

# Event Report: “OpenTwin International Ideathon 2026”

**Date:** June, 11 2026 / **Time:** 10.00 - 15.00 CEST, Online

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**Welcome and Opening Remarks by Christian Schlosser, Ph.D.** Head of Unit, Digital Transformation of the Infrastructure Sector, Federal Ministry of Transport, Germany (BMV)

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*Christian Schlosser, Ph.D.*, opened the Ideathon and welcomed the participants. He highlighted the growing importance of Digital Twins as a key component of digital infrastructure management, supporting more efficient planning, operation, maintenance, and monitoring of infrastructure assets throughout their lifecycle.

Schlosser emphasised the role of BIM, data integration, and real-time information in improving decision-making and infrastructure management, and pointed to BMV’s long-standing commitment to research, innovation, and implementation in this field. He also noted that the openTwin project builds on previous work on Digital Twins in infrastructure, construction, and cities by extending the perspective to the European level.

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**INTRODUCTION: Digital Twins in Infrastructure, Mobility and Cities, OpenTwin Project, Marie Blüml & Jonathan Fuchs** (Think Tank iRights.Lab)

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*Marie Blüml and Jonathan Fuchs*, researchers in the openTwin project at iRights.Lab, kicked off the Ideathon with a presentation of the project’s key findings, which examined the European dimension of Digital Twins in infrastructure, mobility, and cities, building on the predecessor projects on Digital Twin applications in Germany (see further links).

Within OpenTwin, the researchers analysed how Digital Twins can support cross-border and cross-sector cooperation, especially where physical systems such as transport, energy, and urban infrastructures extend beyond national, organisational, and sectoral boundaries.

A working definition of “Transnational Digital Twins” (TDTs) as emerging concept was developed as a basis for the analysis. TDTs can be defined as decentralised, cross-border digital representations that span national, legal, sectoral, and organisational boundaries while data remains within its original context. The full definition can be found in the research report.

The presentation showed that the main added value of Digital Twins across borders lies in reducing duplicated work, enabling reusable technical components and data models, and supporting shared planning, simulation, monitoring, and decision-making across Europe.

At the same time, the research indicates that the main barriers are currently less technical than organisational, institutional, and regulatory. Central requirements are mature cooperation and governance models, interoperable data and technical infrastructures, especially semantic interoperability, and stable long-term funding.

The empirical analysis identified 77 relevant Digital Twin projects and related initiatives across five application areas: mobility, environmental and climate research, cities and urban governance,

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energy and crisis prevention, and border regions as important testing fields. The findings suggest that mobility is currently one of the most mature application domains, while cities and border regions increasingly provide reusable blueprints and infrastructural foundations that can support the development of future Transnational Digital Twins.

Further, data spaces and federated architectures were presented as promising enabling infrastructures for cross-border Digital Twin applications because they can enable secure, sovereign, and interoperable data exchange across countries and sectors.

The concept of Transnational Digital Twins can support a European vision of compatible local, national, and sectoral systems connected through shared standards, interfaces, and governance. Integrating this European perspective from the outset can therefore improve interoperability, scalability, and future cross-border and cross-sector integration, while reducing fragmentation, enabling reuse, and preserving decentralised responsibilities and data sovereignty.

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**KEYNOTE “Advancing National Digital Twins in the UK – Insights from the National Digital Twin Programme”, Alexandra Luck Programme Director** (National DT Programme UK)

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In her keynote, Alexandra Luck, provided insights into the programme’s current work, technical development, and practical applications. She emphasised that the purpose of Digital Twins is to provide the right information to the right people at the right time, in a form adapted to different user needs.

She argued that organisations should not wait for data to become perfect, but improve how they work with the information already available, including data held in legacy systems.

She presented the programme’s open-source Integration Architecture, which connects existing data sources, transforms and maps data to shared ontologies, applies security labels, and supports cataloguing, auditing, and controlled sharing.

The architecture is designed as a federated, layered network of connected nodes rather than a central data lake, allowing organisations to retain control of their information while enabling exchange across organisational and sectoral boundaries. Because roles differ between organisations and conventional data-sharing agreements are often difficult to define and enforce, permissioning is implemented through machine-readable and enforceable policies.

Attribute-based access control can use characteristics such as security clearance or completed training, while handling and usage constraints remain attached to the data when it is shared. The keynote illustrated the approach through the demonstrators IRIS, VISTA, and NOVA, which address housing and energy efficiency, infrastructure resilience and emergency response, and the planning of new energy assets.

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**FOCUS TOPICS: Three Interactive Workshop Sessions in Two Rounds**

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**Workshop 1: Interoperability, Data and Technical Infrastructure** (Moderation: Marie Blüml, iRL)

This workshop examined how interoperable data and technical infrastructures can support scalable and transnational Digital Twins, with a focus on semantic interoperability, shared standards, federated systems, and reusable components. The workshops started with expert inputs from the FP 1 MOTIONAL project:

**Waseem Ul Aslam Peer**, Lead Data Platform & Architecture at Deutsche Bahn InfraGO AG, presented how Digital Asset Engineering in the MOTIONAL project supports the broader goal of a *Single European Railway Area (SERA)* by aligning data, engineering rules, and digital infrastructure across infrastructure managers, suppliers, and borders.

It was presented as a basis for better design through shared engineering rules, safer and more efficient cross-border operation, and improved maintenance through trusted, machine-readable data.

The practical insight showed that today's railway data landscape is still shaped by country-specific data models, national engineering rules, supplier-specific tools and formats, and manual data exchange. Waseem highlighted the ERA Extended Ontology as a shared semantic base model and decisive enabling factor for rail infrastructure. In MOTIONAL, this ontology helps to provide a shared vocabulary to represent railway concepts consistently, enable cross-system data exchange, and preserve meaning across tools and infrastructure managers.

**Andreas Heckmann, Ph.D.**, from the German Aerospace Center (DLR), presented the Digital Twin work in FP 1 MOTIONAL with a focus on the modularisation of Digital Twin components. He described Digital Twins not as monolithic, but as assemblies of modular, interoperable, and exchangeable components. The aim is to reduce duplication, support scalability, enable cross-domain collaboration.

The presentation illustrated this modular approach through the Functional Mock-up Interface, an open standard for exchanging dynamic simulation models. It supports model reuse, reduces vendor lock-in, protects intellectual property, and allows models to run in different technical environments.

#### **Key points of subsequent discussion among participants included:**

- **Use cases determine the relevant data models and interoperability requirements.** The discussion showed that a shared understanding of use cases is necessary before data exchange can be meaningfully organised. Different use cases may require different extensions of existing data models. In MOTIONAL, the ERA Extended Ontology was described as a use-case-driven extension, by e.g. adding elements needed for planning.
- **Semantic interoperability remains a central challenge across countries and infrastructure domains.** Participants discussed that railway-specific ontologies are an important step, but transnational infrastructure projects often involve more than rail, for example bridges or CAD-based infrastructure data. Different concepts, such as the German "Teilbauwerk", cannot always be represented in existing tools or models. The proposed

approach was to develop use-case-specific ontologies and connect them to higher-level domain ontologies where possible.

- **Rail benefits from European reference structures such as the ERA ontology, but national infrastructure descriptions still differ substantially.** The discussion showed that the ERA ontology can provide a shared reference for rail data, especially where European interoperability requirements apply. At the same time, practical data formats and infrastructure descriptions still vary between infrastructure managers and countries, which makes semantic alignment necessary before data can be used reliably in cross-border Digital Twin applications.
- **Transferability is possible at the methodological level, but not always at the implementation level.** The presented use case was described as domain-specific. However, the modular and ontology-based approach can be transferred to other infrastructure sectors. The discussion also noted that some methods used in rail were themselves adapted from the automotive domain, which shows that cross-domain learning is possible.

## **Workshop 2: Organisation, Governance and Scalability** (Moderation: Michael Puntschuh, iRL)

The workshop discussed how governance, coordination, and clear responsibilities can support collaboration and scaling in complex multi-actor and cross-border Digital Twin initiatives. The workshop included two expert inputs:

First, **Niccolò Fattirolli**, COO from olivoENERGY, presented the [BEGONIA](#) project and the concept of Operational Digital Platforms (ODP), which can be understood as digital infrastructures that connect physical assets, data spaces, cloud and edge systems, and sector platforms to support coordinated operation and decision-making.

Showing use cases from the intersection of the energy and transport sectors, he highlighted regulatory and legal differences across countries and sectors, interoperability gaps, and complex governance considerations especially in critical infrastructure contexts. Governance was described as dependent on the specific use case and may range from centralised to distributed or federated models.

A central lesson was that platforms should be designed for integration rather than ownership and should remain adaptable as technologies, actors, and requirements evolve.

**Jonas Merbeth**, project lead at the Daten-Kompetenzzentrum Städte und Regionen (DKSR), presented the [Twin4Resilience](#) project that supports public authorities in using Local Digital Twins for climate resilience and sustainable urban development.

The project develops reusable governance models, actor personas, maturity models, and design guidance that can be applied across different local contexts. Scalability is supported through knowledge transfer and capacity building, including a starter kit, and an AI-supported learning system that guides interested stakeholders through micro-learning units and training materials.

The presentation showed that scaling Local Digital Twins depends not only on technical

replication, but also on reusable governance knowledge, practical guidance, and accessible training for municipalities.

**Key points of subsequent discussion among participants included:**

- **Governance and technical integration are closely connected.** Challenges include interoperability across systems and sectors, the integration of physical and virtual resources, and the governance of critical infrastructures. Governance structures should therefore be considered from the beginning and remain adaptable.
- **Use cases should guide governance and technical design.** Local and regional authorities need frameworks that help them develop Digital Twins around concrete needs while drawing on existing approaches for e.g. governance, ethics, standards.
- **Clear coordination and responsibilities support implementation and counter asymmetries.** Challenges arise when leadership, implementation, and decision-making are distributed across different departments and stakeholders: Dominant stakeholders might prevent other organisations from participating and less experienced stakeholders can face barriers when contributing to a Digital Twin project. Project management structures and suitable coordination formats can help align these actors.
- **Trust, data sovereignty, and stakeholder ownership are important enabling factors.** Data providers should retain control over their datasets, while clear roles, shared objectives, and trust between stakeholders support collaboration.
- **Scaling requires evidence of added value.** Pilot reports, structured implementation guidance, and transparent governance can support replication and provide evidence for impact.
- **Skills and capacity building remain critical enablers.** Limited understanding of Local Digital Twins can slow adoption, while knowledge-sharing and learning formats can support scaling.

**Workshop 3: Mobility Data Spaces and Standards** (Moderation: Jonathan Fuchs, iRL)

This third workshop focused on how mobility data spaces can make data more findable, accessible, interoperable, and reusable to support scalable and cross-border Digital Twin applications. Two expert inputs opened the workshops:

**Sophie Meszaros** from Open & Agile Smart Cities & Communities presented the European Data Space for Smart Communities as a cross-sectoral and cross-border federated ecosystem that connects cities, sectors, data, and services across Europe.

She described federation as a way to connect data, services, and access mechanisms without centralising all data in one system. Federated catalogues can make data and services discoverable across cities and countries, while access management helps define who may use which data or service under which conditions. Service reuse across cities was presented as an important

condition for more scalable digital infrastructures.

At the same time, the presentation showed that implementation remains challenging, especially because the data space connector landscape is fragmented and not yet fully interoperable. Sophie Meszaros also pointed to the lack of data standardisation and the difficulty of achieving semantic interoperability across sectors, while interoperability within individual sectors is often less challenging.

**Philippe Calvez, Ph.D.** from acatech presented deployEMDS that aims to make mobility data easier to discover, access, share, and reuse in a trusted environment. He emphasised that mobility Digital Twins depend on live and trustworthy data from many actors, but that this data is often fragmented across operators, cities, platforms, and national borders.

The presentation identified trusted access and interoperability as two missing layers for Transnational Digital Twins. Trusted access requires clear rules on who may use which data and under which conditions, while interoperability requires shared standards so that data has the same meaning across systems and countries. deployEMDS addresses this through existing standards and reusable components, including mechanisms for trusted exchange, shared identity, data discovery, and controlled access.

At the same time, the presentation showed that implementation remains complex, especially because standards adoption is uneven and metadata alignment remains difficult. Cross-data-space federation and sustained governance were presented as central next steps.

#### **Key points of subsequent discussion among participants included:**

- **Long-term sustainability remains a central challenge for data space and Digital Twin initiatives.** Many projects are still in pilot or proof-of-concept stages, and their maturity differs considerably. The discussion showed that technical deployment alone is not sufficient. Long-term operation requires clear institutional ownership, stable funding, and a viable value proposition. In the mobility data space context, possible models included mixed public-private funding, membership fees, data-space-as-a-service models, and long-term partnerships with private actors slowly replacing public funding.
- **Trust is a central condition for data sharing.** Participants repeatedly stressed that data providers need to know who uses their data, for what purpose, and under which conditions. This is especially relevant in the context of AI-based and data-based services. Trust was discussed not only as a technical issue, but also as a social and institutional one. Security, privacy, clear roles, federated identity, and verifiable credentials were mentioned as important mechanisms for building confidence between actors.
- **Connecting data spaces across sectors and borders is a central but difficult next step.** Participants discussed that their value increases when data can be exchanged beyond projects and sectors, but this requires compatible connectors, standards, identities, access rules, legal conditions, and governance models. Especially connectors, the component that

allow organisations to exchange data in a data space, were identified as not yet sufficiently standardised or interchangeable

- **Data spaces can provide an enabling layer for Transnational Digital Twins, but only if they deliver practical value.** The discussion showed broad agreement that data spaces can support cross-border Digital Twins. However, participants also stressed that data spaces need to prove their added value compared with simpler or cheaper alternatives. Participants agreed that their unique contribution lies in enabling trusted, interoperable, and governed data exchange across sectors and borders.

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#### **Panel Discussion: “Digital Twins across Europe – Collaboration and Lessons Learned”**

- **Monika Heyder** (Open & Agile Smart Cities & Communities - OASC)
- **Anna-Riitta Kallinen** (ARKCON)
- **Jonas Merbeth** (Daten- Kompetenzzentrum Städte und Regionen - DKSR)
- **Andreas Heckmann, Ph.D.** (German Aerospace Center - DLR)

moderated by **Michael Puntschuh** (iRights.Lab)

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The panel discussion brought together perspectives from smart cities, infrastructure and standardisation. It focused on how Digital Twin initiatives can move from pilots to operational systems, how lessons can be shared across Europe, and how reusable components and approaches can support wider implementation.

A recurring theme was the transition from pilots to sustainable implementation. Several speakers stressed that many Digital Twin projects still depend on temporary funding and remain difficult to scale. The discussion showed that Digital Twins need clear use cases, operational value, and long-term ownership if they are to become self-sustaining infrastructures.

Interoperability and standards were discussed as central conditions for scaling. The panel underlined that standards, norms, and common architectures are necessary, but they need to fit practical local realities. [Minimal Interoperability Mechanisms](#) were presented as one approach to define a minimum level of shared description and data exchange while leaving room for local flexibility.

The discussion also showed that use cases and standards need to be developed together. Several speakers argued that projects should start from concrete urban or infrastructure challenges and then identify which standards, data models, and architectures are needed. At the same time, relying only on individual use cases can limit scalability. Standards and conformity checks are therefore needed to make solutions reusable beyond one project or municipality.

A further theme was data access, openness, and security. The panel discussed how Digital Twins can combine public, internal, and sensitive datasets. Examples from the Netherlands and Finland showed that different access levels may be needed, so that public information can be shared openly while more sensitive planning or infrastructure data remains restricted to authorised users.

Capacity building was identified as a good practice for wider adoption. For instance, smaller or less mature cities often need support to understand what a Local Digital Twin is and how it can be implemented. Examples included starter kits, training materials and AI-supported learning tools (see e.g. [here](#)).

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## **OUTLOOK and further links and information**

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The OpenTwin International Ideathon 2026 showed that Digital Twins can support cross-border and cross-sector collaboration, but their implementation depends on semantic interoperability, trusted data sharing, effective governance, and sustainable funding. European cooperation, shared standards, federated infrastructures, reusable components, and knowledge exchange can help move from isolated pilots towards scalable sustainable Digital Twin ecosystems. Digital Twin initiatives should therefore consider interoperability, scalability, and future cross-border integration from the outset while preserving decentralised responsibilities and data sovereignty.

Further information and the detailed research findings are available in the full research report. We warmly welcome feedback, comments, and reflections on both the event and the report and would be pleased to remain in contact with participants and other interested stakeholders to continue the exchange and support future collaboration.

### **Further links:**

- [OpenTwin Research Report](#)
- [Study: Digital twins for construction, infrastructure management and operation: opportunities, areas of application, implementation options Digital Twins in infrastructure, construction and cities in Germany](#)
- [Practical Guide: Planning and implementing Digital Twins in infrastructure management and operation in municipalities](#)
- [BIM Deutschland Newsletter](#)
- [Website of BIM Deutschland](#)
- [Thematic Website Digital Twins BMV \(in German\)](#)