org/TB-SiteMap/MEC/MEC-Leaders-and-Support-Team

ETSI MEC – Foundation for Edge Computing

MEC offers to application developers and content providers cloud-computing capabilities and an IT service environment at the edge of the network



Basic principles:

- *Open standard* → allowing multiple implementations and ensuring interoperability
- MEC exploiting ETSI *NFV framework* and definitions → enabling MEC in NFV deployments
- Alignment with *3GPP* based on fruitful collaboration of common member companies → enabling MEC in 5G
- Access-agnostic nature (as per MEC acronym - Multi-access Edge Computing) → enabling other accesses
- Addressing the needs of a wide ecosystem → enable multiple verticals (e.g. automotive), federations

MEC is focused on *existential* questions of **applications "on the edge"**

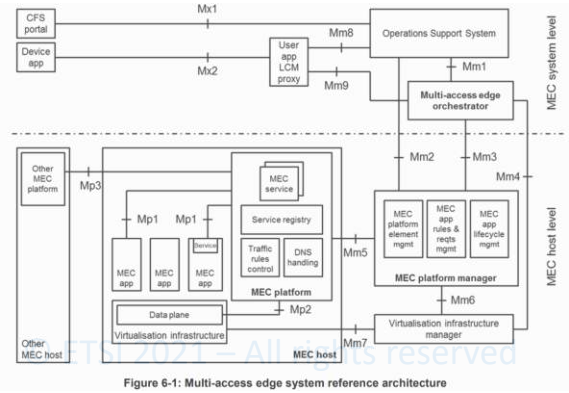


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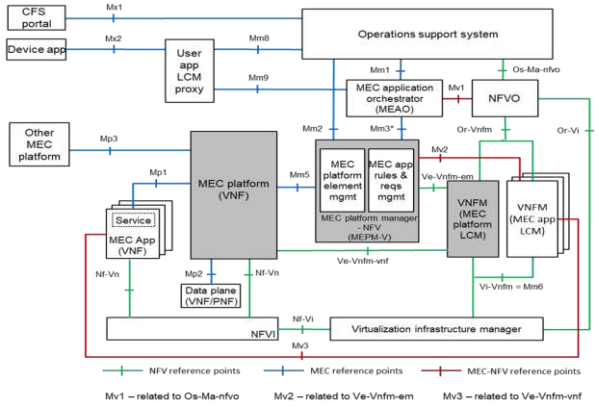
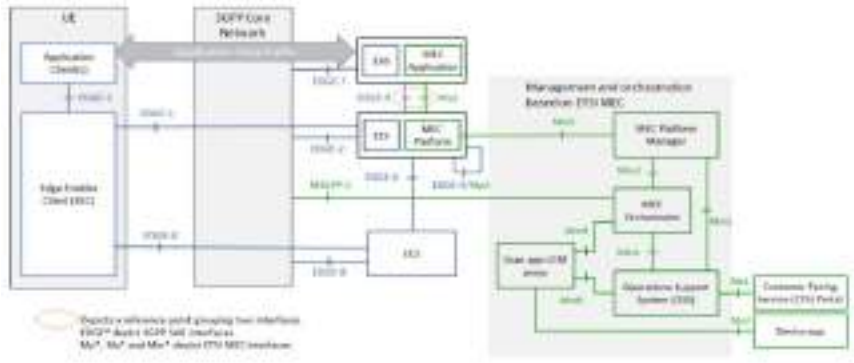
Figure 6-1: Multi-access edge system reference architecture



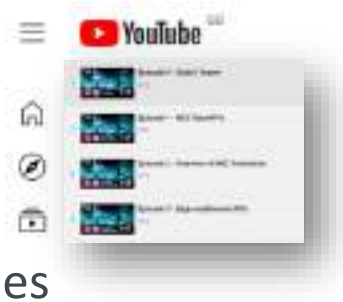


ETSI ISG MEC DECODE Working Group:
MEC Deployment and Ecosystem engagement activities

- OpenAPI representations: ETSI Forge
- Testing and Conformance
- MEC Ecosystem wiki
- PoCs (proof-of-concepts)
- MDTs (MEC Deployment Trials)
- MEC Sandbox
- Collaborations: CAMARA, STF
- Hackathons
- Plugtests
- MEC Tech Series

ETSI/LF Edge/OCP
Edge AI Hackathon 2023

18 Oct 2023, San Jose, California
https://www.opencompute.org/blog/2023-ocp-global-summit-hackathon-was-amazing



https://apiportal.akraino.org/apimap.html

1 - 15 Oct 2021
NFV&MEC IOP
Plugtests 2021

https://mecwiki.etsi.org/index.php?title=MEC_Ecosystem

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MEC Standard work: from Phase 1 to Phase 4

- Key overall specification
  - Technical Requirements (MEC 002)
  - Framework and Ref. Archit. (MEC 003)
  - MEC PoC Process (MEC-IEG 005)
  - API Framework (MEC 009)
- IaaS Management APIs
  - Platform mgmt. (MEC 010-1)
  - Application mgmt. (MEC 010-2)
  - Device-triggered LCM operations (MEC 016)
- PaaS Service Exposure
  - Required Platform Svcs / App. Enablement (MEC 011)
  - Service APIs (MEC 012, 013, 014, 015)
- Key Studies for Future Work
  - Study on MEC in NFV (MEC 017)
  - Study on Mobility Support (MEC 018)

- Evolution of Phase 1 and closing open items
  - Application Mobility (MEC 021)
  - Lawful Intercept (MEC 026)
- Addressing key Industry Segments
  - V2X (MEC 022 – published; MEC 030)
  - Industrial Automation, VR/AR
- Key use-cases and new requirement
  - Network Slicing (MEC 024)
  - Container Support (MEC 027)
- Normative work for integration with NFV
  - Incorporate in v2 of existing specifications as needed
- From "Mobile" to "Multi-Access"
  - Wi-Fi (MEC 028)
  - Fixed Access (MEC 029)
- MEC integration in 5G networks (MEC 031)
- Developer community engagement
  - API publication through ETSI Forge (overleaf)
  - Hackathons, MEC Delpoyment Trials
- Testing and Compliance (MEC-DEC 025; multipart spec MEC-DEC 032-x)

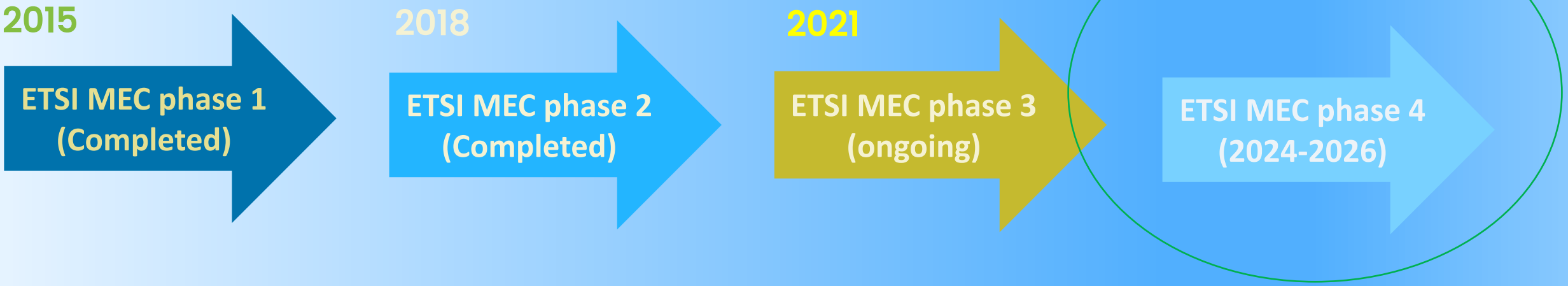
- Full Phase 3 work (with some pre-Phase 4).
- MEC as heterogeneous clouds
  - Expanding traditional cloud and NFV LCM approaches
  - Inter-MEC systems and MEC-Cloud systems coordination: "MEC Federation" (MEC 035, MEC040)
  - Mobile/intermittently connected and resource constrained devices (MEC 036), MEC IoT API (MEC 033)
- MEC Security (GR MEC 041)
- MEC deployments, e.g. in Park enterprises (MEC 038)
- MEC Application Slices (MEC 044)
- Continuing emphasis on enabling developers
  - App Package Format and Descriptor (MEC 037)
  - API Serialization
  - MEC Sandbox development
  - Testing and compliance
- Continue to define services that meet industry demand (e.g., Abstracted Network Info Exposure, MEC 043)
- Maintain and enhance existing APIs (MEC 013)

- Evolution of Phase 3 and closing open items, including maintenance and enhance existing APIs
- Addressing key Industry Segments
  - Listen to verticals via Edge Discovery Days
  - Abstracted Network Info Exposure MEC 043
  - Distributed Edge Network MEC 047
  - Exploiting Edge Computing Resources MEC 059
- Key use-cases, requirements & arch
  - MEC 002, MEC 003
- Normative work on MEC Security
  - MEC architecture (MEC 003), (API GW for Client Apps (MEC 060), Support for Security Monitoring and Management (MEC 062)
- Continuing emphasis on enabling developers
  - Testing and compliance
  - API-driven MEC Sandbox and Edge Native Connector activities (STF678)
- Collaboration with open-source communities (e.g., TeraFlowSDN, OpenCAPIF, CAMARA)
- STF 685 ESTIMED: Enabling Standardized IoT deployments in MEC Environments for advanced systems (OneM2M & SmartM2M)
  - 9 GR/GS, 4 PoC, Testing
- AI/ML in MEC (MEC 061)

2015 ETSI MEC phase 1 (Completed) → **2018** ETSI MEC phase 2 (Completed) → **2021** ETSI MEC phase 3 (Completed) → **2024** ETSI MEC phase 4 (Started)

MEC *toward 6G*

- CAVEAT: nobody knows yet *what 6G will be*! So, we cannot claim (still) what MEC in 6G will be, of course.
- On the other hand, MEC evolution and vision can be shaped (in a pragmatic way).
- The newly approved ToR#5 of MEC (available here) is related to the period 2023-2024.
  - Thus, it will include also the beginning of MEC Phase 4 (2024-2026).
- So, at least, we could draw (from the ToR#5) some differences between Phase 3 (20212-2023) and **Phase 4** (2024-2026).



MEC *toward 6G* : planning MEC Phase 4

- CAVEAT: nobody knows yet *what 6G will be*! So, we cannot claim (still) what MEC in 6G will be, of course.
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- So, at least, we could draw (from the ToR#5) some differences between Phase 3 (20212-2023) and **Phase 4** (2024-2026).

In a nutshell, a transition from MEC Phase 3 to MEC Phase 4 can lead to:

- *more consolidated work on MEC Federation, including exposure of resources managed by multiple operators, e.g. addressing multi-domain and multi-tenancy slicing and MEC support for application slicing;*
- *MEC architectural/service updates needed to support cloud native communication systems and edge native design for app developers (also with container support)*
- *introduction of proper normative work to improve security and privacy in MEC systems*
- *Further promotion of MEC as an attractive development environment for the industry by creating "developer-friendly environments" (e.g. portals, SDK) that enable convergence of key industry ecosystem, e.g. app developers and operators*
- *Further outreach efforts, e.g. Hackathons/trials in collab with open source communities, industry groups (e.g. 5GAA, etc..)*

MEC and vertical industries

MEC is a key enabler for **many vertical market segments**.

Several (specialized) use cases driven by different verticals:

- automotive,
- industrial automation,
- VR/AR,
- Videostreaming,
- Gaming,
- e-health,
- Smart Cities,
- Etc …

Edge Exposure Day (Sept 18th, 2022, Kfar Saba, Israel) supported by ETSI

Attendance from diverse people, e.g. local companies, MEC delegates, repr from 5GAA and AECC, …

Edge Discovery Events

Edge Discovery Events: meeting vertical industries

A series of live panels with relevant experts from the various **vertical market segments**.

https://mecwiki.etsi.org/index.php?title=Edge_Discovery_Events

First event on Drones vertical:

- 70+ people registered
- 6 keynotes and 1 demo
- Final panel discussion

Stay tuned for next Edge Discovery Events!

MEC meets Spatial Computing and Gaming

- C-level keynotes and moderated panel
- Remote: online event (bridge and material online!)
- Participation free of charge

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STF: Edge Native Connector

- Special Task Force (STF) under ETSI
  - https://portal.etsi.org/xtfs/#/xTF/678/
- Edge Native applications are designed to leverage the full potential of edge computing
- Edge service discovery is a core function of the MEC Platform, enabled via the Mp1 reference point for MEC applications, as per ETSI MEC Architecture.
- The Edge Native Connector STF will *extend the MEC Sandbox* by enabling the integration of APIs from various sources (e.g., CAMARA APIs, 6G-SANDBOX (SNS JU)).
  - *Provides an API-driven Sandbox for Application developers.*
  - *Supports CAPIF APIs for platform interoperability.*
  - *Supports MEC Federation APIs to enable multi-platform and multi-host interoperability*

MEC Sandbox Version 1.10 includes MEC profile for CAPIF and Federation APIs

https://try-mec.etsi.org/

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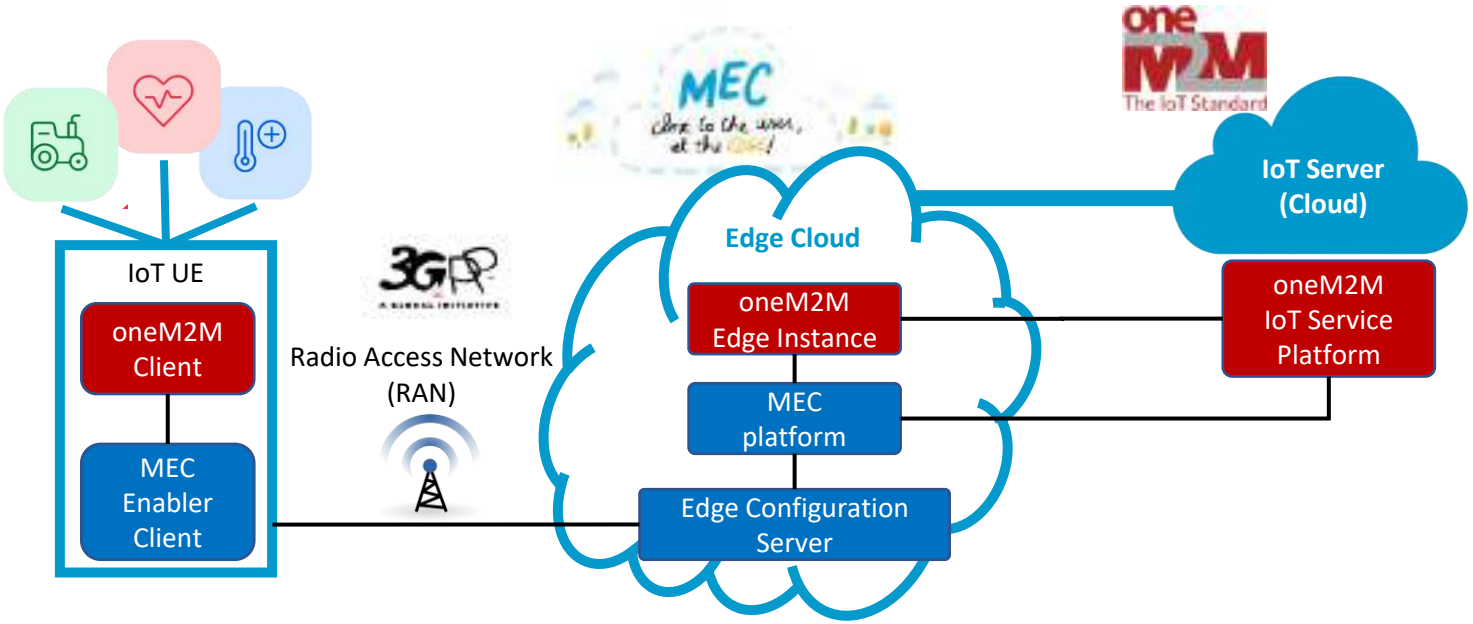
Enabling Multi-access Edge Computing in IoT: how to deploy ETSI MEC and oneM2M

- MEC interworking with oneM2M is possible (*)
- Further standardization work might be needed
- Future activities planned (e.g. EISMEA project in 2025)



NOTE: architectural interworking between ETSI MEC and oneM2M is made possible by seeing the CSE and AE functional elements of oneM2M as particular instances of MEC services and applications from the point of ETSI MEC system

(*) https://www.etsi.org/images/files/ETSIWhitePapers/ETSI-WP59-Enabling-Multi-access-Edge-Computing-in-iot.pdf

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Thank you for your attention

Dario Sabella

VP at xFlow Research, ETSI MEC Chair

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Backup

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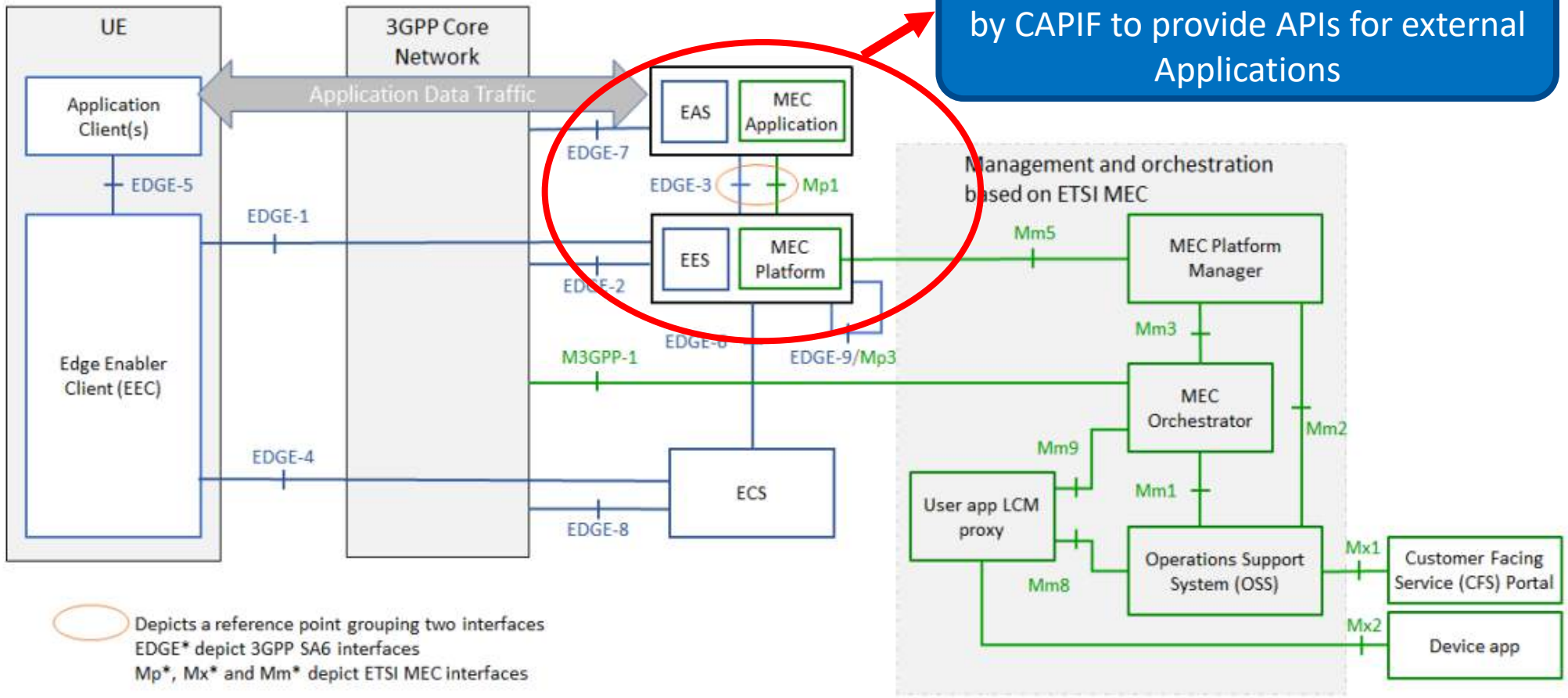
MEC harmonised Architecture of SA6 3GPP

EDGEAPP Architecture also leveraged by CAPIF to provide APIs for external Applications



White Paper: :https://www.etsi.org/images/files/ETSIWhitePapers/ETSI_wp36_Harmonizing-standards-for-edge-computing.pdf

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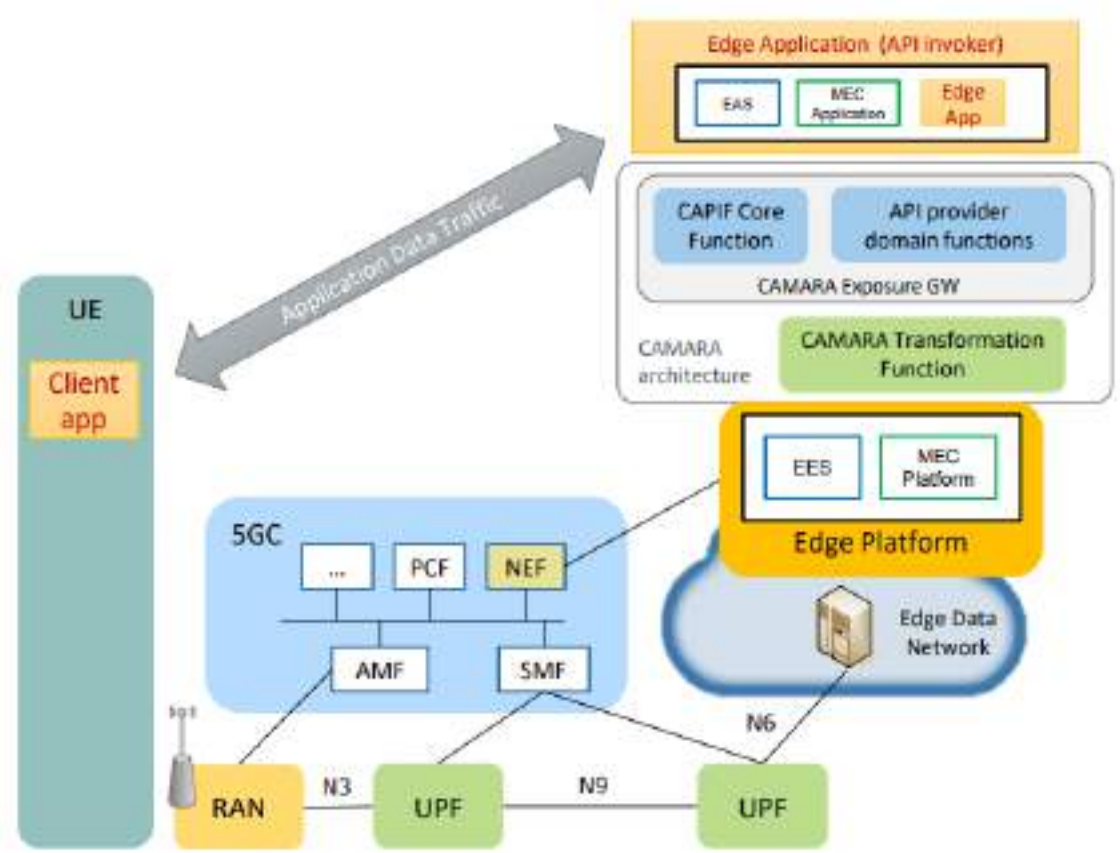
Potential synergies and opportunities related to 3GPP, OpenCAPIF, and CAMARA.

- MEC Apps can be considered as 3GPP Application Servers offering services (not defined by ETSI MEC) to client applications (e.g., device hosted applications).
- A realisation of the MEC service management APIs (offered over Mp1) can be provided via 3GPP CAPIF APIs ("MEC profile of CAPIF" specified in ETSI GS MEC 011).
- As part of an overall capability exposure framework, MEC service APIs can be leveraged as network APIs by the GSMA Open Gateway / CAMARA initiative, e.g. abstracted APIs toward Customers.



White Paper: https://www.etsi.org/images/files/ETSIWhitePapers/ETSI-WP55-MEC_support_towards_Edge_native.pdf

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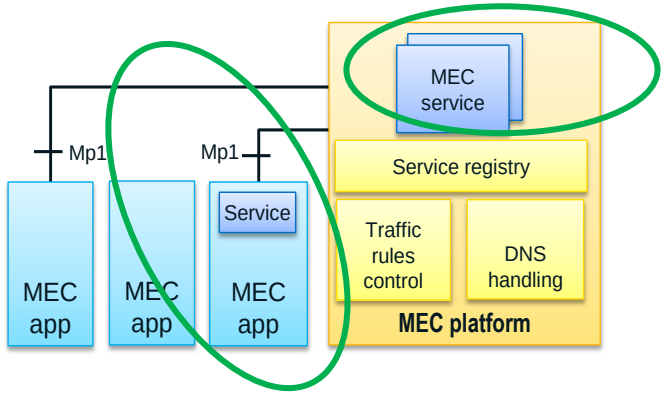
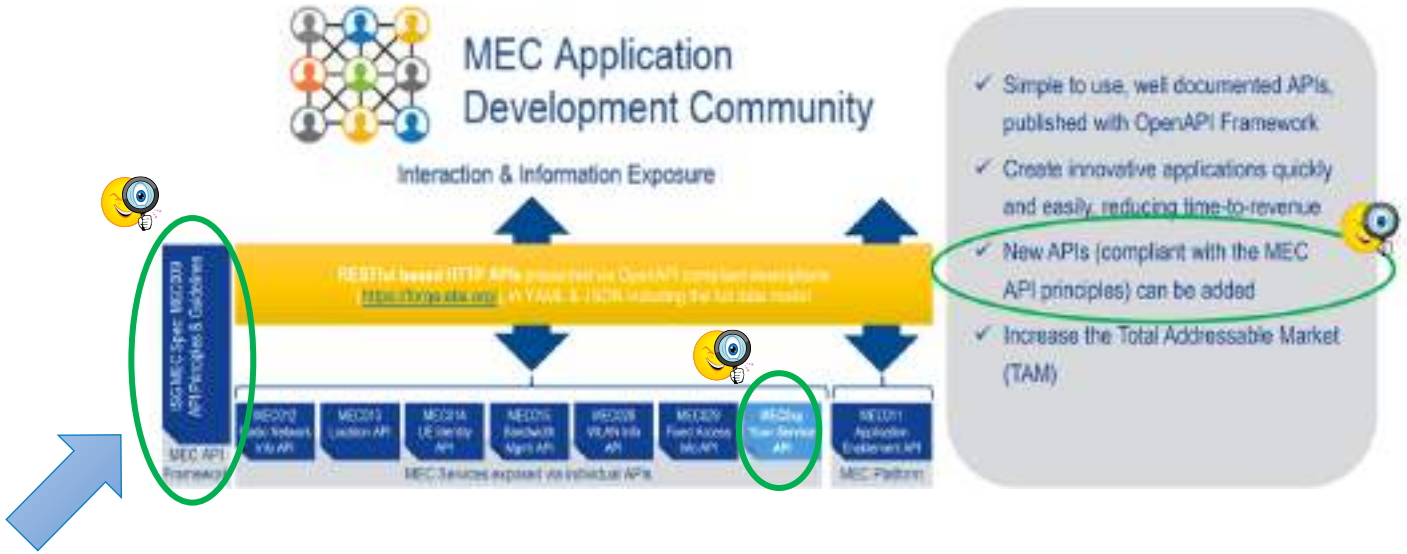
Extending MEC with new MEC Service APIs

MEC Services: value-added capabilities to enable MEC applications

- "Built-in" MEC standardized services provided via the MEC Platform.
- MEC applications can offer new MEC Services APIs, extending the MEC system





NOTE: ETSI GS MEC 009 is defining General principles, patterns and common aspects of MEC Service APIs

NOTE: also the MEC Sandbox includes capabilities to advertise, discover, and consume New MEC Services

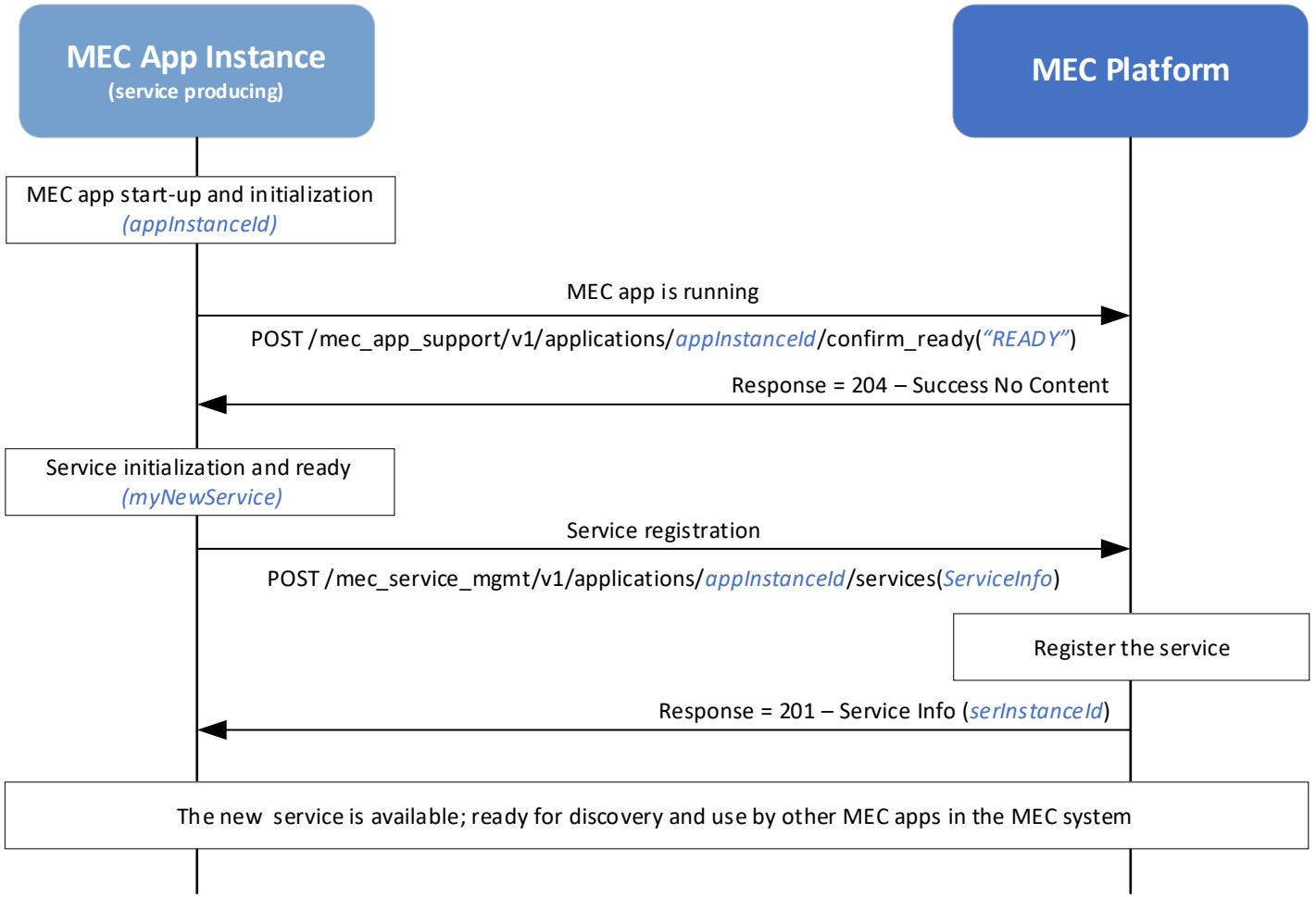
www.etsi.org/deliver/etsi_gs/MEC/001_099/009/03.01.01_60/gs_MEC009v030101p.pdf

try-mec.etsi.org

2 – MEC App exposing a New MEC Service

New Service Registration:

- MEC application initializes and confirms it is ready to the MEC Platform (MEP)
- MEC app prepares its new service API
- MEC app registers the new service with the MEP, providing Service Information
- MEP registers the service and allocates a service instance
- The New MEC Service is now available for other MEC Apps in the MEC system



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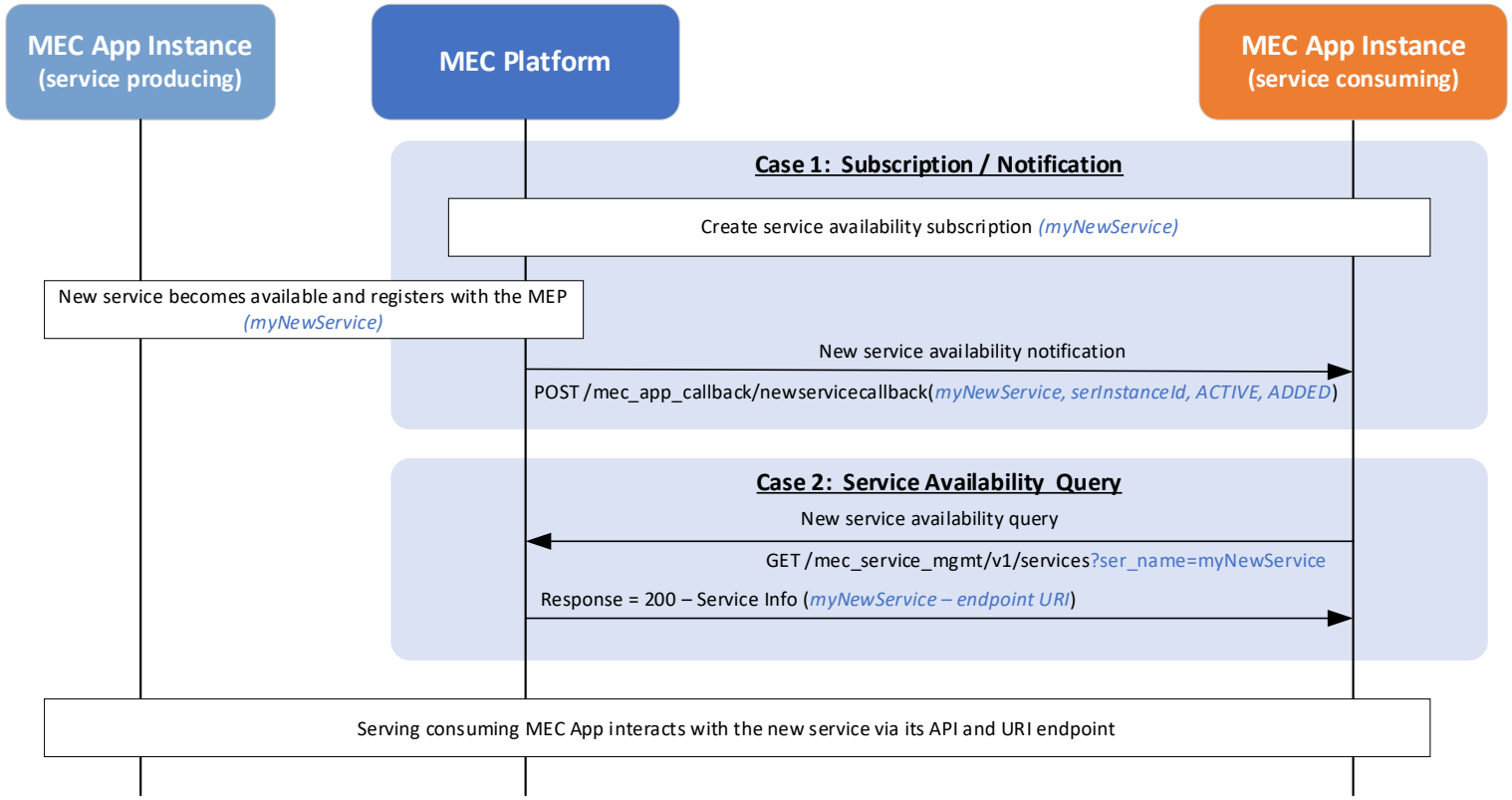
3 – MEC App discovering a new MEC Service

New MEC Service Discovery:

- Case 1: Subscription / Notification
  - Service consuming MEC App creates a Service Availability Subscription
  - When the new service registers and becomes available, the MEP issues a Service Availability Notification, indicating the New Service is available
- Case 2: Service Availability Query
  - Service consuming MEC App issues a service availability query to the MEP
  - MEP responds with the new service's information, including it's URI endpoint.
- MEC app utilises the New MEC Service via it's API and endpoint



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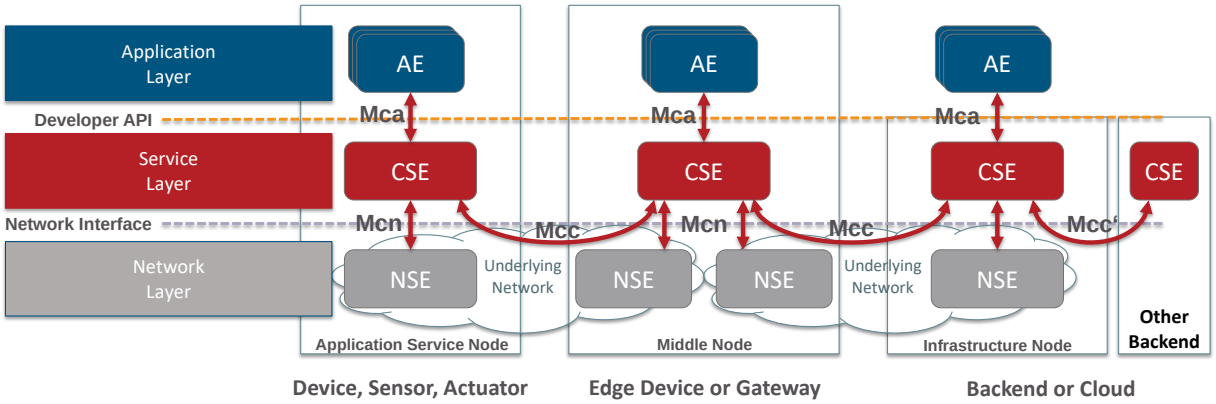
oneM2M architecture and MEC deployment options



Possible mapping:

- **CSE** in oneM2M architecture can be represented as a **MEC Service** and/or as a service-producing MEC App instance. This service would be exposed by the MEC platform to be connected to (authorized) consumer Application Entities (AE).
- Similarly, **AE** in oneM2M architecture can be seen as a **MEC App instance** by ETSI MEC system.

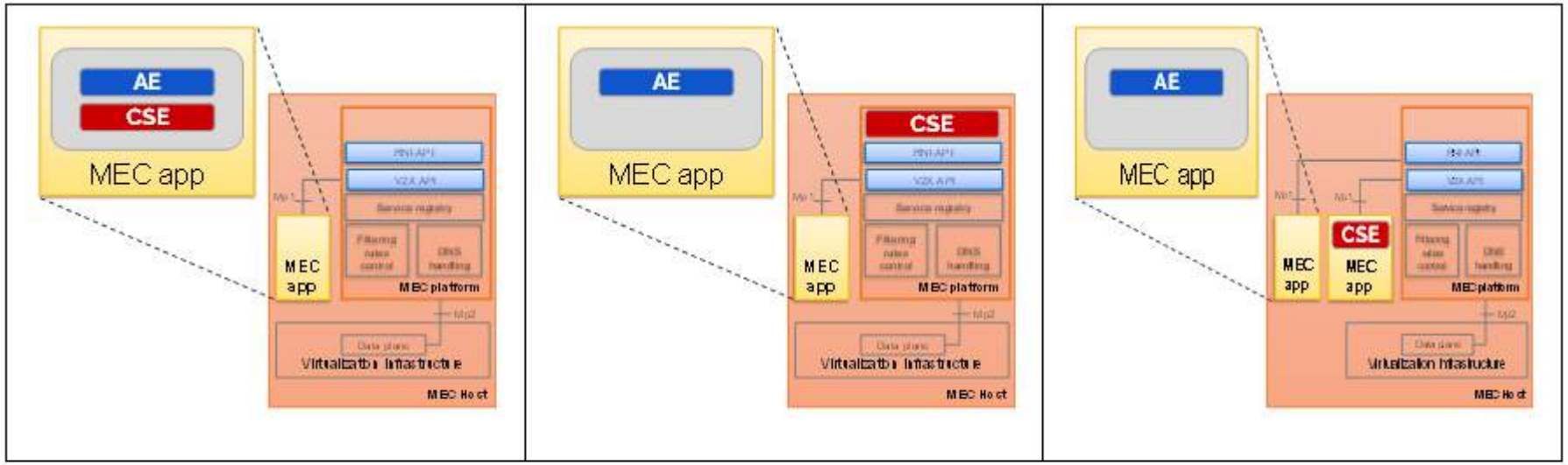


Figure 4-2: deployment options of CSE and AE in MEC systems: (left) both AE and CSE as a single MEC App instance; (center) CSE as a service in the MEC platform; (right) CSE implemented as a service-producing MEC App instance (CSFs)

White Paper: https://www.etsi.org/images/files/ETSIWhitePapers/ETSI-WP59-Enabling-Multi-access-Edge-Computing-in-iot.pdf

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Cross-Domain Standardisation and Architecture for Edge Computing
26 November 2024 in Brussels

Semantic Interoperability at the boarder between OT and IT

Johannes Stein – DKE Germany, Christian Diedrich ifak/OvGU Germany

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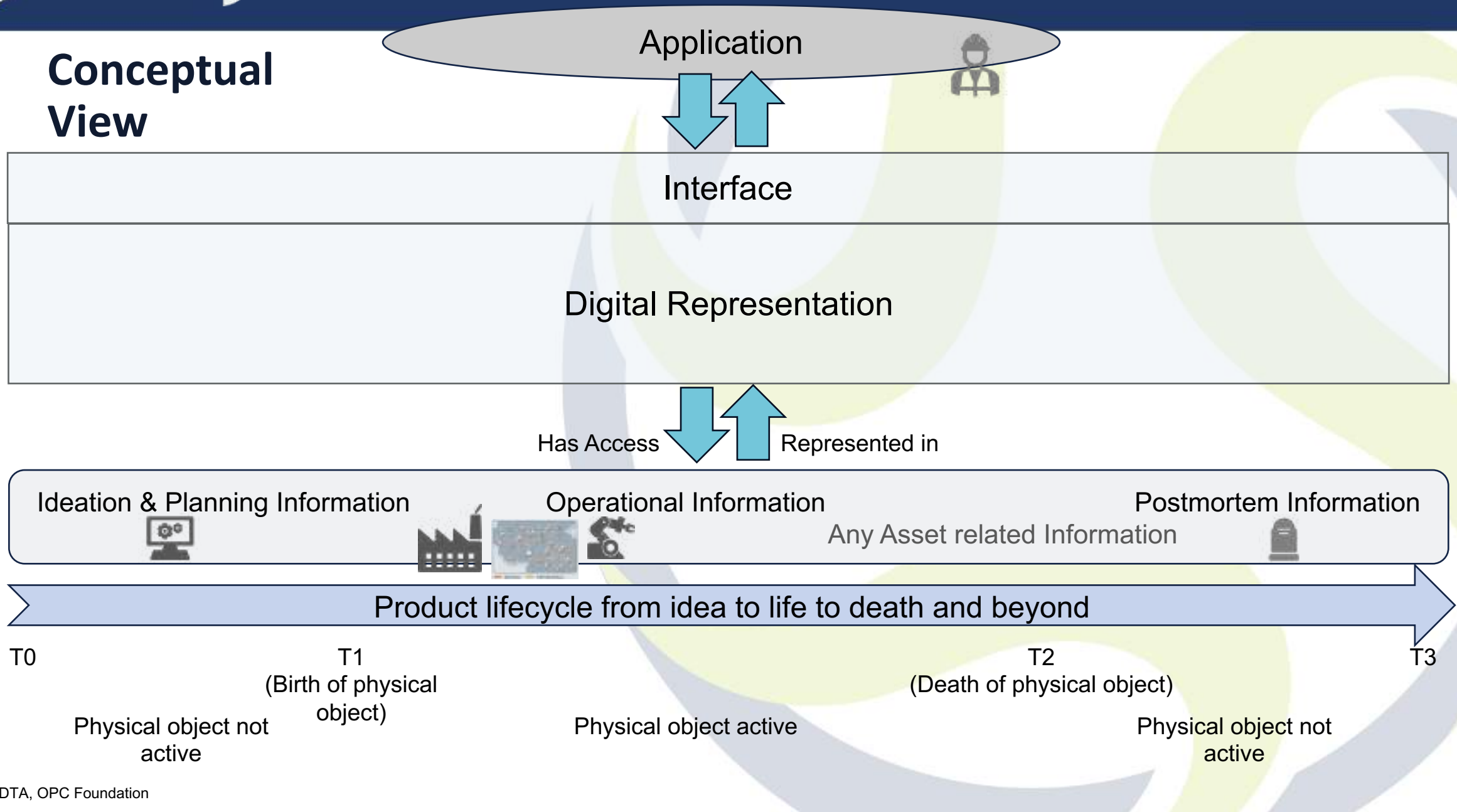
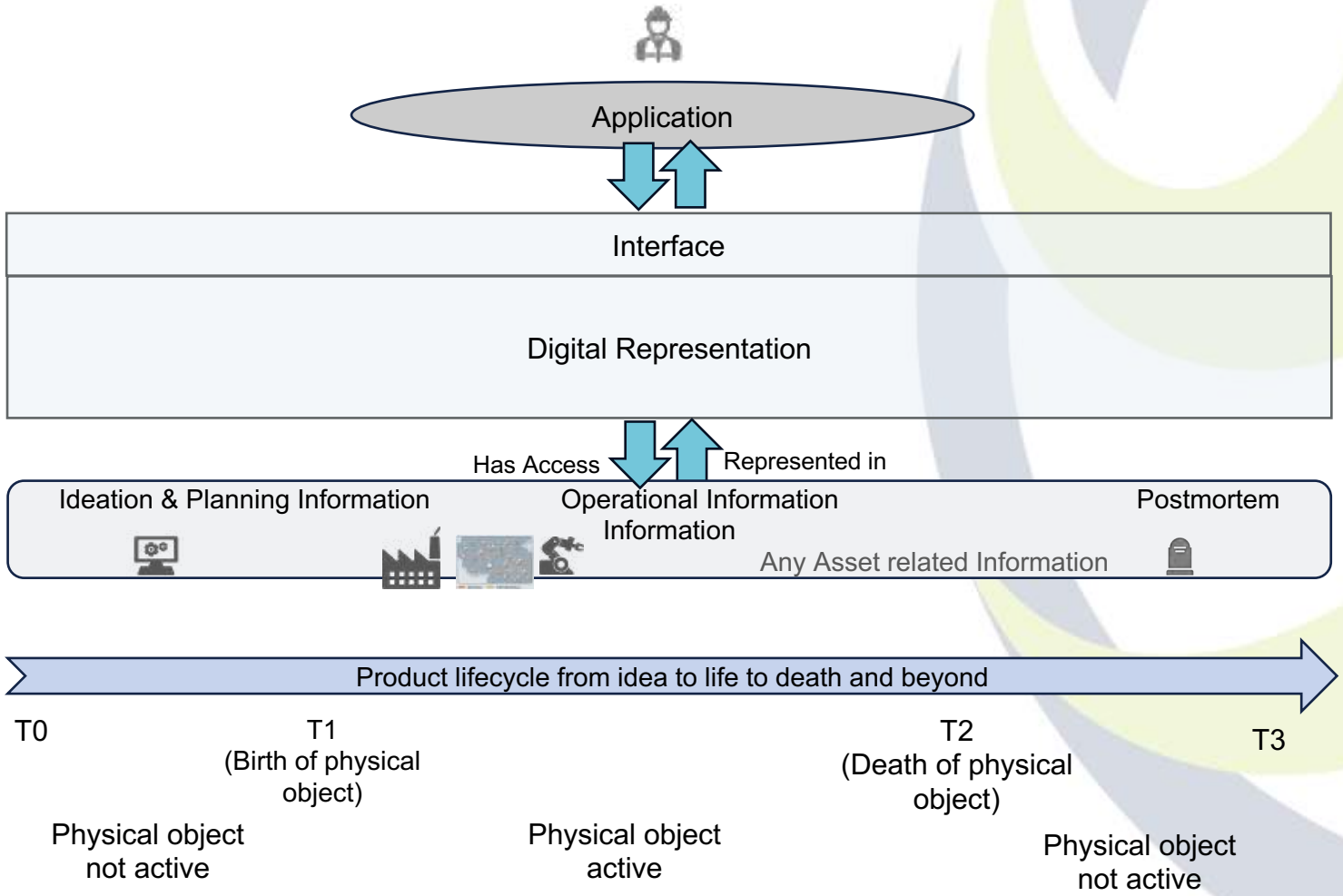
Conceptual View



Source: IDTA, OPC Foundation

Physical World, Edge, Cloud, Processes



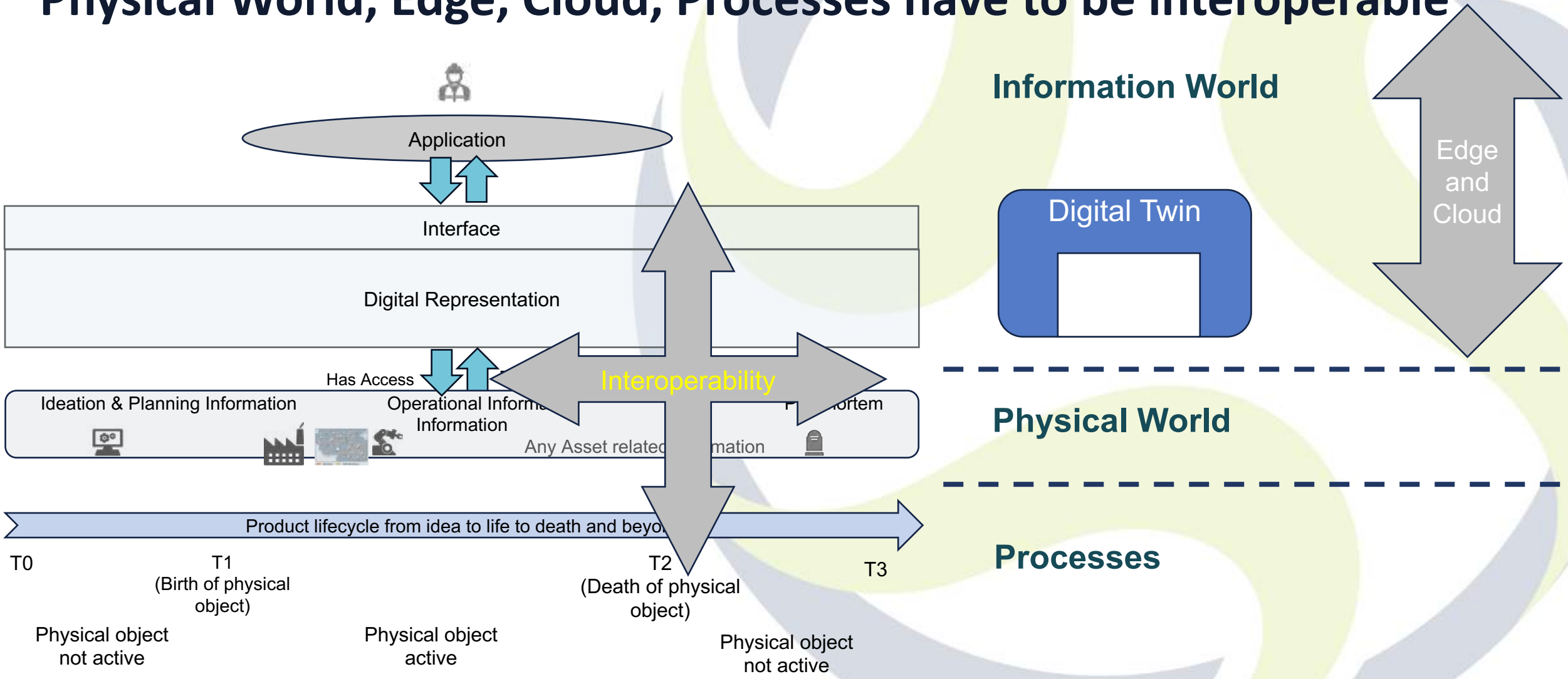
Information World

Edge and Cloud

Physical World

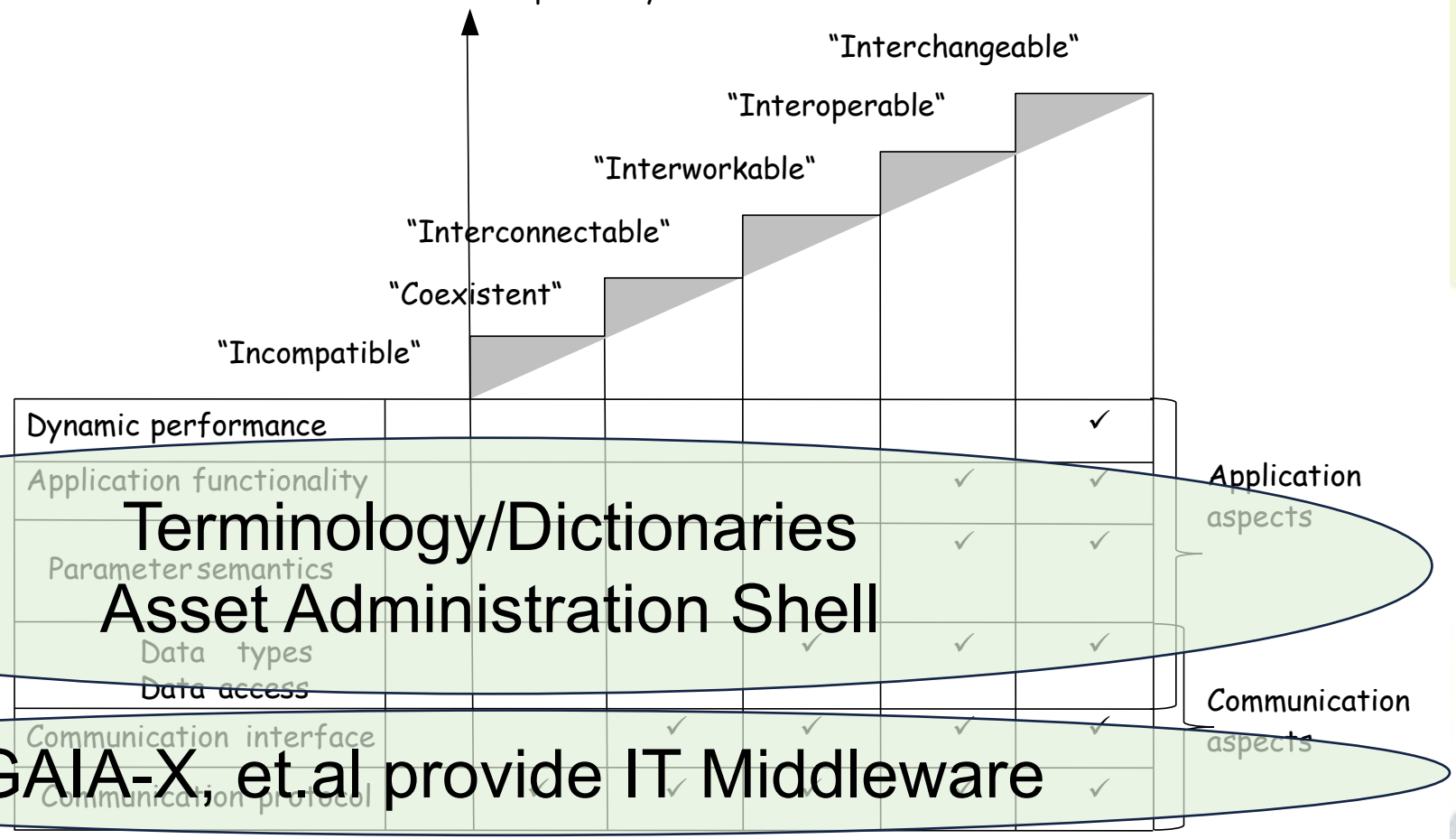
Processes

Physical World, Edge, Cloud, Processes have to be interoperable



Compatibility levels

Process descriptions missing



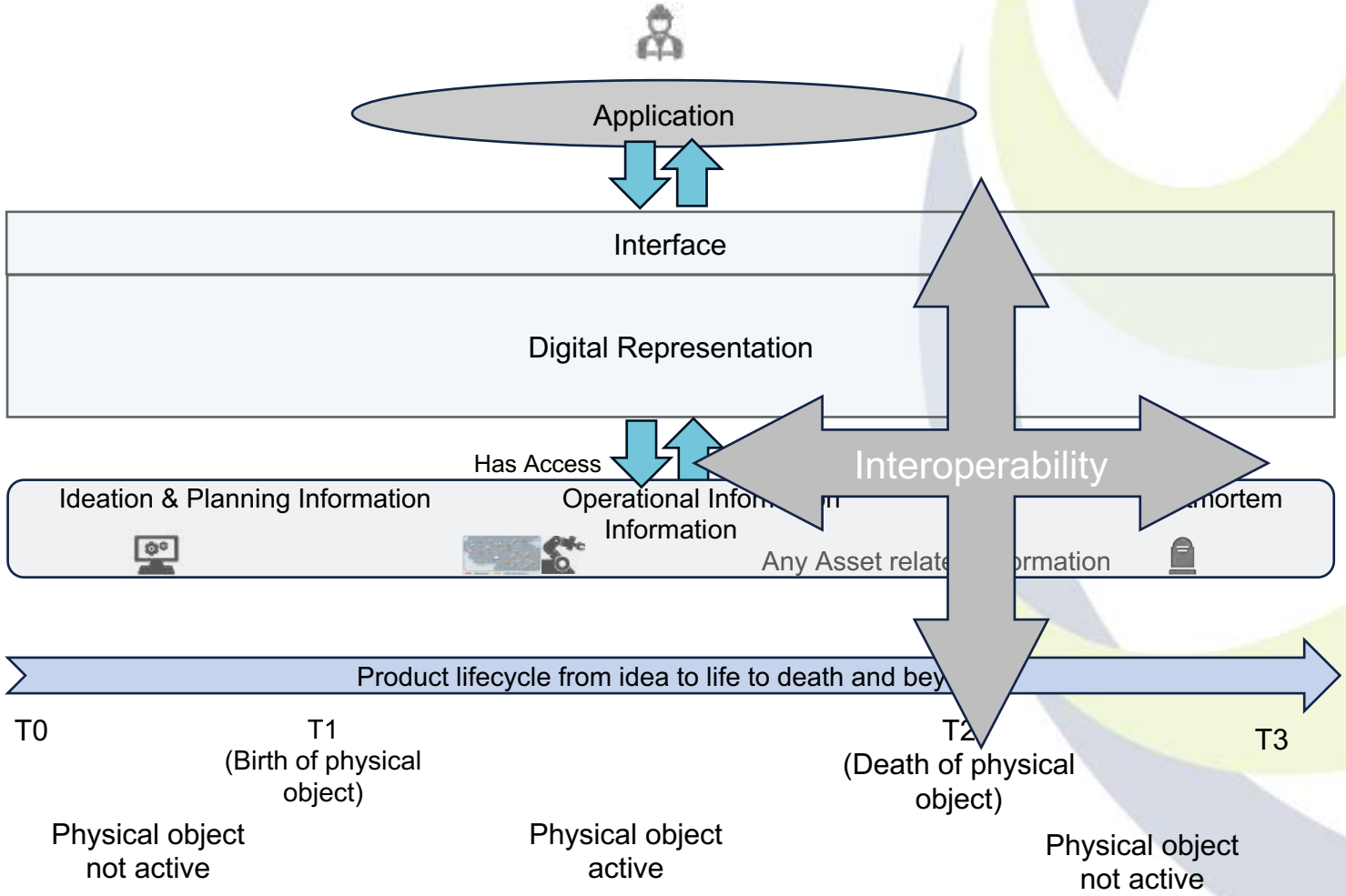
Terminology/Dictionaries

Asset Administration Shell

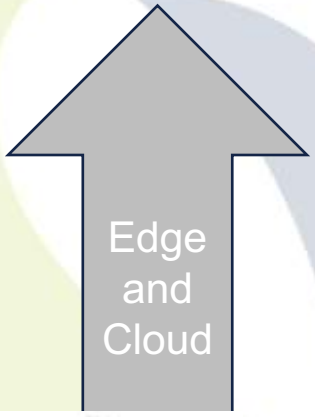
GAIA-X, et.al provide IT Middleware

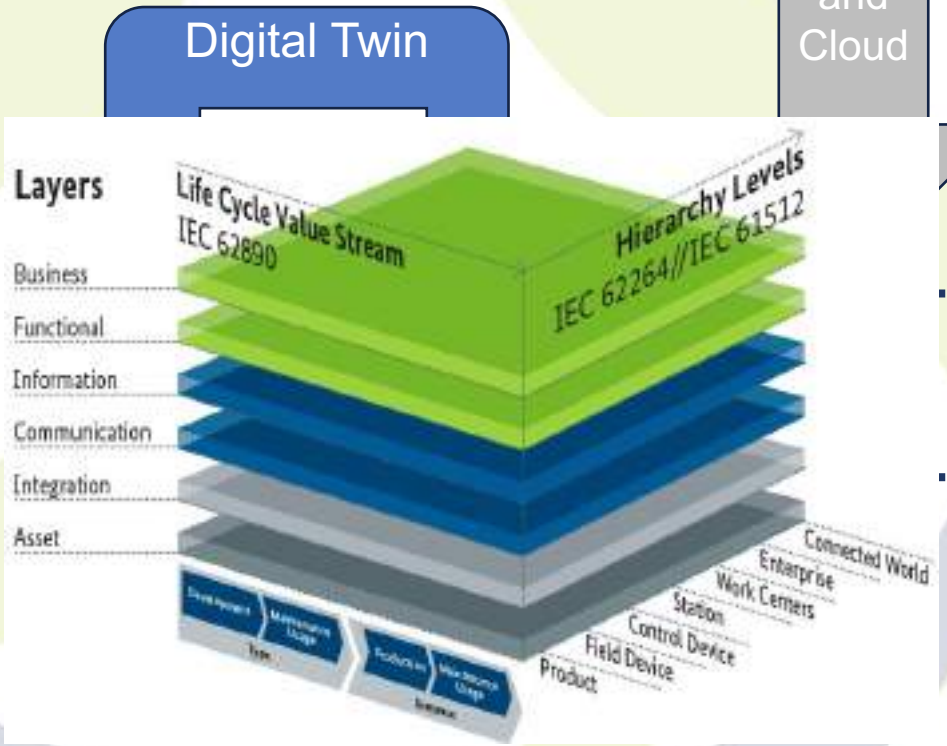
Source: derived from IEC 61804-2

RAMI 4.0 gives guidance for interoperability

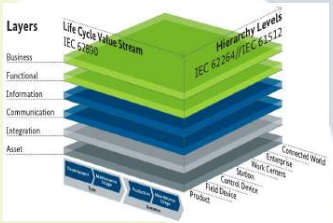


Information World





Important life cycle concept for life cycle interoperability – Type and Instance



Construction Plan:

Development
Construction
Computer Simulation
Prototype
…

Construction Plan:

Software Updates
Instruction Manual
Maintenance Cycles
…

Production:

Product
Data
Serial Number
…

Facility Management:

Usage
Service
Maintenance
Recycling
Scrapping …

Graphics: © Plattform Industrie 4.0

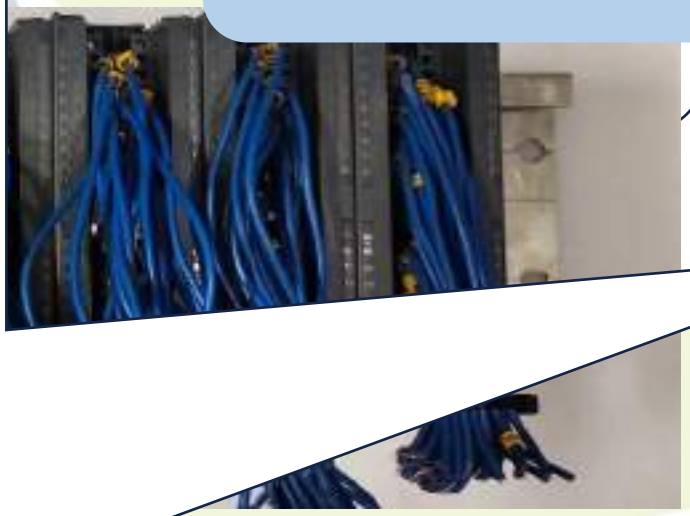
Example 1 – Dictionaries (IEC CDD, ECLASS based on IEC 61360)

Dictionary

Attribut	Wert
ID	0173-1#02-BAB576#005
Version	V9.1
Name	Spannung
Definition	-
Symbol	U
SI-Einheit	V
Datentyp	real
Werteformat	ASCII
Wert	240
Definition	The elektric voltage U is the potential difference ….

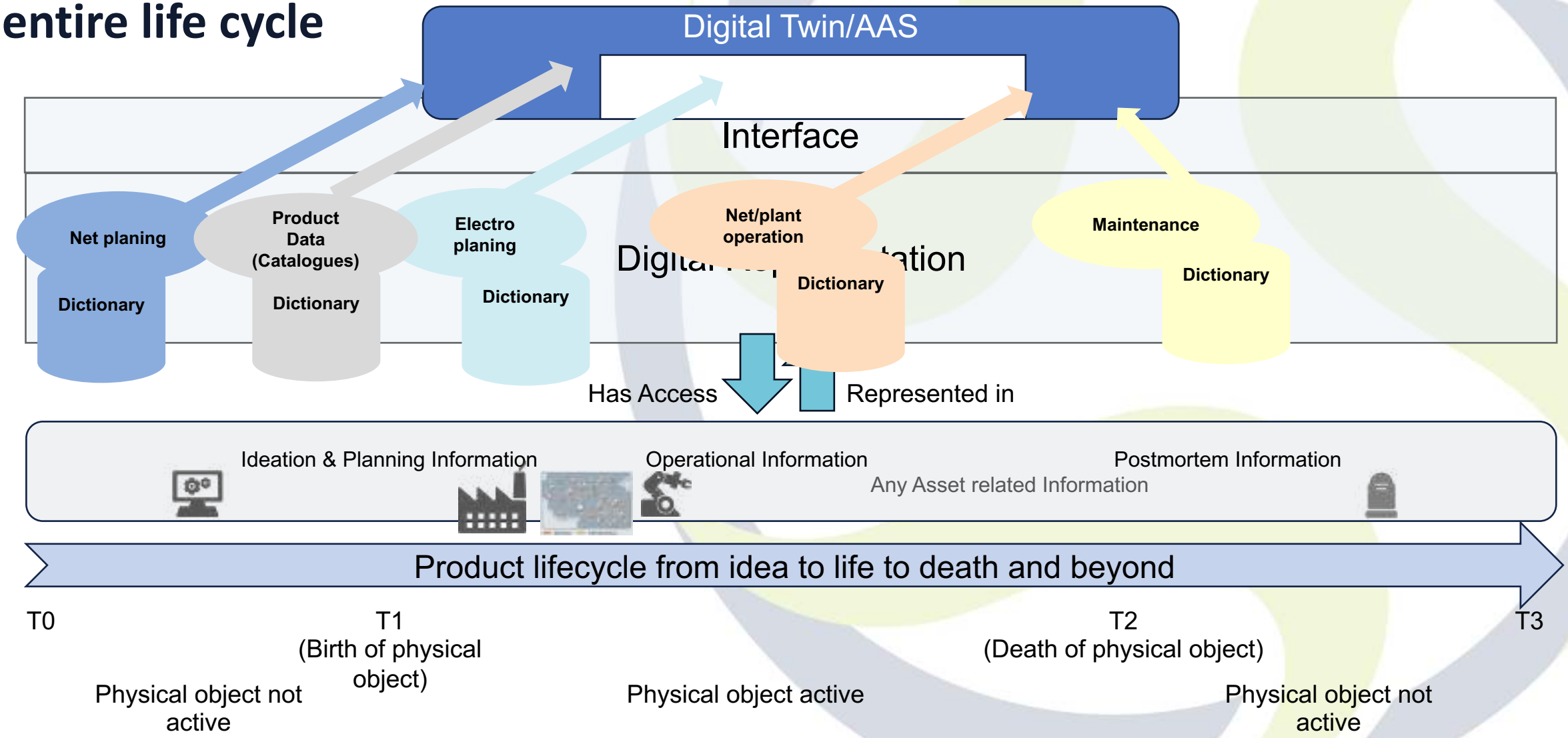
Source of picures: Alexander Belyaev, Siemens AG, ELV

Machine interpretable description of Variables/Parameters = Vocabulary/Dictionary

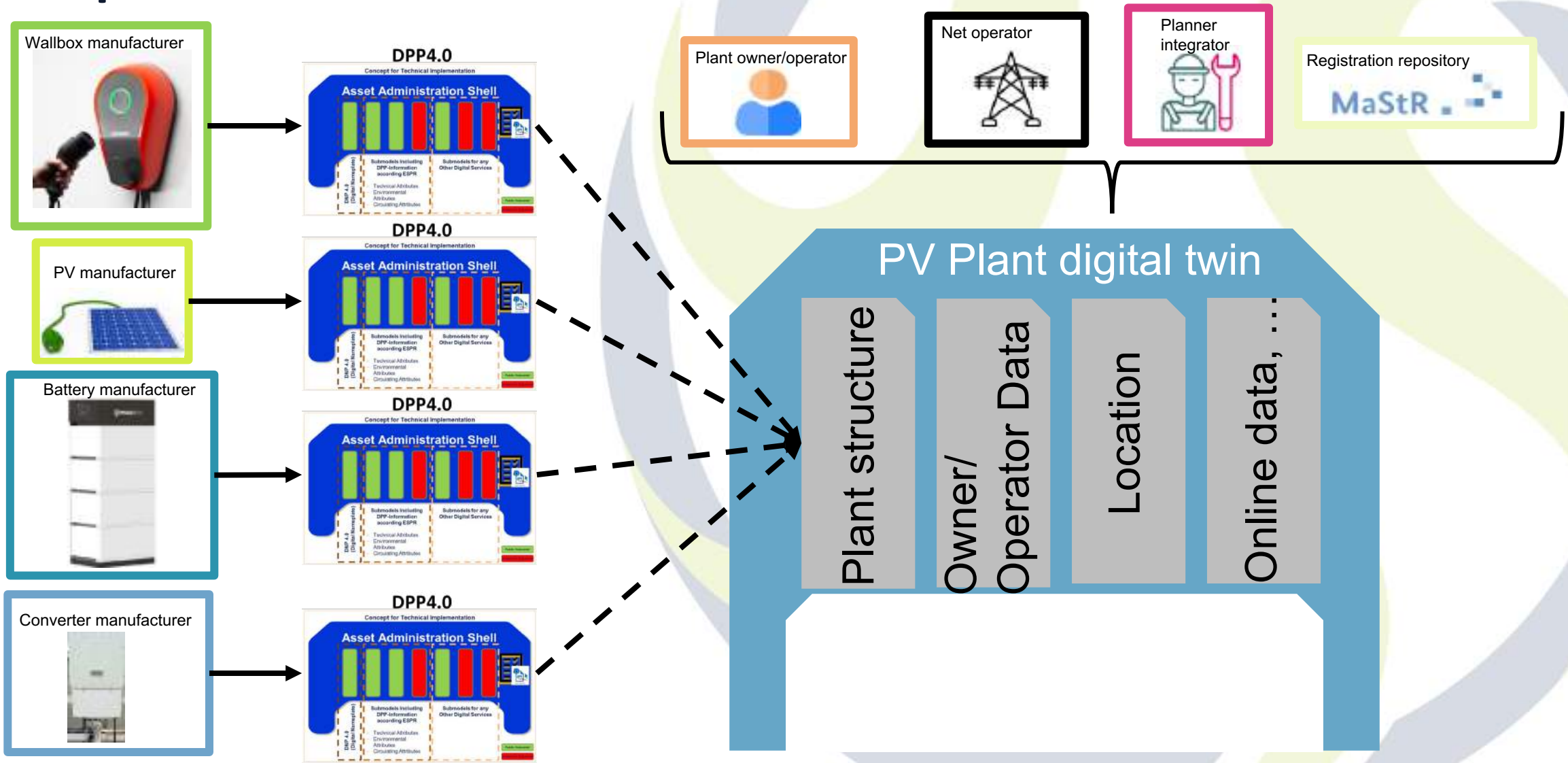


The value of voltage and current can interpreted with unit, range, etc.

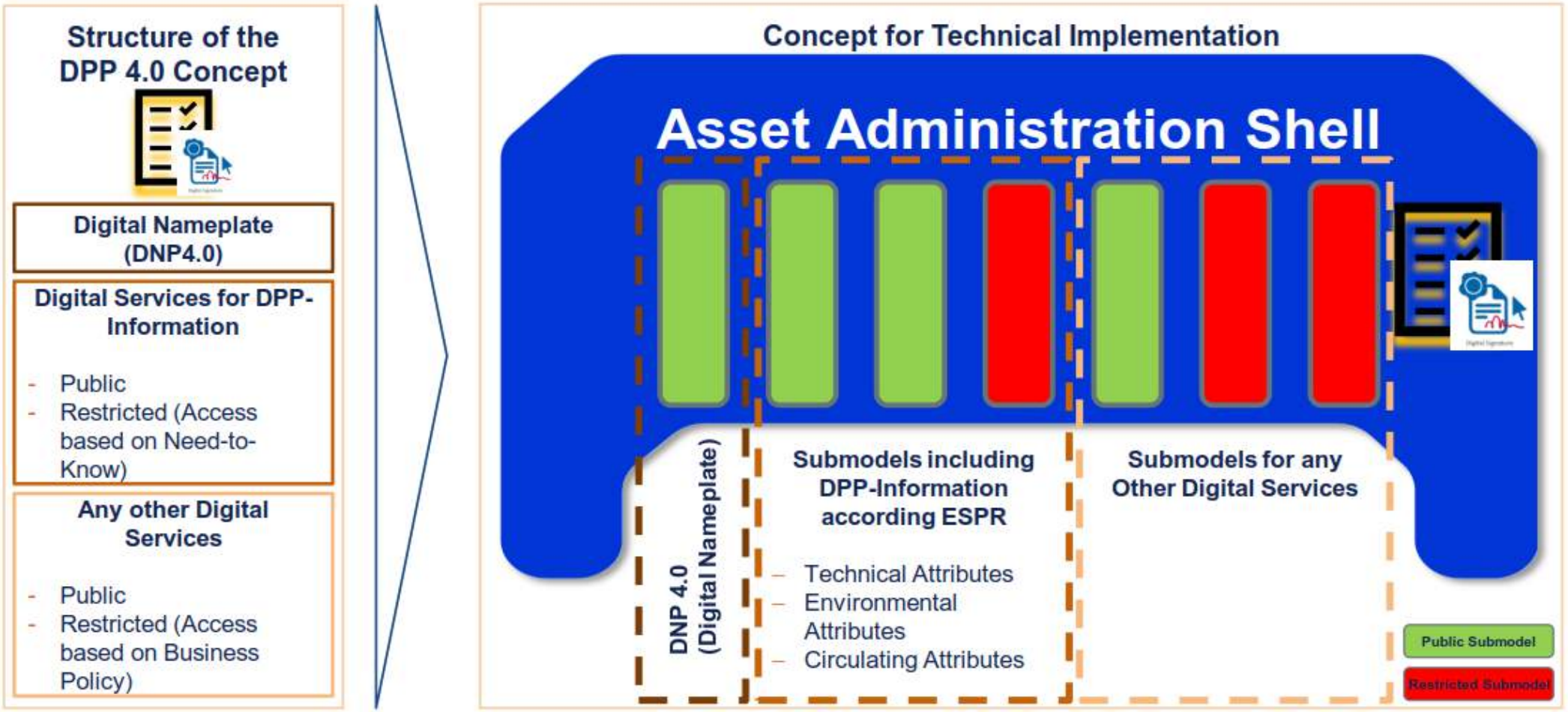
Standardised dictionaries for the entire life cycle



Example 2 – Cross-domain interconnection of sectors



Example 2 – Digital Twin AAS has a modular concept and is based in dictionaries



Concept Industrie 4.0 + DPP = „DPP4.0“

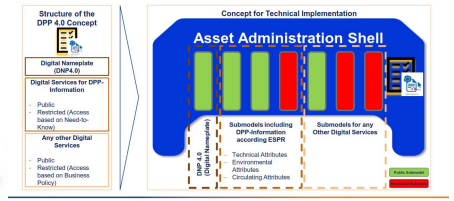
ESPR (System Requirements (DPP))

- Data carriers and unique identifiers
- Access rights management
- Interoperability
- Data storage
- Data processing
- …

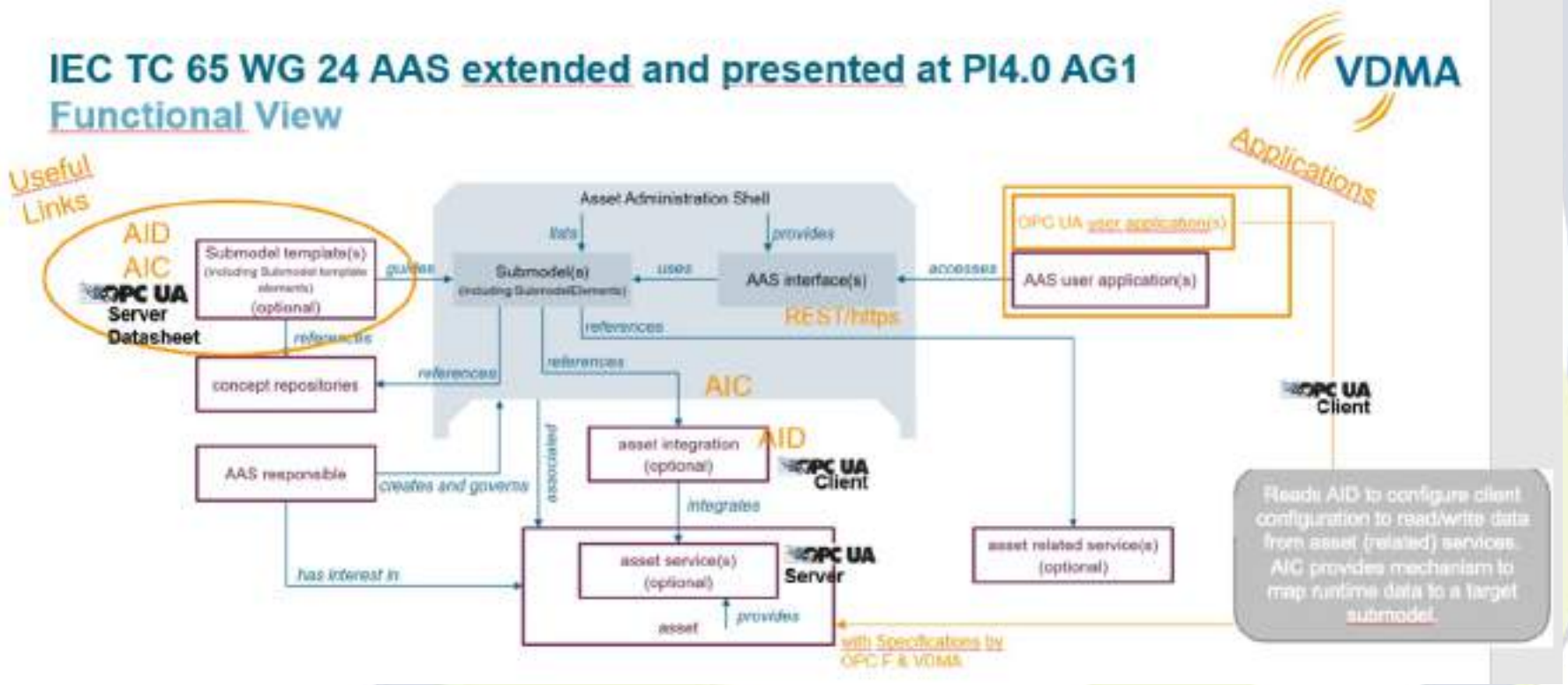
Industrie 4.0 Concepts

Asset Administration Shell – IEC 63278-series
Identification Link – IEC 61406-series
Digital Nameplate
IEC Common Data Dictionary
Cyber-Security
Access Control
…

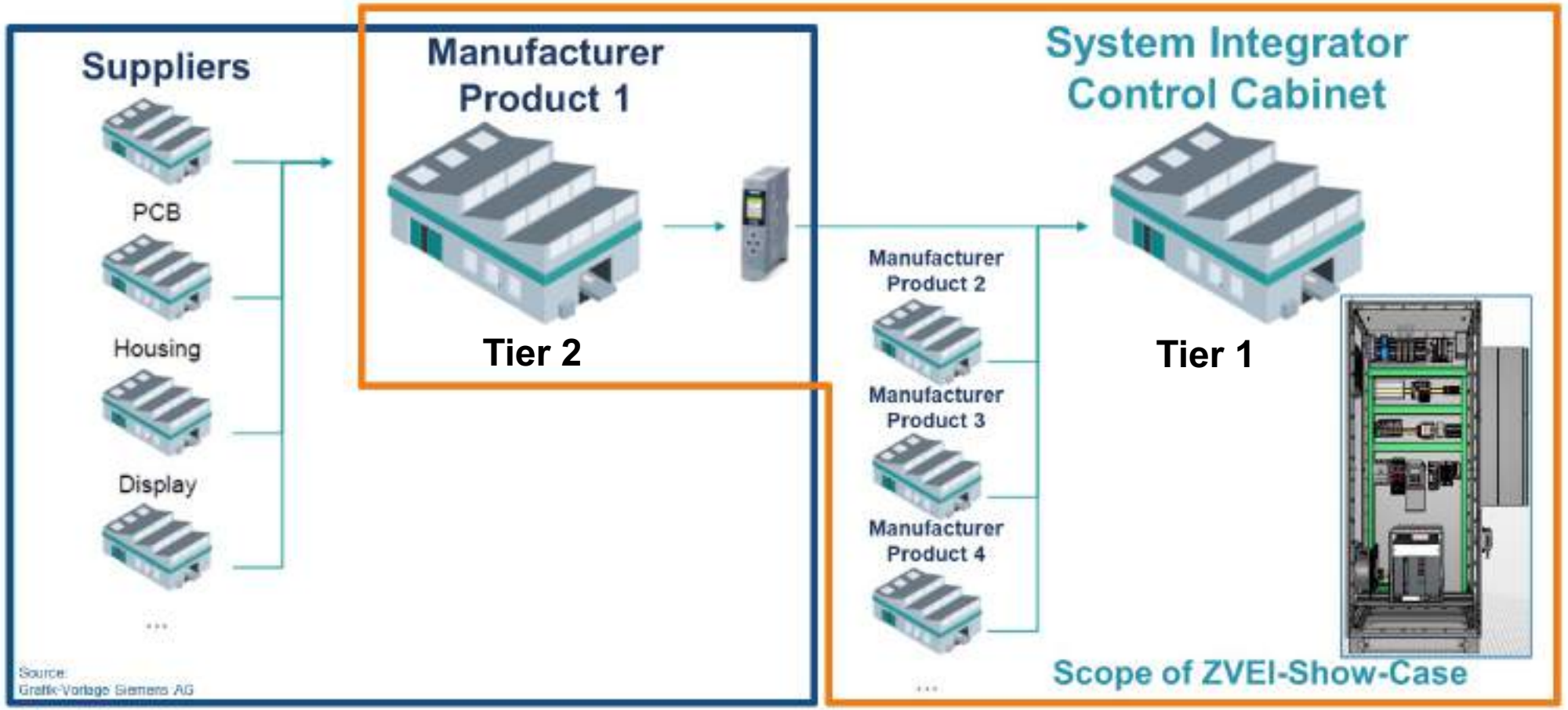
DPP4.0



AAS (IEC 63278-1) integration concepts



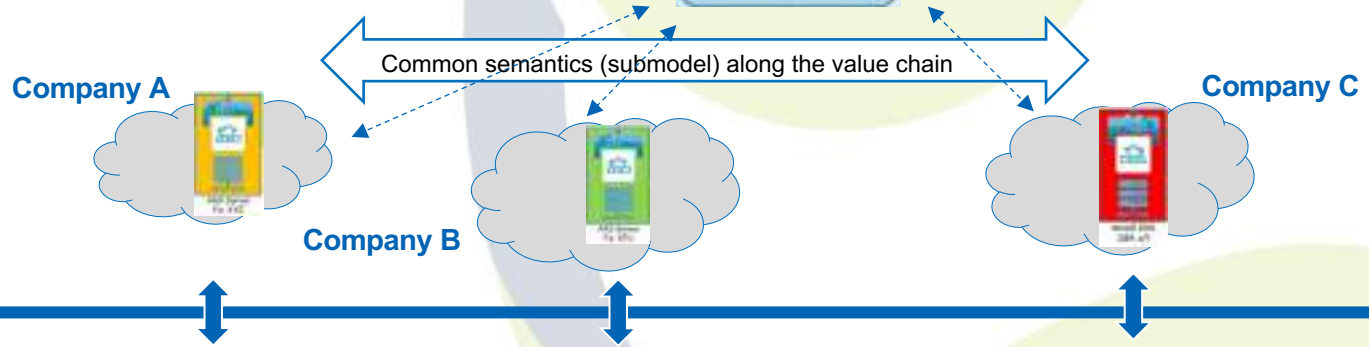
ZVEI-Show-Case “PCF@Control Cabinet” – Scope of the Show-Case: From Manufacturer to System Integrator (Tier 1 and Tier 2)



Example Product Carbon Footprint (PCF) – Cross-domain, cross-company ShowCase from associoation ZVEI

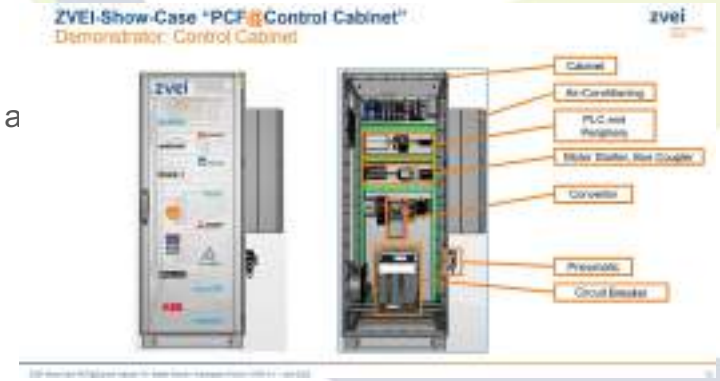
Application accesses semantically defined data via registry

Information World Cloud, Data Spaces



Physical World

Components of a control cabinet



Source: based on Plattform Industrie 4.0, Kai Garrels
ZVEI, Schork, own composition

Summary

- Standardised vocabularies and dictionaries are the basis of all interoperability
- Interoperability have to be provided along the entire life cycle of products machines, plants – type instance concept is a must
- Digital twin and the standardised Asset Administration Shell AAS with its modular structure and its various integration means could be a suitable implementation of both DDP and interoperable cross-domain applications virtualised in edges and clouds
- What's missing?
  - Standardised process description methods and means are not well established and available
  - Ontology integration such as for example SAREF, QUDT have to be evaluated
  - Scalability of client/server communication paradigm is not good enough for the virtualisation of edge and cloud. Peer-to-peer and pub/sub seems to be more appropriate.

Assessing conformity. A new European trust label for Cloud-Edge-IoT

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Panel discussion

slido.com
#4259442

Damir Filipovic
AIOTI

Antonio Kung
Trialog

Daniel Alonso
BDVA

Why conformity

- Conformity in the EU is already mainstream requirements in last 30 years, since CE mark was introduced
- It is general, with specific provisions like LVD, EMC Directive, RED etc.
- It is not specific to the Cloud/Edge/IoT (CEI) systems

What exists

- A lot of individual certificates, covering mostly:
- Compliance or interoperability with standards (like CSA/Matter)
- Security (like ISO/IEC, GSMA, ETSI etc.)
- Sometimes for IoT, sometimes for Cloud, but not for both
- International and national schemes
- No scheme covers “end-to-end” CEI system

Why CEI Trust Label

- Formal certifications can strengthen both the demand and supply sides of the cloud/edge/IoT (CEI) market

- Development of a trust label across the CEI eco-systems can improve and guarantee a minimum level of interoperability and portability with existing legacy systems, energy efficiency and reflect potential dual-use

- Such trust label can also support alignment with trusted partner regions, alignment with national or regional initiatives and foster consensus on interoperability and standards as well as ecosystem building in and across verticals, including the sustainability impact

Why CEI Trust Label (2)

- The trust label framework would be built on the UNLOCK-CEI CEI-ling CEI assessment tool and other available tools, processes and methodologies developed in the Standards Development Organisations (SDOs), notably ETSI and ISO/IEC

- It will also include existing certification schemes, usually developed at the component/device level as well as compliance with the existing EU legislation (radio equipment, cybersecurity, AI, data, GDPR) and the applicable codes of condu

Objectives

- to improve and guarantee a minimum level of interoperability and portability, energy efficiency and security of the CEI eco-system
- to ensure trust between the Tech Adopters and Providers and support the market-fit of the CEI products and services developed in EU funded large-scale pilot projects, leading to stronger collaboration
- to facilitate the market adoption of technological approaches and methods developed in previous EU-funded programmes or relevant industry associations and initiatives
- to accompany post-pilot market deployment
- to align the architecture of the framework in alignment with ISO practices (CASCO)

Discussion

- What should such a trust label cover
- How to ensure there is “end-to-end” coverage, not individual parts or devices or software
- Security, interoperability and sustainability are important
- Not re-inventing the wheel – take into consideration what exists and works

Assessing conformity. A new European trust label for Cloud-Edge-IoT

Antonio KUNG

26 November 2024

Outline

- Speaker
- Conformance assessment
- Challenges (Actions) for a trust label

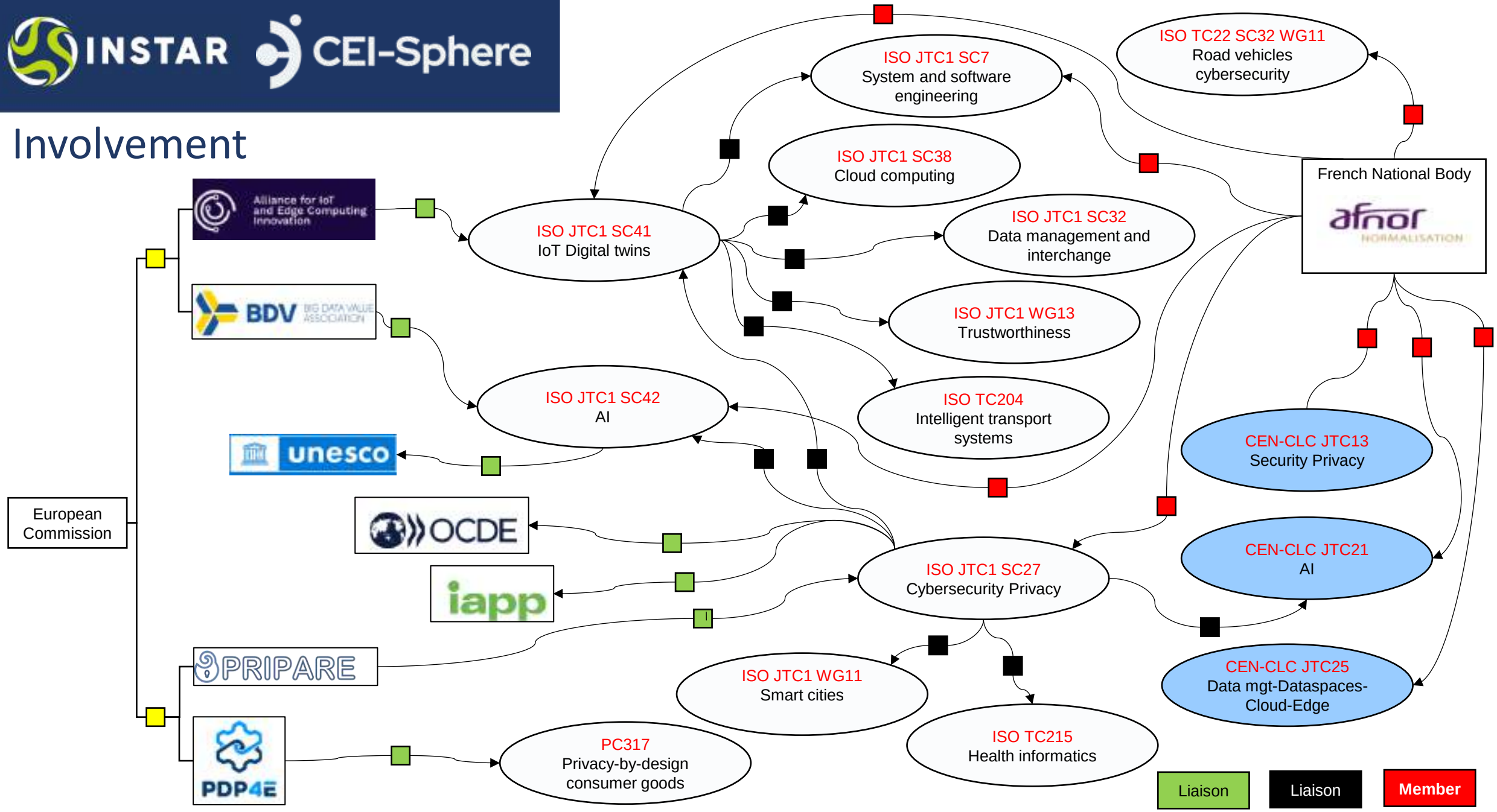
Outline

- Speaker
- Conformance assessment
- Challenges (Actions) for a trust label

Antonio Kung

- Co-founder Trialog - former CEO – Executive board
  - IoT systems (Smart meters, Vehicle charging, Connected vehicles)
- Standardisation activities
  - AIOTI
  - BDVA
  - About 20 standards
- Standardisation topics
  - Horizontal: Use cases, Architecture; IoT, Digital twin, AI, Metaverse, Security and Privacy, Interoperability, Trustworthiness
  - Vertical: Smart cities, Automotive; Health, Energy, Vehicle charging

Involvement



Outline

- Speaker
- Conformance assessment
- Challenges (Actions) for a trust label

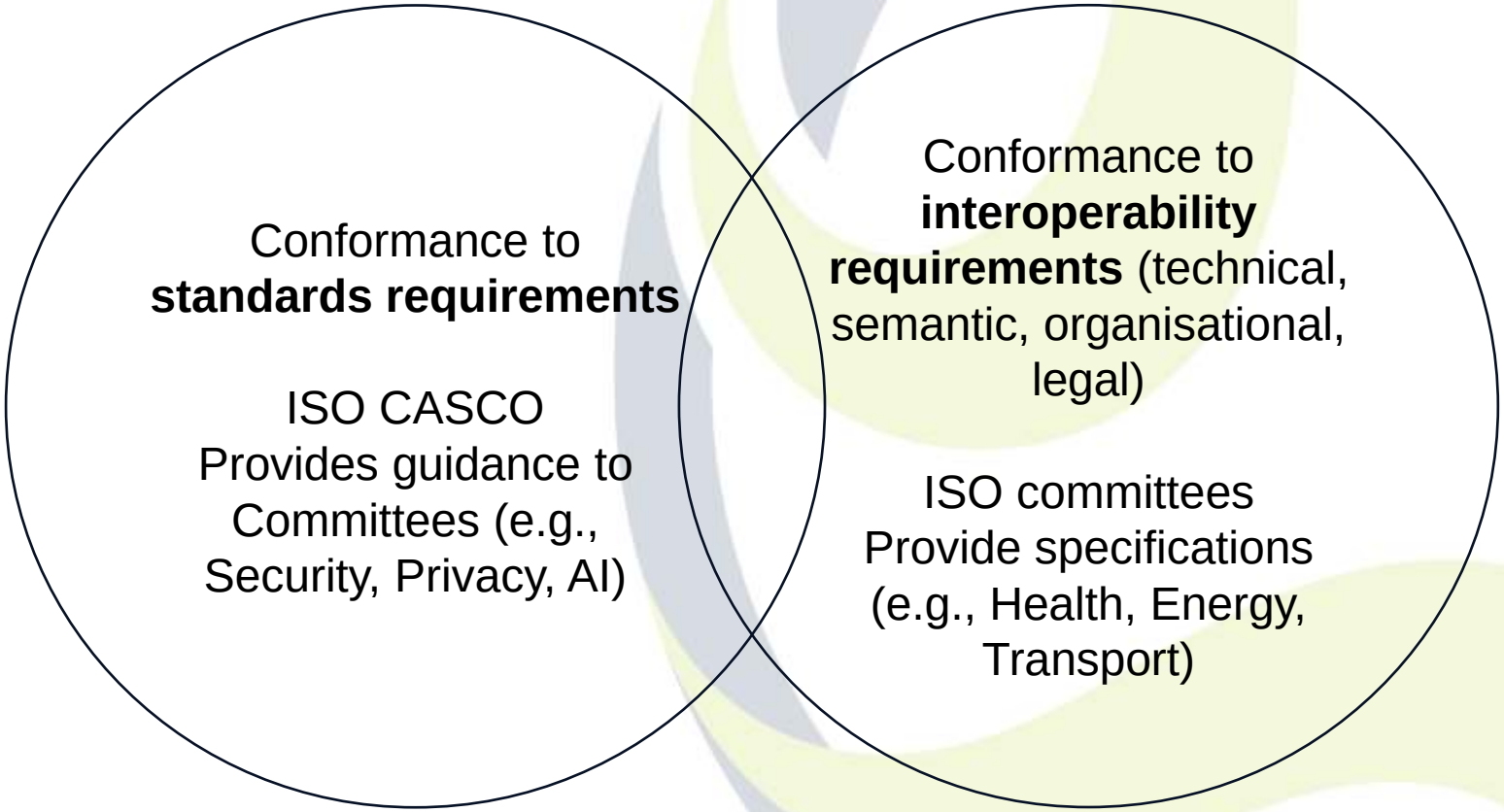
Paper on interoperability to be published by AIOTI - Evolution of interoperability standards. *Submitted to SC41*

DOCUMENT JOINTLY PRODUCED BY

INT:NET	int:net
AIOTI	Alliance for IoT and Edge Computing Innovation
StandICT	standICT.eu 2026 ICT Standardisation Observatory and Support Facility in Europe

CONTENTS

Two types of conformance addressed in standards



Who is defining the end-to-end trust label?

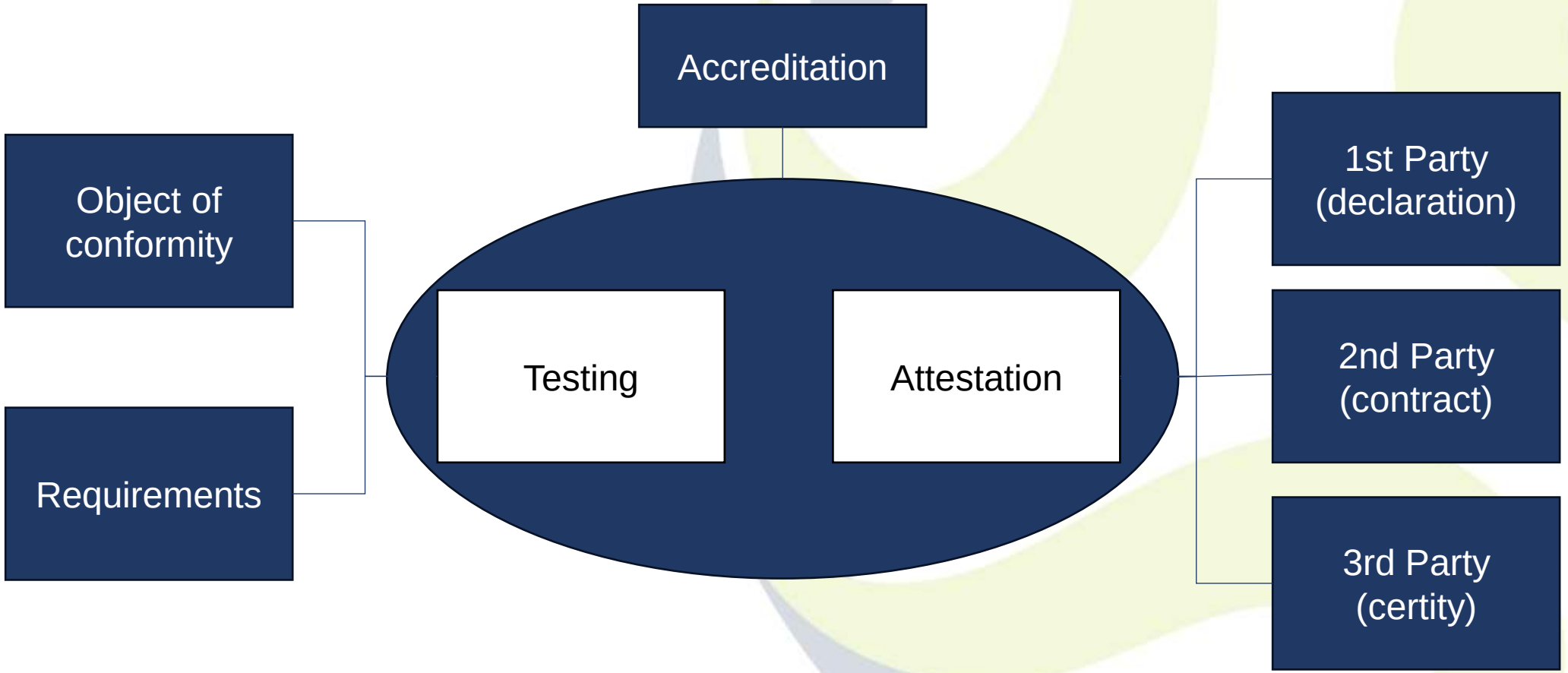
Conformity assessment resources

- Resources
  - https://www.iso.org/resources-for-conformity-assessment.html
- Conformity assessment for standards writers - Do's and don’ts
  - https://www.iso.org/publication/PUB100303.html
- ISO/IEC Directives, Part 2, Clause 33
  - https://www.iso.org/sites/directives/current/part2/index.xhtml#_idTextAnchor450
- 2022 Workshop on the directive
  - https://www.iso.org/committee/54998.html?t=tsM8v8I0MwSBSaUlcUo2WIZ4b9Hud4eCmipOVeK9eThOL2ym09_7tdSiLugwiMQ6&view=documents#section-isodocuments-top

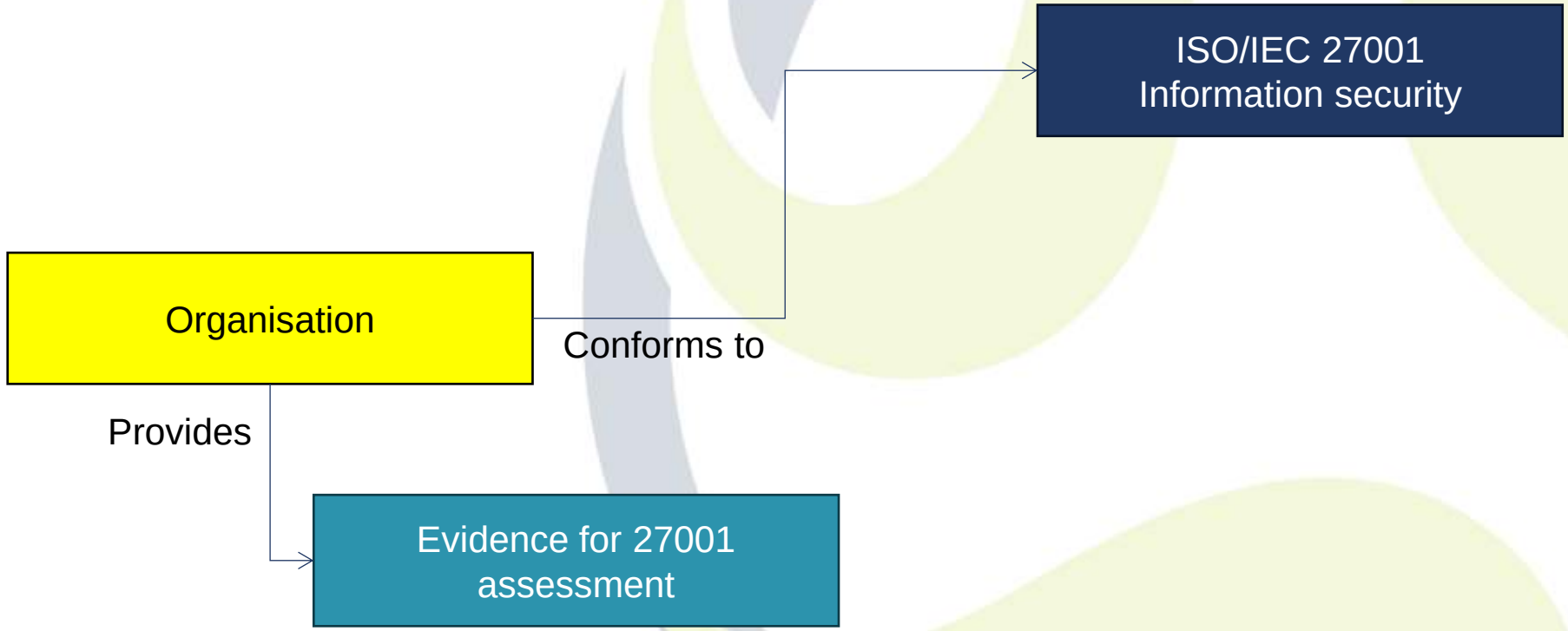
Definitions (ISO/IEC 17000:2020)

- Conformity assessment:
  - demonstration that specified requirements are fulfilled
    - Note 1: The process of conformity assessment […] can have a negative outcome, i.e. demonstrating that the specified requirements are not fulfilled.
    - Note 2: Conformity assessment includes activities […], such as but not limited to testing, inspection, validation, verification, certification, and accreditation.
    - Note 3: Conformity assessment is explained as a series of functions. Activities contributing to any of these functions can be described as conformity assessment activities.
    - Note 4: This document does not include a definition of “conformity”. “Conformity” does not feature in the definition of “conformity assessment”. Nor does this document address the concept of compliance.
- Object of conformity assessment
  - entity to which specified requirements apply
    - EXAMPLE: Product, process, service, system, installation, project, data, design, material, claim, person, body or organization, or any combination thereof.
    - Note 1 to entry: The term “body” is used to refer to conformity assessment bodies and accreditation bodies. The term “organization” is used in its general meaning and may include bodies according to the context. The more specific ISO/IEC Guide 2 definition of an organization as a body based on membership is not applicable to the field of conformity assessment.

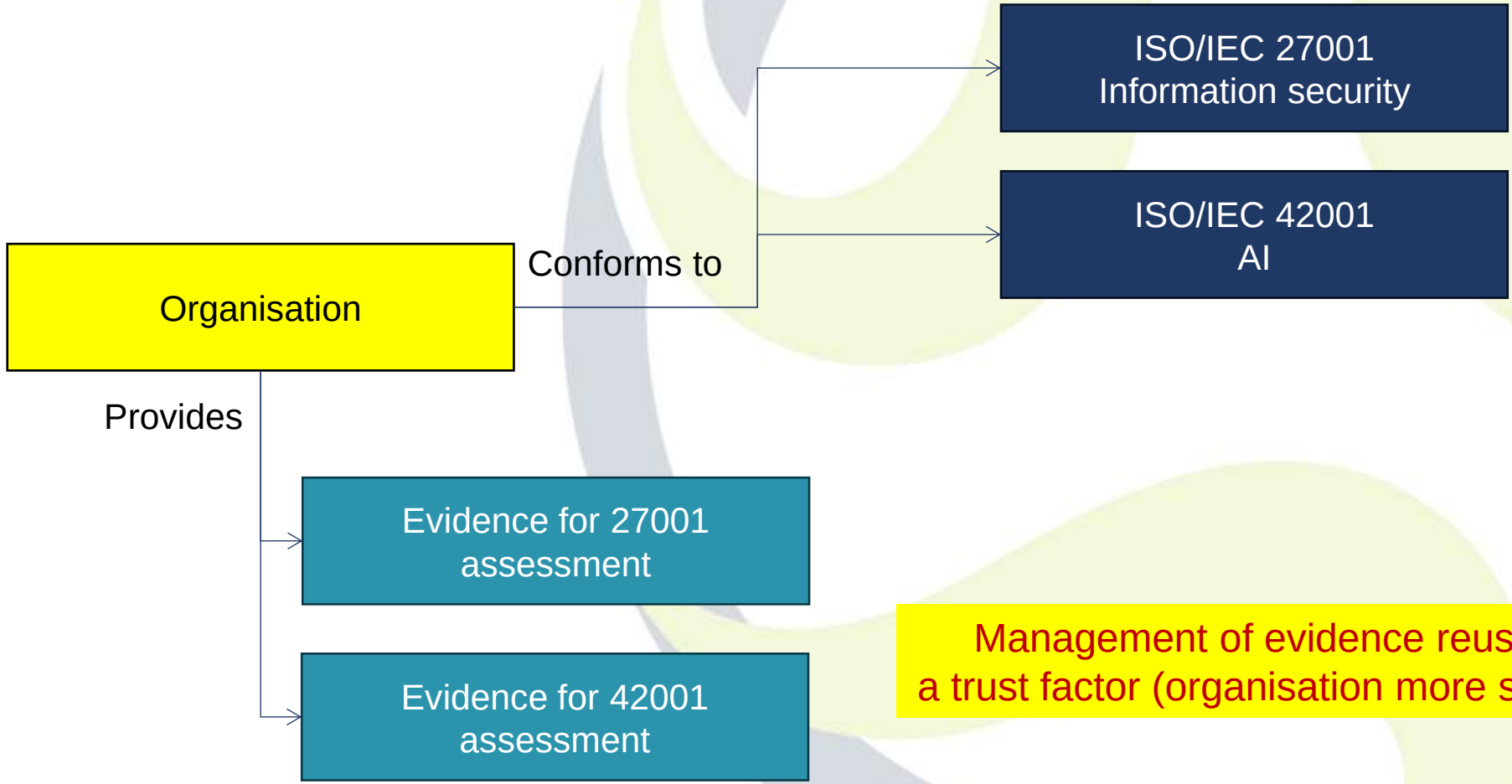
Conformity assessment activities (from CASCO)



Example of assessment (organisation)

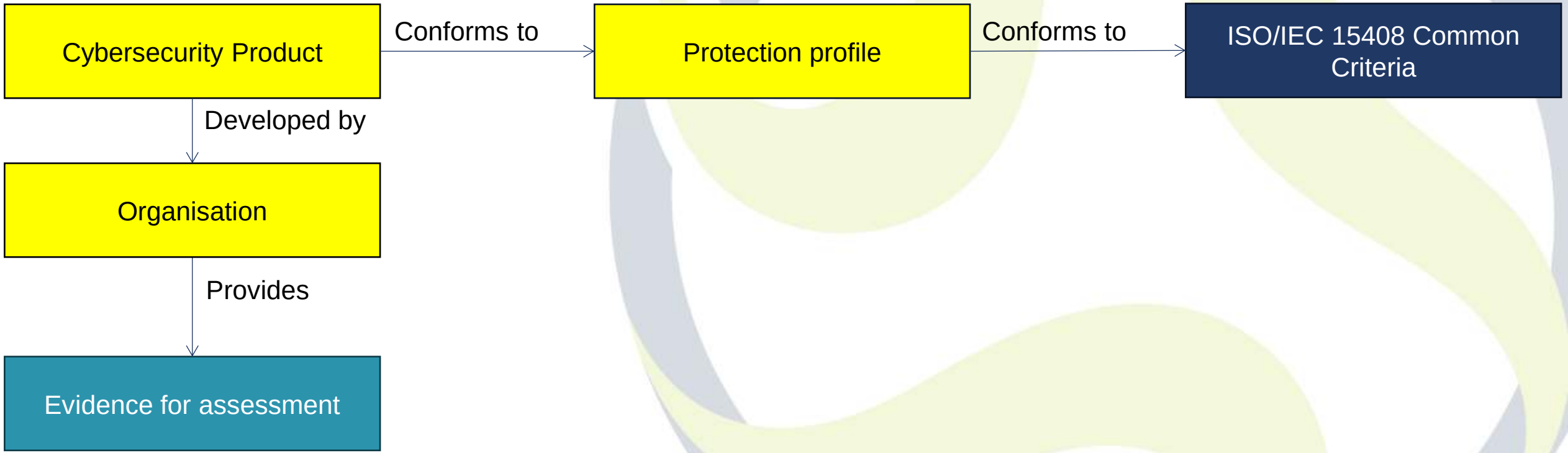


Example of multiple purpose assessment (organisation)

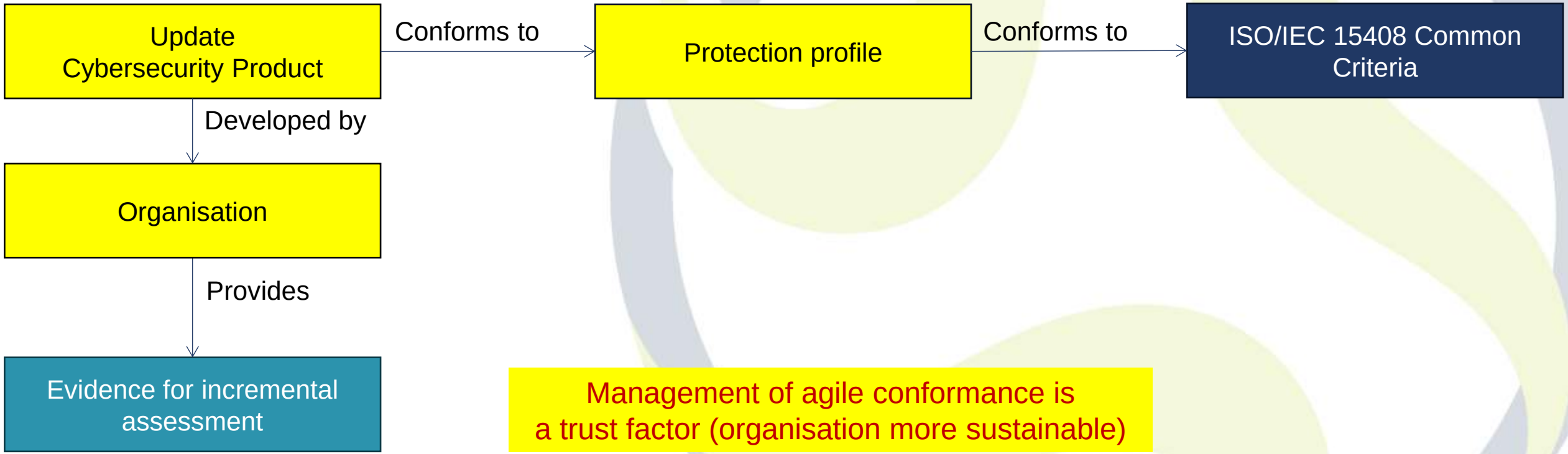


Management of evidence reusability is a trust factor (organisation more sustainable)

Example of assessment (product)

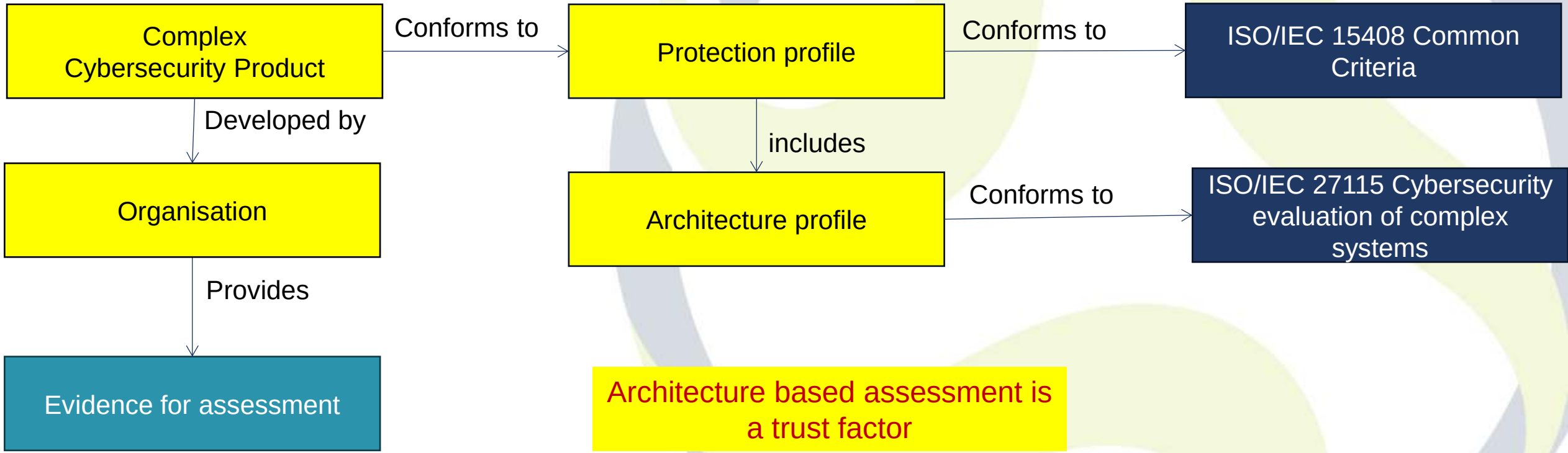


Example of re-assessment (product)



Management of agile conformance is a trust factor (organisation more sustainable)

Example of assessment (complex system)



Outline

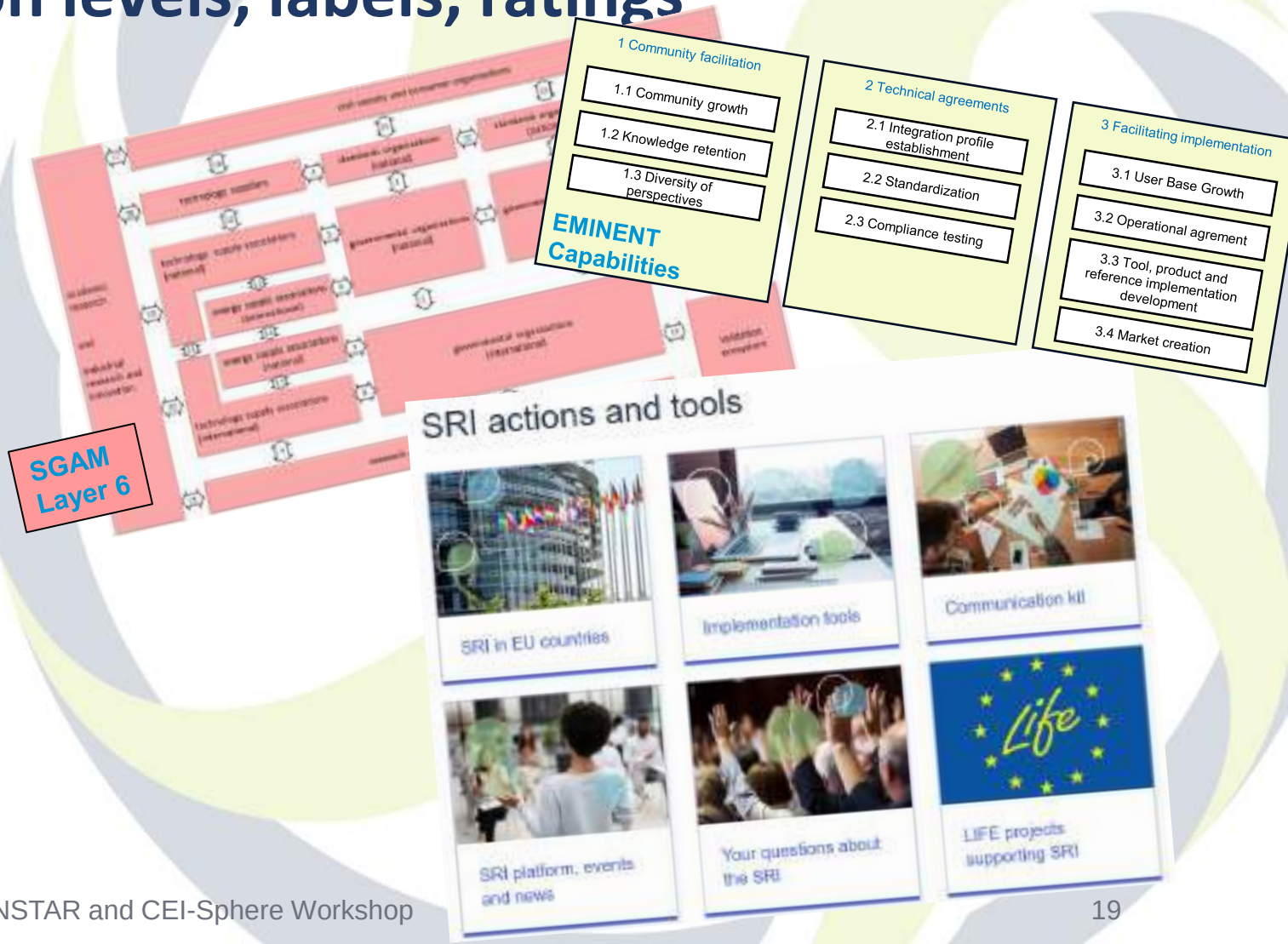
- Speaker
- Conformance assessment
- Challenges (Actions) for a trust label

Examples of standardisation work on levels, labels, ratings

- ISO/IEC JTC1/SC27 Cybersecurity and privacy protection
  - ISO/IEC 15408 Evaluation criteria for IT security
  - ISO/IEC DIS 27404 Cybersecurity labelling framework for consumer IoT
- ISO/IEC JTC1/SC41 IoT and digital twin
  - ISO/IEC 30186 ED1 Digital twin – Maturity model and guidance for a maturity assessment
  - ISO/IEC 30187 ED1 Internet of Things (IoT) - Evaluation indicators for IoT systems
- ISO/IEC JTC1/SC42 Artificial intelligence
  - ISO/IEC PWI 42117 Trustworthiness Fact Labels for AI systems
- ISO TC22/SC32 Road vehicles
  - ISO/SAE CD PAS 8475 Road vehicles — Cybersecurity Assurance Levels (CAL) and Targeted Attack Feasibility (TAF)
- IEC 62442-2-2 Security for industrial automation and control systems – Part 2-2: IACS Security Protection
  - Maturity levels, Protection levels, Security program rating
-

Examples of initiatives on levels, labels, ratings

- INTNET support action for energy data spaces
  - EMINENT – Interoperability maturity model
  - Intmas – Interoperability management system
- EU Smart Readiness Indicator
  - measures a building's capacity to use smart-ready services
  - https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/smart-readiness-indicator_en

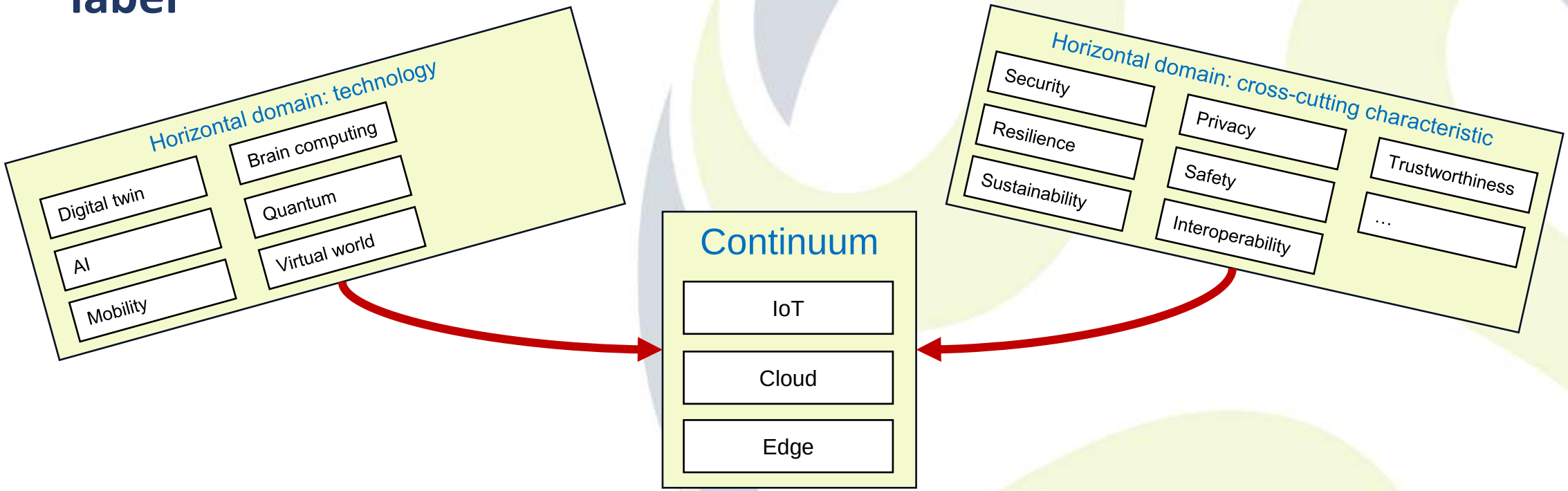


Challenge 1: need for methodology for creating a trust label

- Methodology
  - VCIO (Value – Criteria – Indicator – Observable)
  - https://www.researchgate.net/publication/360167343_VDE_SPEC_90012_V10_-_VCIO_based_description_of_systems_for_AI_trustworthiness_characterisation

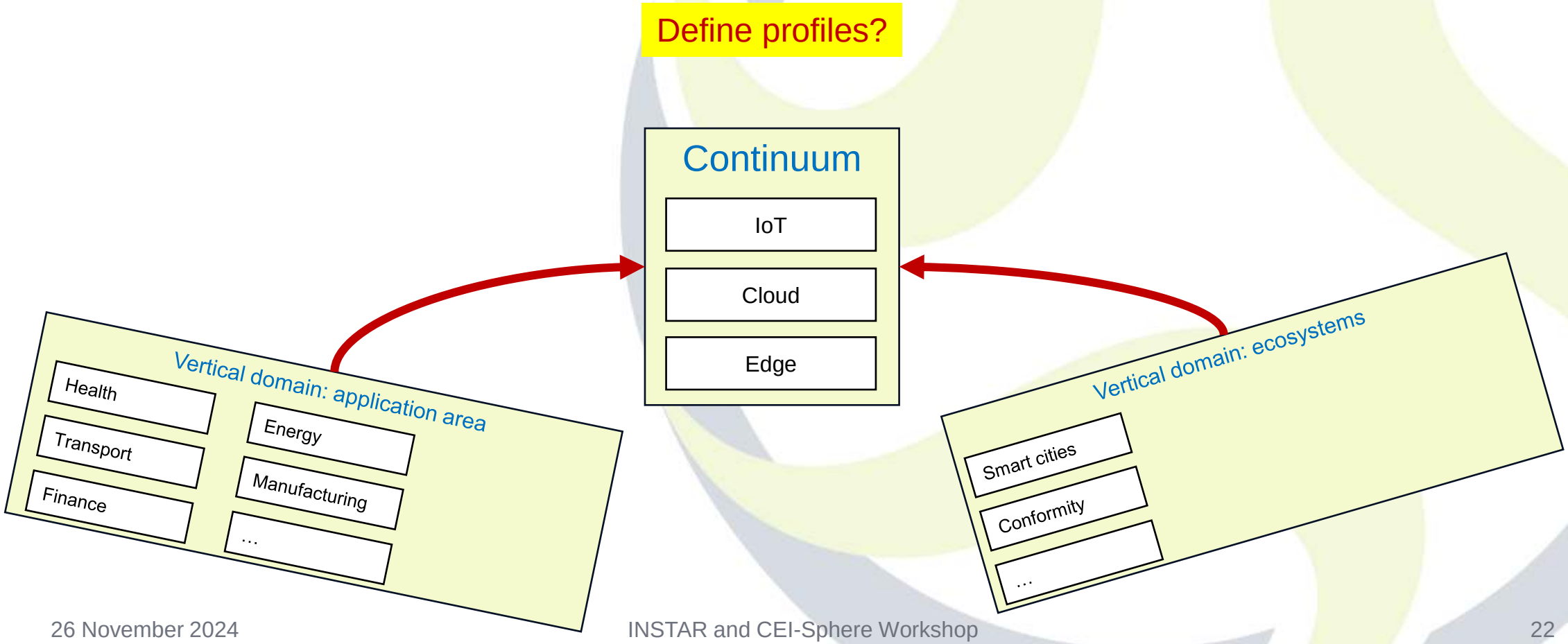
Create a taxonomy of observables and indicators?

Challenge 2: need for supply side consensus for creating a trust label

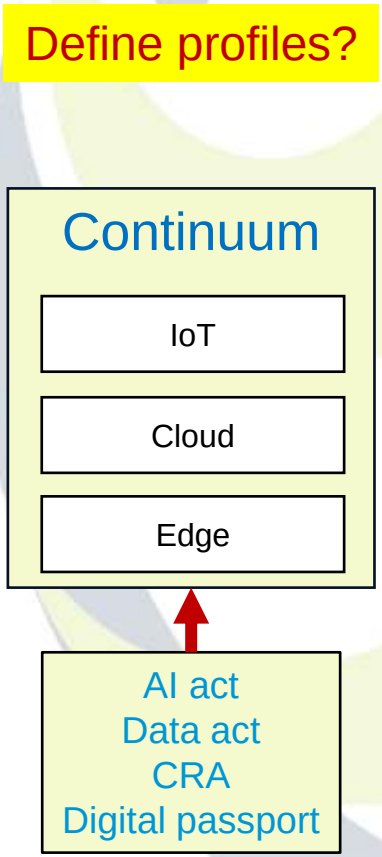


Apply VCIO?

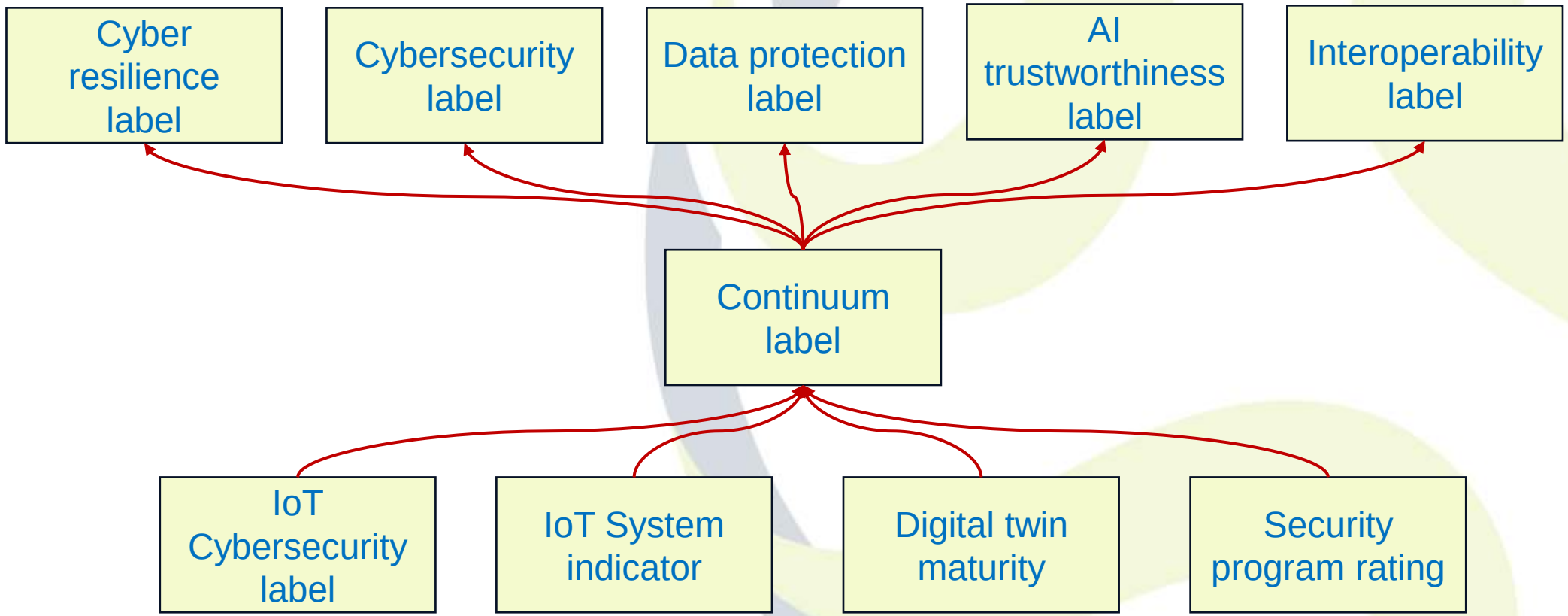
Challenge 3: need for demand side consensus for creating a trust label



Challenge 4: support regulation



Challenge 5: composing indicators – levels – labels (examples)



Thanks

Antonio.kung@trialog.com

Assessing conformity. A new European trust label for Cloud-Edge-IoT

Data and data spaces standarization landscape

Daniel Alonso (Senior Technical Lead, Big Data Value Association)

Industry-driven research and innovation Data/AI community with **240 members** all over Europe. And growing!!

Data Strategy

AI Strategy

Digital Transformation and Digital Decade

Value for members

BDV BIG DATA VALUE ASSOCIATION

European Ecosystem

Projects

Network of Collaborations

BDV cPPP

BIG DATA VALUE PUBLIC-PRIVATE PARTNERSHIP

430 M€ public and 2,26 B€ private investment

AI, Data and Robotics Partnership

BDV BIG DATA VALUE ASSOCIATION

CLAIRE

ellis

eu ROBOTICS

adra

EurAI

EuroHPC JU

EuroHPC

EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

BDV BIG DATA VALUE ASSOCIATION

ULC

Data Spaces Business Alliance (DSBA)

BDV BIG DATA VALUE ASSOCIATION

FIWARE FOUNDATION

INTERNATIONAL DATA SPACES ASSOCIATION

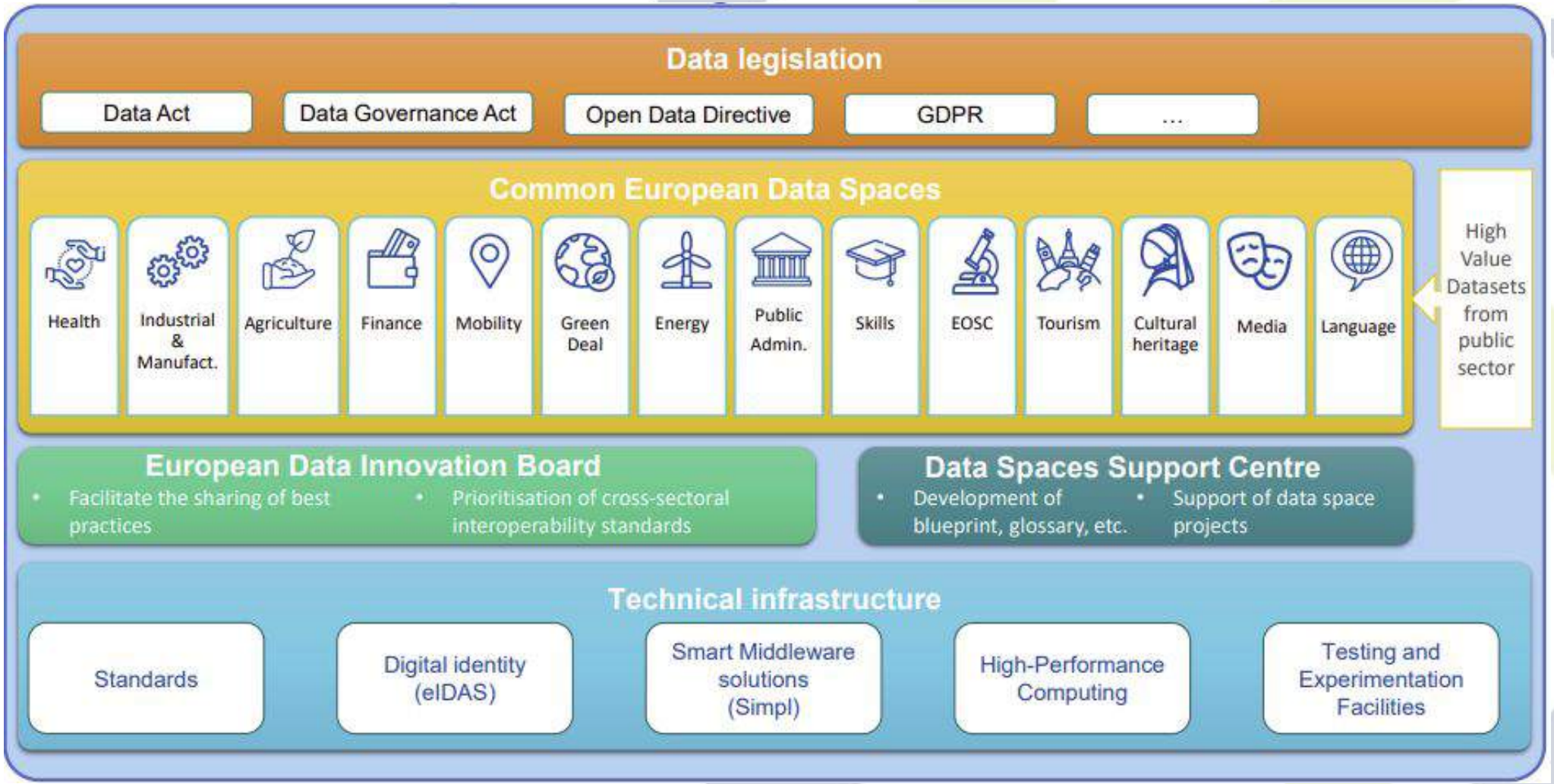
gaia-x

Other collaborations

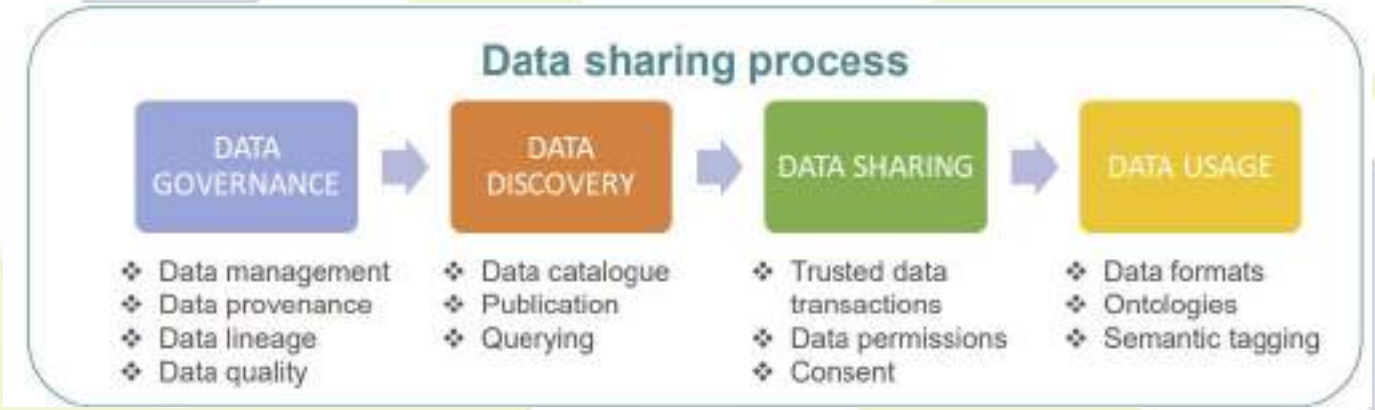
TCI

DIGITAL FOR PLANET

Standard. Bodies...


Data legislation
Data Act
Data Governance Act
Open Data Directive
GDPR
...
Common European Data Spaces
Health
Industrial & Manufact.
Agriculture
Finance
Mobility
Green Deal
Energy
Public Admin.
Skills
EOSC
Tourism
Cultural heritage
Media
Language
High Value Datasets from public sector
European Data Innovation Board
• Facilitate the sharing of best practices
• Prioritisation of cross-sectoral interoperability standards
Data Spaces Support Centre
• Development of blueprint, glossary, etc.
• Support of data space projects
Technical infrastructure
Standards
Digital identity (eIDAS)
Smart Middleware solutions (Simpl)
High-Performance Computing
Testing and Experimentation Facilities

High-Level Forum on European Standardisation / Workstream on data interoperability (report 11/04/2024)



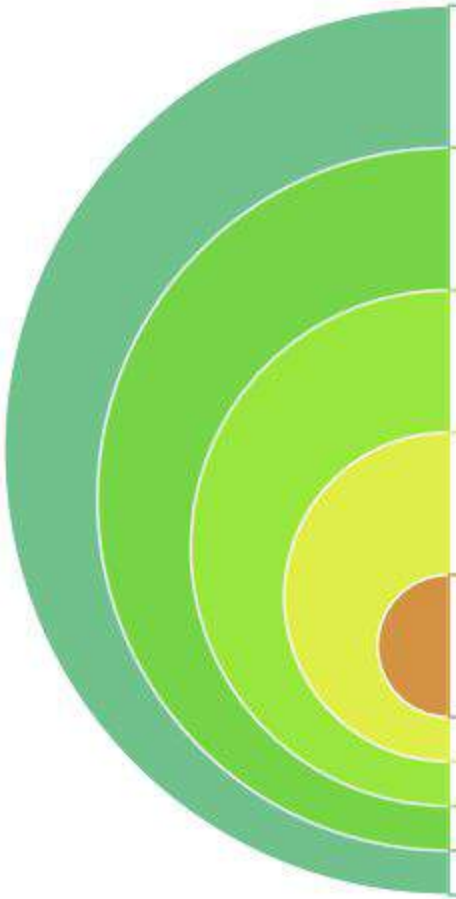
- **R1**: A formal **standardisation request** should be initiated, in support of the high-level action '**EU Trusted Data Framework**'
- **R4**: The **data spaces community collaborating in Data Spaces Support Centre (DSSC)** contribute to the standardisation work in fulfilment of the standardisation request
- **R5**: Support and strengthen the **ISO/IEC JTC 1/SC 40** work on a standard for data governance management.
- **R6**: Initiate development of a (harmonised) European Standard for **quality assessment of internal data governance** processes.
- **R7**: Meta-data standards to support development of **open-source software tools and services** for data management
- **R8**: Initiate development of a European implementation framework for **data catalogue (DCAT) profiles** and extensions. See whether the framework of **SEMIC (Interoperable Europe)** can be used as a basis

https://ec.europa.eu/docsroom/documents/58914

- **R9**: Initiate development of a harmonised European Standard for trusted data transactions. Leverage the already ongoing work of the **CEN Workshop on Trusted Data Transactions**
- **R10**: Ensure that the **eIDAS2** developments regarding identification and authentication taken as a basis for the identification of data space participants
- **R11**: Initiate development of a European implementation **framework for trusted ontologies.** A mechanism in support of the selection and implementation of ontologies, semantic models, and vocabularies should be created.
- **R12**: Initiate development of a European **framework for the maturity assessment of common European data spaces** - a scorecard.
- **R13**: Ensure that process to ensure broad acceptance of **Data Spaces Support Centre (DSSC) results undergo a wider consensus**

Standardisation request
European Trusted Data Framework

Includes the following 5 standards / standardisation deliverables:



Maturity model for Common European Data Spaces	•Drive convergence and increase transparency •Leverage the work of DSSC, in particular the data spaces blueprint and the data spaces maturity model
Trusted ontologies and data models (implementation framework)	•Quality criteria on the management and maintenance of ontologies and vocabularies •Leverage the work of SEMIC and DSSC
Data catalogue (implementation framework)	•Managing the core profile and domain-specific extensions (DCAT standard) •Leverage the work of SEMIC (data.europa.eu)
Data governance (implementation framework)	•Addresses the internal data governance processes of individual organisations (data management, data quality, …) •Approach to be determined
Trusted Data Transaction (harmonised standard)	•Addresses the essential interoperability requirements on in Data Act article 33. •CEN pre-standardisation workshop ongoing

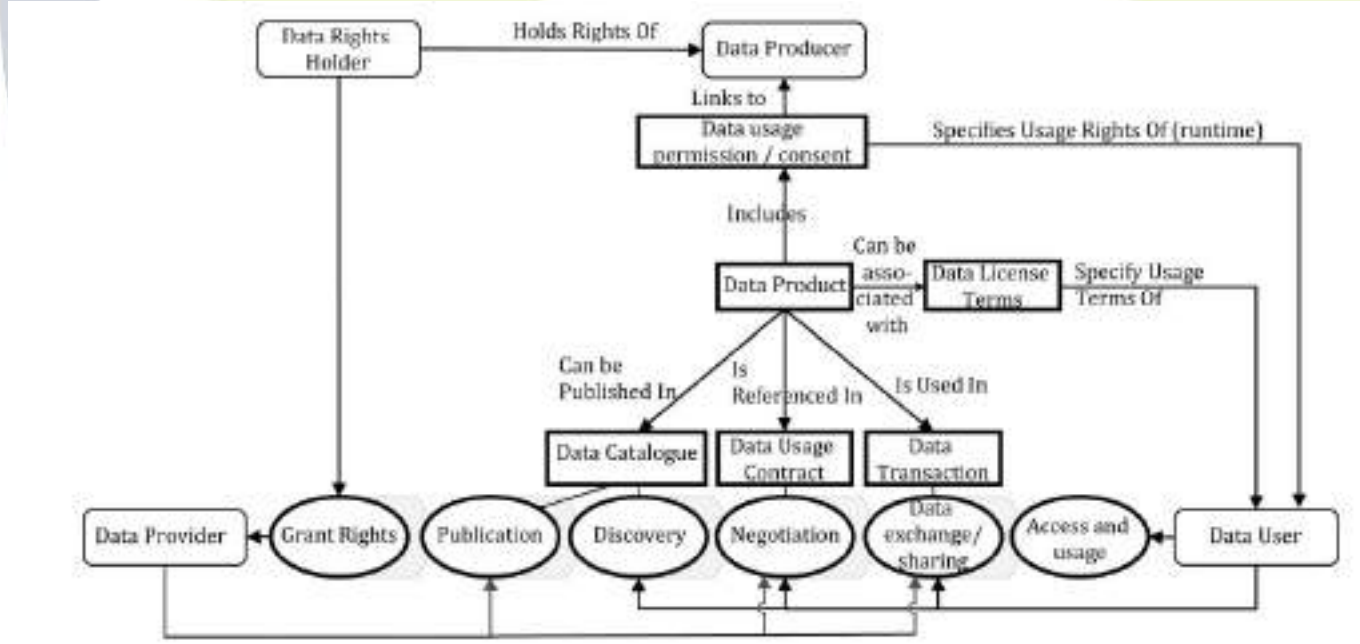
European Commission

CEN Trusted Data Transactions CWA

Contribute to develop a **terminology**, **concepts**, and **mechanisms** for **common elements** to form a foundational understanding on which **trusted data transactions** can be based independent of any architectural choices or technical implementation (pre-standardization activity)

TRUSTED DATA TRANSACTION

- ***Part 1***: *Key concepts, terminology, and mechanisms (finished and published)*
- ***Part 2***: *Identification of trusted stakeholders and transaction characteristics (ongoing*



CEN CENELEC JTC25 - Data management, Dataspaces, Cloud and Edge

- Support the widespread adoption of digitalization and the establishment of a fully functioning Single Digital Market for the EU
- To address the requirements of the current draft **EC standardization request on the Data Act** (EU Trusted Data FW)
- Formally established September 2024 (kick-off meeting on 20th Sep)
- Chair Sebastian Steinbuss (IDSA), Secretary Helene Carnevale (Uninfo)
- Structure:
  - WG1 – Advisory Group
  - WG2 – Data spaces
  - WG3 – Data management and governance
  - WG4 – Cloud and edge

Data Spaces Support Centre (DSSC)

Collection of Standards

- Overview of most used standards in data spaces
- DSSC MISSION: Analyze the collection to give some insights and identify the cross-domain standards

Standards collection

Cross-domain standards recommendation

- Consensus on cross-domain standards to foster inter-operability
- Key for data sharing business
- DSSC MISSION: Propose wide adopted standards in the Blueprint (DCAT, ODRL, VC)

Blueprint v1.0

Standardization plan
Task Force Liaison with SDOs

Engagement with Standards Development Organizations (SDOs)

- Be aware of all committees in Data Spaces
- Unique and consolidated message on standardization topics
- DSSC MISSION: Identify and influence the SDOs to contribute (observer, advisor, contributor)

Alignment and contribution to the European standardization initiatives

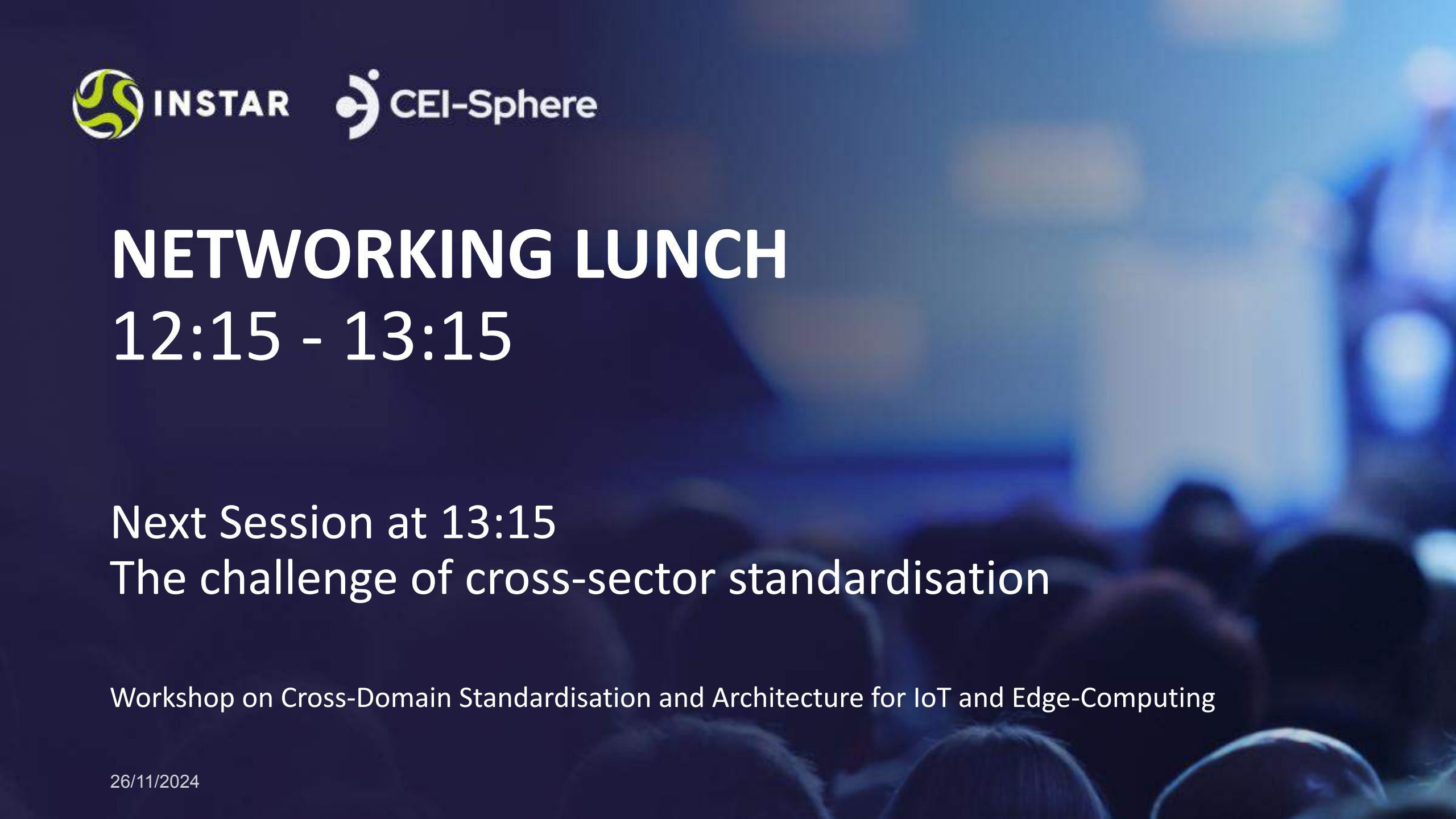
- Finding the international consensus
- Identify gaps for new standardization requests
- Key topic at European Data Innovation Board (EDIB)
- DSSC MISSION: contribution to reports, workshops, EC support

High Level Forum report

www.bdva.eu

Daniel Alonso Román

Daniel.Alonso@bdva.eu



NETWORKING LUNCH
12:15 - 13:15

Next Session at 13:15
The challenge of cross-sector standardisation

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Afternoon Agenda

13:15 - 13:35 | The challenge of cross-sector standardisation

13:35 - 13:55 | Interoperability of Energy Smart Appliances: a code of conduct to drive consensus for industry

13:55 - 14:10 | Minimal Interoperability Mechanisms (MIMs) as a tool to support international standards for Energy Flexibility

14:10 - 14:20 | S2: A standard to unlock residential demand-side flexibility

14:20 - 14:50 | Industrial evidence pitch: sector coupling for heat pumps

14:50 - 15:40 | Panel: Industrial evidence for common standards: What unlocks the full potential of flexibility of energy assets?

15:40 - 16:00 | COFFEE BREAK

16:00 - 16:10 | Cross-sector standardisation

16:10 - 16:20 | eebus as an emerging standard connecting appliances, charge points

16:20 - 16:30 | New API standards for behind the meter flexibility management

16:30 - 17:15 | Panel : Scaling up standards from pilots to international actions

17:15 - 17:45 | Fireside chat: Lessons in scaling tech adoption from a Market leader

17:45 | CLOSE

18:30 | NETWORKING DRINKS

Join the discussion!

You can participate both on-site and online

1. Go to slido.com
2. Use the code #4259442 or use the QR code
3. For on-site participants: state in your question

   if you would like to ask your question live

WiFi network: Sparks Meeting Guest
WiFi password: Rockyourmeeting!

The challenge of cross-sector standardisation

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Rolf Riemenschneider

Policy Officer for the European Commission | DG CNECT, E4

The Challenge of Cross-sector standardisation

Standardisation Challenges in light of IoT, Edge, Digital Twins

Rolf Riemenschneider
Head of Sector
Internet of Things
European Commission - DG CONNECT/E4

IoT-Edge: Recommendations from the Di

Leadership in strategic IoT areas, like edge computing

Challenges identified

Recommendations

IoT /Edge

Fragmentation also makes it harder to capitalise on new technologies. Europe currently has virtually no presence in edge computing.

Edge computing refers to the distribution of computational tasks across smaller nodes closer to customers, reducing data transport to smaller distances. As the EU builds highly automated manufacturing plants requiring low latency and significant data volumes steered by AI, **edge computing for industrial applications could better enable performance and reduce latency** for industrial connected robotics, keeping data transfers more secure.

Underpin leadership in strategic IoT areas (e.g. O-RAN, **edge computing, NW API standardization**) by **deregulating new investments** (5GSA, IoT), subject to preserving competition

Coordinate standards for edge, NW APIs, and IoT at EU level

To ensure that EU players remain at the forefront of new technological developments, → to establish an EU-level body with public-private participation **to develop homogenous technical standards for the deployment** of network APIs and **edge computing**

Coordinate on standards for edge, NW APIs and IoT

IoT (cross-domain)

Digitalisation can also contribute to Europe's decarbonisation and transition to net-zero by 2050. **Connecting advanced technologies, such as the internet of things (IoT) and remote sensors**, additive manufacturing and predictive maintenance has great potential to promote the circular economy and energy savings

Digita
exper
and **re**

Connecting advances technologies for circular economy and energy savings

I enabler for the electronics value chain, and **a ecurity and industrial strength across**

Ensure support for the innovation potential of mainstream chips in larger nodes (more than 28 nm) as well as of chiplets, **to leverage EU strengths in established industries and innovative deployments (e.g. the automotive industry, sensors for IoT, power controls**,, etc

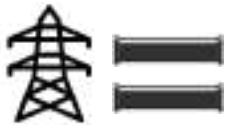
European Commission

Grid Edge:
Game changer in the energy system

Yesterday

Few large power plants

Centralised



Large power lines and pipelines

Top to bottom

Passive, only paying

Market

Production

Transmission

Distribution

Consumer

Many small producers

Decentralised

Includes small-scale transmission
and regional supply compensation

Both directions

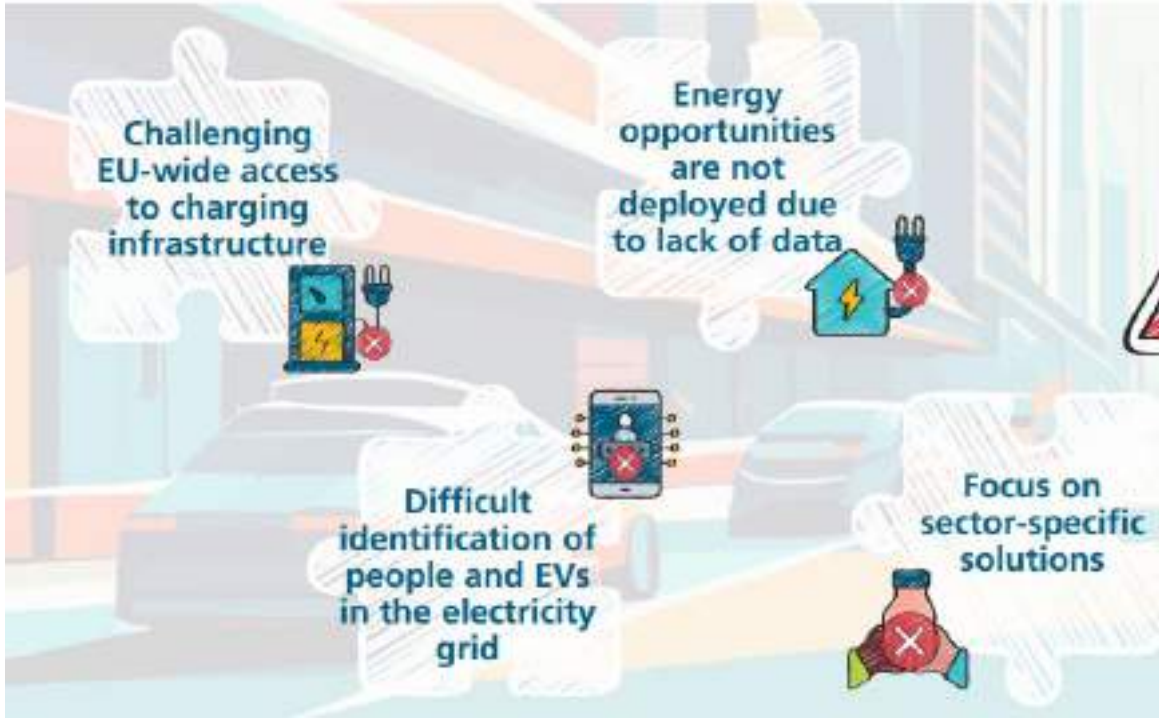
Active, participating in the system

Tomorrow

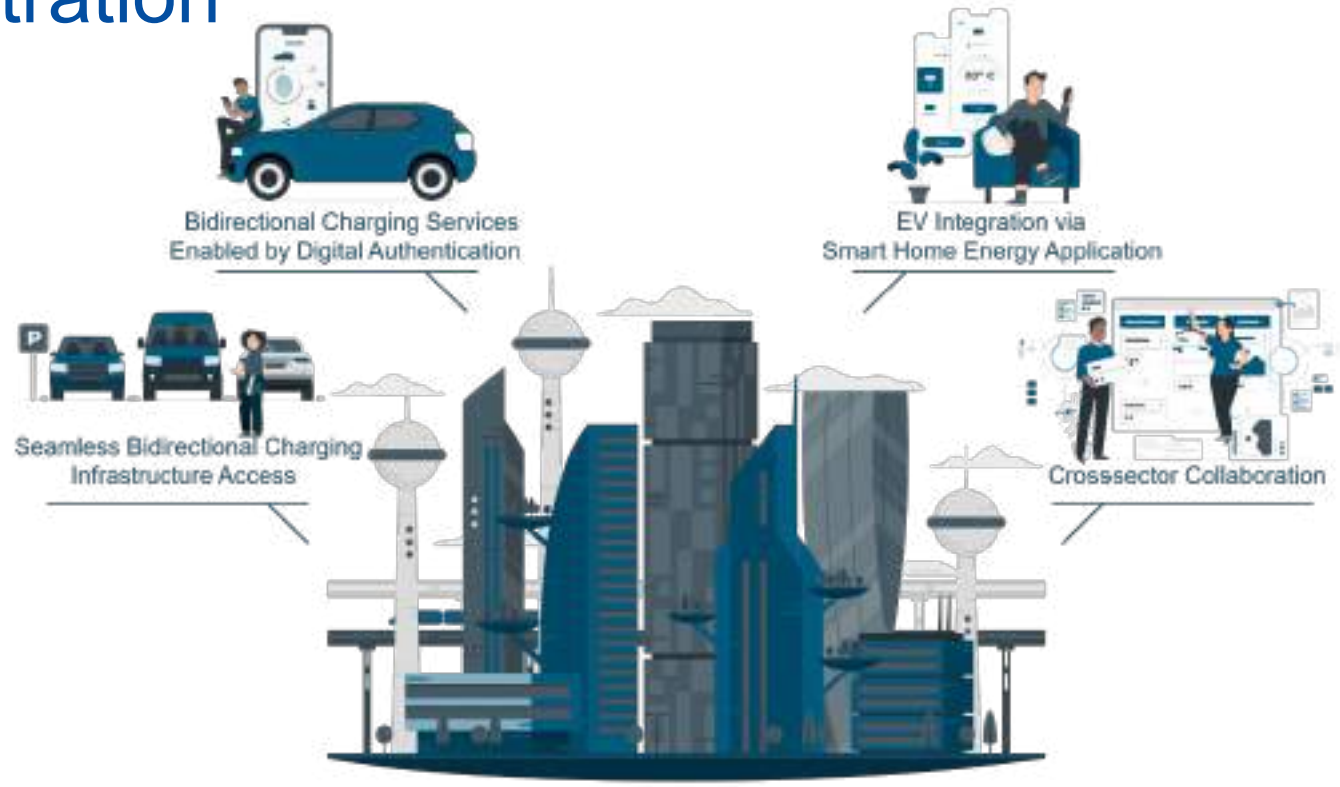
European Commission

Lack of cross-sector orchestration

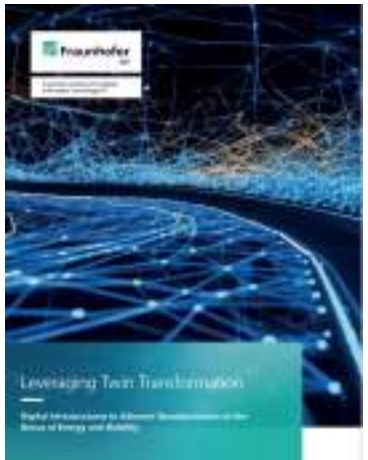
Challenges



Opportunities



Study Report by Fraunhofer FIT, May 2024 *<<LEVERAGING TWIN TRANSFORMATION DIGITAL INFRASTRUCTURES TO ADVANCE DECARBONISATION AT THE NEXUS OF ENERGY AND MOBILITY >>*



European Commission

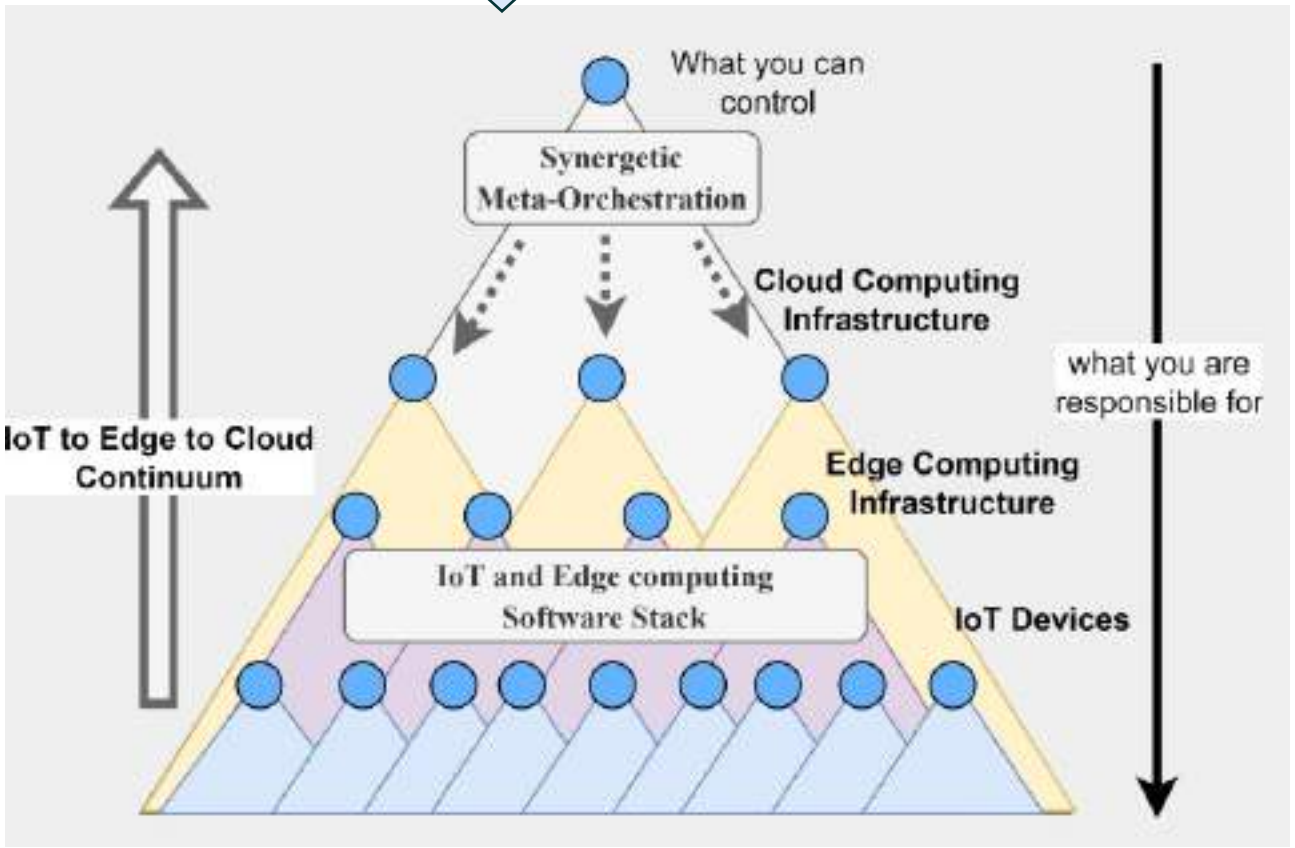
Generic Attributes for Sector Coupling

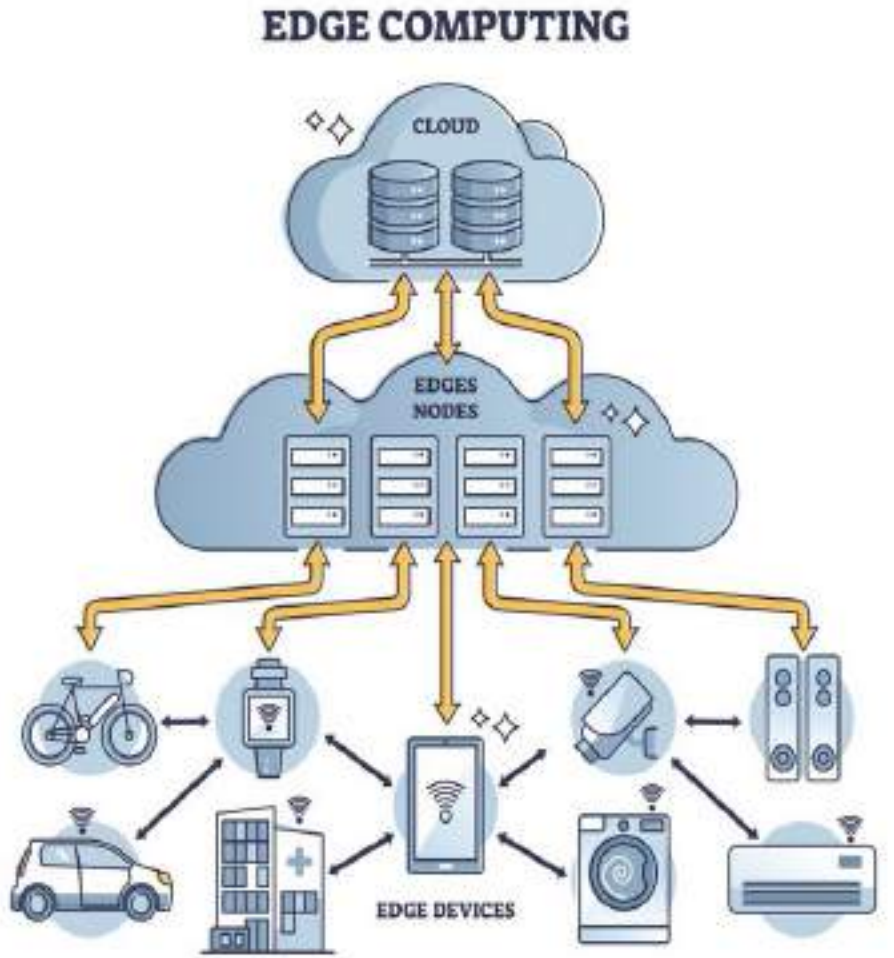
- Energy Sector Coupling for better market flexibility
- great **potential of data exchange** for sector coupling
- **Generic Data Model** For District Heating, Waste water management, biogas, etc.
- **The Flexibility Function (FF)** providing interface between local flexibility across different energy vectors

Courtesy: Center Denmark

Need of Semantic abstraction at the edge

Abstraction





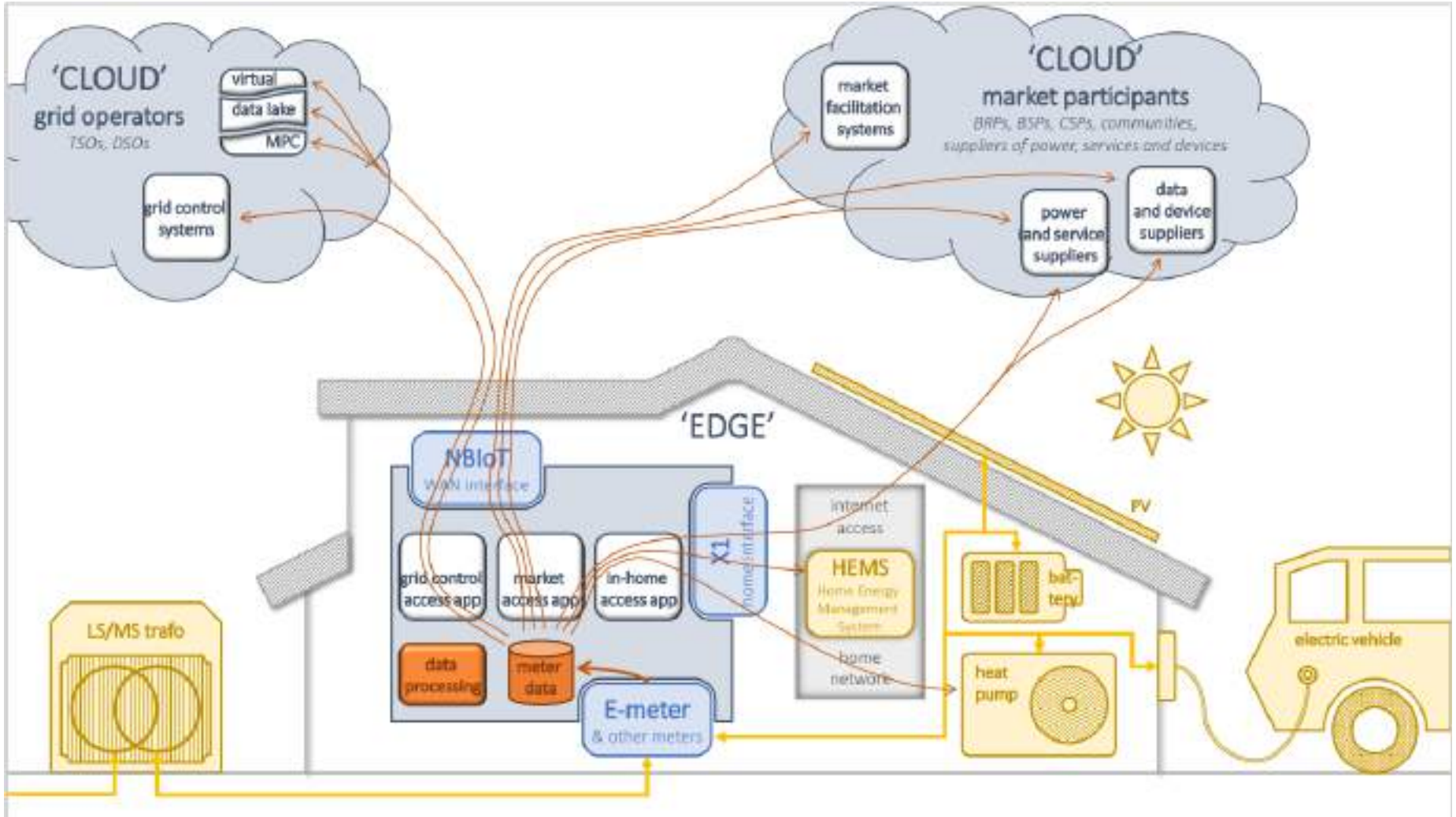
Data Exchange

• Courtesy: W3C Virtual Object Model

European Commission

Data operational space
→ balanced central – decentralised spaces

- Mix between cloud – edge operations // CEN-CENELEC S2



- **Other Market participants**
  - OEMs of EVs + EV CPOs
  - Energy communities
  - virtual home batteries
  - EV fleet management
  - Heat pumps
  - Solar power

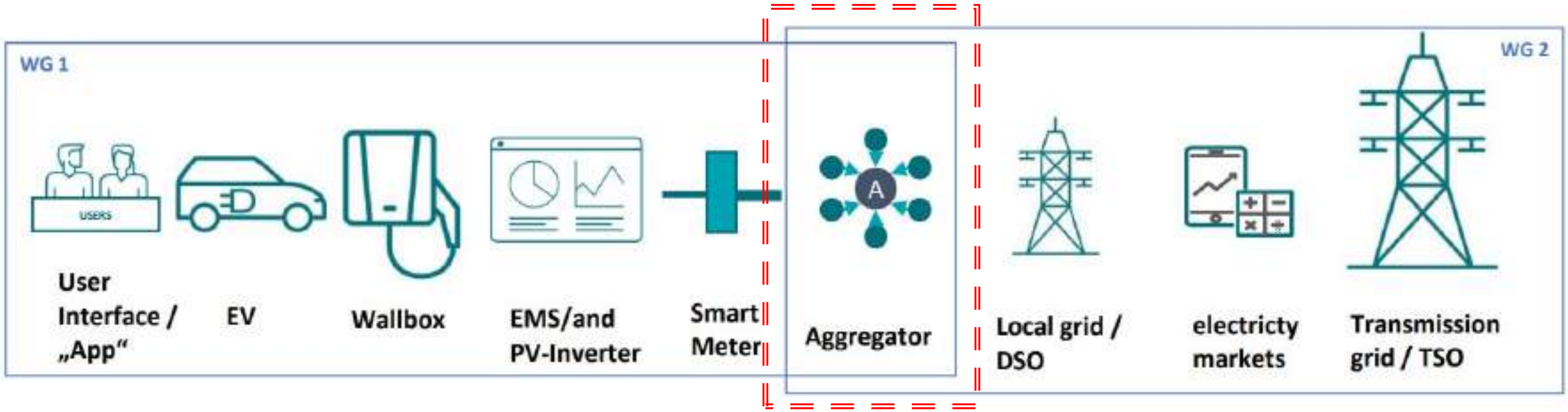
Courtesy: TECHNOLUTION

European Commission

Bidirectional Charging:
A Level Playing Field across the Value Chain

2 Camps need to talk…

- If talking about flexibility two camps mean different things
- Requires a high-level abstraction (similar to the CEN/CENELEC S2)
- *Cross-Sector Dialogue* as a baseline for interfering the two camps at the (data) aggregator level



Courtesy: Coalition of the Willing for bidirectional Charging

Master File for X-Sector Standards

Connecting Energy Assets:
Data exchange across different domains and sectors

Standards & Interoperability
Abstraction, attributes, digital twins, orchestration

Balanced Data & Computing
Data processing across the d**evice-edge-cloud** continuum

Balanced Across Value Chains
New market actors / a level playing field

International
Aligned with emerging global standards

European Commission

HORIZON-CL4-2024-DATA-01-05: Platform Building, standardisation and Up-scaling of the 'Cloud-Edge-IoT' Solutions (Horizontal Activities - CSA)

Related Background

- **Horizon Europe**:
  → Calls, topics, deadlines WP2023-24

- **Position Papers and Event Reports**
  → Alliance AIOTI Strategic Foresight : IoT and Edge Computing Convergence

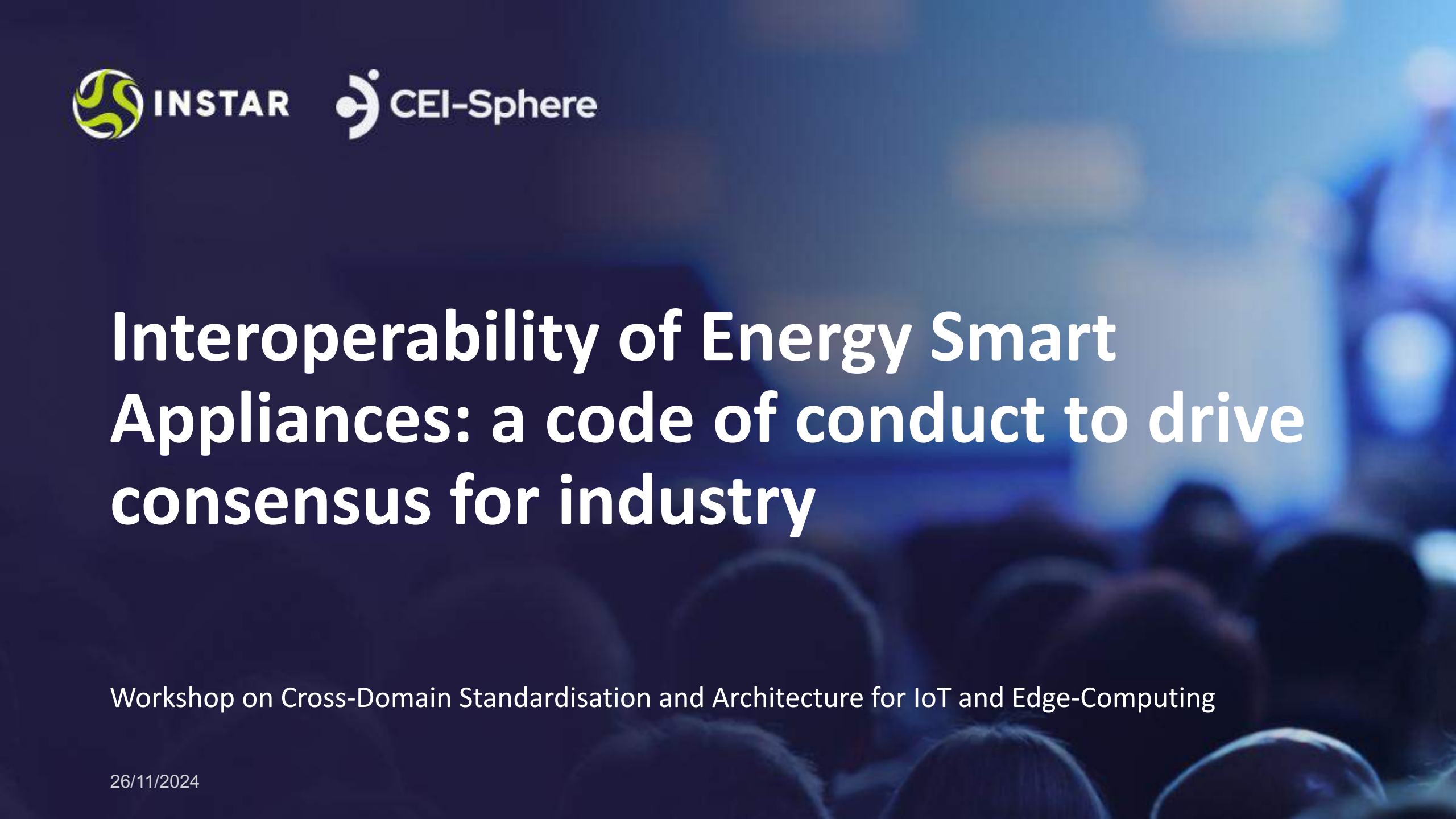
- **Cloud-Edge-IoT Portal** – see www.EUCloudEdgeIoT.eu

- HIPEAC Vision https://www.hipeac.net/vision/#/latest/

- Edge-IoT Policy on Europa

➢ **3Cs Strategy**:
→ Calls, topics, deadlines WP2023-24

European Commission



Interoperability of Energy Smart Appliances: a code of conduct to drive consensus for industry

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Giorgios Takoudis
DG ENER, B3

Isabel Gonzalez Cuenca
JRC Sevilla

Code of Conduct on interoperability of Energy Smart Appliances (ESA)

Project Website

ESA are products that provide energy flexibility being capable of automatically *(using M2M communication)* ***optimising their consumption patterns*** *(e.g. time or profile)* ***in response to external stimuli, based on user permission.***

Launch:
DG ENER → DG JRC

CoC on energy management related IOP of ESA (V.1.0)

CoC - Primary Objective

Project Website

Target: **COOPERATION**

Goal: **INTEROPERABILITY**

Bring together all key relevant **stakeholders** to **support** and foster the **energy transition** by:

- **Identifying** and implementing **commonly selected services** that **facilitate Demand Side Response**
- **Enabling** the secure and seamless **exchange of information between** devices from **different manufacturers**

CoC - approach

Inclusive process with open stakeholder participation

Agreement on specific demand response services (i.e. use cases)

Use cases drawn from international standards

Focus on semantic interoperability

Flexibility to manufacturers on how to implement

CoC - Development of the Project

Project Website

CoC v.1.0 – 23 Apr 2024

Official Launch

Signing manufacturers

Arçelik · CLIVET · DAIKIN · Electrolux Group · Miele · MITSUBISHI ELECTRIC Changes for the Better · Panasonic · VAILLANT GROUP · VESTEL · VIESMANN · QVANTUM · geo[1]

Consultations & Constant feedback from stakeholders involved through:

- ❖ Roundtable meetings
  - CoC 1st phase: 3 roundtable
  - **CoC 2nd phase: Working Groups**
- ❖ Workshops
  - CoC 1st phase: 3 Workshops + The launch event
  - **CoC 2nd phase: Workshop - Sep 24**
- ❖ Surveys
  - CoC 1st phase: 4 Surveys
  - **CoC 2nd phase: EMS Survey - Aug 24**
- ❖ Technical Reports
  - CoC 1st phase: 2 TRs
  - …

(1) Signatory form for "other relevant actors" in CoC v.1.0. Support with product not included in Scope. Here, energy management system manufacturer

Way forward

Process Working Group

- Drafting documents to facilitate plenary discussions on key topics, such as:
  - Decision-making processes for new demand flexibility services (criteria for acceptance and for status, i.e. mandatory/optional)
  - Principles of the Coordination of the Technical WG with the existing standardization bodies (IEC, CLC, ETSI), in particular regarding the maintenance of SAREF triples.
  - Testing needs to demonstrate compliance with the CoC (including potential implementation ideas)
- Keep track of relevant initiatives

Technical Working Group

- Proposing new demand flexibility services (e.g. Use Cases) for existing or new products.
- Ensuring the semantic representation of new demand flexibility services (Use Cases) within the SAREF common reference framework
- Creating implementation examples of Use Cases (existing and new) using various standards and solutions (e.g., SPINE, S2, Matter, Home Connectivity Alliance, KNX)
- Developing drafting suggestions, such as mapping tables, to incorporate these examples into the Code of Conduct's Annexes

CoC - Content

CoC V.1.0

Chapters

1. Introduction
2. **Scope**
3. Aim
4. **Commitment**
5. Monitoring and updating

Annexes

Annex 1. Mapping UCs to ESA

Annex 2. Use Cases & SAREF

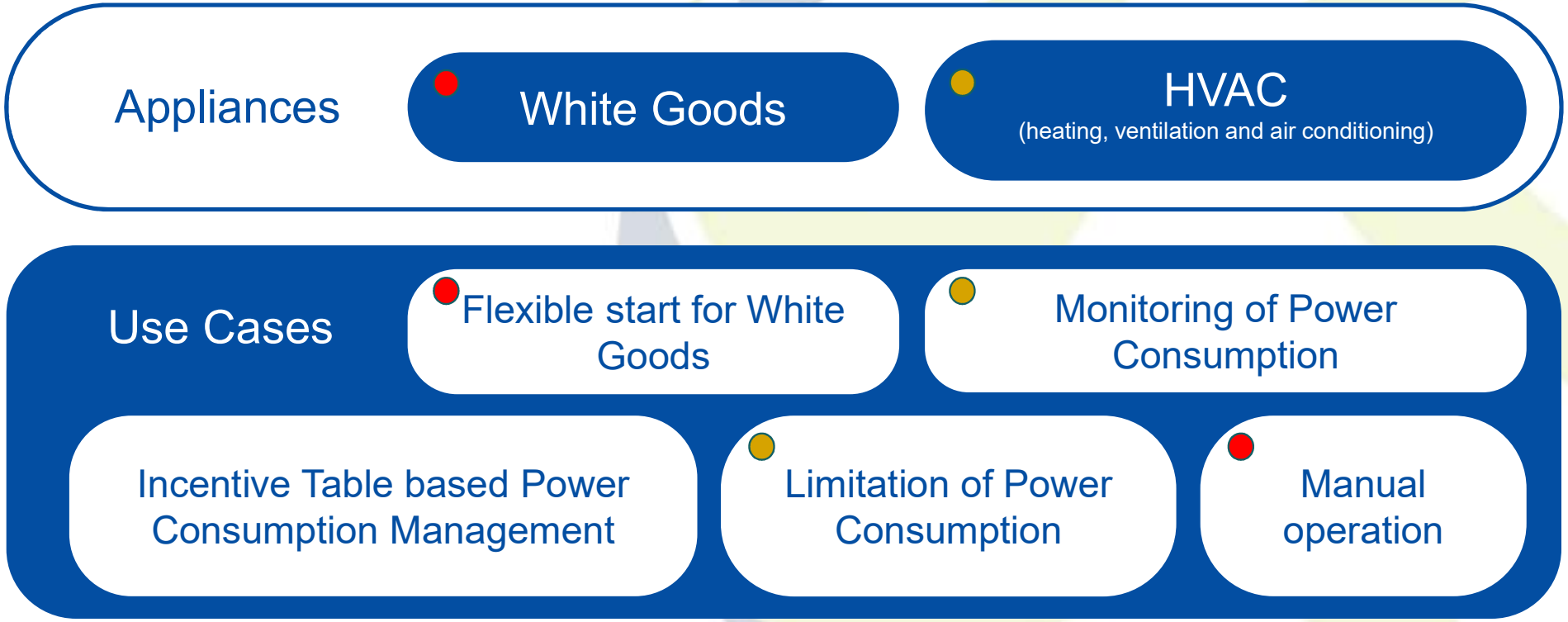
Annex 3. SAREF & protocols

Annex 4. Aim of Interoperability

Annex 5. Signing form

CoC - Chapter 2: Scope

CoC V.1.0



CoC V1.0 includes mapping example between EN50631 and SAREF. We are working to add other solutions.

CoC - Chapter 4: Commitments

CoC V.1.0

Manufacturers Commitments

- **a) Place one IOP ESA in one year**
- b) Use open API/protocol
- c) Ensure Security & Privacy
- **d) Ensure SAREF representation**
- e) Provide information to end-user
- f) Cooperate in the annual review
- g) EPREL database

CoC - Annexes

CoC V.1.0

→ Annex 1 - **Mapping of UC to ESA** White Goods HVAC

→ Annex 2 - **UC, Core Data Elements and SAREF Representation**

Annex 3 - Example: Mapping protocols to SAREF (informative)

Annex 4 - Aim of Interoperability (informative)

→ Annex 5 - Signing form

CoC - Annex 1

CoC V.1.0

Annex 1 - Table A1.1. Mapping of use cases to Energy Smart Appliances that have an energy label.

Feasible	Flexible Start	Monitoring of Power Consumption	Limitation of Power Consumption	Incentive Table based Power Consumption Management	Manual operation
White goods					
• **washing machines, tumble driers, washer-driers, dishwashers**	M	O	O	n/a	M
Heating, cooling, and ventilation appliances					
• **heat pumps (delivering heat/cold through air or water)**	O	M	M	O	O
• **local space heaters**	O	M	M	O	O
• **water heaters**	O	M	M	O	O
• **ventilation**	n/a	M	O	O	O

M: mandatory; O: optional, n/a: not applicable

CoC - Annex 2

CoC V.1.0

1) UC Description

2) SAREF triple representation for the UC with following core data elements

Annex 2 - Table A2.3. SAREF triple representation for the use case ***Monitoring of Power Consumption*** with following core data elements:

SAREF triples	Value	Description
?esa rdf:type saref:Device		Device description
?esa saref:isUsedFor ?commodity		In this use case: Commodity = Electricity
?commodity rdf:type saref:Electricity	saref:Electricity	Mandatory in this use case
?esa saref:makesMeasurement ?monitoring_of_power_consumption		Device makes a measurement
?monitoring_of_power_consumption saref:relatesToProperty ?power		In this use case measurement of power
?power rdf:type saref:Power	saref:power	Mandatory in this use case
?monitoring_of_power_consumption saref:isMeasuredIn ?unit	om:watt	Device makes a measurement in unit of measure (Watt)
?monitoring_of_power_consumption saref:hasValue ?value	xsd:decimal	Measurement value

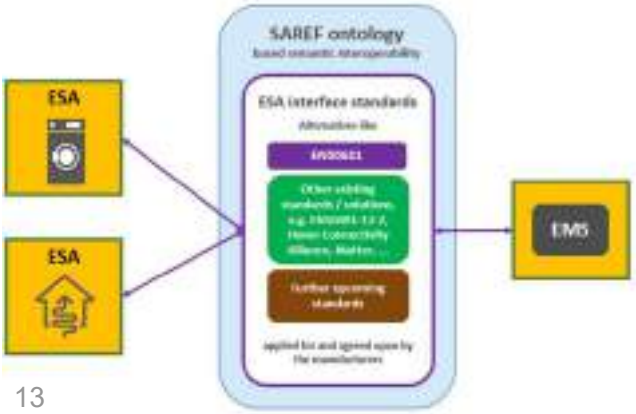
CoC - Annex 3 & 4 (informative)

CoC V.1.0

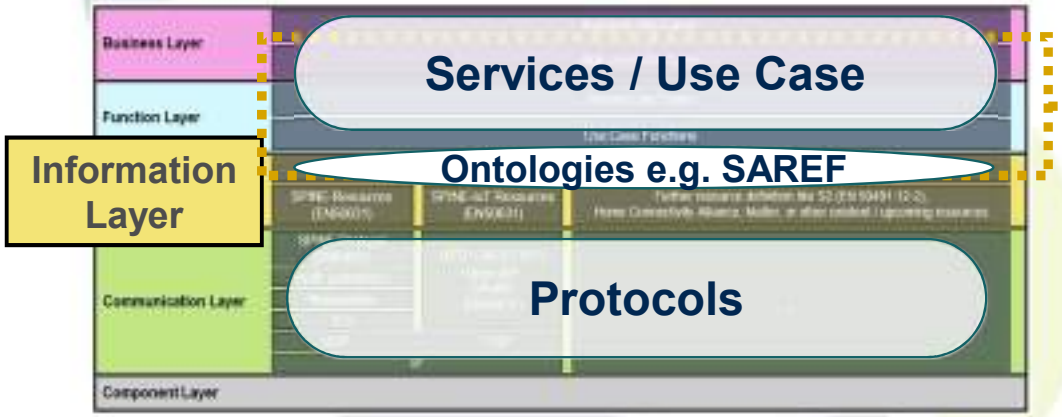
Annex 3 - Table A3.3. Mapping of the ***Monitoring of Power Consumption*** use case SAREF triples on EN 50631.

SAREF triples	Value	EN50631 data elements	EN50631 value + constraints
?esa rdf:type saref:Device			
?esa saref:isUsedFor ?commodity		commodityType	String, "electricity"
?commodity rdf:type saref:Electricity	saref:Electricity		
?esa saref:makesMeasurement ?monitoring_of_power_consumption			
?monitoring_of_power_consumption saref:relatesToProperty ?power		measurementType	String, "power"
...	...	...	...

Annex 4 - Figure A4.2. Semantic IOP at the level of Information Layer.



Annex 4 - Figure A4.1. Code of Conduct reference layer model based on SGAM layer model (3)



(3) Smart Grid Architecture Model

Summary of CoC v.1.0

CoC V.1.0

- Voluntary
- From Manufacturers to Manufacturers
- Communication Protocol Agnostic
- Devices Included in V.1.0: White Goods and HVAC
- Based on SAREF Ontology
- Built on Services (Use Cases)

Beyond the CoC v.1.0

Project Website

Map more Protocols

- Matter
- HCA
- SPINE
- SPINE-IoT
- …

Increase Devices

- **Energy Management Systems**
- PV inverters
- EV chargers

Include Services

(or adapt old ones)

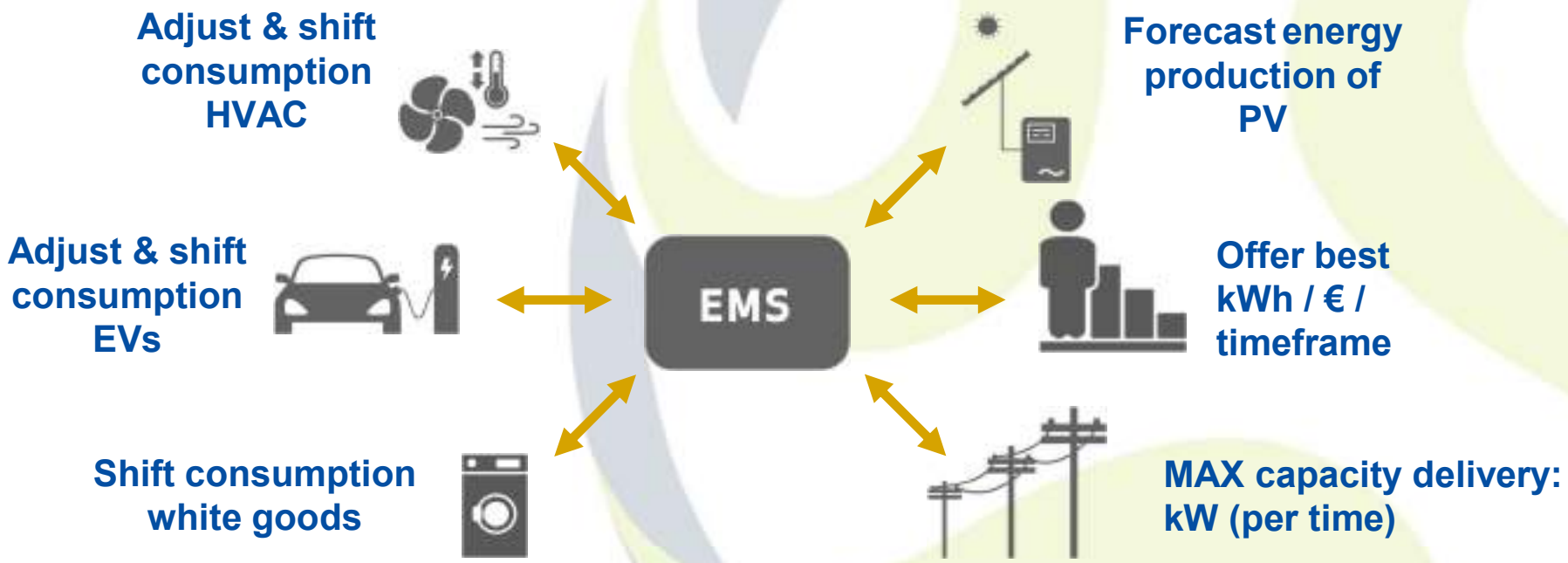
- S2
- Depending on protocols & devices

Engaging manufacturers & Promoting dialogue

- Surveys
- Workshops
- Bilateral Meeting
- Working group(s)

EMS: Key Enabler of the CoC

Project Website



CoC Working Groups: Process & Technical

Call to new stakeholders: EMS, PVs, EVs, SDOs, TSO, DSO, EPS

Collaborate with Us:
Take Part in the CoC

Learn more visiting the Project Website

Project Functional Mailbox:

JRC-ENERGY-SMART-APPLIANCES@ec.europa.eu

Check also the JRC Smart Electricity Systems website: http://ses.jrc.ec.europa.eu/

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European Commission

Minimal Interoperability Mechanisms (MIMs) as a tool to support international standards for Energy Flexibility

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Henrik Madsen

DTU, Citycom.AI TEF

Minimal Interoperability Mechanisms (MIMs) as a tool to support international standards for Energy Flexibility

November 2024

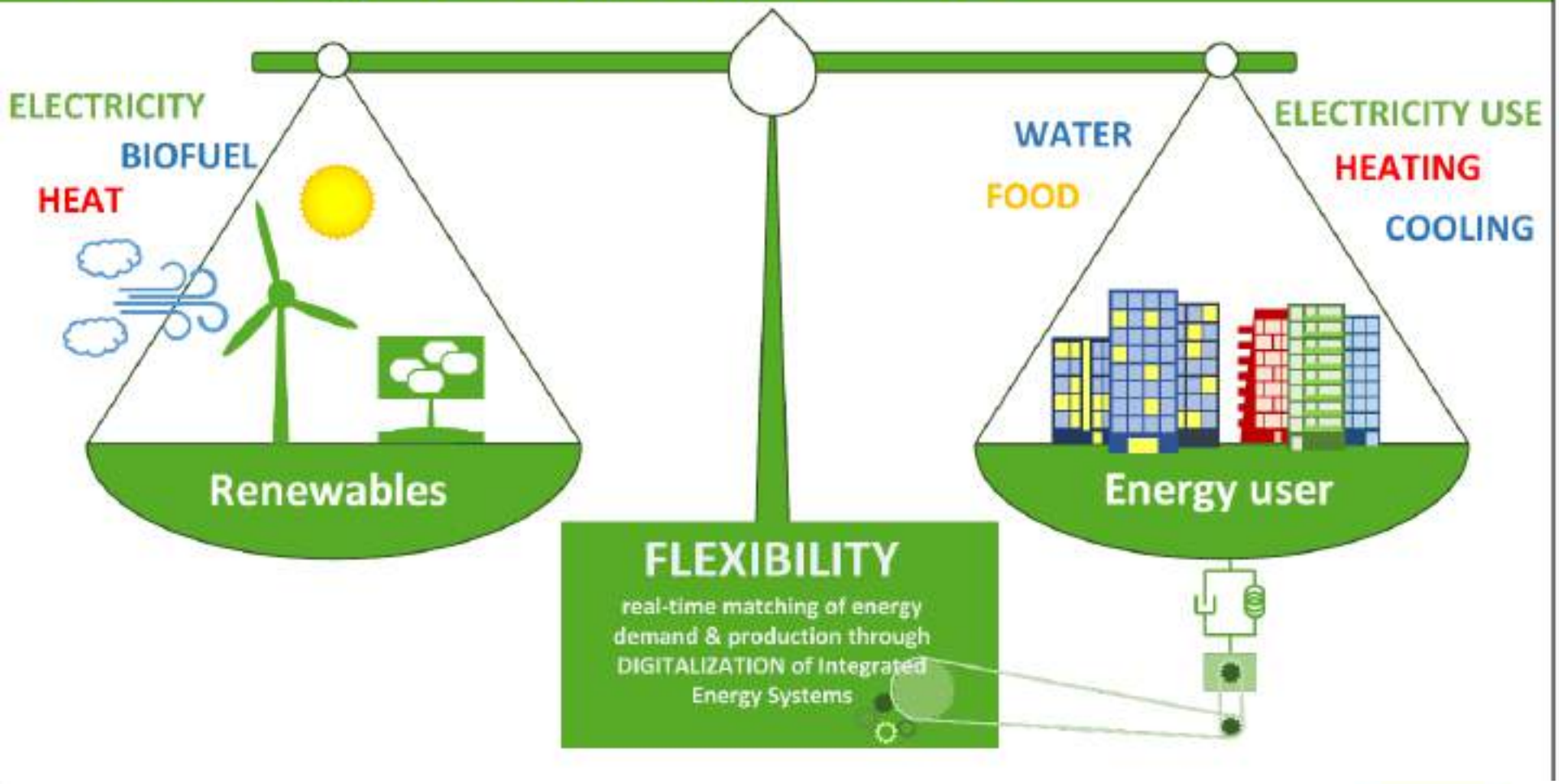
INSTAR Workshop on Cross-Domain Standardisation and Architecture for Edge Computing

Henrik Madsen
DTU Compute

Innovation Fund Denmark

This initiative is funded by

The Challenge: Denmark Fossil Free 2050



Minimum Interoperable Mechanisms (MIMs)

- **The minimal interoperability mechanisms (MIMs) enable a minimal but sufficient level of interoperability for data, systems, and services**.
- **MIMs Plus** format strive to enable a global **marketplace for data, systems and services** for the European market.
- **Y.MIMs** format of MIMs is standardised by the ITU.
- The Living-in.EU movement and its Technical Working Group is responsible for moving this work forward with the guidance of **Open & Agile Smart Cities (OASC) to ensure that the MIMs initiatives are coordinated**.
- The **MIMs are vendor-neutral and technology-agnostic**, meaning that anybody can use them and integrate them in existing systems and solutions.
- All the entities described by data in the data ecosystem should be described by a consistent set of data models using the **Resource Description Framework (RDF) methodology, Resource Description Framework Schema (RDFS), and Web Ontology Language (OWL)**
- For **spatial (and spatio-temporal) data** the provisions of **MIM-7 (Places)** regarding data encoding have to be taken into consideration.

Minimum Interoperable Mechanisms (MIMs)

Handled by OASC which is a non-profit organization.

Interaction	MIM1	Context Information	MIM2	Data Models
	MIM3	Contracts		
	MIM7	Places		
Integrity	MIM4	Trust		
	MIM5	Transparency		
	MIM6	Security		
Impact	MIM8	Indicators		
	MIM9	Analytics		
	MIM10	Resources		

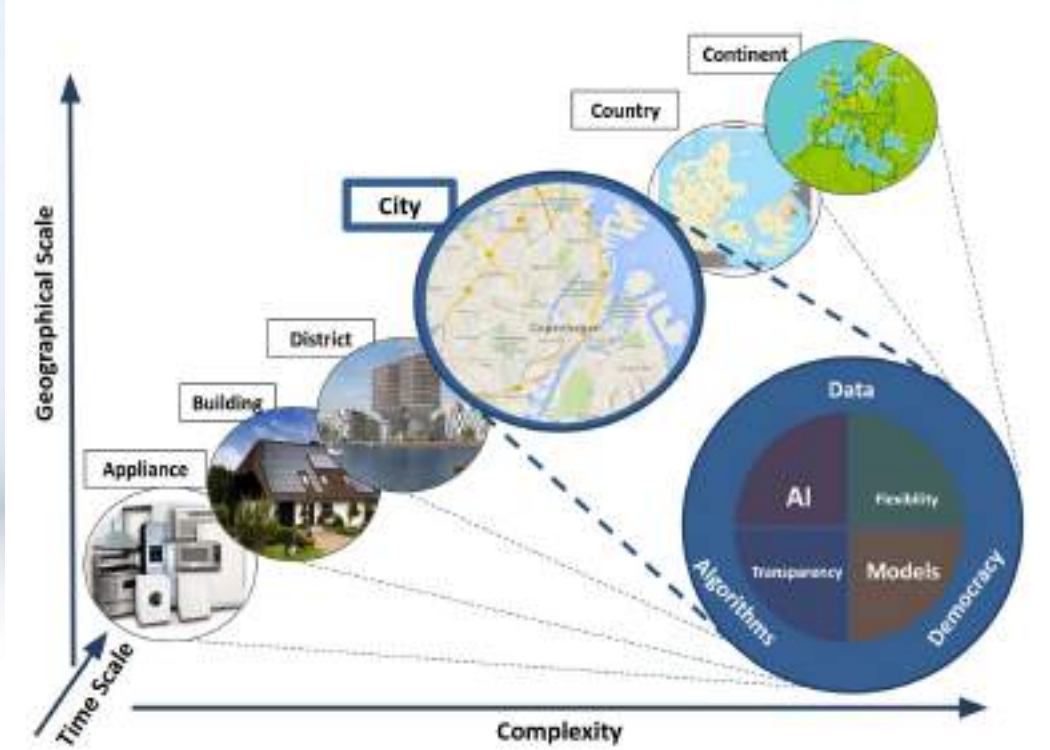
MIM2 is an overarching MIM that governs the use of data models and is applicable for each category.

How to connect the markets and the physics at the edge?

- Static -> **Dynamic**
- Deterministic -> **Stochastic**
- Linear -> **Nonlinear**
- Many power related services (voltage, frequency, balancing, spinning reserve, congestion, ...) -> **Coordination + Hierarchy**
- Speed / problem size -> **Decomposition + Control Based Solutions**
- Characterization of flexibility (bids) -> **Flexibility Functions**
- Requirements on user installations -> **One-way communication**
- Markets for Energy Systems Integration -> **Price-based solution**

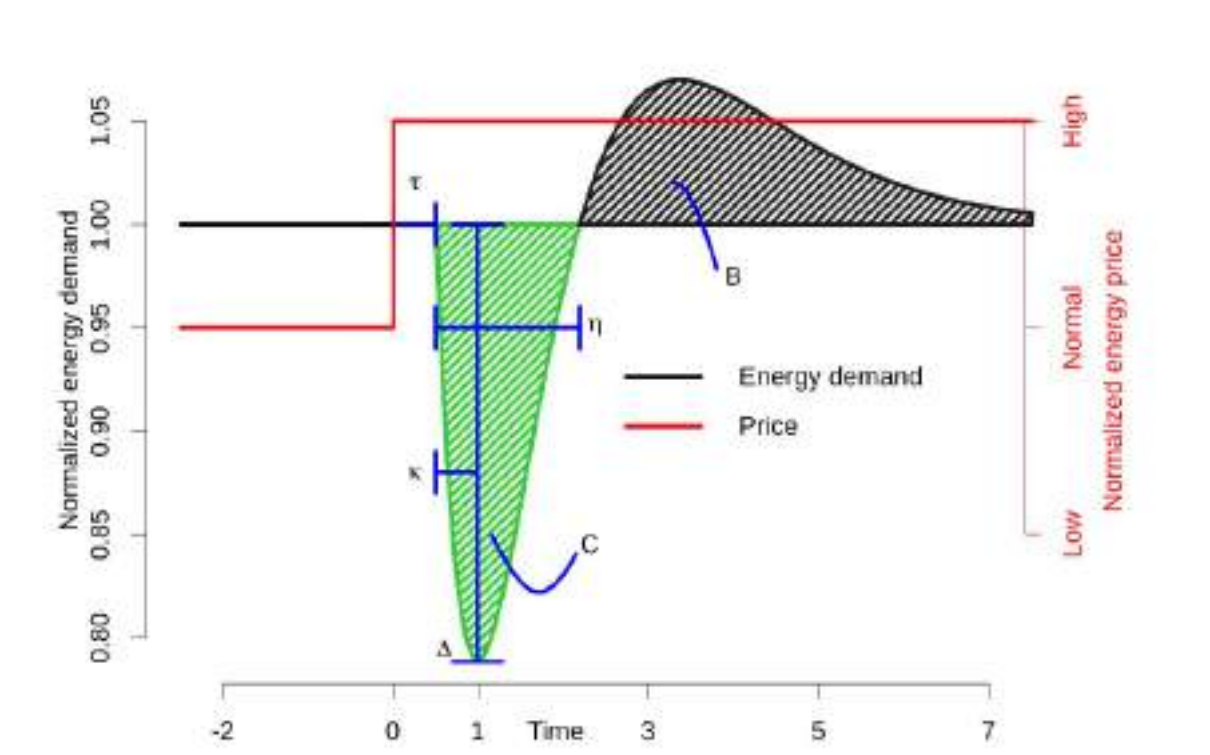
Temporal and Spatial Coherency

A so-called ***Smart-Energy Operating-System (SE-OS)*** is developed to **develop, implement and test energy data space solutions** (layers: data, models, optimization, control, communication) for *operating flexible electrical energy systems* at **all scales (MIM-7)**.

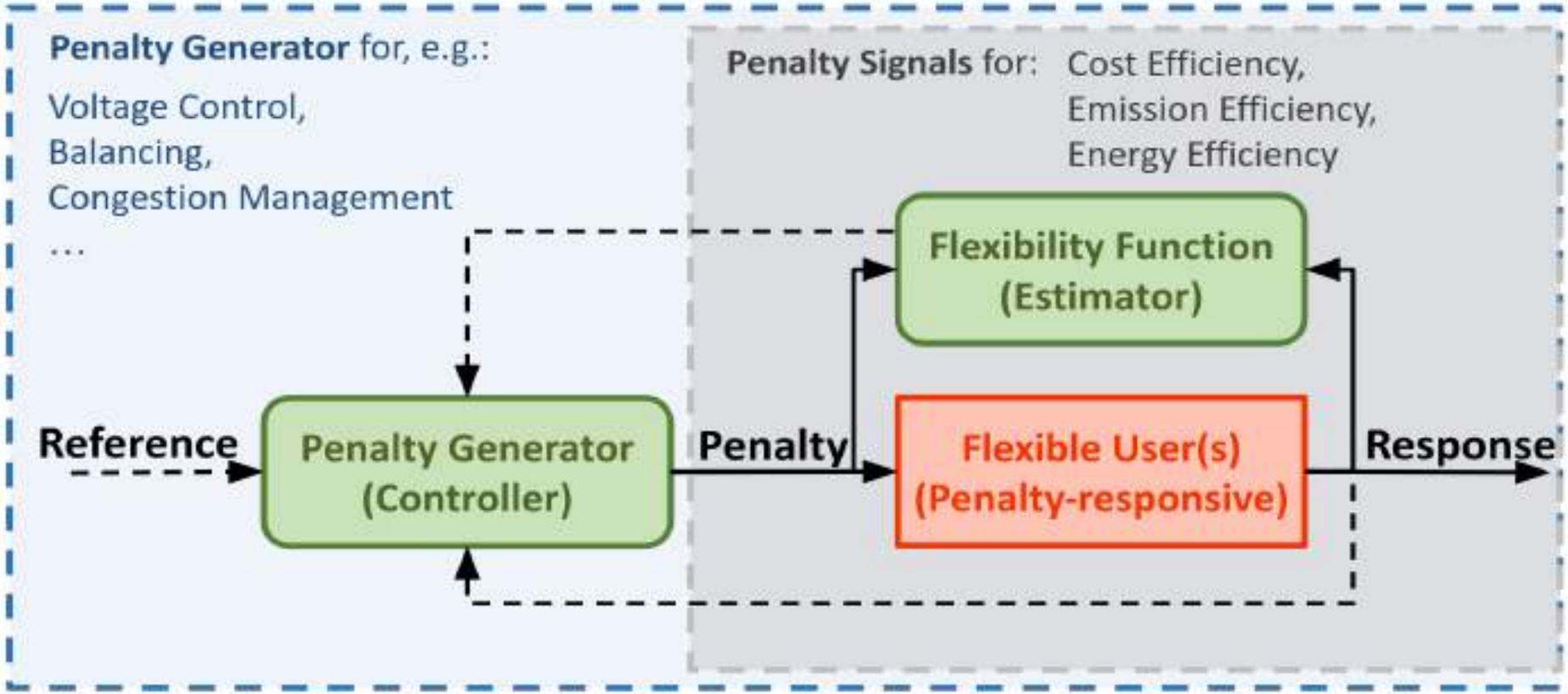


Flexibility Function

The ***Flexibility Function (FF)*** is a new **Data Model (MIM-2)** used to characterize flexibility and providing an interface between the physics and the markets.

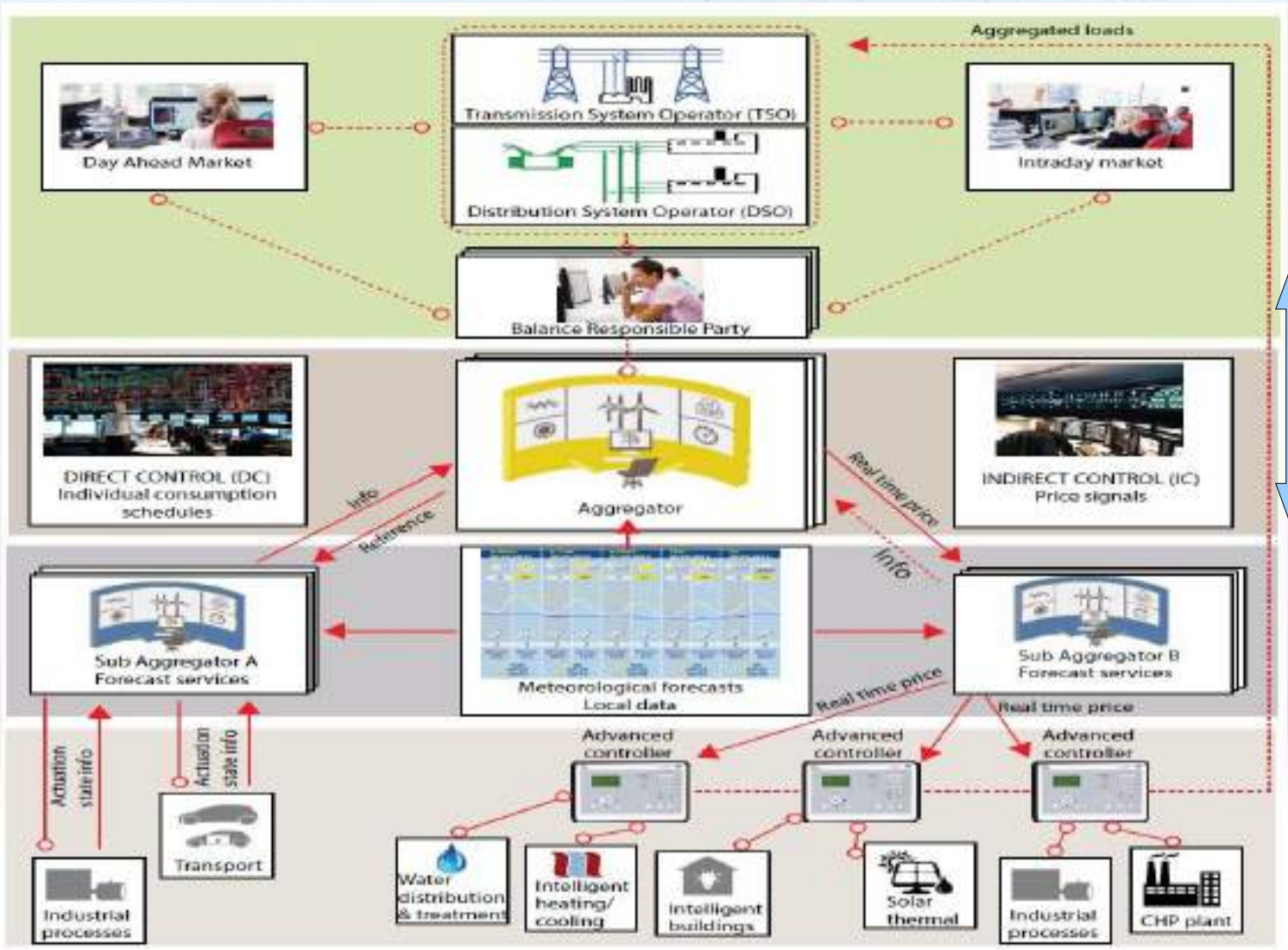


Flexible Users and Penalty Signals



Smart-Energy OS

The Transformative Power of Digitalization



(**Static**)

Conventional Markets

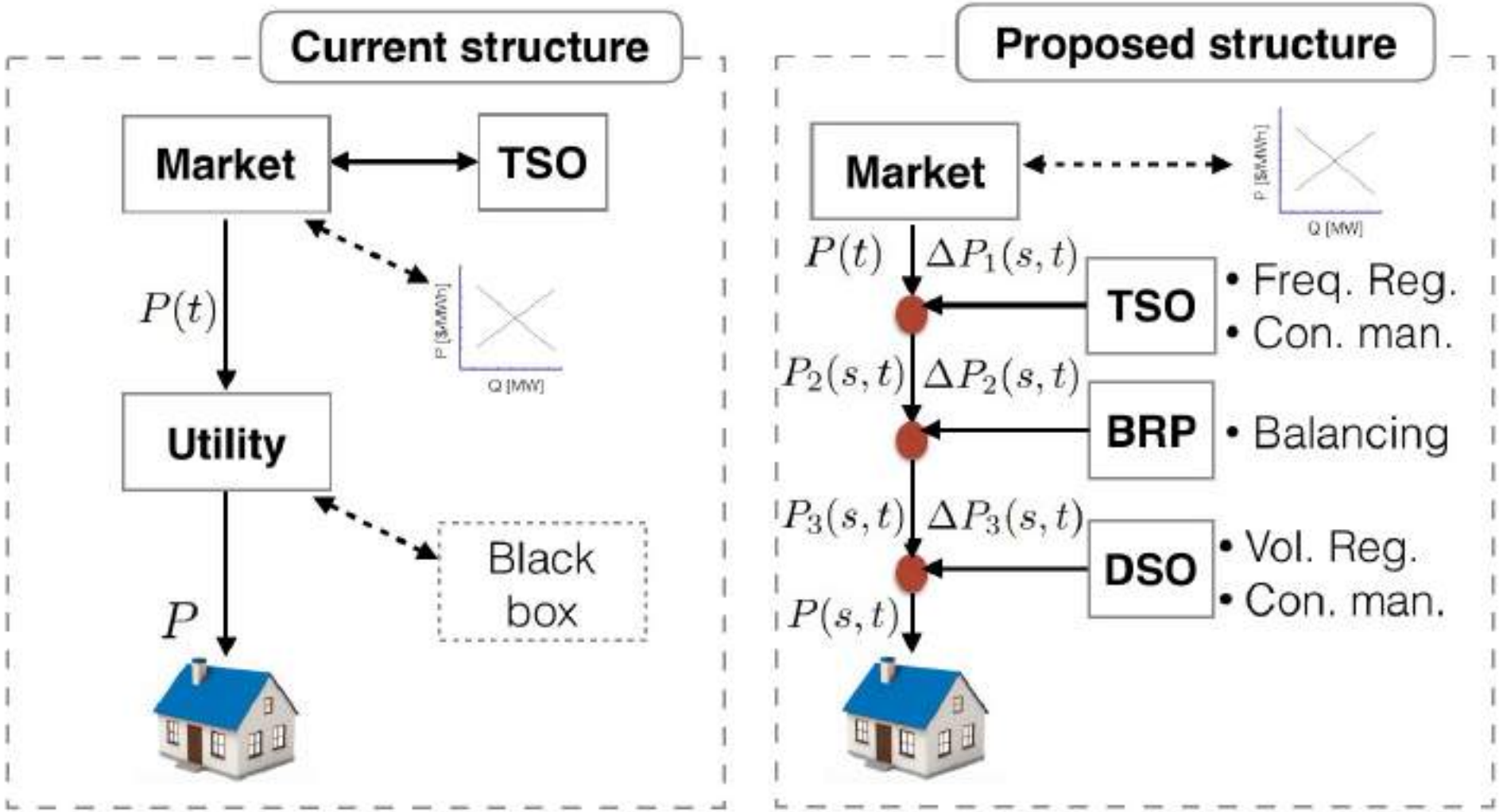
Linking Markets to Physics using MIMs

(Flexibility Functions)

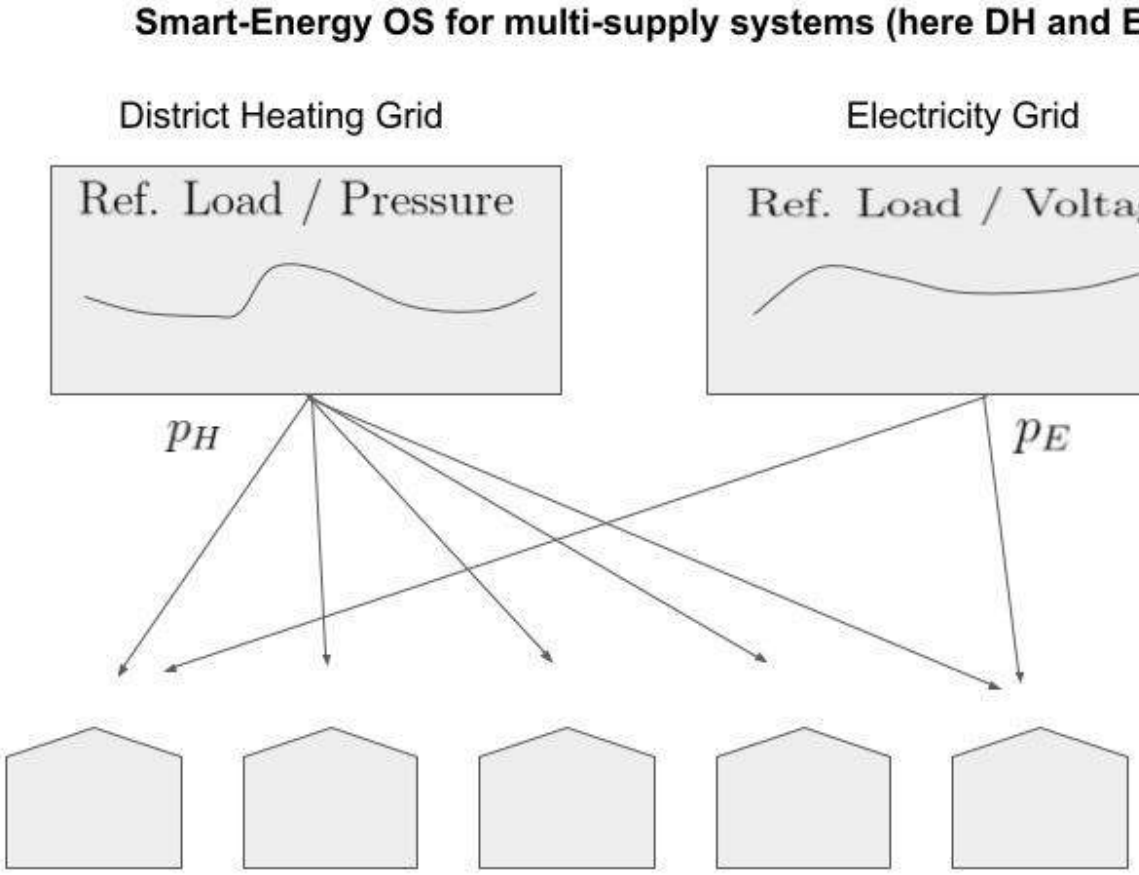
(**Dynamic**)

Local Flexibility Markets

(Hierarchy of controllers)


Current structure
Market
TSO
$P(t)$
P [$/MWh]
Q [MW]
Utility
Black box
P
Proposed structure
Market
P [$/MWh]
Q [MW]
$P(t)$
$\Delta P_1(s,t)$
TSO
• Freq. Reg.
• Con. man.
$P_2(s,t)$
$\Delta P_2(s,t)$
BRP
• Balancing
$P_3(s,t)$
$\Delta P_3(s,t)$
DSO
• Vol. Reg.
• Con. man.
$P(s,t)$

Cross-sector setup with clusters of buildings



$$\arg\min_{p}(L(p) - ref_{load}))^2$$

$$\arg\min_{U_H,U_E} \sum_{k=1}^{N}(p_H U_H + p_E U_E)$$

$$s.t.$$

$$Temp(U_H, U_E) \in \text{Comfort}$$

INSIEME

New project on European Energy Data Space

- **Hierarchical data spaces** for coherent services.
- Data spaces will be linked using extensions of the current **MIMs standard** with new **data models (MIM-7)** describing flexibility using the **Flexibility Functions**.
- **Direct and Indirect activation of flexibility.**
- Development of coherent spatial-temporal data space hierarchies providing improved forecasting as well as **grid and balancing flexibility services** using the **Smart Energy OS framework.**
- Embedded **TSO-DSO-BRP coordination.**

Smart Energy OS
Case Study
Novasol

Use-Case: Summer houses with a pool
Savings (price/CO2): 20-40 pct

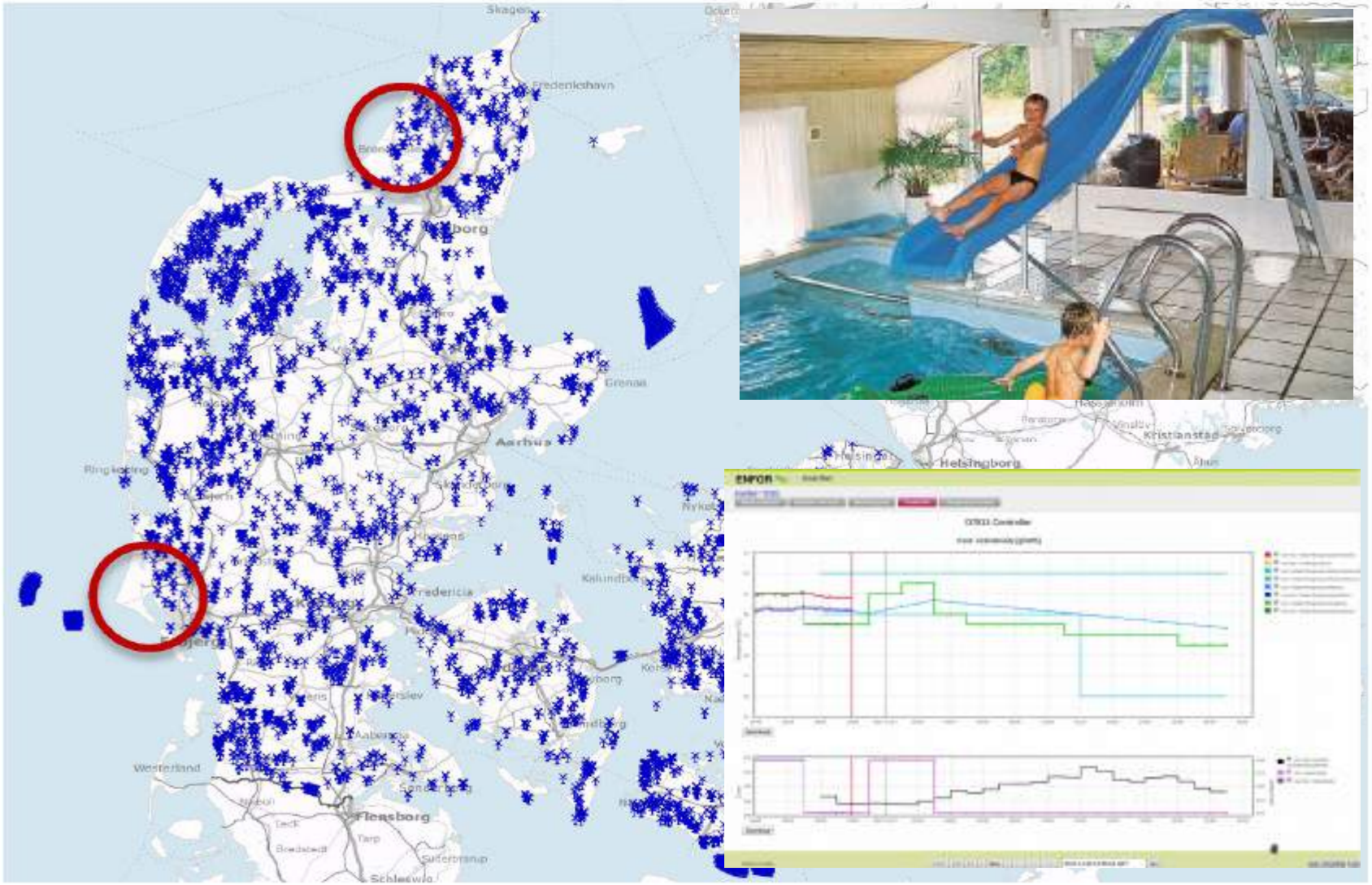


Figure 3.1 Geographical locations of summer houses in Denmark.

S2: A standard to unlock residential demand-side flexibility

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Luka De Bruyckere

ECOS

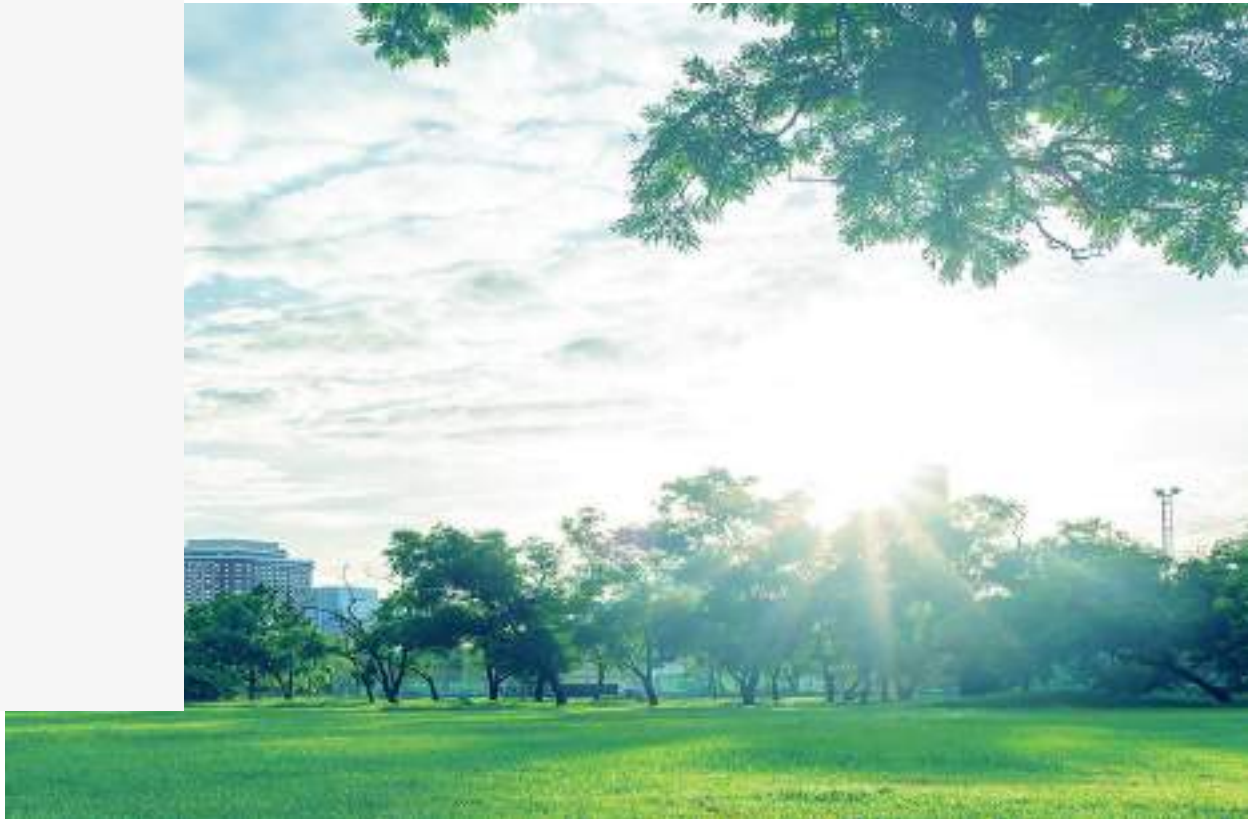
A standard to unlock residential demand-side flexibility

Luka De Bruyckere | Senior Programme Manager | 26.11.2024

ECOS

Environmental Coalition on Standards

is an international NGO with a network of members and experts advocating for environmentally friendly technical standards, policies, and laws.



The need for demand-side flexibility

DSF is needed to

- ✔ stabilise the grid when we electrify large loads
- ✔ integrate more renewables

= essential for the energy transition

From large loads

- ✔ EVs
- ✔ Heat pumps
- ✔ Battery storage

and

- ✔ PV inverters

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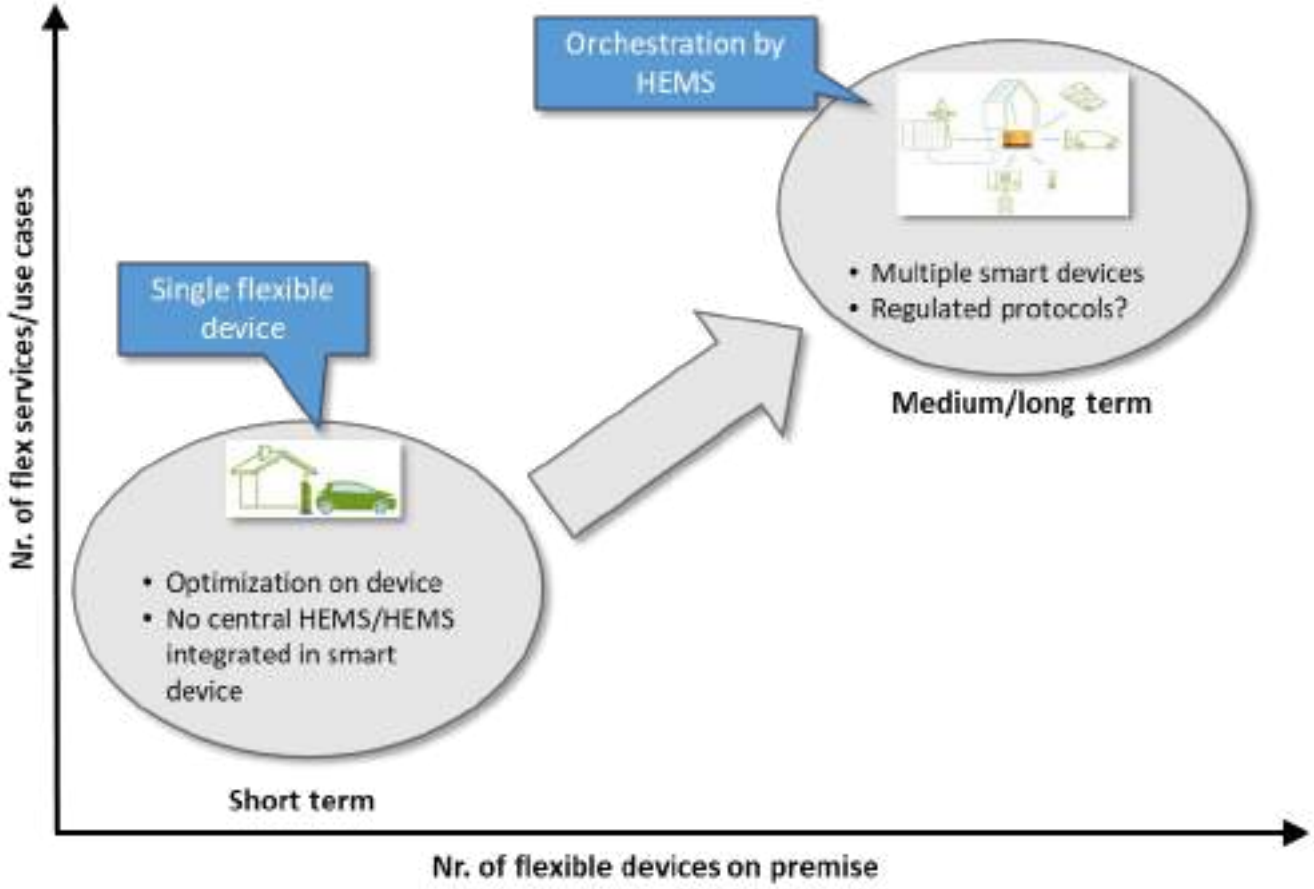
The importance of device orchestration



- USP for a smart device will be how much added value it can bring to a consumer out of the box
- A HEMS coordinating multiple smart devices will not be on most consumers mind yet
- However, smart devices can have a lifespan of up to 15 years or more and should be able to deal with both autonomous operation and central control by a HEMS
- If the HEMS scenario is not taken into account smart devices may even hinder the full flex potential of a premise

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The ideal standard

An energy transition-proof EMS standard should

- ✔ enable interoperable EMS-device communication – **now and in the future**
- ✔ avoid vendor lock-in – **now and in the future**
- ✔ ensure longevity of devices
- ✔ remain open to innovation

} = **future-proof**

The S2 standard EN 50491-12-2 is future-proof because **software updates happen in the EMS,** instead of the device

S2 Standard

Introducing S2: EN 50491-12-2

- Focus on “**behind the meter**” energy management
- No limitation in technology

✓ Wired ✓ Wi

✓ Local ✓ Clo

- **Orchestration** of multiple energy flows of Smart Appliances
- **No** deep and costly integration with firmware is needed
- S2 is **device-agnostic**, it does focus not on specific (types of) devices
- Developed as **EN 50491-12-2** under European Standardisation Request **M/490** on smart grids in CENELEC TC205/WG18
- Currently under discussion in IEC SC23K WG3 / TC13: **IEC 63402**
- Included in **SAREF4ENER**

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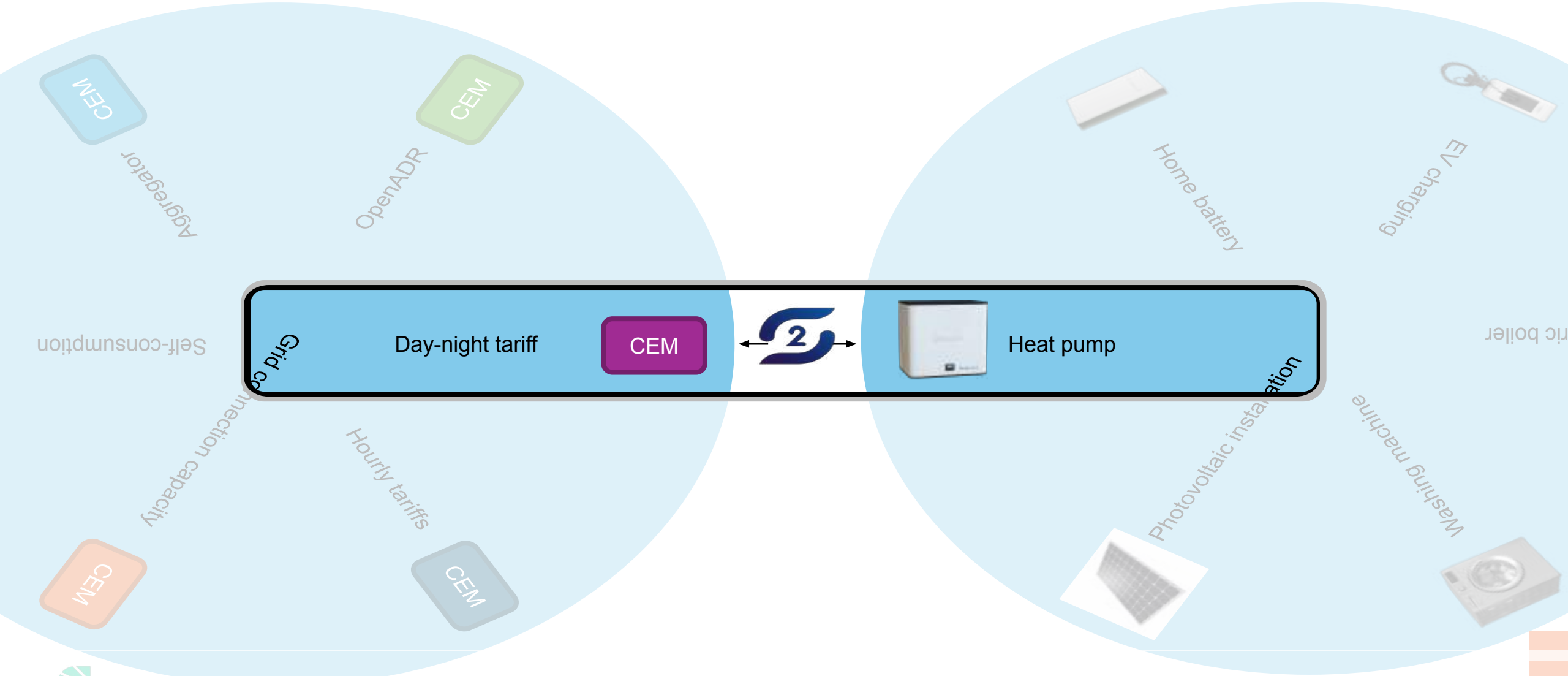
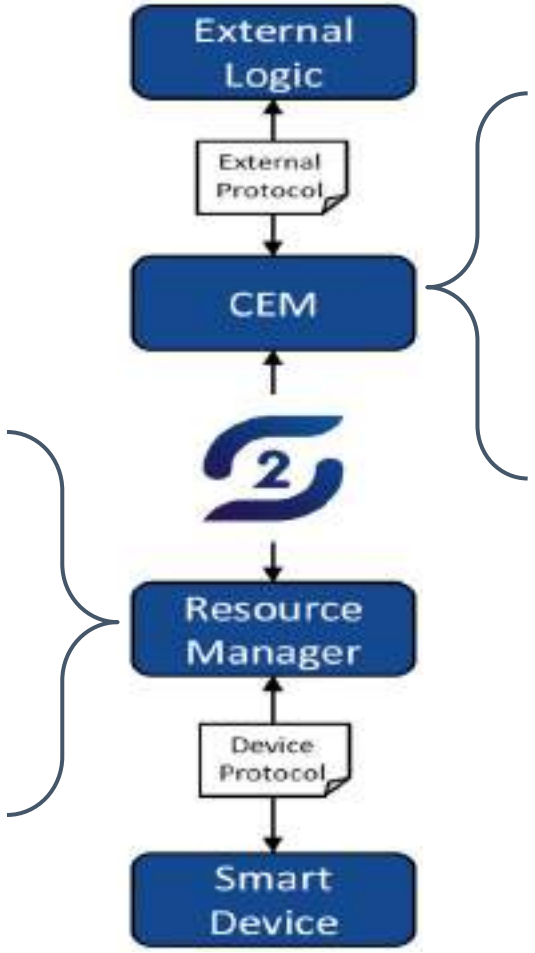
S2 combines any device with any optimization strategy



S2 Architecture (1/2)



- Responsibility of HEMS/aggregator/supplier/...
- Implementation of flexibility use cases
  e.g. tariffs, self-optimization, congestion
- Balances flex options for multiple devices
- Sends instructions to the Resource Manager
- End user chooses optimisation strategy

- Responsibility of OEM, OEM keeps control
- Communicates flexibility options from device
- Safeguards safety and performance constraints
- End user provides comfort requirements
- Translates device protocol into S2

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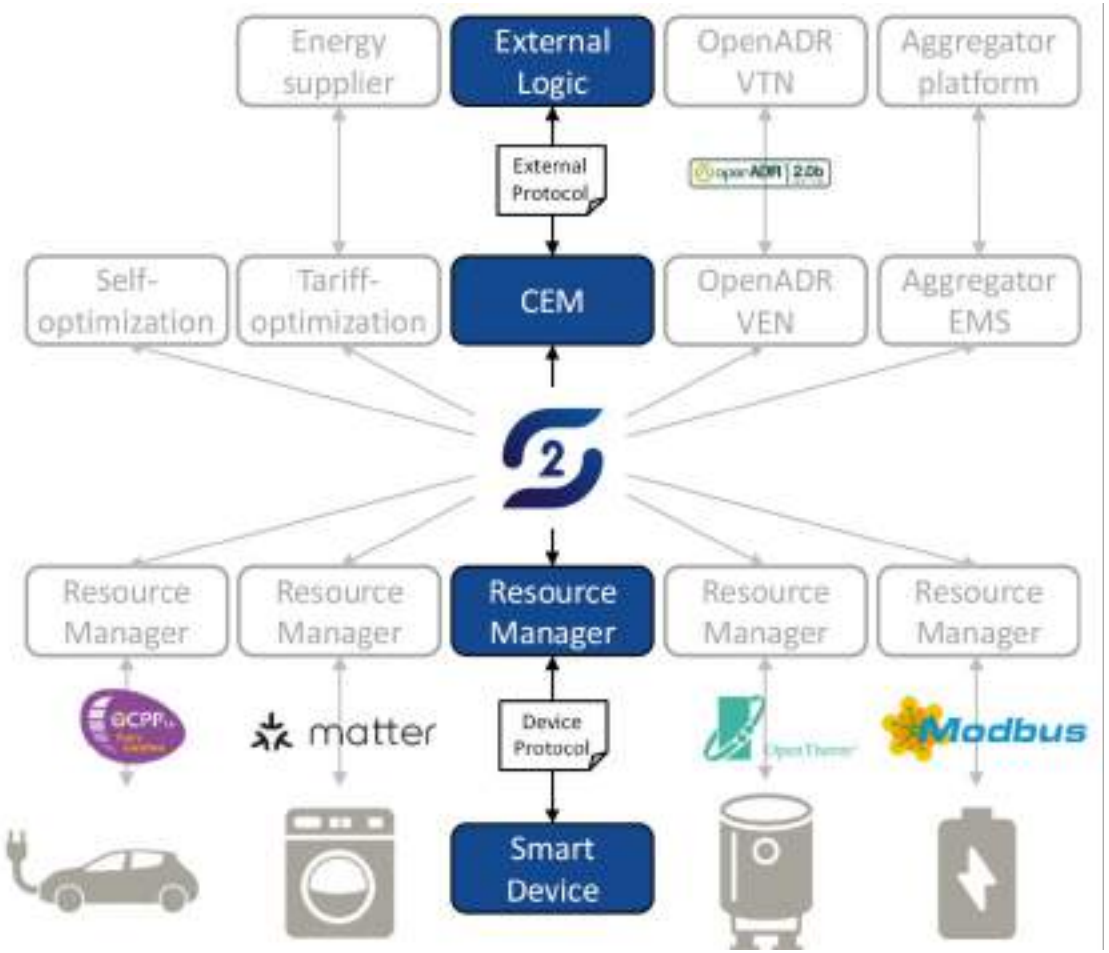
S2 Architecture (2/2)



S2 Standard

EN 50491-12-2

https://s2standard.org/

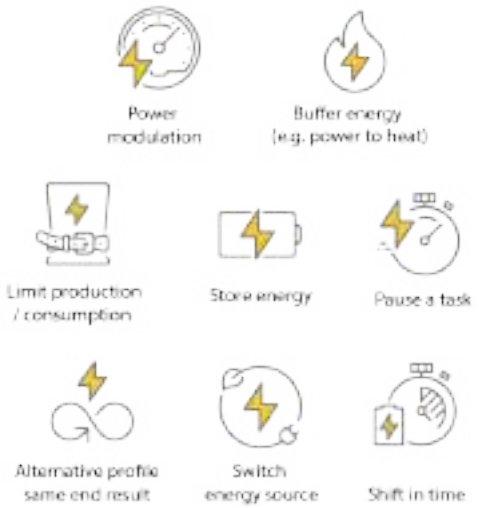
How is flexibility expressed?

Eight basic energy flexibility patterns can capture all possible use-cases in a device agnostic way

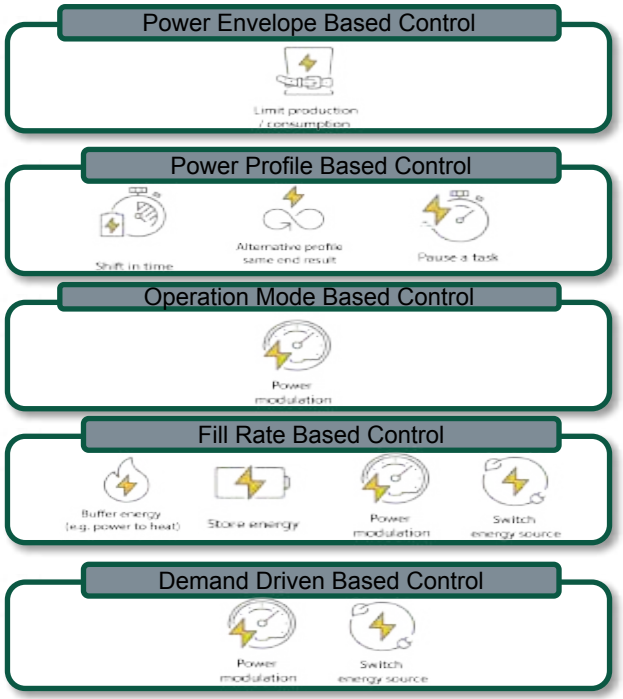
- Limit production or consumption
- Shift production/consumption in time
- Pause a task
- Alternative energy profiles
- Power modulation
- Buffer energy
- Store energy
- Switch energy type

A flex capability -based approach

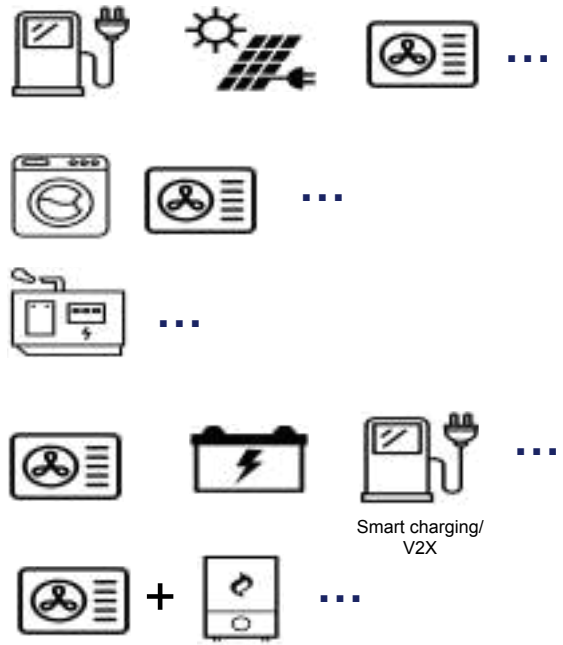
8 generic energy flexibility capabilities ...



... are combined into 5 control types ...

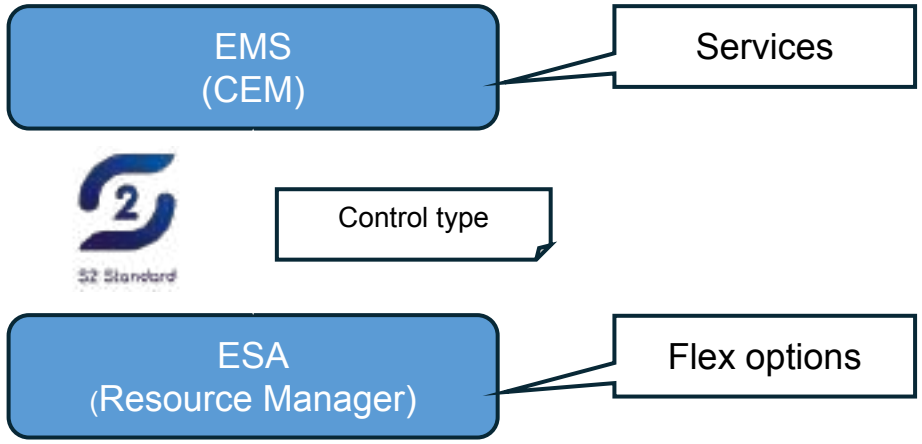


... to manage flexibility of any energy smart appliance



The flex capabilities can capture all possible use-cases in a device agnostic way

Adding new use cases/services



- Use cases/services are only implemented on the HEMS HEMS providers can freely implement new use cases/services
- Interoperability is guaranteed when the HEMS implements all 5 control types and the ESA at least 1
- No ESA updates required for a new use case/service

Key takeaways of S2

- Only manages energy flexibility
- End-user in control
- Future-proof interoperability
- S2 is an add-on to existing protocols
- S2 does not interfere with the OEM
- Open market for EMS

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S2 benefits for manufacturers

S2 Standard

- S2 is not focused on specific use cases e.g. heating or EV charging
- S2 works with incentives, not in ‘commands’ from DSO or ESCO: user is in control
- Management of S2 is open and well managed in CENELEC standardization body
- Device integrity: S2 does not override or interfere with internal logic and safety
- S2 does **not need other** OEM information like runtime, maintenance info etc.
- S2 is not yet another protocol, and as such not a replacement **for OEM protocols**
- See S2standard.org for links to the S2 whitepaper and Github

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Thank you

Luka De Bruyckere • Senior Programme Manager

Environmental Coalition on Standards

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@ECOS_Standard

ECOS-NGO

ECOS is co-funded by the European Commission & EFTA

Industrial evidence pitch: sector coupling for heat pumps

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Martin Roßmann

VIESSMANN

Agenda

1. About us….
2. Products & Systems
3. Tech Stack
4. Use-case HeatFlex - Residential
5. Use-case HeatFlex - Commercial
6. Sum-up

Carrier Group

Key Facts

- USD 22.1 Billion Sales Inside World
- 53,000+ Employees
- 75 Brands

Carrier HVAC Business Unit RLC EMEA

Key Facts

- USD 6.0 Billion Sales Inside Europe
- 12,000+ Employees
- 1000+ Sales People
- 1500+ Service People

Carrier
VIESMANN
TOSHIBA
RIELLO
Beretta

INSTAR CEI-Sphere

Residential HVAC EMEA


Heat pumps


Battery


PV systems


Wall hung boilers


Floor standing boilers


Buffer tanks and domestic hot water tanks


Solar thermal collectors


Air conditioner


Air quality


Ventilation


Burners


Direct electric heating

Carrier VIESMANN TOSHIBA RIELLO Beretta

Light Commercial HVAC EMEA

Heat pumps

Boilers

Buffer tanks and domestic hot water tanks

Solar thermal collectors

PV systems

Battery

Air conditioner

Air quality

Ventilation

Combined heat and power

Transfer station

Burners

Carrier VIESMANN TOSHIBA RIELLO Beretta

Technology Stack - The Integrated Solution Offering

Value Added Services

Service Plus · ViShare · ViContact · Wärme + Strom · FörderProfi · Adminprofi · …

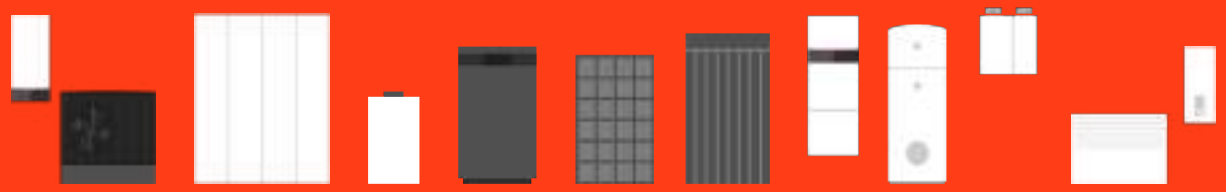
Digital Services

ViCare · ViGuide · …

Connectivity & Platforms

Connectivity Inside · Energy Management · Vitoconnect · wibutler · …

Products & Systems



…

INSTAR CEI-Sphere

EMS

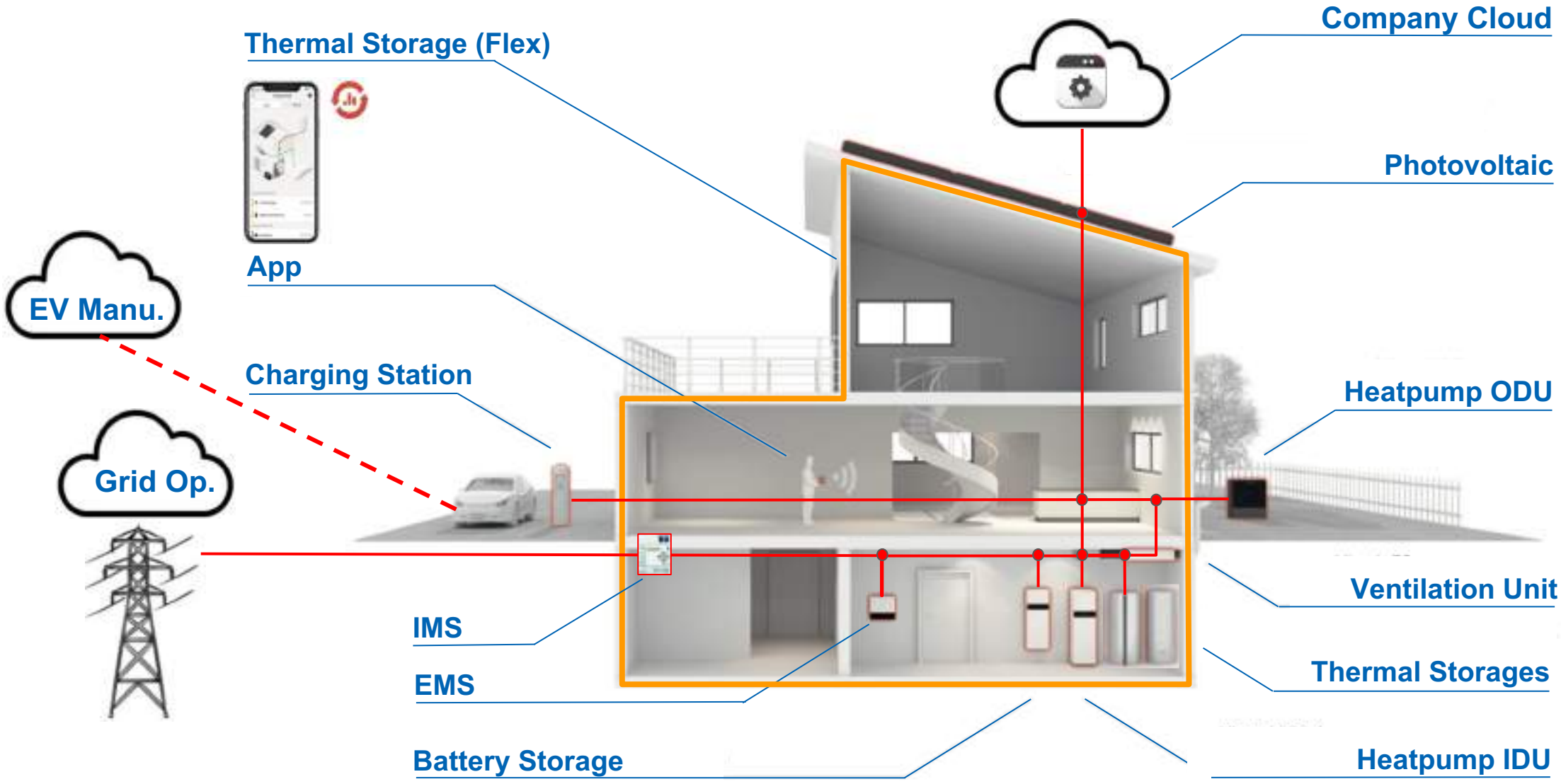
Customer APP

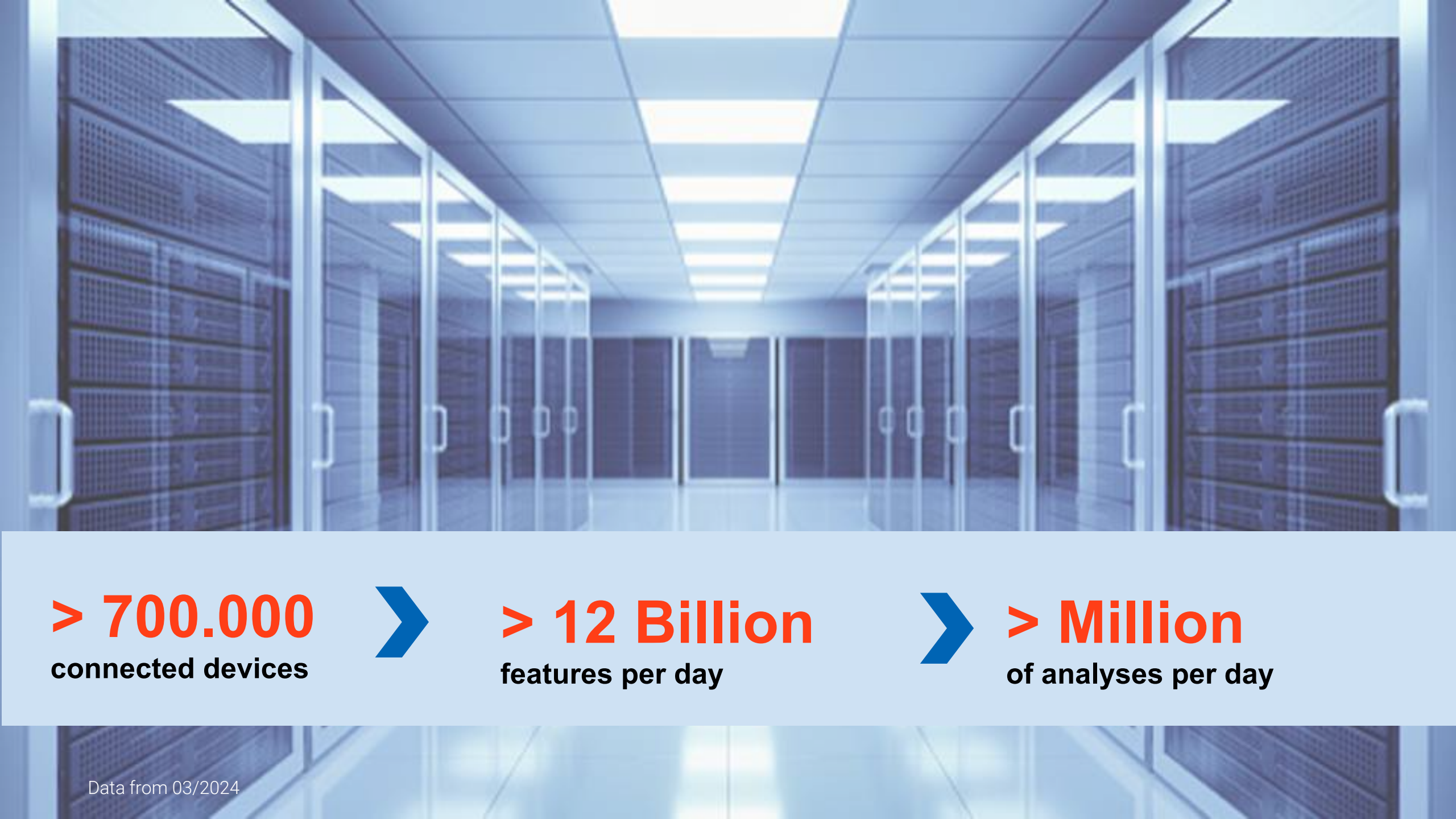
Service APP

Master:
Vitocal One Base

ONE BASE

All Electric and Thermal Solution





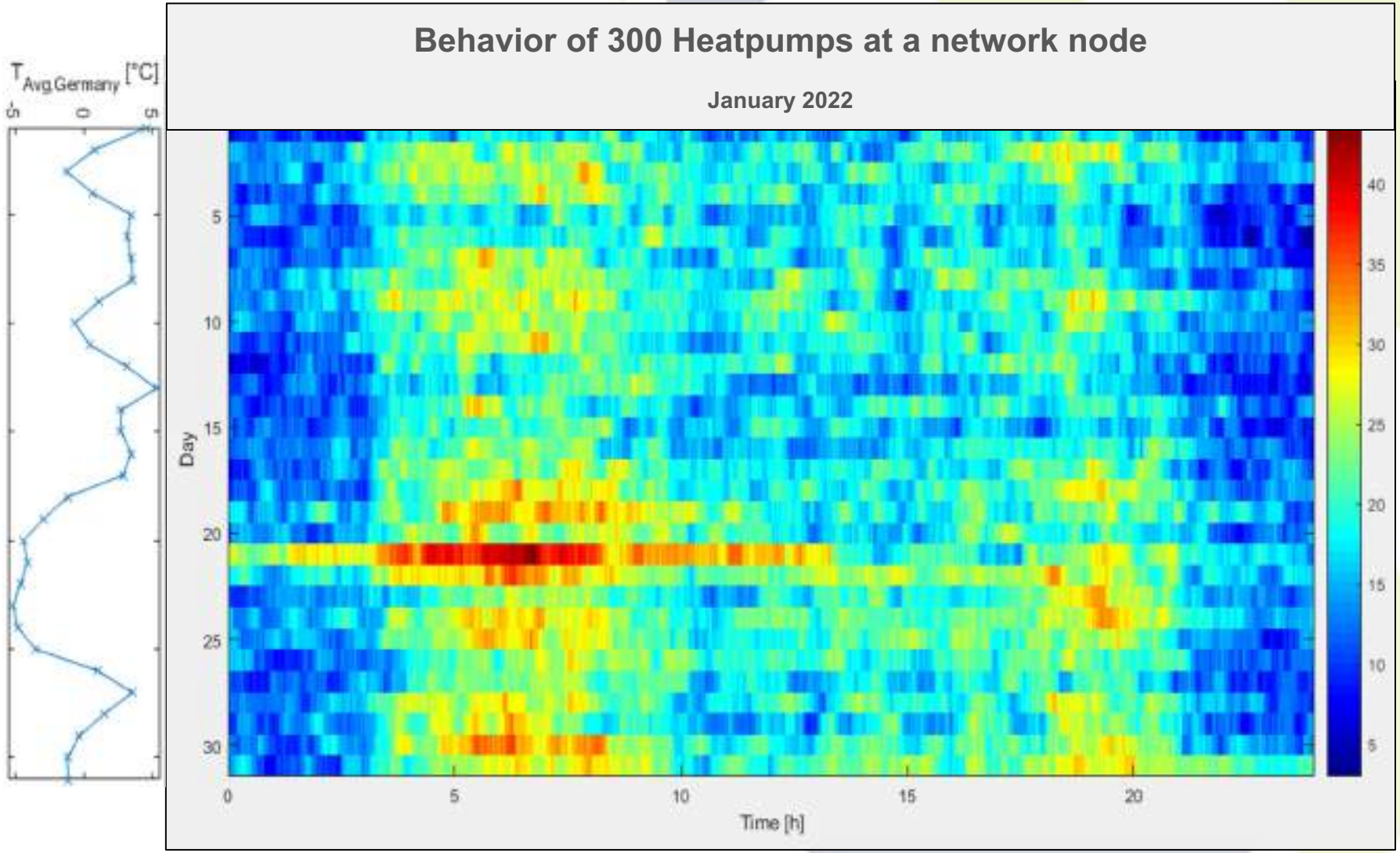
> 700.000
connected devices

> 12 Billion
features per day

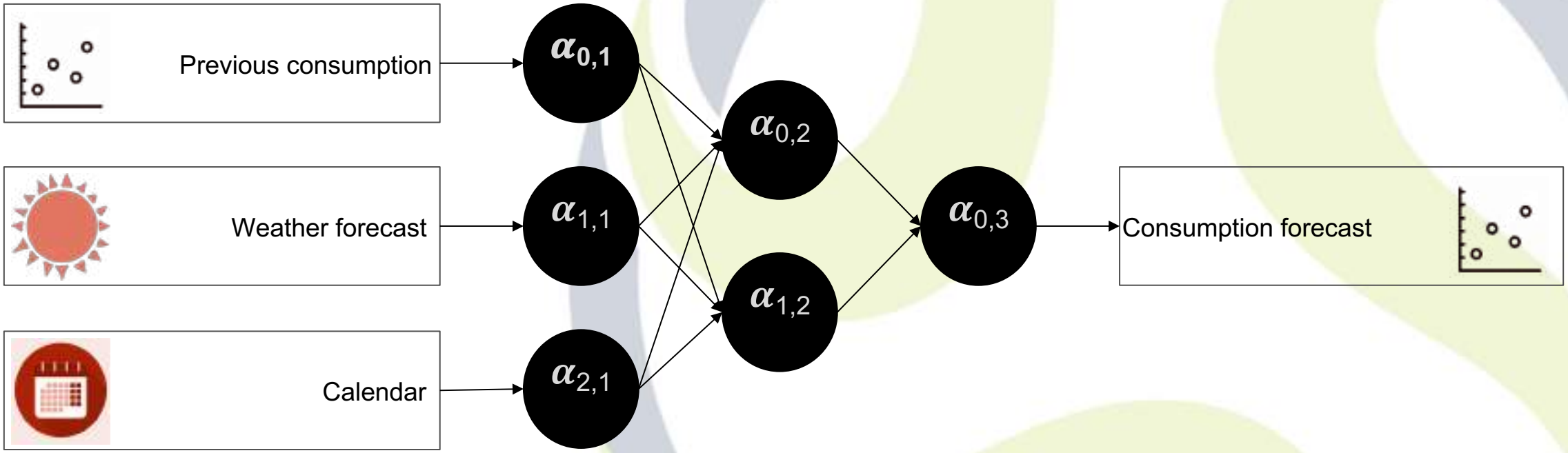
> Million
of analyses per day

Data from 03/2024

HeatFlex - The grid utility use-case for residential buildings



Consumption forecast determination per Heatpump



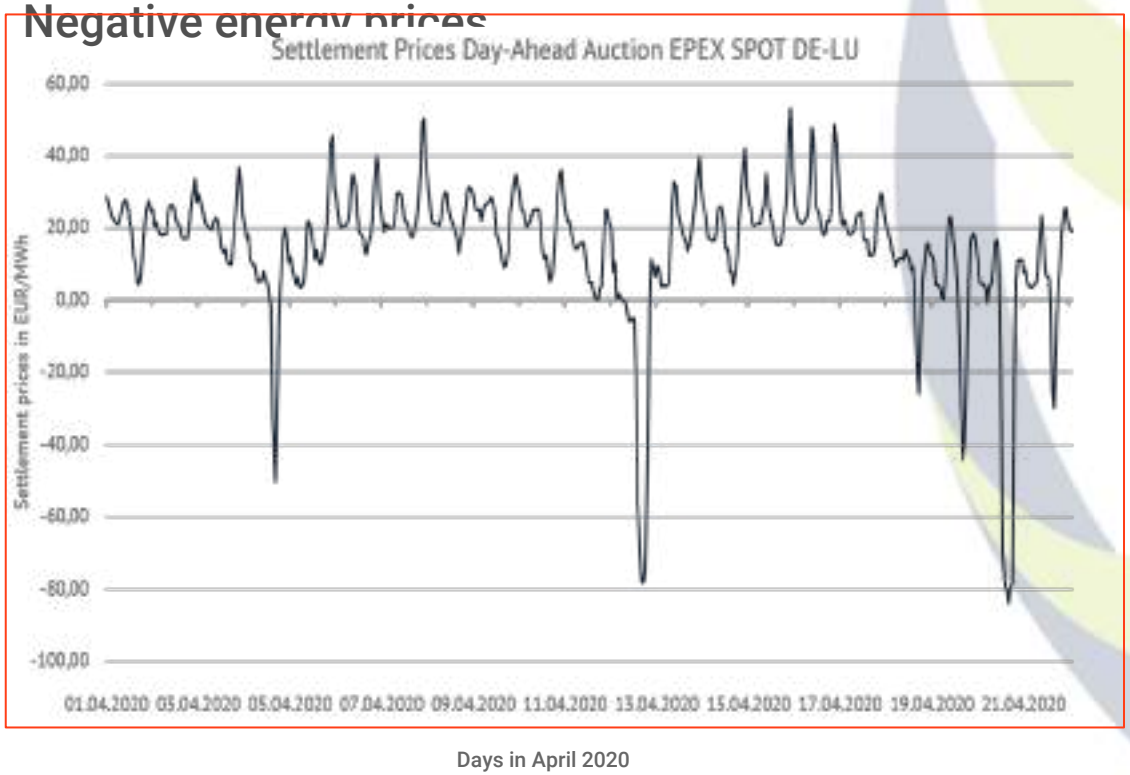
Algorithm determines potential of shiftable load in dependance of:

- Consumption forecast
- Building class
- User behaviour
- Summation per network node

Solar and wind are awesome but their volatility is a challenge

Energy Markets

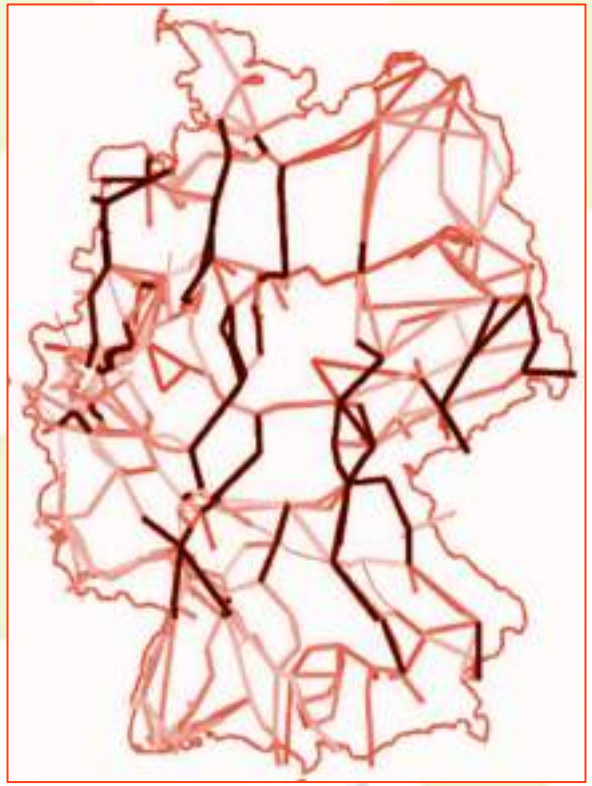
- Increasing fluctuation and price spreads on wholesale markets
  - ‘10: 20 €/MWh -> ‘20: 50 €/MWh -> ‘22: 800 €/MWh
- Negative energy prices



Settlement Prices Day-Ahead Auction EPEX Spot in Germany

Grid Operation

- Increasing fluctuations and grid congestions
- Decentral and distributed all over the countries
- Feed in on all voltage levels

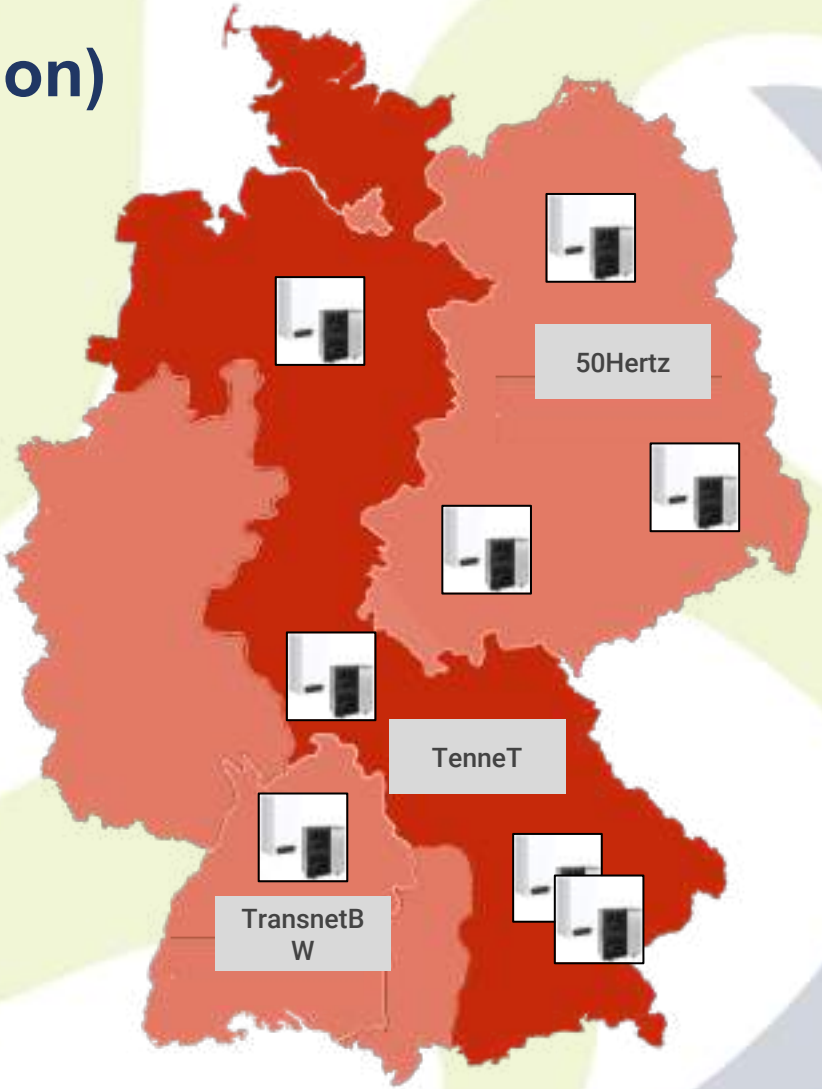


Transmission grid utilization and congestions in 2021 in Germany

Heatflex -> ViFlex (Viessmann Product Discription)

Load management for transmissions systems

- Viessmann pools residential heat pumps of all ViFlex customers per grid node. For these pools, we predict the consumption for the next day and offer flexibility by increasing or decreasing the consumption (via Crowd Balancing Platform for Redispatch 2.0). TSO can accept an offer and request the required flexibility. Viessmann controls the heat pumps accordingly and sends the actual consumption for reporting and controlling
- Service established in TSO areas of TenneT, 50Hertz and TransnetBW
- Customer will get an annual fee for participating



TenneT TRANSNET BW 50hertz | Elia Group

Equity-Crowd-Balancing Platform

HVAC Cloud

HVAC Cloud

HVAC Cloud

HVAC Cloud

EMS Backend

EMS Backend

train model → aggr & predict → submit flex offer → generate flex order → select devices → measure consumption

INSTAR CEI-Sphere

Viessmann (14:30 D-1)
Hey 👋, tomorrow at 17:00, our heat pumps will consume 1 MW, and we offer you 80% of that as flexibility, meaning we could go down to 200 kW, for 1 hour.

→ **Provide baseline consumption and flexibility offer**

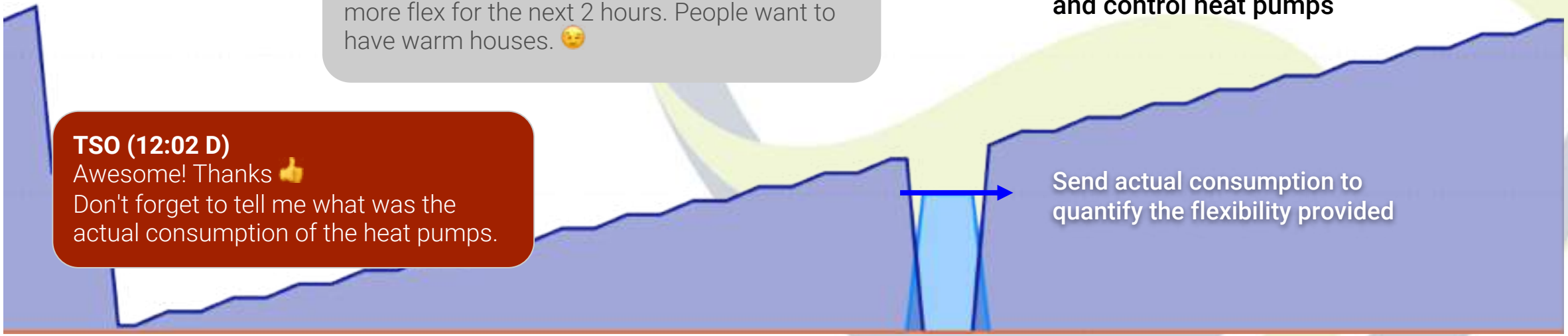
TSO (12:00 D)
Nice, the grid is a bit busy at that time. Please limit consumption to 200 kW, for 1 hour, okay?

→ **TSO accepts the offer and sends a request for flexibility**

Viessmann (12:01 D)
Definitely! That means we can't provide any more flex for the next 2 hours. People want to have warm houses. 😉

→ **Provide updated baseline/offer and control heat pumps**

TSO (12:02 D)
Awesome! Thanks 👍
Don't forget to tell me what was the actual consumption of the heat pumps.



→ **Send actual consumption to quantify the flexibility provided**

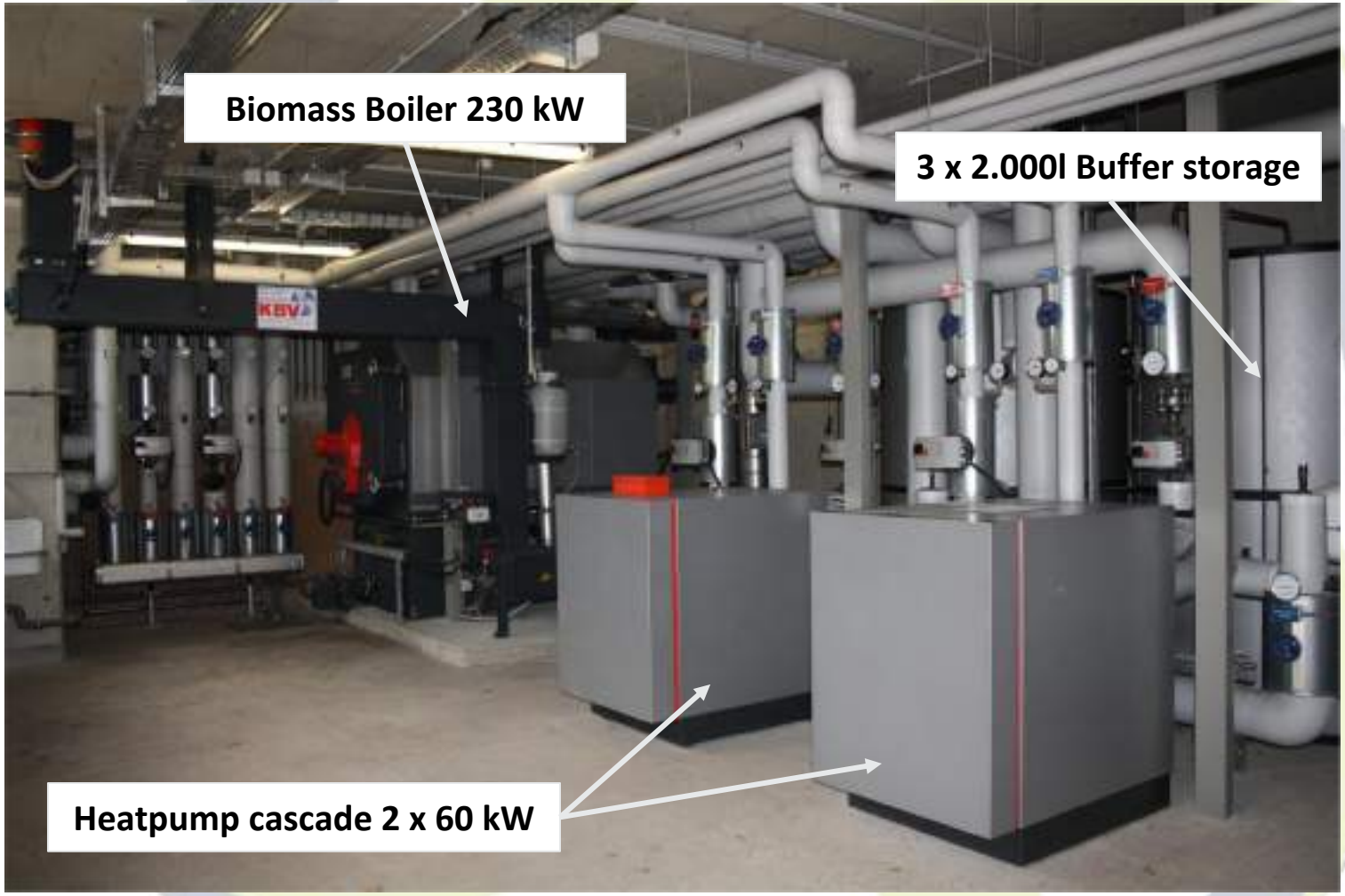
ViFlex for commercial

HeatFlex for residential works very well, but in some situations the grid has to cope with a “Catch-up effekt”.

The R&D-Project HeatFlex Commercial can offer more flexibility than the residential case.

To avoid the “Catch-up effect”, the system can generate the heat by switching on to biomass boiler.

A special pay-back for this grid service is under negotiation….



Research test field at Solms-Oberbiel in Germany

Sum-up

- Consistent digitalization of products and processes is of enormous importance
- The heating sector is already well positioned for cross-sector solutions
- Local and cloud-based energy management systems cooperate and enable new use cases
- Non-standardized interfaces, use cases and services are a major hurdle for Europe-wide implementation

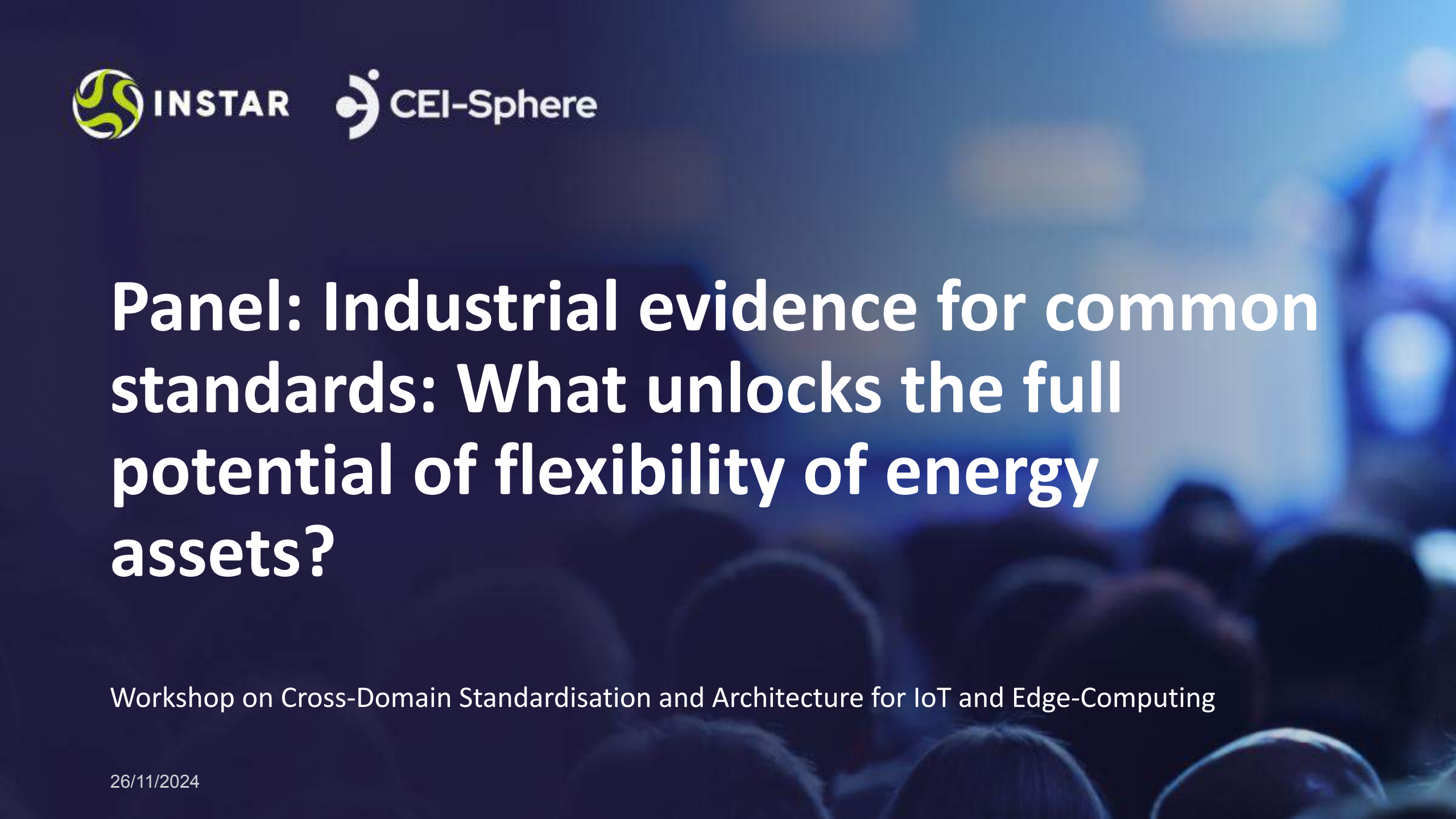
Thank you very much !

Industrial evidence pitch from Viessmann

Martin Roßmann
Technical Senior Advisor
Viessmann

romm@viessmannn.com

14/11/2024



Panel: Industrial evidence for common standards: What unlocks the full potential of flexibility of energy assets?

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Panel discussion

slido.com
#4259442

Rute Sofia
fortiss

Philipp Miesen
WIKA Alexander Wiegand SE & Co

Martin Roßmann
VIESSMANN

Martin Forsen
Nibe Industrier

Henrik Madsen
DTU, Citycom.AI TEF

From Physical to Integrated Information.

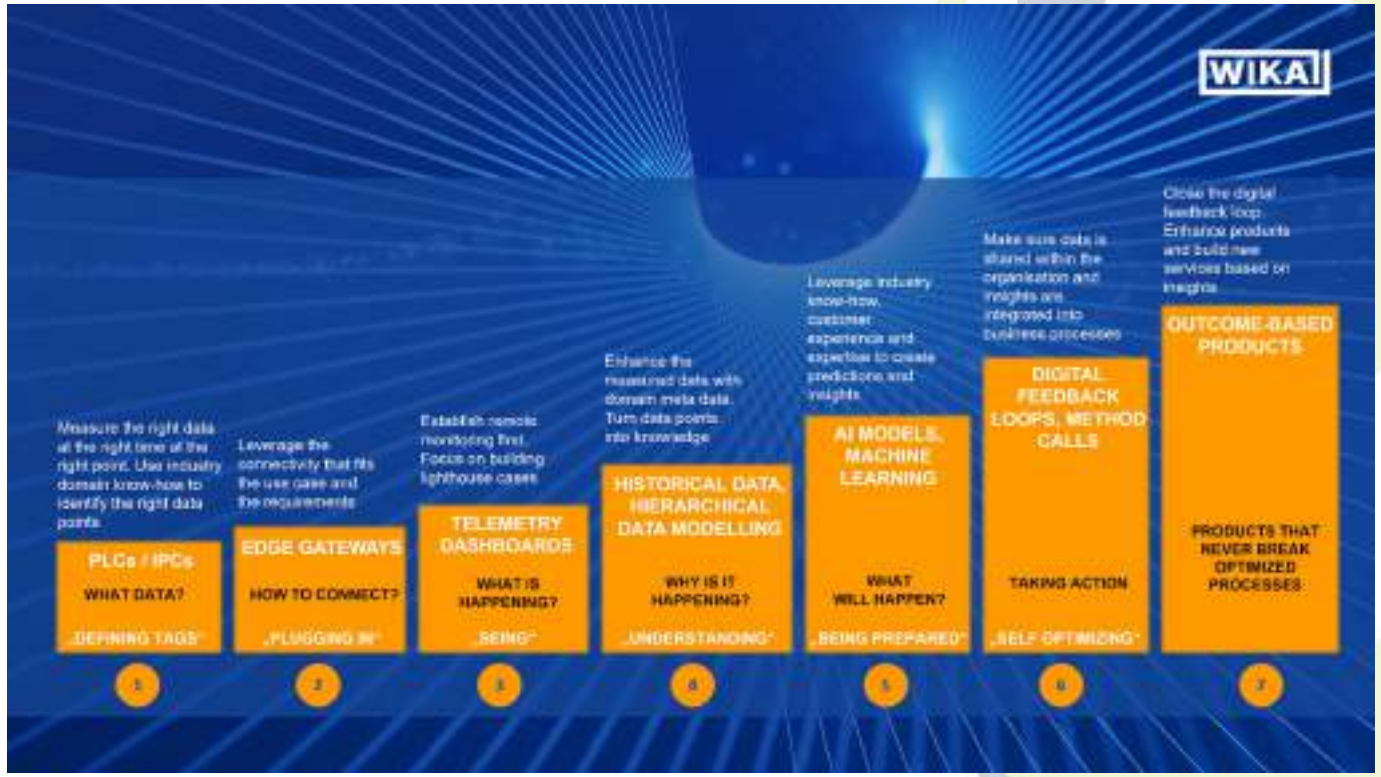
The Challenges of Complexity and Fragmentation in IIoT end-to-end solutions and the role of Standardization.

WIKA Alexander Wiegand SE & Co. KG

Philipp Miesen – Global Senior Advisor IIoT

22/11/2024

Steps of Digital Readiness – How to Digitalize your Assets



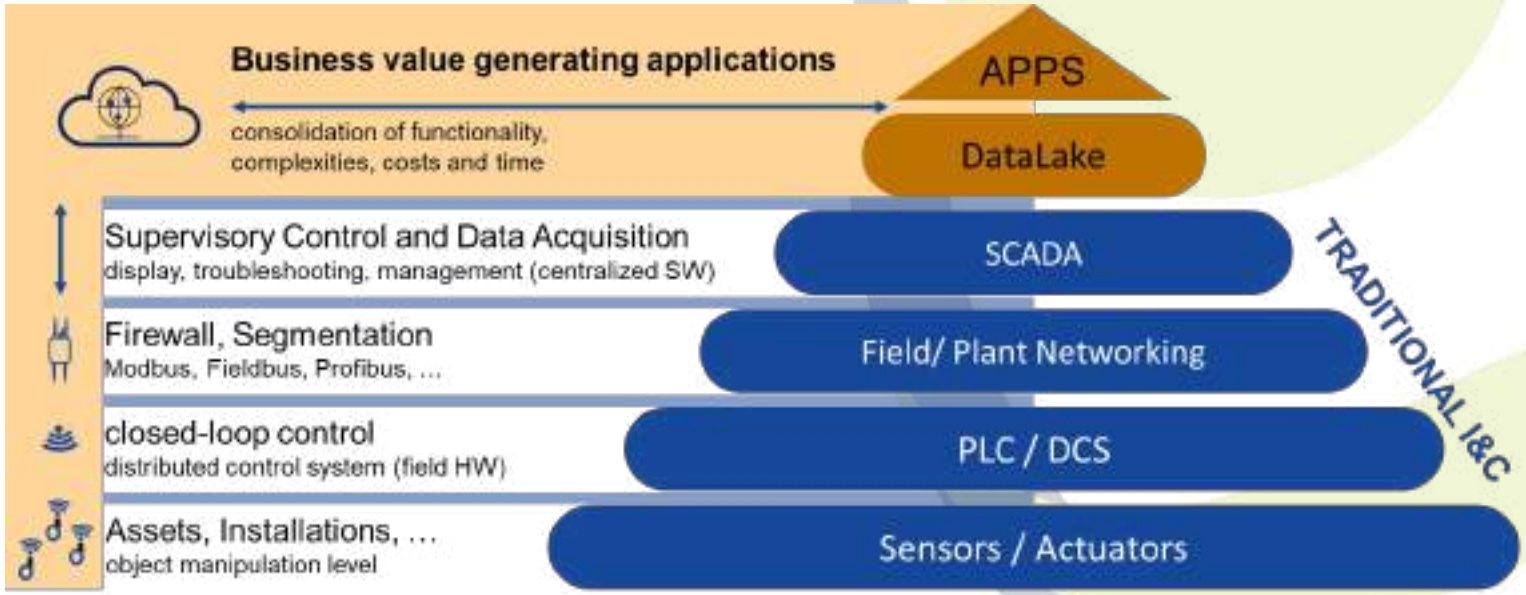
Complexity and Fragmentation

- Holistic IIoT Solutions
  - Multidisciplinary - technical
  - Transformational - organizational
  - Disruptive – value chain

Legacy meets Digital Transformation (New Standard emerges)

From Tradition to Future Digitalization "teamup" Process Industry Control System Topology

- >> monitoring and control >> information-based decisions



- broader database
- different system design objective
- multi-site data access
- large scale cross-asset data
- decentralized system architecture
- highly complex data/SW models

manage all layers by the right IIoT eco-system

Vertical Open Services and Horizontal Enablement – Role of Standardization

- areas / objectives:
  - Interfaces
    - vertical (functional chain)
    - cross domain (verticals)
    - inter system/platform operability
- enablers & accelerators
  - organize complexity and manage fragmentation
  - risk reduction
    - technology resilient
    - guard interoperability
    - speedup time to market with a clear frame to technologies requirements and development rules
    - manage “choice”

Panel: Industrial evidence for common standards

Martin Roßmann
Technical Senior Advisor
Viessmann

14/11/2024

Agenda

1. Products & Systems
2. Viessmann One Base
3. HEMS - Home Energy Management System
4. HEMS - Interoperability today
5. Interoperability - challenges

Heating & Cooling

Products & Systems

Residential:

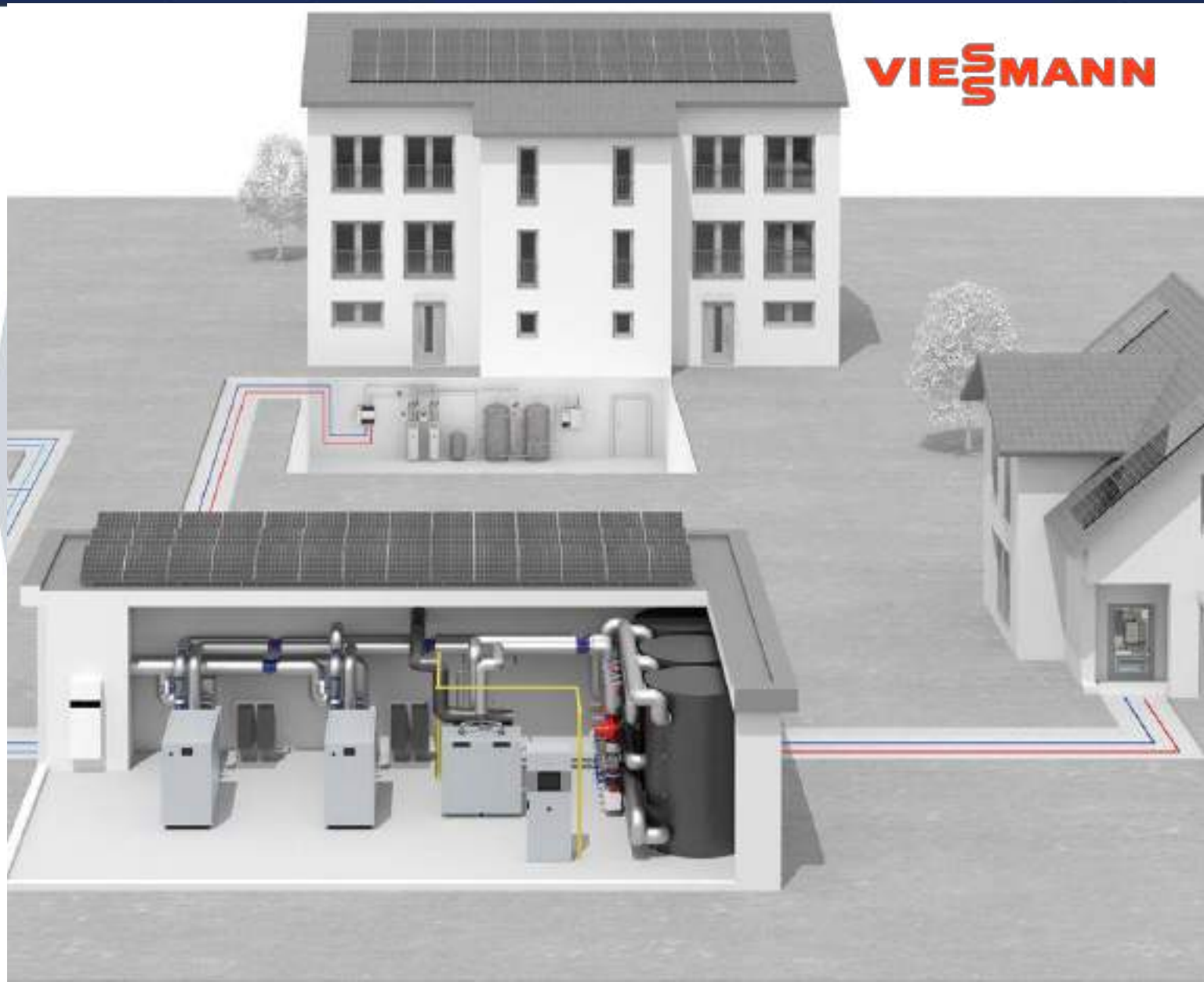
- Heat Pumps
- Biomass Systems
- District or local heating
- Condensing Boilers
- Solar Heat
- Instantaneous Water heaters
- Electric Direct Heating

Heating & Cooling

Products & Systems

Commercial:

- Commercial gas boilers
- Commercial heat pumps
- Commercial biomass systems
- Solar Heat
- District Heating
  Transfer Station



Electricity Generation & Energy Storage

Products & Systems

Residential:

- PV modules
- Battery storage
- Solar Heat

Commercial:

- PV modules
- Solar Heat & Ice Storages

INSTAR CEI-Sphere

Viessmann One Base

Energy Management controlled by Heat Pump

INSTAR CEI-Sphere

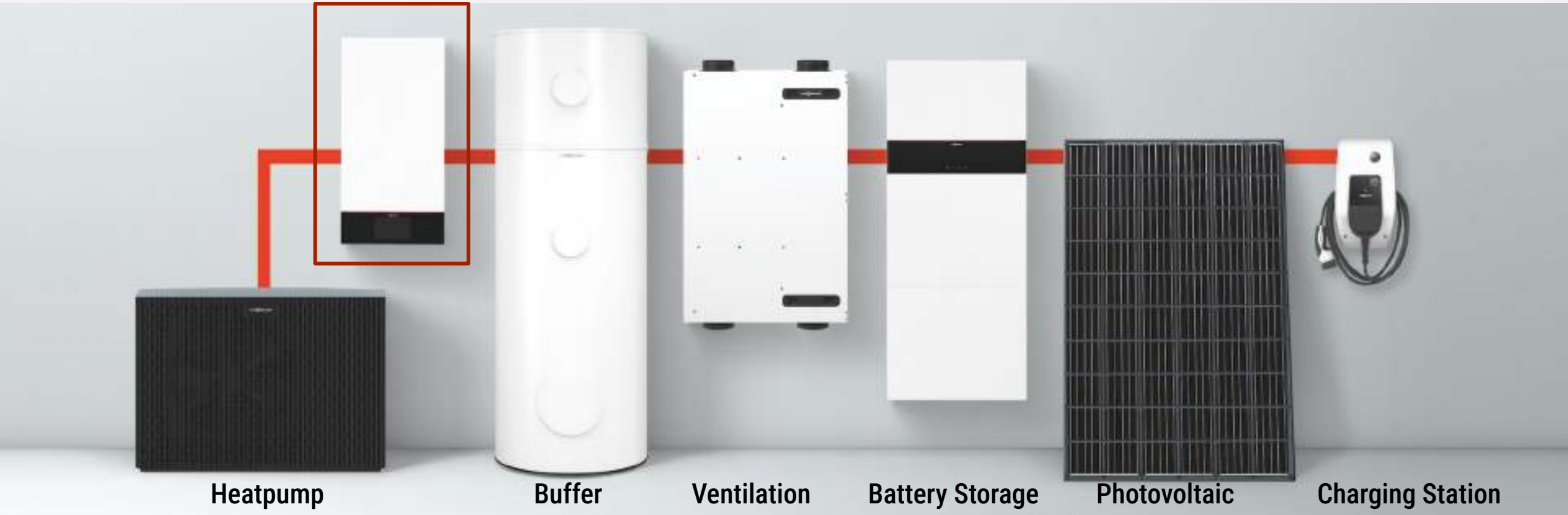
EMS 

Customer APP 

VIESMANN Service APP

Master:
Vitocal One Base

ONE BASE

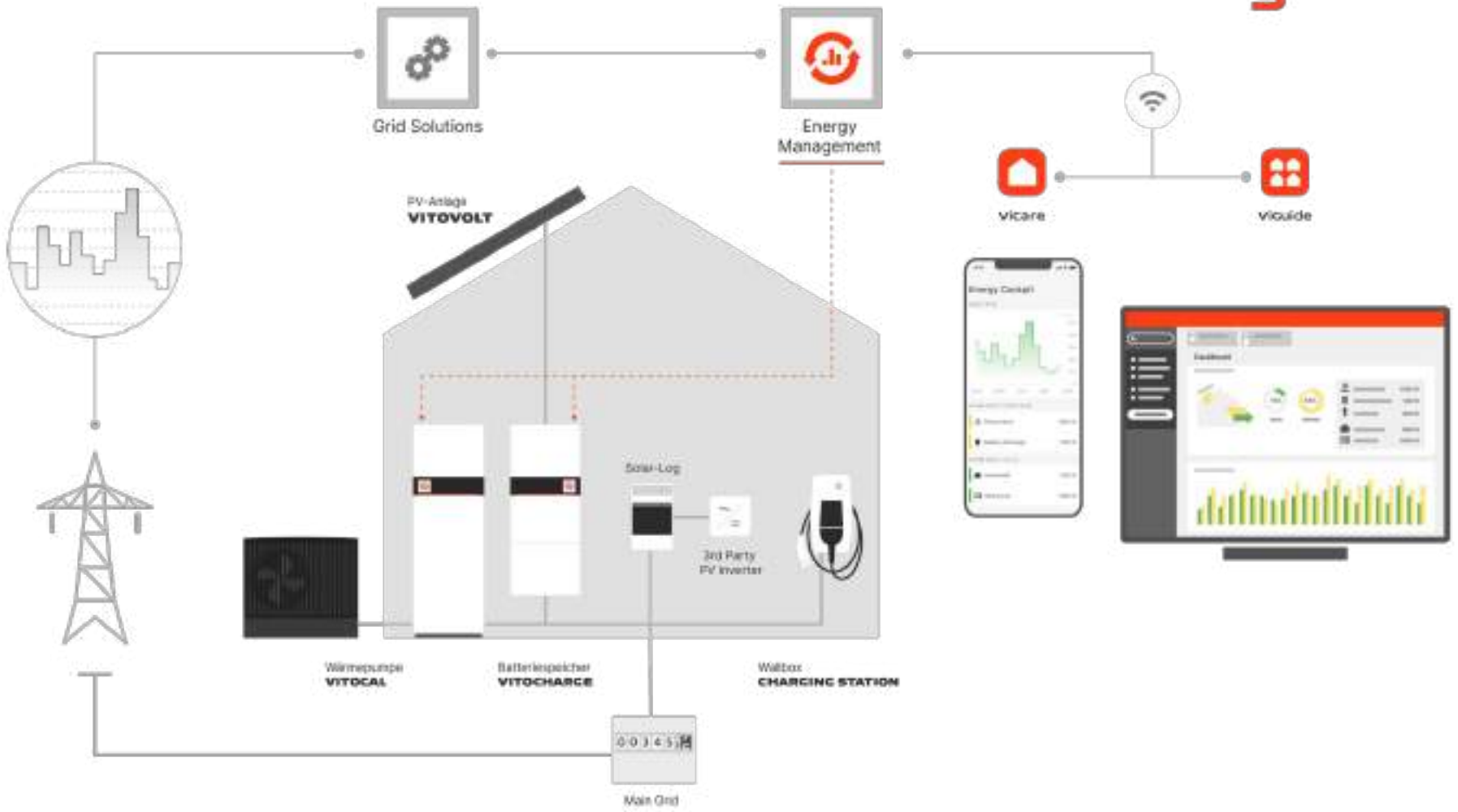


Heatpump Buffer Ventilation Battery Storage Photovoltaic Charging Station

Viessmann HEMS

The integrated and intelligent Connectivity and Home Energy Management System package that:

- manages all kinds of energy going into/leaving the house across all building equipments (PV, Battery, HVAC, E-Mobility)
- optimizes local energy flows to increase energy efficiency, renewable energy share and to reduce system complexity, for electrical and hybrid devices (e. g. heat pump)



Viessmann HEMS Interoperability

Connecting third-party inverters to Viessmann One Base

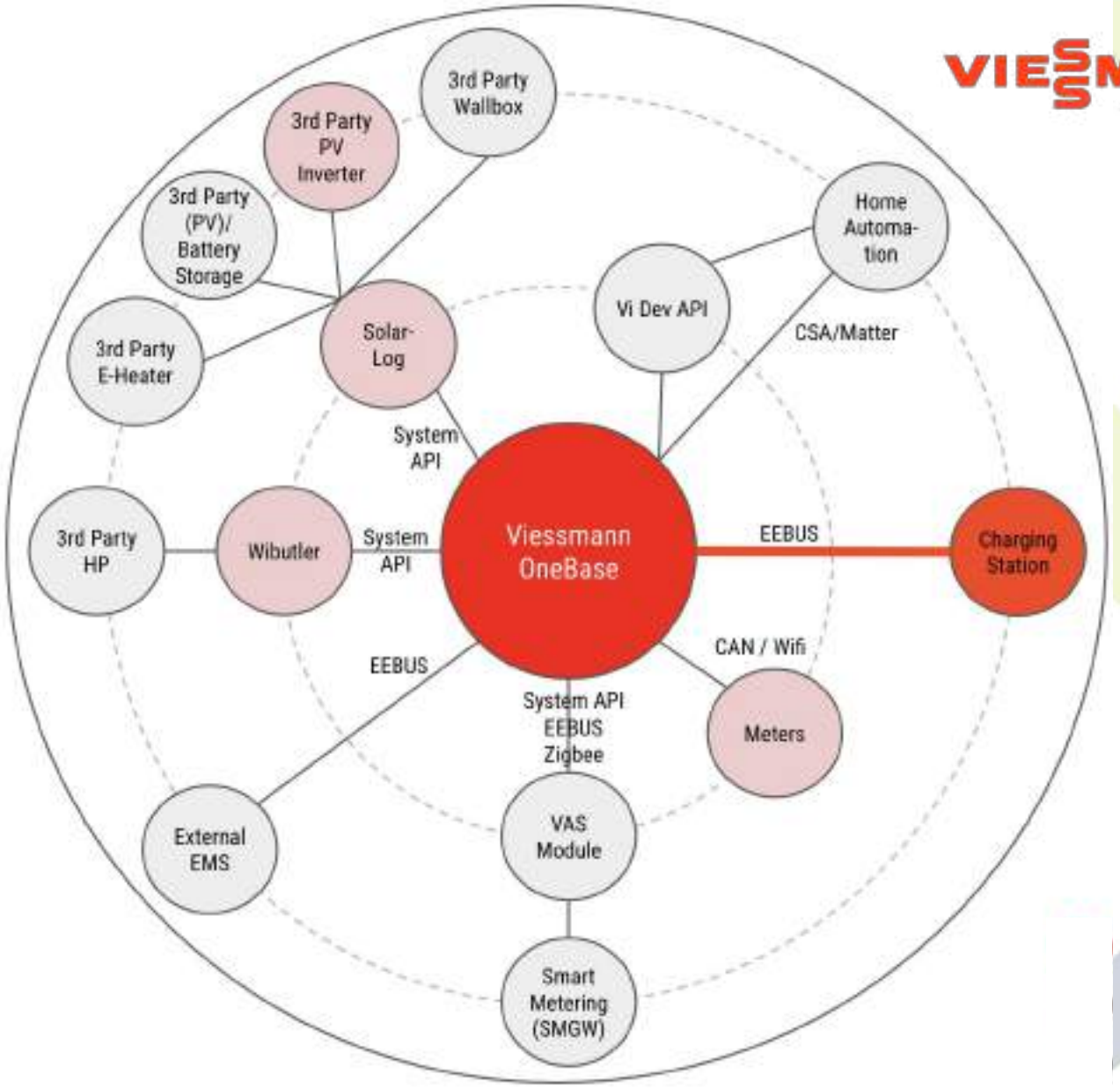
- Inventory
- Installed inverters

EEBUS is still implemented

- External EMS
- VAS Module
- Charging Station

Vi Device API

- > 22.500 registered users



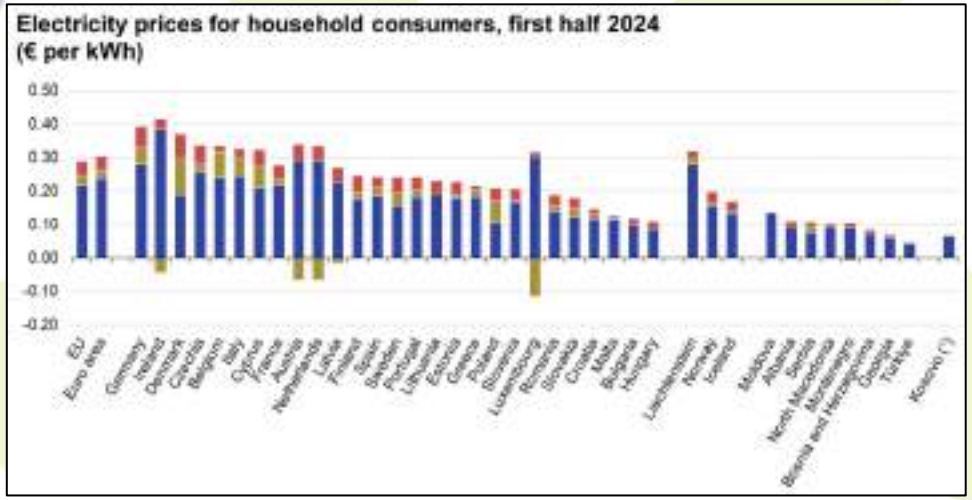
Interoperability - Challenges

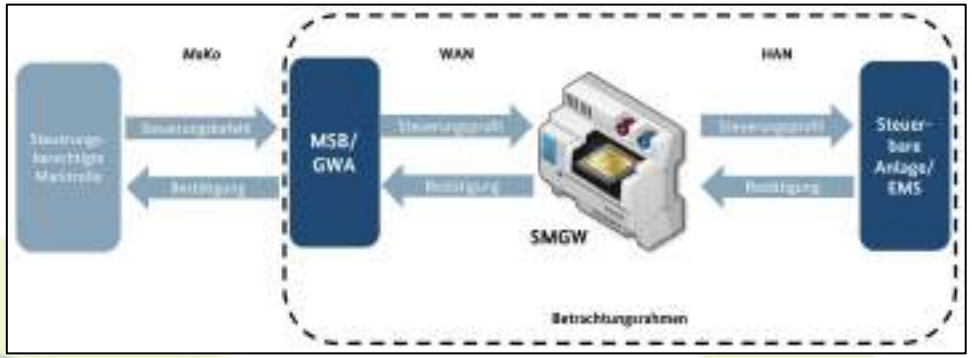
- **Use-cases**
  Development of EU-wide implementable use-cases for electricity demand-side flexibility

- **Cloud-to-cloud**
  Development of cross-sector standards for data, smart services and use-cases

- **Edge Computing**
  What will be the standard for smart energy meter gateways (EEBUS?)

- **Device (Heatpump)**
  Heatpump interface SG-Ready will be replaced in 2028 by EEBUS in Germany (EU-wide?)





INSTAR CEI-Sphere

Martin Forsén
Manager International Affairs
NIBE

26/11/24

Electrification

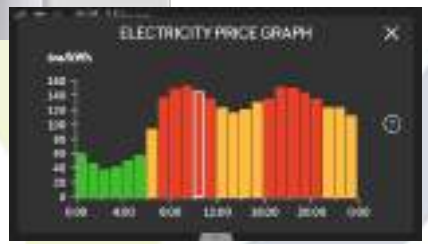
- Transport sector
  - Cars
  - Busses
  - Bicycles
  - Railroad traffic
- Heating Sector
  - **Heat Pumps**
- Industry

Monday Nov 4 - Day ahead spot prices on Nord Pool (FR, Sweden Stockholm area)

NIBE – Smart Price Adaption

SINCE 2014

SINCE 2019



NIBE´s ECO system

NIBE

266

NIBE

- 160 000 heat pumps connected
- 160 000 additional has connectivity possibility
- 40 000 active users of smart price adaption

Panel
Industrial evidence for common standards: What unlocks the full potential of flexibility of energy assets?

November 2024

INSTAR Workshop on Cross-Domain Standardisation and Architecture for Edge Computing

Henrik Madsen
DTU Compute

Innovation Fund Denmark

This initiative is funded by

Some questions

- What are the benefits of Demand-side flexibility?
- How to link the markets to the physics?
- How to create an indicator which guides the tariffs / economy for the DSOs etc.
- How to characterise and use flexibility?
- How to establish ‘markets’ for ancillary services in a DSO area?
- How to establish markets for flexibility?
- How to establish TSO-DSO coordination?
- How to solve DSO issues (voltage, congestion, ..) ?
- How to establish ‘markets’ for sector coupling and multi-supply systems?
- How to ensure privacy, democracy, transparency, GDPR, ...?
- One-way or two-way communication?
- Security and resilience - how?

Unlocking the Full Potential of Flexibility of Energy Assets

- We have suggested methodologies such that **flexible assets owners can access multiple markets**.
- We have suggested **Flexibility Function as a data model / standard (MIM-2) for bridging energy markets and the physics**.
- The suggested flexibility standards support **cross-domain flexibility and sector coupling**.
- We suggest to formulate **coherent spatial-temporal data models (MIM-7)** for the flexibility.
- We suggest using the **spatial-temporal hierarchies offered by the Smart Energy OS**.
- The Smart Energy OS is dominated by **one-way dynamic prices-based control.**
- We suggest to use **Minimum Interoperable Mechanisms (MIMs)**.

COFFEE BREAK
15:40 - 16:00

Next Session at 16:00
A code of conduct to drive consensus for industry

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Cross-sector standardisation

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Dave Raggett

W3C

Cross Sector Standardisation

and architecture for IoT and edge computing

Dave Raggett, W3C/ERCIM

26th November 2024

Brussels

Grateful acknowledgement of support from the Nephele and SmartEdge projects under the EU Horizon Europe programme

Challenges to Overcome

- IoT application developers face a long, confusing and fragmented list of standards and technologies from many different organisations
- Some standards are behind paywalls, discouraging access
- This all places hurdles in the way of development and deployment
- To encourage the realisation of the benefits of the IoT we need to lower the cost and complexity

Clean Abstractions to the Rescue

- We need clean, simple, easy to understand approaches that hide the underlying complexity
- An object oriented view of digital twins as models of devices and processes
- Descriptions in terms of classes, properties and relationships
- Behaviour modelled in terms of events, facts and rules

Swarms as Collaborating Agents

- The IoT can be conceived as a swarm of agents collaborating on shared tasks
- Unlike typical natural swarms, agents can take on different roles according to their capabilities
- Simple communication between agents in terms of their names, roles, topics of interest, or agent proximity
- or via leaving notes for other agents to find attached to locations, objects, events, actions or processes as a form of stigmergy

Agents are software or systems designed to perceive their environment, make decisions and take actions to achieve a specific goal or set of goals

Trust and Security

- We need systems to be trust worthy and resilient in the face of faults, cyber-attacks and climate stress
- Rapid response to suspicious behaviour using AI as the front line with human experts in support
- Safe handling of personal data, e.g. digital patient records, journeys travelled and purchase history
- Controlled access on a need-to-know basis to preserve privacy
- Establishing trust with verifiable credentials
- Perils of universal identifiers

The Role of Artificial Intelligence

- Hand crafting software and systems is slow and expensive
- Machine learning is very effective given good quality training data
- Key to reducing the burden on the cloud by preprocessing at the edge, e.g. for video
- Human-AI collaboration on curating use cases and data

From Generative AI to Sentient AI

Sentient AI as the basis for intelligent co-workers for many different kinds of roles

Generative AI

- Requires expensive pre-training on vast datasets
- Followed by fine-tuning for application needs
- Knowledge is frozen-in during training
- Limited work around using retrieval augmented generation
- Weak on semantic consistency and liable to hallucinations
- More memorisation than reasoning

Sentient AI

- Agents that are aware of their environment, their goals and their performance, and which remember their experiences
- Continual learning using continual prediction and associative memory
- Continual reasoning including the means for reflection in respect to learning and problem solving
- Inspired by human cognition and advances in the neurosciences

Programming superseded by explaining and showing agents what you want, where agents can learn from experience and apply their knowledge to fill in the gaps, e.g. on safety and security

Detailed Recommendations

Descriptions and Behaviours

- Digital twins can be described in terms of classes, properties and relationships
  - Graph representations of facts
  - Additional metadata as needed, e.g. for uncertainty and provenance
- Behaviours can be described in terms of event triggered rules
  - Asynchronous actions that trigger further rules when they complete
  - Real-time control through delegation and low latency feedback loops
- Intents as aims, purposes, goals or objectives
- Intents form high level APIs that describe what should happen but not how
  - e.g. target gripper position and orientation for a robot arm
  - The robot needs to generate and execute a plan for controlling its actuators to reach that target with reactive adjustments as needed
- Safer than lower level APIs

Digital Twins as Virtual Objects

- Digital twins as models of devices and processes
  - State: past, present and future
  - Simulation, planning and repairs
  - Fault diagnosis using abductive reasoning
  - Relation to Circular Economy and Digital Product Passports
- Abstractions that are decoupled from the details of the hardware and protocols
- Object oriented models with properties, actions and events, along with their data models
- Composite virtual objects as abstractions for groups of multiple physical devices

- Web of Things uses RDF to describe the object model, the semantics, and lower level details for libraries to access the digital twin on behalf of the application using whatever protocols it supports
  - Intended to complement other standards, not replace them
- Devices are often modelled in terms of hierarchical paths
  - Relation to URIs, CRUD and REST
- Communication patterns
  - Topic streams with pub/sub messages
  - Services with request/response messages
- Many possible protocols
  - HTTP, CoAP, MQTT, DDS, Zenoh, Zigbee, …

Many different overlapping standards that incurs cost and complexity for developers. Web of Things is one way to solve that by decoupling applications from the heterogeneous underlying protocols and standards.

Vocabulary Standards

workshop page

- Controlled vocabularies, taxonomies and full blown ontologies
  - Need for widely agreed metrics for assessing level of maturity
- RDF Schema and OWL as standards for describing vocabularies
  - Design patterns, e.g. core ontologies
- SHACL and ShEx for graph constraints
- Examples include:
  - ECLASS as taxonomy for manufacturing
  - SAREF as ontology for smart appliances
  - Common Core Ontologies

- Questions about process and governance for vocabulary development
  - How is community feedback handled?
  - Is vocabulary static or changing?
  - How are the use cases curated?
  - What's needed to encourage re-use?
- AIOTI workshop on Semantic Interoperability for Digital Twins
  - 5-6 February 2025, Sophia Antipolis, France, hosted by W3C/ERCIM
  - Best practices for vocab development
  - Focusing on industry needs

Digital Twins and Knowledge Graphs

- W3C **Web of Things**: RDF for properties, actions and events
  - **JSON-LD** for RDF using JSON
  - **CBOR-LD** for RDF using CBOR
- **NGSI-LD** an API and protocol for accessing context models
  - W3C/ETSI liaison for work on alignment with Web of Things
- REST API description languages
  - **OpenAPI** – based upon Swagger
  - **RAML** – based upon YAML

- Knowledge graphs
  - **RDF** for graph edges as triples
  - **LPG** for graphs with properties for both vertices and edges
  - **Chunks & Rules** as a higher level abstraction for facts and rules
    - Chunk as collection of properties
  - **Plausible Knowledge Notation** (PKN) for imperfect knowledge that can be uncertain, imprecise, context sensitive, incomplete, inconsistent and subject to change
    - Rational arguments in place of logic

W3C is working on RDF 1.2 to make it easier to annotate edges and facilitate the use of RDF as a basis for semantic interoperability across diverse information systems and formats

Swarms and Orchestration

- Missing standards for swarms
  - How entities join or leave swarm?
  - How entities change their roles?
  - Swarm messaging at an abstract level that hides messy details
- Fully decentralised algorithms for greater resilience
  - Auctions + automated negotiation for balancing supply and demand for services
  - Agreed rules for dynamic load balancing, trading benefit and cost
- Stream processing
- Operations on encrypted data
- Role of distributed ledgers
- Decentralised identifiers
- Verifiable credentials
- Voting mechanisms for trust
- Software defined networking
- Container based deployment
- Use of AI to monitor performance

AI Related Standards

- W3C WebNN for access to local AI acceleration hardware
- W3C WASM for efficient coding
- Federated machine learning
- Access control and digital rights
- AI models and frameworks
- Improved energy efficiency
  - Using pre-trained models
  - Spiking neural networks

Summary

The IoT has lots of standards, but are they the right ones?

- Good abstractions are needed to overcome existing complexity
- Digital Twins as abstractions for devices and processes
  - Graph models can be used to decouple apps from underlying details – see W3C Web of Things
  - Behavioural models for low-code control of digital twins
- Swarms of agents with different capabilities using messaging and hiding underlying protocols
  - Emphasis on decentralised control for increased resilience
- Standards for vocabularies, associated metrics and best practices, encouraging reuse
  - Aligning practices across SDOs
- Standards for trust and security
  - AI, cyber-security, decentralised
- Generative AI will give way to Sentient AI agents with continual learning and reflective reasoning
- Programming will be superseded by explaining and showing agents what you want, where they apply their knowledge to fill in the gaps

Grateful acknowledgement of support from the Nephele and SmartEdge projects under the EU Horizon Europe programme

eebus as an emerging standard connecting appliances, charge points

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Robert Böhm

eebus

EEBUS – AN EMERGING INTERNATIONAL STANDARD

Workshop on Cross-Domain Standardisation and Architecture for Edge Computing
26th November 2024

WHAT CHARACTERISES EEBUS?

- EEBus Initiative e.V. is a non-profit organisation and association of leading **companies** in the **energy industry** and **manufacturers** in the fields of **automotive, heating & air conditioning, decentralised energy storage and generation**
- EEBUS has been the address for **energy networking** at the **grid connection** for over **10 years**
- Market-leading manufacturers integrate the EEBUS standard into their devices

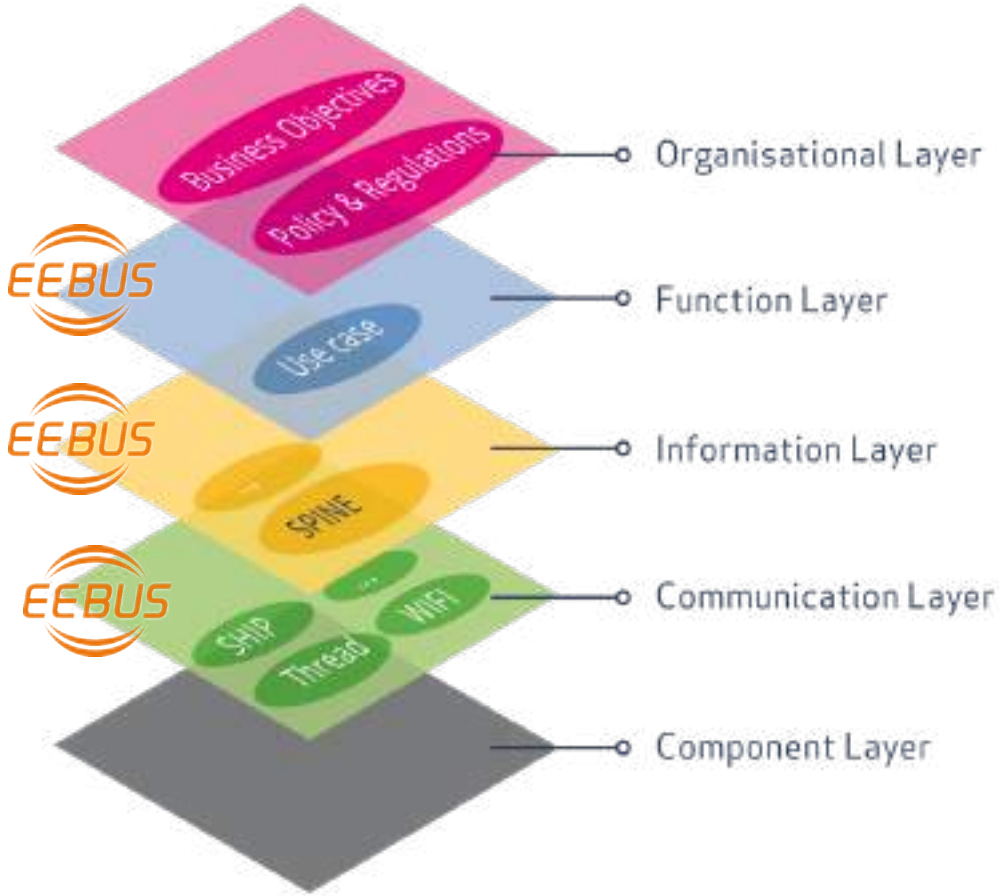
Writing specifications

Testing in research projects

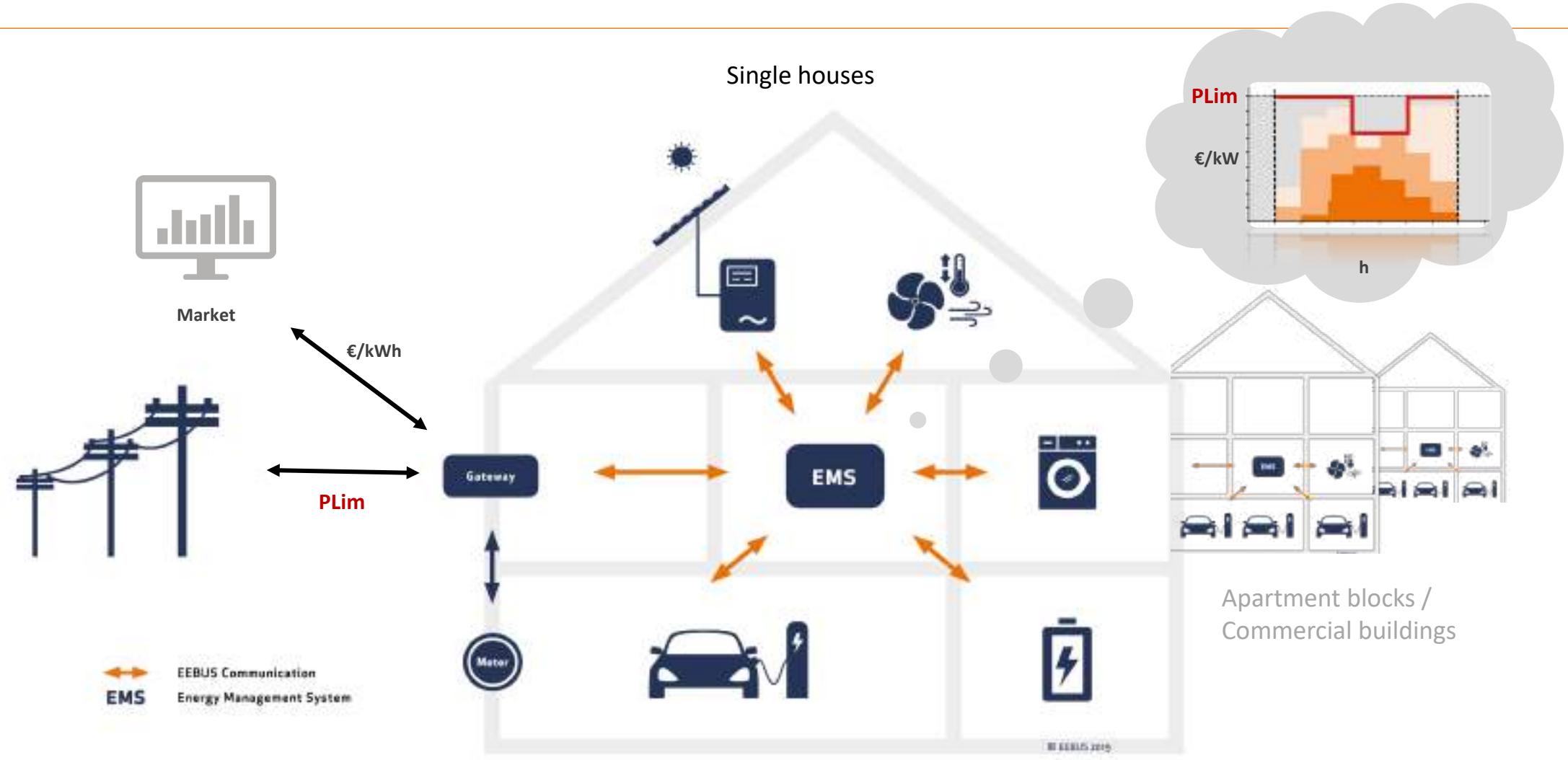
Standardise

Interfaces
for all
energy-relevant
accesses

EEBUS IN THE SMART GRID ARCHITECTURE MODEL



THE EEBUS ECOSYSTEM



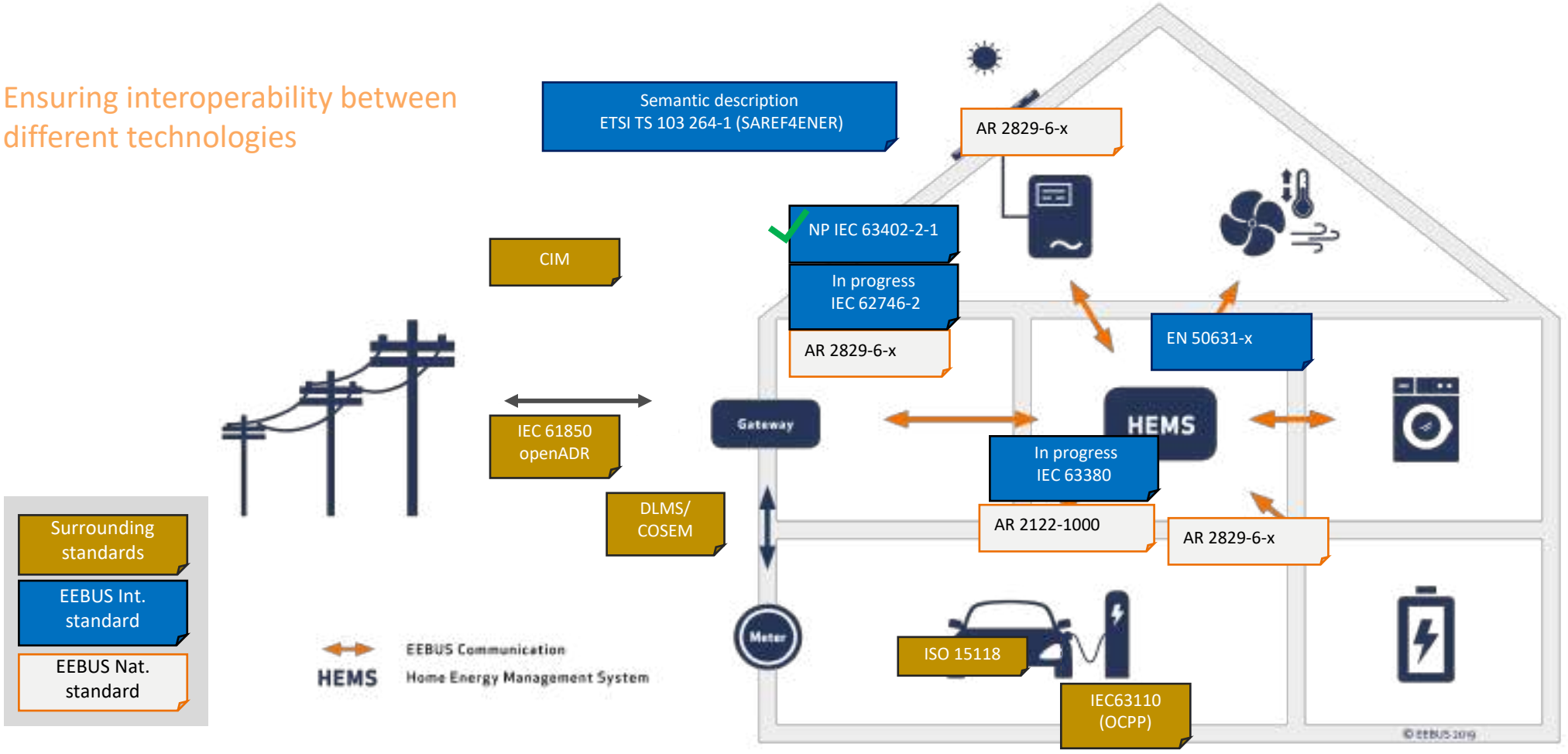
WHY STANDARDISATION?
BECAUSE OF DIVERGING INTERESTS IN DEVICE CONTROL

- More and more players want to influence the behaviour of the end customer (and controllable loads)
- Smooth operation of divergent accesses at the same Grid Connection Point (GCP)
  - **coordinated**, **prioritised** and **standardised** handling of the **various signals** inside the building is required
- EEBUS provides this standardised **interface** for the GCP to coordinate these signals

GCP = Grid Connection Point

EEBUS STANDARDISATION ACTIVITIES - OVERVIEW

Ensuring interoperability between different technologies

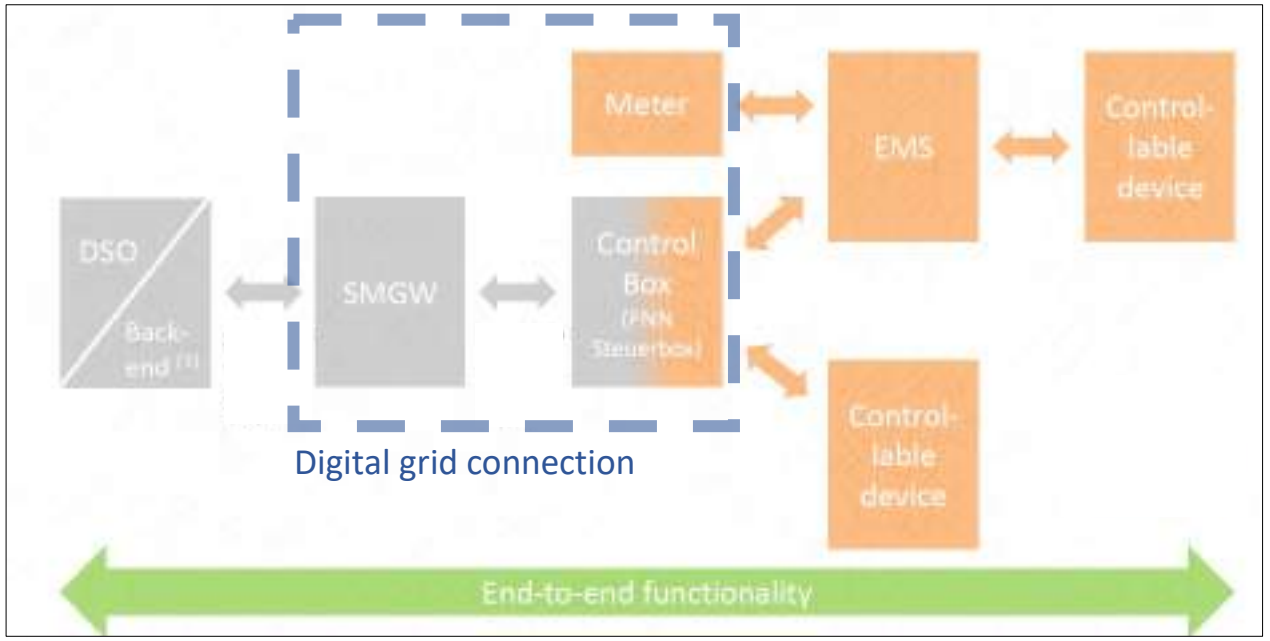


LIVING LAB: TESTING CONSISTENT INTEROPERABILITY OF THE ECO SYSTEM

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

aufgrund eines Beschlusses des Deutschen Bundestages



ENSURING INTEROPERABILITY: (PILOT-)QUALIFICATION

Successful Qualification – Device List

At the Living Lab Cologne, we operate a cross-manufacturer test infrastructure for intelligent metering systems (iMSys) and controllable energy-consumer devices (SteuVEs). Our infrastructure includes the following permanently installed iMSys and SteuVEs, which can be flexibly exchanged in test setups. Additional devices are available upon request.

GCPH		EMS	EMOB	HVAC		INV		DOMA
Gateway	Control Unit		Wallbox	Heating	Cooling	Solar	Battery	White Goods
PPC	Prolan	TQ Systems	MENNEKES	Vaillant				
Theben + Theben MWM		GridX	KOSTAL	Daikin				
	PPC CLS-Gateway							
	Consolinno		eSystems					

Testing in progress, more qualified devices to be added soon!

We look forward to welcoming you soon!

EEBus Initiative e.V.
Deutz-Mülheimer Str. 183, 51063 Cologne / GERMANY

www.eebus.org
www.livinglab.cologne

New API standards for behind the meter flexibility management

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Laurent Schmitt

Digital4Grids

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

IEC TC57 WG21
New API standard for behind the meter flexibility management

L. Schmitt
Convenor TC57 WG21

26 November 2024

TC57 WG21 Mission & Scope

- **Mission**

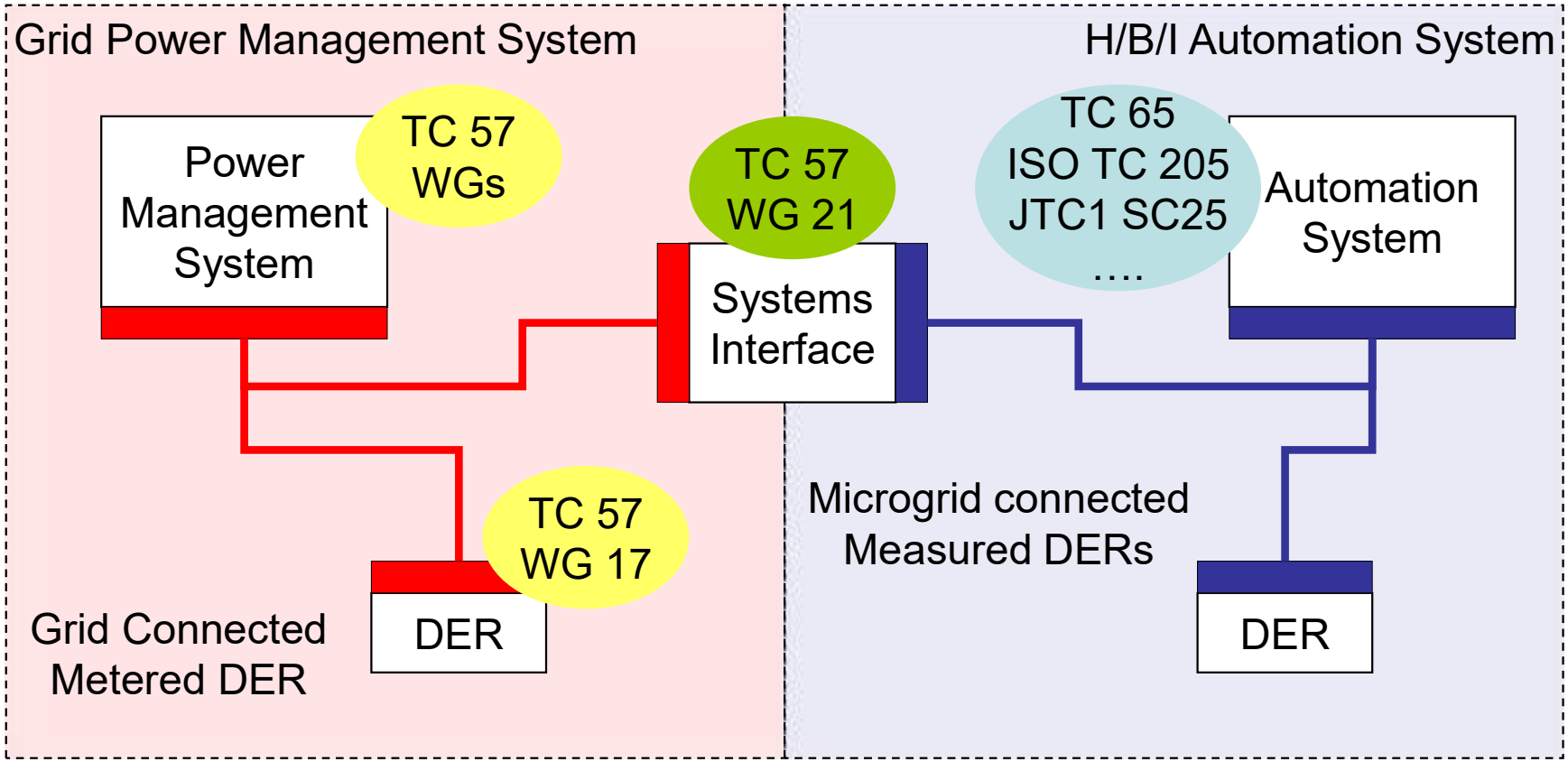
  Define interface between Smartgrid infrastructures and Residential, Commercial Building and Industrial energy management systems

- **Scope**

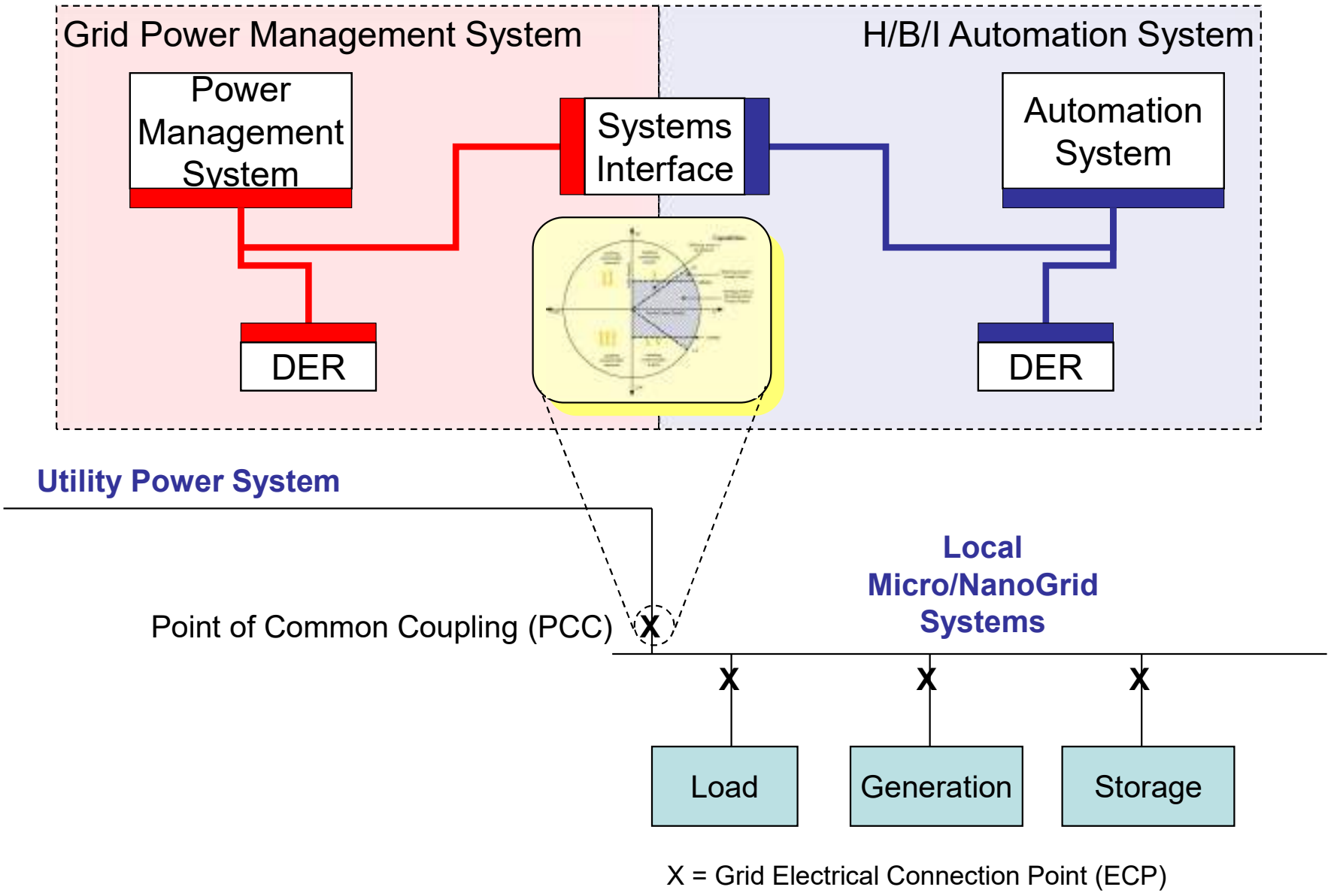
  Identification relevant use cases. The focus is on interaction between the Power System (TC 57 standards) and Behind the Meter Energy management layers
  Development of international standards, communication protocols and associated profiles covering :

  - **Aggregation of a large number of geographically distributed systems**
  - **Behind the meter domain specific protocols for industrial, home and building automation**
  - **State-of-the-art IP based wireless and wired communication**
  - **Enabling 'plug and play' installation, commissioning and maintenance aligned with Grid CIM reference ontologies**

Visualization of Scope



Point of Common Coupling



Domain Split for Systems Interface

Grid Technical Operations (After the Market Response)

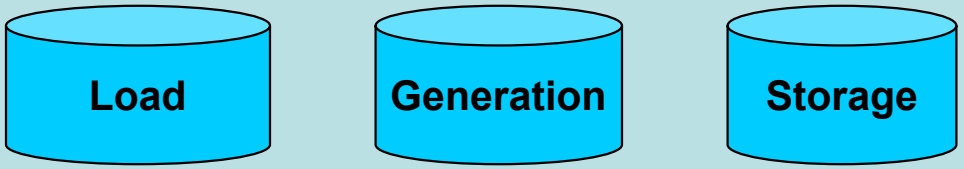
Grid Commercial Operations (DSF Flexibility Markets)

	Grid Control Rooms Redispatch/Emergency Response IEC 61968/61970 (CIM)	Demand side flexibility (Implicit and Explicit) IEC62325 (CIM)	Metering & Settlements IEC62968
Communication	Near Real-time Communication and Data Exchange Platforms		Rest Data Exchange
Data Model	 **Point of Common Coupling Model** Detailed DER connection models as per 61850-7-420 (aligned with IEEE2030-5)	**DER Resource Model** Detailed DER market resource models **IEC62746-4**	**COSEM** **IEC 62056**

WG17

WG21

Home/ Building / Industry Energy Management



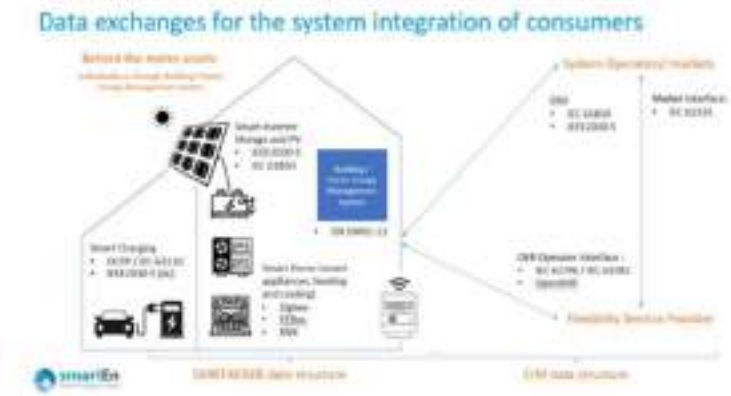
European flexibility usecase integrated through the new IEC62746-2 repository document

CONTENTS

New sets of usecases

Target European data exchange architecture

Landscape report on energy and flexibility data models and interoperability across the sectors of energy, mobility and buildings Source : European Commission, ***Mai 2023***



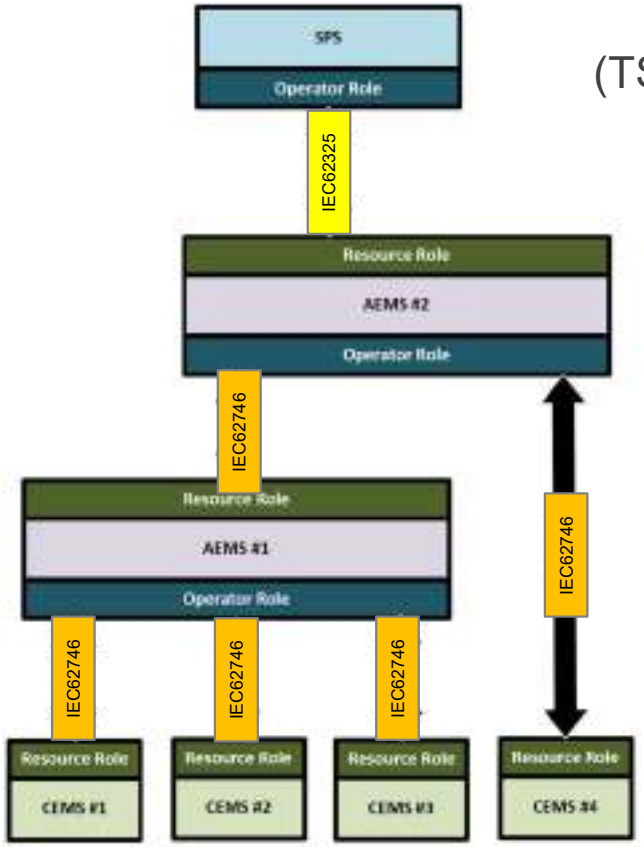
Assessment whitepaper on available standards and ontologies Source : SmartEn, ***June 2023***

SolarPower Europe positioning for Demand side flexibility data Source : SPE, ***February 2024***

New German V2X coalition paper / Interoperability architectures Source : German Coalition, ***October 2024***

Support across Flexibility Service & DER equipment providers

IEC62746 mapping to European Market roles



System Operators
(TSO or DSO depending on flexibility products)

Service Providers
Balancing Responsible Party (VPP) or
Balancing Service Provider (FSP)

Technical Aggregator
Control Unit Administrator and Operator
(example Cloud OEMs or Charging Point Operators)

Local Consumer Energy Manager when applicable
Local Home / Building Level DER Orchestrator

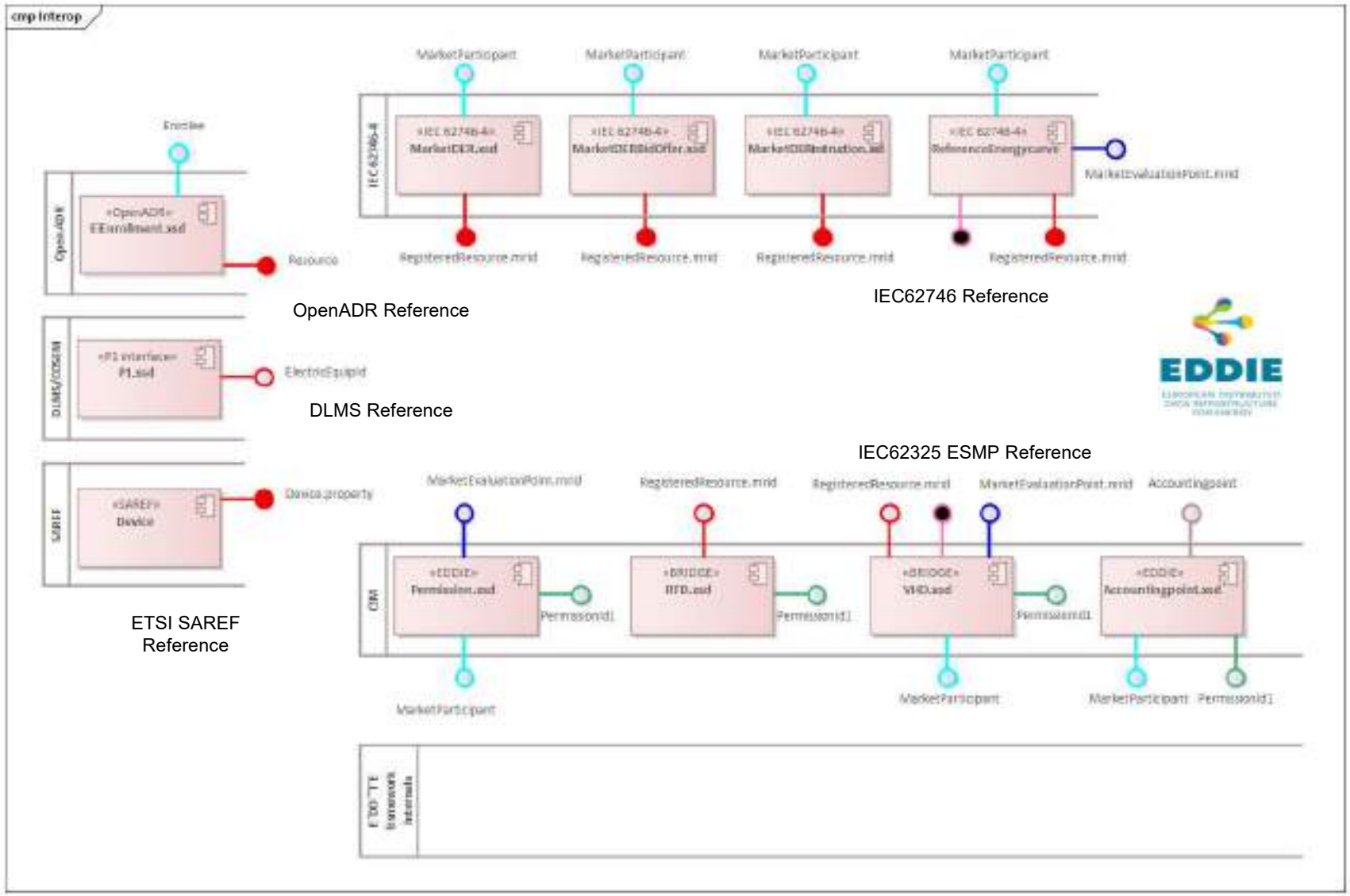
Technical Aggregator API
IEC62746 Message Profiles

1. Market DER registration message	1. Resource Location, Resource Capability & Product Qualification	
2. Energy Schedule message	2. DER schedule exchange (near real-time baseline, ex-post / ex-ante flexibility measurements)	
3. Bid/Offer message	3. DER Flex Offer (FSP or VPP)	*Explicit Flexibility*
4. Dispatch instruction message	4. DER Activation / Power envelop	
5. Commodity & Price message	5. Price Base transactive controls	*Implicit Flexibility*

Proposed next steps

- **High level Use case definition**
  - **TR 62746-2 Use Cases and Requirements**
  - **Incorporation of comments into Revision Ed. 2**
  - **Update of associated architecture diagrams if needed**
- **Architecture & Data modelling team**
  - **Modelling exercise on priorities usecases / definition of reference data exchange services**
  - **Integration into the next 62746-4 European Profiles**
  - **Generation of reference message profiles as per IEC methodologies (IEC62325-450 and IEC62361-100/104)**
- **Alignment with OpenADR3.0, IEC61850, OCPP2.1 and ETSI SAREF/ Matter 1.4 technology stacks**

Data dictionnary alignment work on-going



Target data architecture

dcbel

3 key dataspace developments required for mass produced DERs

Priority 1
Pan European Dataspace for DER market participation

IEC62325 data exchanges

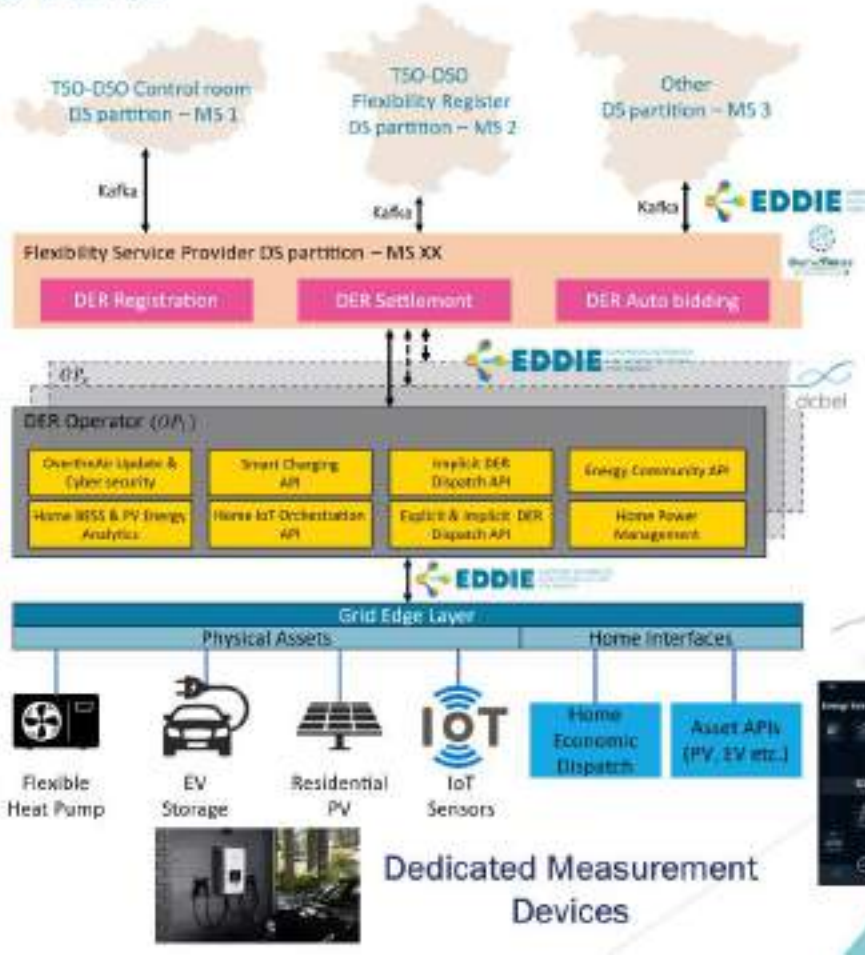
Priority 2
Pan European Dataspace for Flexibility Service Provider Interactions

IEC62746 data exchanges

Priority 3
Pan European Dataspace for mass produced DERs & CEMS interfaces

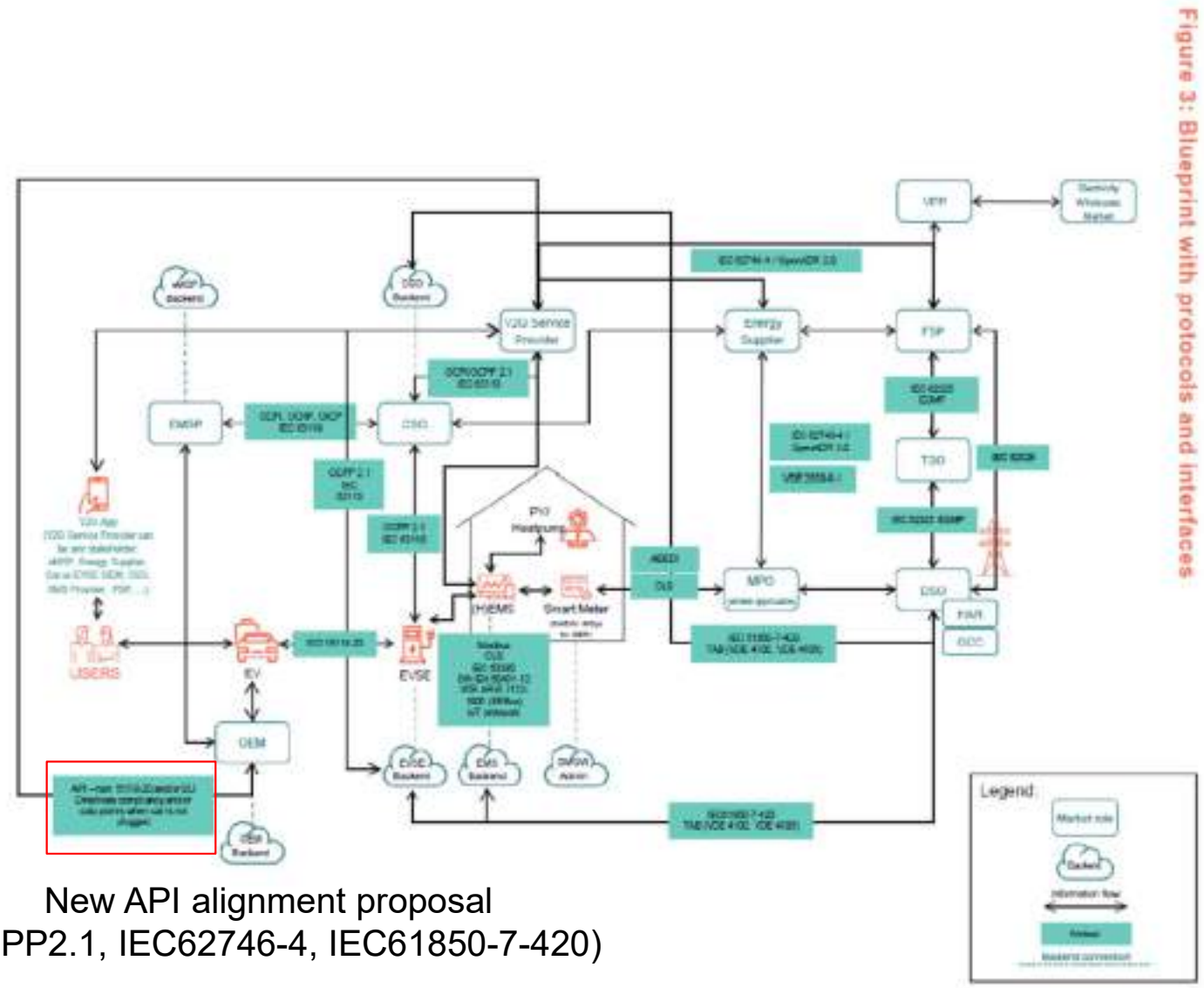
OEM specific data exchanges

(EEBus, KNX, Matter, OCPP, IEEE2030.5/IEC61850-7, MQTT)



End to end Consent Based Data exchange platforms

Alignment with V2X Usecase



New API alignment proposal
(OCPP2.1, IEC62746-4, IEC61850-7-420)

Panel : Scaling up standards from pilots to international actions

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

26/11/2024

Panel discussion

slido.com
#4259442

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Trust-IT Services

Aikaterini Poustourli
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CEN/CENELEC STAIR Expert

Dave Raggett
W3C

Laurent Schmitt
Digital4Grids

Panel: Scaling up standards from pilots to international actions

- What are the key drivers to bring the dialogue on international standardisation to the next level?
  e.g. policy actions like the combating climate change or competitiveness as highlighted in the Draghi report.
- What role do standards play in innovation policy? Do they drive innovation, or does innovation accelerate the adoption of emerging standards?
- How can European innovation projects, such as pilots, benefit from engaging in an international standardization dialogue?
- What strategies can support an international dialogue on the adoption of standards in key areas?
  e.g. EV charging, heat pumps, home/building energy management , etc.

Panel: Scaling up standards from pilots to international actions

- **Abstraction levels** → How can we **collaborate across SDOs** to achieve **consensus at a higher level**?
- "**Draghi report: Pan-european activities that last longer**" → **Clustering effect** to increase longevity of EU-Funded projects results.
- **Internationalisation of universities** → It is a good channel to bring new ideas to the policy making pipeline.
- Tech domains are interconnected → **EU-funded projects** should provide **simultaneous support** for multiple **policies**.
- It is important to **align with parallel regulatory developments**, particularly the data act and associated dataspaces.
- **Universities, Industry, SDOs and Government** should sit at the same table to foster innovation.
- How to **support an international dialogue** on the **adoption of standards** in key areas?
- **Standards are driven by industry**, Open Standardisation helps.
- **The Joint Undertaking with both the Chips JU & EuroHPC** are intertwined & good initiatives for PPP tool.
- **Interoperability and consensus** are a pillar for **interoperable international standards**.
- How do we link **international standards to test ideas**?
- How do we deal with the **green deal** (digital product password, repair market)?

Panel: Scaling up standards from pilots to international actions
Some first ideas for some first next steps……

- For 2025 - A Workshop with the US on the «High level abstraction model in energy and automotive».
- Provide preliminary standardisation guidance & support for the €40M EU «Cloud-Edge-IoT pilots» kick starting in January 2025
- …..

WHAT's NEXT?

Some comments for discussion

- Industry should drive **incremental standardisation** as market needs evolve
- This should be **transparent** rather than behind closed doors – W3C as an exemplar for how to do this
- **Procurement policies** as a tool to encourage wide uptake of standards
- Need for **pan-European drivers for early adoption**, perhaps as an evolution of PPPs, given the limitations of 3 year pilots
- International standards are needed to support the circular economy and **right to repair**
- Products need to be designed to enable repairs rather than being scrapped when anything goes wrong, given the prevalence of shoddy products designed to fail soon after their warranty expires
- Businesses need to be required to open up to third parties for parts and repairs
- The **information needed** should cover how to dismantle and repair products, the specs for the parts needed for the repairs, and for recycling
- We further needs standards to establishing that parts are **safe** and repairs are **competent**, e.g. the parts are genuine rather than grey-market copies, and that the businesses doing the repairs are trustworthy for what they do
- So a combination of **standards** for **ontologies** and **credentials**, along with the potential for life-long **digital footprints** for any work done (e.g. on your car)
- Needs for ensuring privacy and handling of confidential business information

Questions for the Panel

- What are the key drivers to bring the dialogue on international standardisation to the next level, e.g. policy actions like the combatting climate change or competitiveness as highlighted in the Draghi report?

  Don't forget about sustainability and the environment. Today's materials and products aren't sustainable, and we urgently need work on new materials better suited to recycling, e.g. replacements for current plastics. For a dramatic boost to competitiveness, we need to invest in enabling Sentient AI for much smarter human-machine collaborative work given limitations of Generative AI.

- What role of standards for an innovation policy? Do standards drive innovation or innovation accelerate adoption of emerging standards?

  Both in my experience with the growth of the Web, where standards evolved incrementally alongside technical innovations. This needs to be driven by industry. Research policies and investment can sow the

- How could European innovation projects, like pilots benefit from an international standardisation dialogue?

  Pilots can be used to validate proposed standards and provide valuable experience to strengthen such standards. However, short lived pilots are insufficient to drive wide uptake of new technologies and standards.

- How to support an international dialogue on the adoption of standards in key areas (like EV charging, heat pumps, home/building energy management , other)?

  International trade will benefit from shared standards, but this needs industrial champions to encourage others to the table. A regular series of workshops is a good way to support this, along with pilots to prove the benefits. We will be in a stronger position if early market adoption is driven with public/private partnerships and associated procurement policies.

The EU will need to devise policies to discourage or ban inappropriate uses of AI that fly in the face of European values. The AI Act is just a small step in that direction and a lot more will need to be done. In a bad scenario, most people are unemployed and on benefits, whilst the lucky few have highly paid jobs based upon their exploitation of AI. Order is maintained by a police state and the use of AI to detect and suppress any dissent. By contrast, in a good scenario, AI enables people to live enjoyable fulfilling lives that respect human values, e.g. a high level of social contact. This requires a redistributive tax system that encourages the use of AI to boost productivity and shares the benefits across the population.

Fireside chat: Lessons in scaling tech adoption from a Market leader

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

Fireside Chat

slido.com
#4259442

Tanya Suarez
BluSpecs

Thomas Hahn
Siemens

Closing remarks

Workshop on Cross-Domain Standardisation and Architecture for IoT and Edge-Computing

27th November 2024

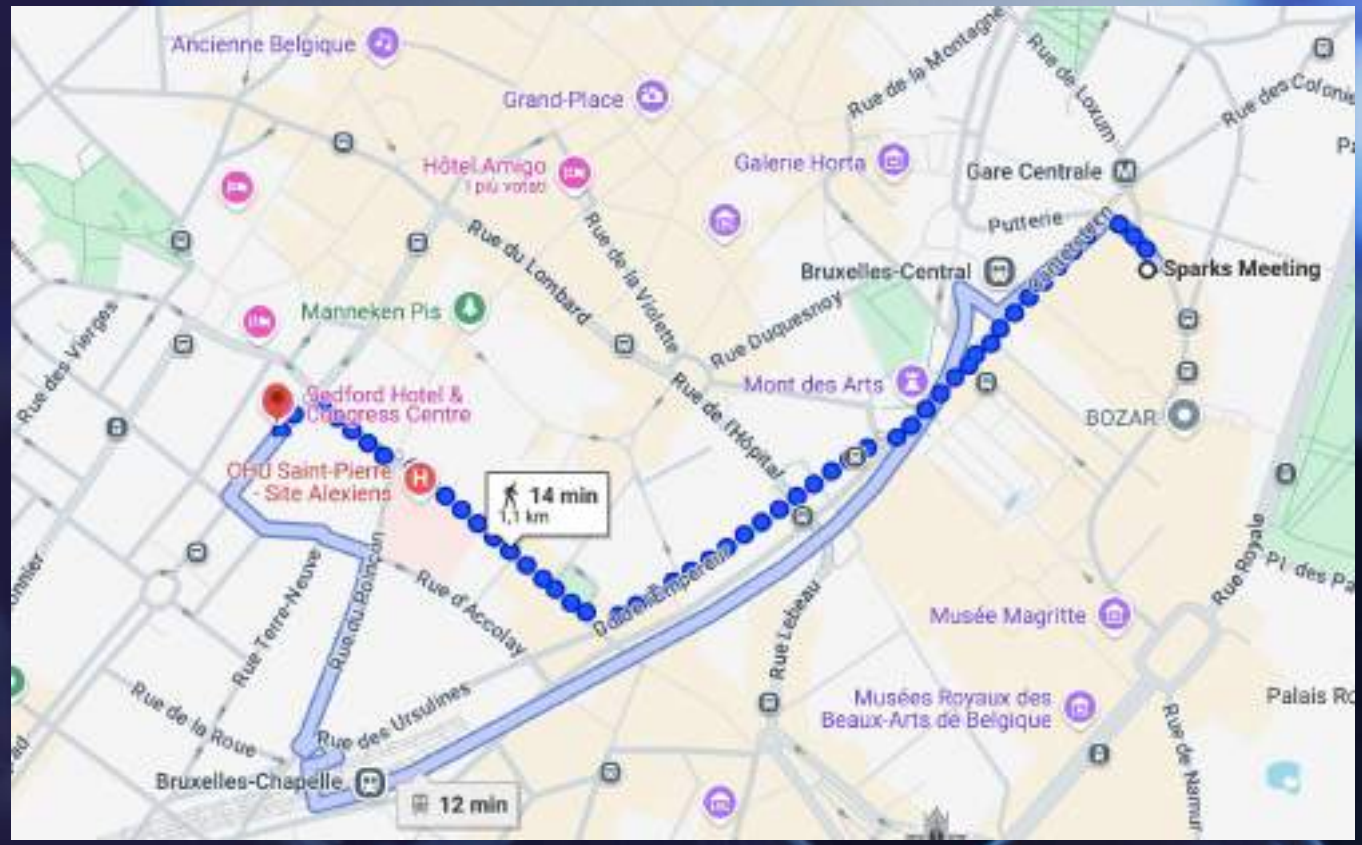
Venue

Centre Borchette, Rue Froissart
36, 1040 Etterbeek, Belgium.

NETWORKING DRINKS

18:30

The Eight Rooftop
Rooftop & cocktail bar
Rue du Midi 135
1000 Bruxelles



26/11/2024

Our consortium

Coordinator

BluSpecs

Fraunhofer

fortiss

Alliance for IoT and Edge Computing Innovation

Trialog

TU Delft

Trust-IT Services
communicating to markets

COMMpla

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