EUBIM TASKGROUP

WORKSHOP X

DATA INTEROPERABILITY IN THE BUILT ENVIRONMENT

Bern, 3-4 July 2025

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WHY?
EUBTG members came together to answer the questions of “How can interoperability be achieved in the built environment?” and “how can public authorities, standardization bodies and the industry contribute to its success?”.

WHAT?
Share practical experiences and national initiatives on developing data catalogs, dictionaries, and using linked data standards to enhance interoperability in the built environment.

GOAL
Foster discussions with policymakers, public authorities and standardization bodies on promoting data interoperability nationally.

WHO?
The workshop participants were representatives from 10 countries: Denmark, Sweden, Czech Republic, Germany, Greece, Italy, Latvia, Norway, Austria and Switzerland.

THE OUTPUT IS INTENDED FOR THE ACHIEVEMENT OF COMMON GOALS

- A free market
- A transparent and non-discriminatory competitive environment
- Efficient spending of public money
- Support for digitalization
- Commitment to the Green Deal through targeted efforts to reduce our environmental impact

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FINDINGS

1

Interoperability from a Standardization Point of View

Standardization creates the common semantic and syntactic framework (e.g., ISO 12006-3, ISO 23386/7, ISO 81346, ISO 704, future DPP standards, etc.) that allows different systems along the built assets life cycle to share and understand data consistently. Already in use data dictionary concepts (such as bSDD), or national pilot initiatives such as the Czech National Dictionary as a governance model, provide solutions on how to ensure data interoperability across all relevant stakeholders including manufacturers, regulators, asset owners, and actors throughout the construction and operation supply chain.

2

Interoperability from a Regulatory Point of View

Regulations like the revised Construction Product Regulation (CPR) and the Ecodesign for Sustainable Products Regulation (ESPR) mandate machine-readable data delivery, such as the declaration of performance and conformity (DoPC) and the Digital Product Passport (DPP). These legal frameworks ensure that in the future regulatory-required information (such as technical specification and LCA data) can be required, checked, and exchanged digitally.

3

Interoperability within the National Context

Interoperability initiatives, such as the one led by the Czech Standards Agency, provide a compelling example of how national bodies can systematically operationalize ISO and EU-level standards into a structured, interoperable ecosystem. Their approach includes using ISO 12006-3 as a backbone, layering in national norms, and aligning with bSDD and product data templates. This demonstrates how countries can build governable and reusable data dictionaries. It shows that national-level harmonization is both feasible and necessary to enable processes such as digital permitting.

4

Interoperability within the Organizational Context

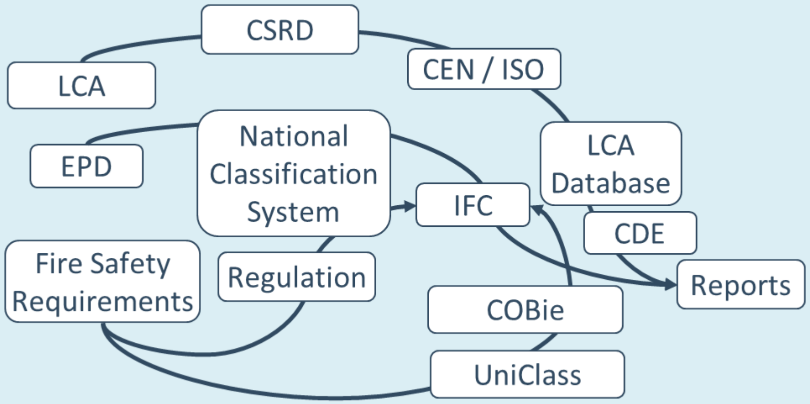
Large Asset owners such as the Swiss Federal Railways must navigate multiple semantic layers, from high-level conceptual models to domain-specific standards and down to implementable BIM object catalogues. Interoperability within the organization depends on structuring these layers to be interconnected, enabling different departments to work with tailored but consistent information artefacts. Importantly, the entire approach is tool-independent, which is essential given the diversity of systems involved from ERP and FM tools to BIM authoring software.

WORKSHOP Sessions 1-4
Goal: Clarify the concept of interoperability in the built environment to identify responsibilities and pinpoint areas of friction

SESSION 1: INTEROPERABILITY MAP

→ *What are the components of interoperability?*

To better understand how interoperability challenges arise in the built environment, participants mapped the key components of their own understanding of interoperability. This revealed fragmented responsibilities and highlighted the need for clearer coordination between regulators, standards bodies, and industry actors.



→ **The example** shows how diverse standards, regulations, and data formats interact across layers of the information ecosystem. It highlights the need to align classification, regulatory intent, and digital delivery to enable true interoperability.

SESSION 2: INFORMATION FLOW

→ *How does information flow between those components today and what should change?*

To better understand how an interoperable information flow between the identified components might look, participants compared current "as-is" data flows with idealized "to-be" scenarios. This helped identify key gaps and highlighted the importance of shared semantics and structured governance models to support effective information exchange.

As-Is | To-Be

	Information Provider	Information	File Format	Information Channel	Use Case	Application	Information Requester	Delivery Objects
As-Is	LCA Specialist	environ-mental Information	- XML - DWG - PDF	-Ökobaudat -EPD Library	Life Cycle Analysis	-E-LCA -One Click LCA	Client	LCA-Report (Excel)
To-Be	LCA Specialist	environ-mental Information	Database IFC plugin	API	Life Cycle Analysis	BIM Authoring tool	Client	LCA-Report (PDF)

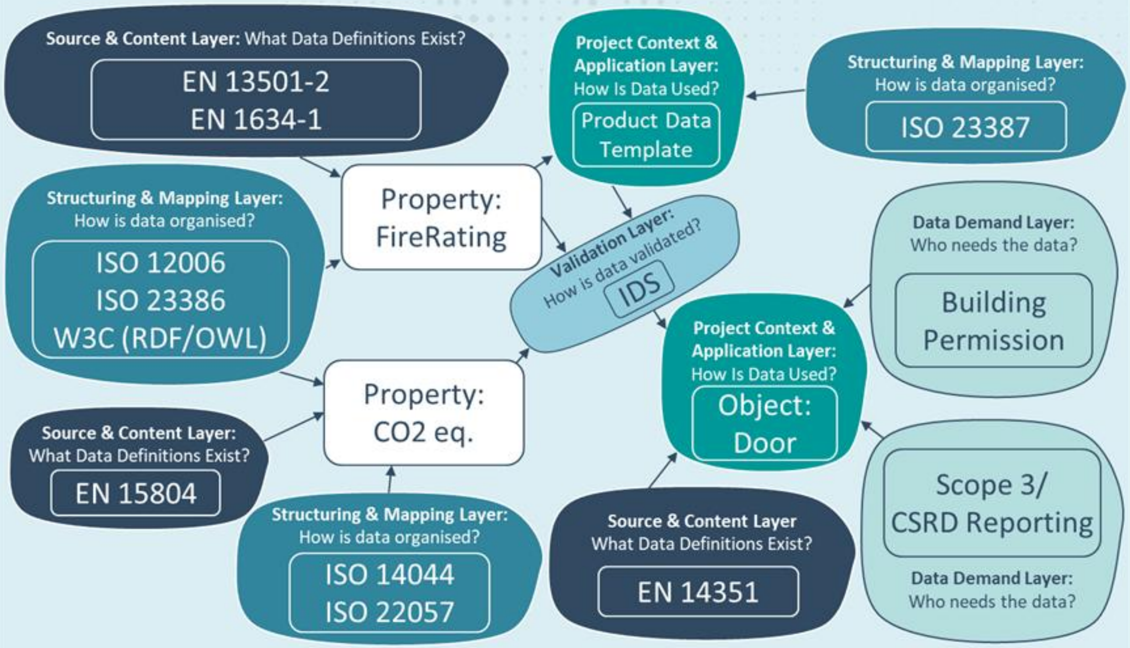
→ **The gap** lies in the inconsistent file formats and lack of integration between environmental data sources and BIM tools, making LCA validation dependent on manual input and disconnected systems.

	Information Provider	Information	File Format	Information Channel	Use Case	Application	Information Requester	Delivery Objects
As-Is	Specialist	technical information	PDFs (unstructured data)	E-mail Document Transfer	Compliance / Approval checks	- Excel - Word	Client	Compliant Project
To-Be	-Norms Server -Specialist	technical information	xml, xlsx	API	Compliance / Approval checks	- Apache Jena - Web browser	Client	Compliant Project

→ **The gap** is caused by unstructured technical documents and disconnected compliance systems, which prevent automated validation and hinder reliable delivery of compliant project data.

SESSION 3: INTEROPERABILITY FRAMEWORK

→ *What framework would enable interoperability along the information flow?*



Example of how 2 properties are connected across the five interoperability layers:

Data Demand Layer: Properties like *Fire Rating* and *CO_2 eq.* can stem from distinct needs, such as building permits or sustainability reporting.

Source & Content Layer: Standards (e.g. *EN 13501-2*, *EN 15804*) define how these properties are measured and expressed.

Structuring & Mapping Layer: Schemas like *ISO 12006*, *ISO 23386*, or *RDF/OWL* organize properties for machine-readable use.

Project & Application Layer: The *Product Data Template* links the door object with relevant properties in BIM and project tools.

Validation Layer: This layer ensures that the properties assigned to an object (i.e. Door) comply with defined requirements

SESSION 4: CALL TO ACTION

→ *What can EUBTG Members do to support interoperability?*

Pocket Guide

1. Review the standards, classifications, and data structures currently in use across your organization or sector. Identify where silos exist and where different systems are solving the same problem differently.

2. Pick a real use case (e.g. permitting, co2 reporting) and trace the information flow through each of the following layers:

➢ **Data Demand**: Who requests the information, and for what purpose?

➢ **Source & Content**: What standards or documents define the required information?

➢ **Structuring & Mapping**: How is information organized (e.g. in templates, schemas)?

➢ **Project Application**: How is this information captured, exchanged, and applied in tools or models?

➢ **Validation**: How and by whom is the data checked, and is it machine-readable?

3. For each layer ask yourself:

➢ Where do definitions or formats diverge?

➢ Who owns or controls this information?

➢ How can this layer align better — and how can we contribute?

4. Focus on low-effort, high-value actions that can be implemented quickly such as clarifying terminology, aligning data definitions for commonly used objects, or testing shared data structures in a controlled context.

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CONCLUSION

1

The standards and technical capabilities do already exist; however, interoperability fails with missing governance. While governance is addressed in the context of BIM by the ISO 19650 series, it needs clarification when dealing with information interoperability in a broader context. Defining a governance model is therefore the very first step to take, to unlock interoperability at organizational, national or international level.

2

While digitizing internal processes and adopting openBIM workflows can yield quick wins, true interoperability requires a deeper understanding of external dependencies. From authoring and distributing information to its downstream use, data must remain semantically and ontologically consistent across all phases to be machine-readable and enable automation.

3

In today's fragmented digital ecosystem of proprietary formats and evolving systems, it's no longer feasible to build dedicated APIs for every new tool. Instead, we must design flexible, extensible data models grounded in shared semantics, not rigid schemas. Approaches inspired by graph structures and triplet-based logic, offer a scalable way to reduce integration complexity while adapting to evolving use cases.

4

As good practice, when tackling interoperability issues, we should start looking at the affected use case through several layers and ask the following questions:

- **Data Demand Layer** – Who needs what, and why?
- **Source & Content Layer**– What data definitions exist?
- **Structuring & Mapping Layer** – How is data organized?
- **Project Context & Application Layer** – How is data used?
- **Validation Layer** – How is data validated?

By applying this layered lens, we can pinpoint where data flow breaks down and define the corrective actions, standards, or coordination mechanisms needed to enable interoperability