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# OMEGA X standardization workshop

## Learnings and recommendations for [Energy] Data Spaces

Online | April 4th 9:00 to 11:00

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WG 2 Data Spaces

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Silvia Castellvi
Omega X Standardisation leader

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# OMEGA X standardisation workshop

**Opening remarks:**

- **Arturo Medela**, OMEGA X Coordinator – (5 minutes)

**Part 1: Standard Development Organization (SDO) presentations**

- **Sebastian Steinbuss**, Chairman, CEN/CENELEC JTC 25
- **Martin Brynskov or Patrick Bezombes**, Chair, CEN/CENELEC JTC 25-WG2 on Data Spaces
- **Olivier Genest**, Member of the CEN/CENELEC/ETSI Coordination Group on Smart Grids
- **Antonio Kung**, Standardisation expert, AIOTI chair of standardization working group, and Enershare standardization Task Leader.
- **Javier Valiño**, Eclipse Dataspaces WG

**Part 2: Lessons learned and recommendations on Vertical and Horizontal Interoperability**

- **Silvia Castellvi**, Omega X standardization Task Leader
- **Fatma-Zohra Hannou**, Common Semantic Data Model for Energy
- **Erik Maqueda**, Interoperability Framework in energy data spaces

**Part 3: Discussion -** Open floor for questions, comments, and next steps (30 minutes)

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# Standardization Activities

Contributions to standards and data space initiatives

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*April 4th, 2025*

# Standardization workshop

## Objective

- **Explore together OMEGA X standards implementation, best practices, needs and recommendations to contribute to standardization bodies.**


# Worldcafe method

We propose a creative process for leading collaborative dialogue around standardisation, sharing knowledge and creating possibilities for action in three groups.

We organize three round tables of groups (10-15). One chair for each table.

Round table structure:

1. Round table 1. Data interoperability and privacy and preserving technologies
2. Round table 2. Energy domain: smart grids and use cases
3. Round table 3. Energy domain: communication and interoperability, metering and data exchange, general aspects.

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# Internal standardization workshop

## Summary

- We organized four online and 2 F2F workshops.
- 57 standards identified
- 19 recommendations collected – Review and enrich
- Report of the workshop recommendations

# Data interoperability and privacy and preserving technologies – Recommendations

1. **Knowledge acquisition methodology**: Establish a structured methodology for acquiring knowledge from products before delving into technical aspects.
2. **Managing data heterogeneity**: Address the challenge of heterogeneous datasets within the same database by implementing standardized data structures and ontologies.
3. **Standardized database solutions**: Adopt a common database software standard to ensure consistent data storage and retrieval.
4. **Standardized data exchange formats**: Define and promote standardized formats for data exchange, such as JSON and CSV, to enhance interoperability.

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# Data interoperability and privacy and preserving technologies – Recommendations

5. **Collaboration for semantic interoperability**: Work closely with the IDSA Vocabulary Hub to improve semantic interoperability across systems based on the experience of developing CSDM framework for the management of vocabulary hub in data spaces
6. **Unified semantic data modelling**: Develop a standardized semantic data modelling methodology that aligns with existing standards and well-known ontologies.
7. **AI-driven maintenance forecasting**: Leverage AI-based predictive maintenance techniques to optimize asset management and enhance operational efficiency.

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# Data spaces interoperability – Challenges and recommendations

1. **Connector to Connector communication interface –**

- Connectors with different Dataspace Protocol (DSP) versions are not interoperable.
  - This is the most important challenge to focus.

We recommend using compatible versions of the DSP and clearly publishing and communicating which versions are compatible.

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# Data spaces interoperability – Challenges and recommendations

**2. Identity Management –**

- Each dataspace defines its own Trust Anchor and may enforce custom Verifiable Credential (VC) schemas—with specific required attributes, formats, or credential types.
- This leads to:
  - Incompatibility between VCs and VPs when crossing dataspaces.
  - Failure in authentication and authorization flows, because an attribute required in one dataspace may not even exist in another.
  - A barrier to peer-to-peer interoperability, especially if each dataspace evolves independently without common standards.

We recommend adopting a shared cross-data space credential profile to be decided and agreed upon among all interconnected data spaces (e.g., use OID4VC)

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# Data spaces interoperability – Challenges and recommendations

**3. Connector management API –**

Challenge: Lack of standardized connector metadata access

- In environments like Omega-X, where multiple connector implementations (flavors) and versions coexist, managing them via a unified interface is difficult because:
  - Each connector may expose a different set of management endpoints or schemas.
  - The EDC Management API does not expose metadata like:
    - connectorType (e.g., Sovity, Truzzt, Eclipse EDC, etc.)
    - connectorVersion (e.g., 0.2.1, 0.6.4), supported Features (contract negotiation, policy management, etc.)
- This makes it hard to:
  - Debug compatibility issues
  - Ensure lifecycle consistency
  - Provide support for users with different setups

Recommendation: Define a connector metadata endpoint specification to improve management, standardization, and UX: use the IDS information model as a base and extend it..

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# Energy domain: smart grids and use cases

**Recommendations:**

1. **Data model standards for smart meters** – Establish uniform data models (e.g., IEC 61968-9, IEC 62056) for interoperability and seamless integration.
2. **Standardizing smart meter parameters** – Define a common set of measurable parameters (voltage, frequency, consumption) for global harmonization.
3. **Service provisioning** – Enable automated service provisioning, dynamic tariffing, and real-time billing using blockchain-based smart contracts.
4. **Service virtualization** – Implement digital twins, cloud-based energy management, and AI-driven predictive maintenance for grid optimization.
5. **Service quality evaluation** – Define KPIs, real-time monitoring, and power quality standards (IEC 61000-4-30) for reliability assessment.
6. **Endpoints lifecycle** – Standardize onboarding, updates, and decommissioning of grid devices while ensuring cybersecurity compliance (IEC 62443).
7. **Sharing best practices (IEC 62559)** – Use IEC 62559 to document and update best practices for emerging technologies in smart grids.

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# Energy domain: communication and interoperability, metering and data exchange, general aspects – Needs and gaps

1. **Standardized forecasting for energy systems** → Need for a standardized approach to forecasting in energy systems.
2. **ILT - Blockchain & Generative AI** → Ensuring trust in AI-generated outputs and blockchain applications.
3. **Gap in OCPI* reservation functionalities**
   - Interoperability → Lack of standardized interoperability mechanisms for EVSE optimal planned reservations.
   - Reproducibility → No clear framework for planned reservations reproducibility.
4. **OCPP* de facto standard** → Need to reinforce or formalize it further.
5. **Lack of common semantic binding** → No common methodology today to handle user agent (UA) variability.
6. **Common standard for data exchange** → Need for common formats (e.g., JSON, CSV) for seamless data interoperability.

* *OPCI: Open charge point Interface / OPCP: Open charg point protocol*

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# Energy domain: communication and interoperability, metering and data exchange, general aspects – Recommendations

1. **Standardize forecasting methods** → Investigate whether an **ISO standard** can be defined.
2. **Develop reservation mechanisms in OCPI** → Improve **interoperability** and **reproducibility** frameworks.
3. **Ensure semantic interoperability** → Collaborate with **standardization bodies** to create a unified methodology.
4. **Strengthen OCPP as an industry standard** → Recognize and reinforce it within regulatory frameworks.

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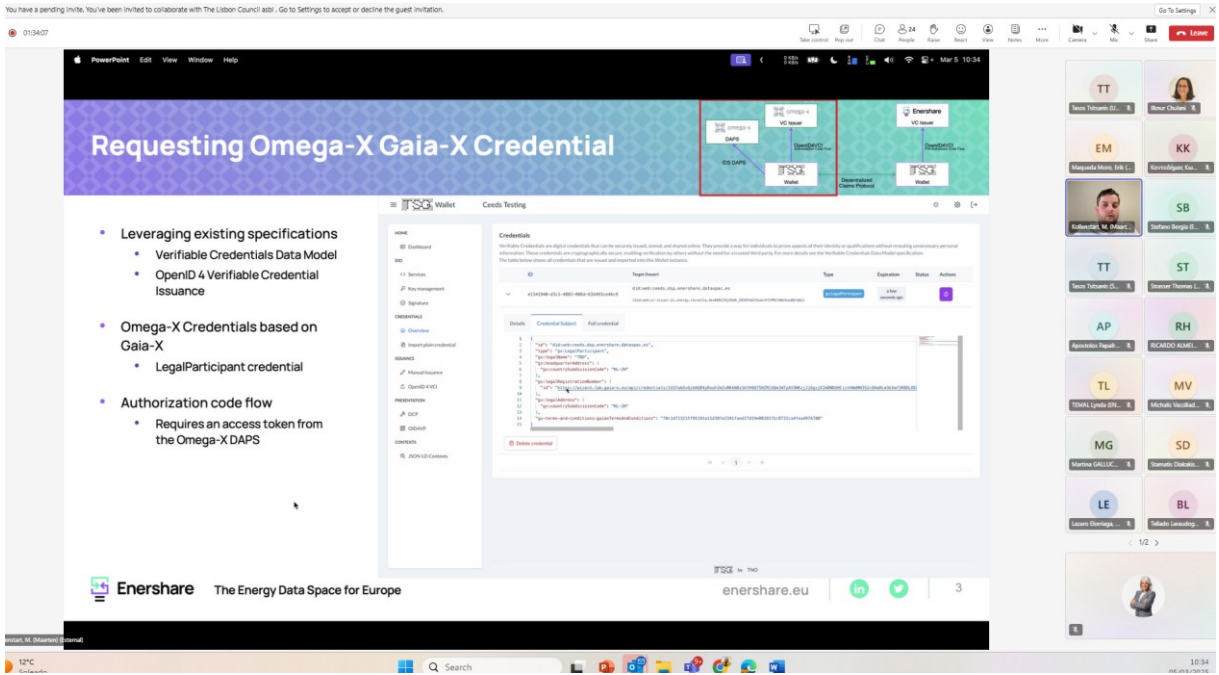
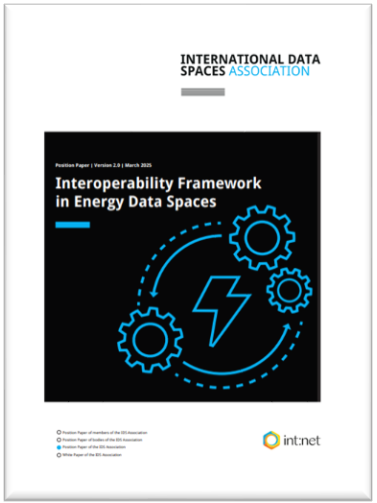
# EDSCP - Semantic Interoperability UC - Live Demo Bilbao – March 5th , 2025

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# Key findings & challenges in energy standardization

**Energy Data spaces interoperability framework workshop**

1. Difficulties in achieving interoperability across different components.
2. Need for standardized onboarding and credential verification.
3. Challenges in aligning different projects and architectures.
4. Metadata synchronization issues in data spaces.
5. Differences in contract negotiation across platforms.
6. Lack of a unified semantic data binding methodology.

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# Recommendations

**Energy Data spaces interoperability framework workshop**

1. Adopt standardized credentials such as OPEN ID and eIDAS for authentication.
2. Ensure compatibility between data space connectors (Omega X, Enershare, etc.).
3. Encourage common data formats (JSON, CSV) for interoperability.
4. Develop a standardized methodology for metadata exchange.
5. Promote cross-domain collaboration and alignment with European digital identity frameworks.
6. Continue testing interoperability scenarios with real use cases.

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# Thank you

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