

Data Spaces in support of a European Digital Twin

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Data Space Roles and Interactions

Technological Perspective

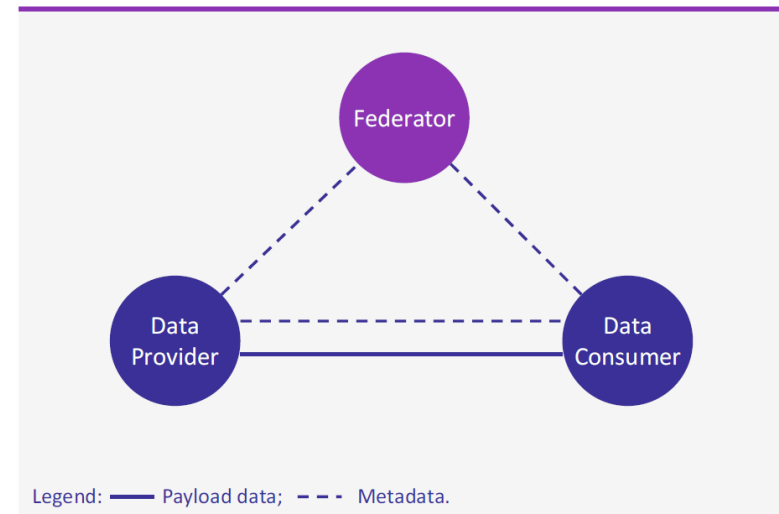
▪ Data Provider and Data Consumer

- Exchange of the data happens directly between the two
 - No central data store
- No common database schema
 - Integration on semantic level (e.g. shared vocabularies)
- Allow for data redundancies, “co-existence” of data

▪ Federator

- Ensures security, trust, [...] through intermediary services
- e.g. cataloguing, brokering of data sources

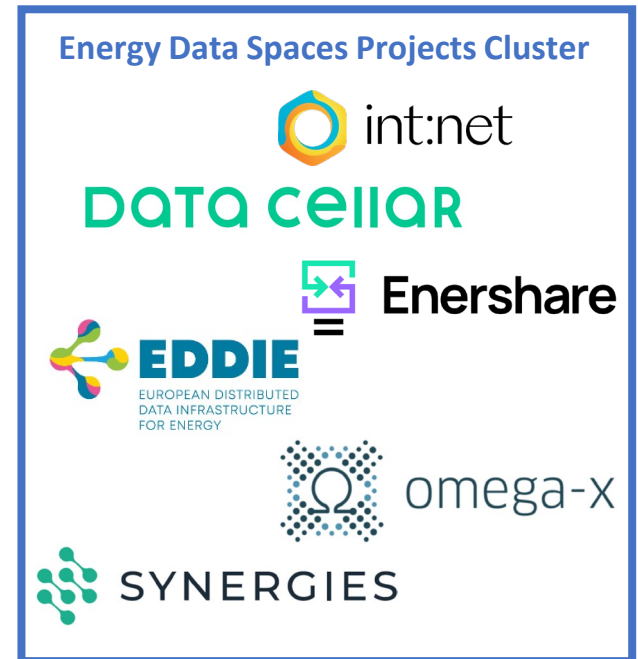
Role Interactions



Source: [Designing Data Spaces : The Ecosystem Approach to Competitive Advantage | SpringerLink](#)

The Energy Data Spaces Cluster

- General objective: **prepare the ground for the Common European Energy Data Space (CEEDS).**
- Specific objectives :
 1. **Priority use cases**
 2. **Target data sets** and the respective providers of data.
 3. **Common building blocks**
 4. **Interoperability** requirements
 5. Key **data hubs/platforms** that should be federated.
 6. **Governance arrangements**, involving key stakeholders and investment needs.

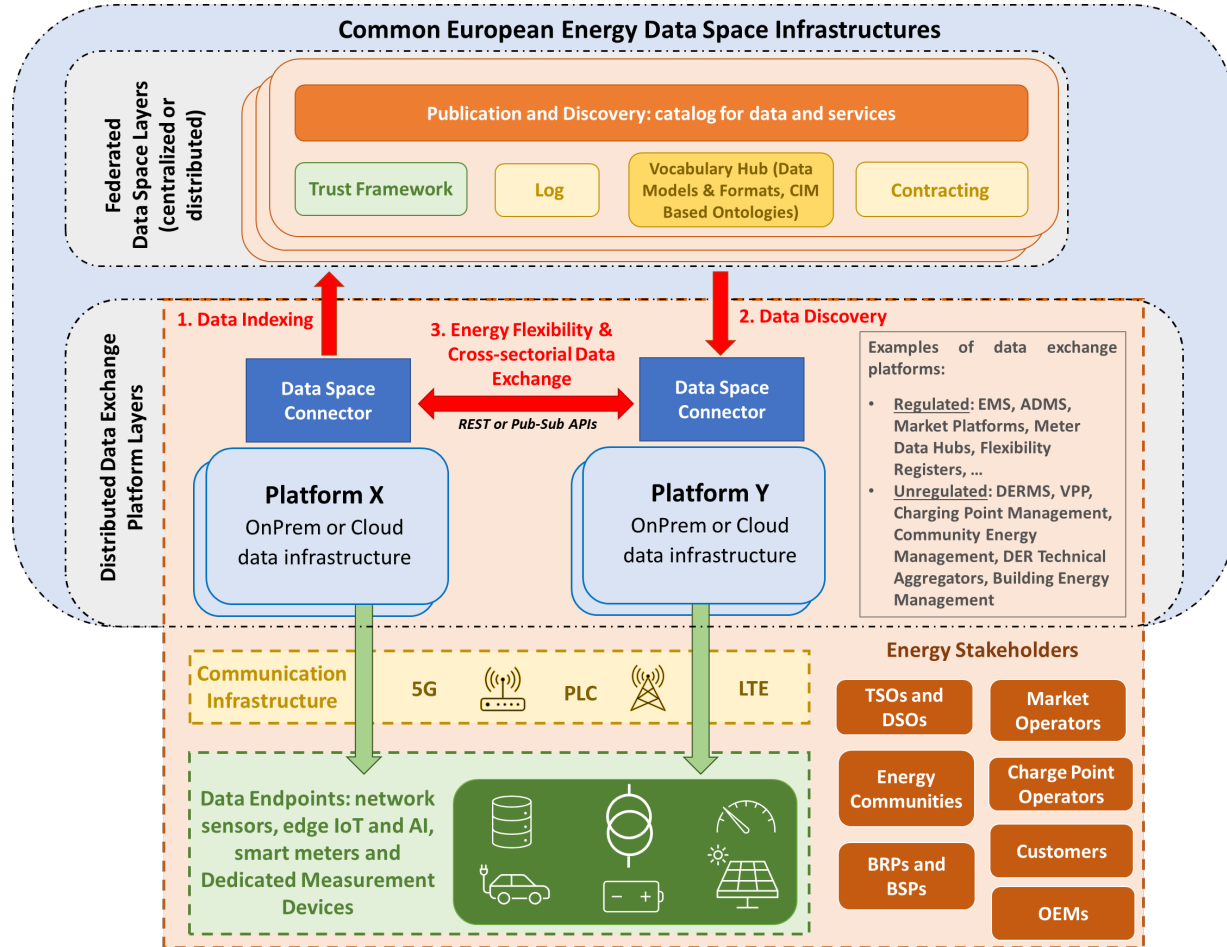


Blueprint of the CEEDS

Goal: from Innovation Actions to national initiatives and large-scale deployments of data spaces

Content:

- **Business use-cases** of CEEDS:
 - Scenarios, Actors, Exchanged Data
- **Architecture: not MVP version, but with complete set of components**
- **Interoperability:**
 - Technical
 - Semantic
 - Governance



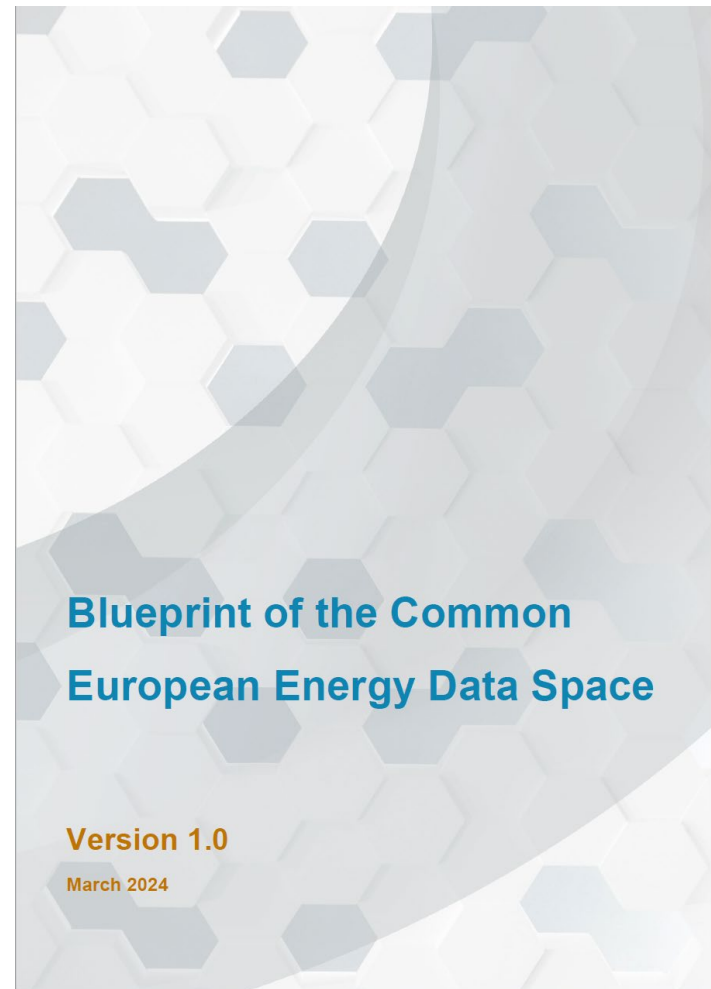
Blueprint of the CEEDS

Published and now available in the int:net website:

<https://intnet.eu/resources/technical-resources>



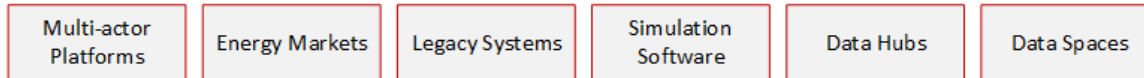
Work on the Blueprint is in progress: updated version 2.0 planned in June 2024



TwinEU Strategic Goal

TwinEU will leverage a unique set of competences coming from grid and market operators, technology providers and research centres to create a concept of Pan-European digital twin based on the **federation of local twins** so to enable a reliable, resilient, and safe operation of the infrastructure while facilitating **new business models** that will **accelerate the deployment of renewable energy sources** in Europe.

3rd Party Access



TwinEU Services Workbench



Service Orchestrator

Models Sharing

Dataspace-enabled data/models sharing infrastructure

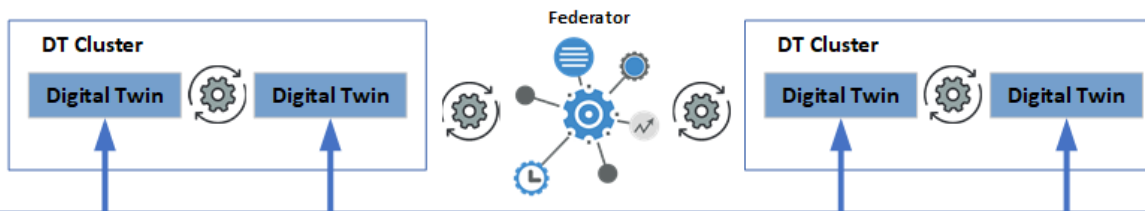


Data Sharing Governance

TRL maturity

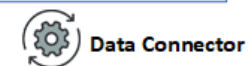


Data Integration & Homogenisation



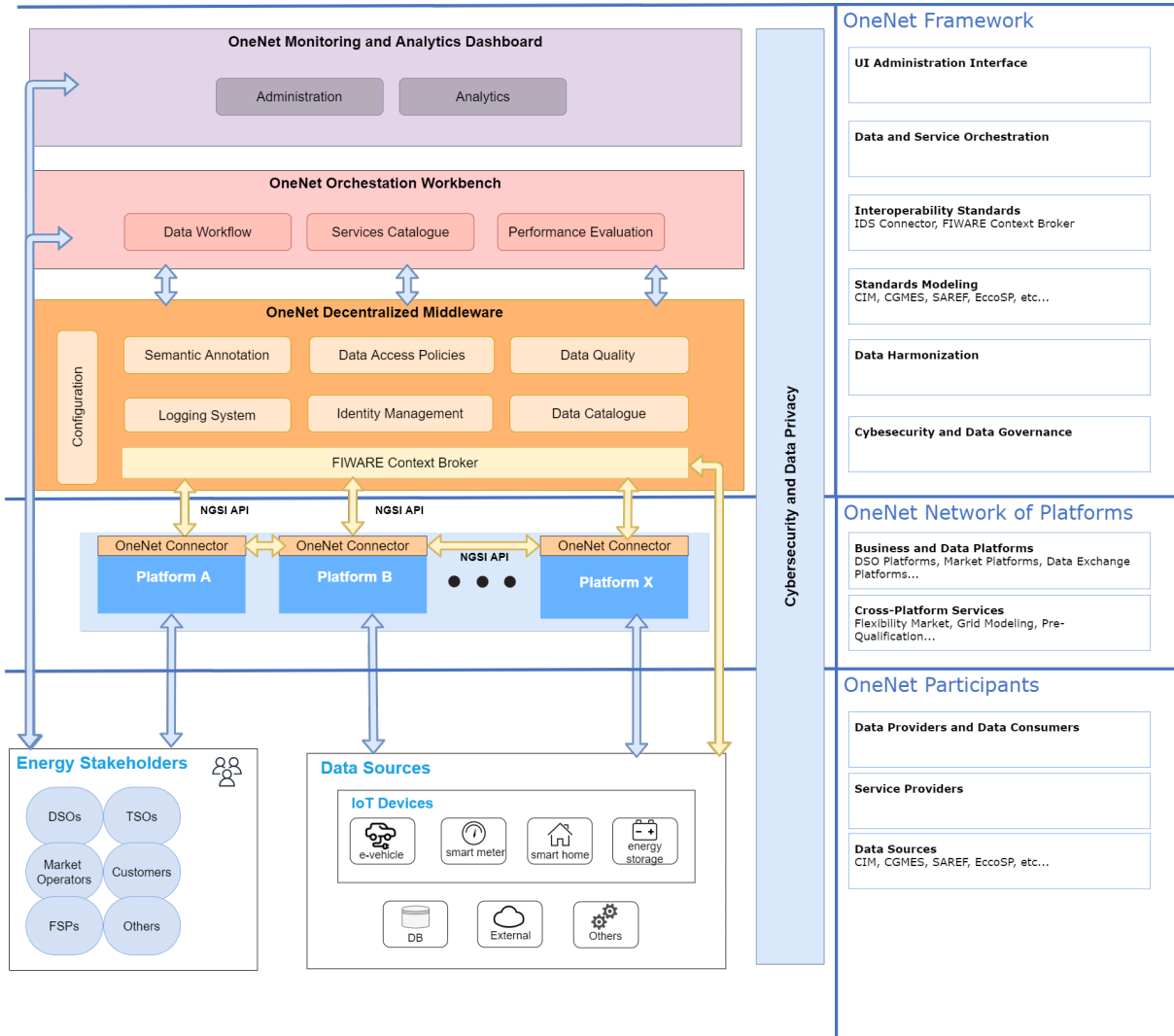
Data Sources

Physical Devices



Technology Enablers

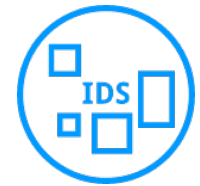
OneNet Reference Architecture



OneNet Middleware and Connector

OneNet Middleware

- enables a **secure and trust end-to-end data exchange** between OneNet Participants
- offers central features to all the OneNet participants like *identity management, sources discovery, semantic annotation, vocabularies and ontologies*



OneNet Connector

- follow the standards **IDS specifications**
- is a **decentralised instance of the OneNet Middleware**
- is **responsible for the execution of the complete data exchange process**
- each OneNet Participant is able to **deploy and configure its own connector**
- Context Broker in the OneNet connector is based on **FIWARE Orion Context Broker and NGSI-API**
- It also includes
 - **Configuration tool**
 - Set of **interoperable API** for the connection with already existing Platform/Application/Services
 - **OneNet Data Harmonization services**



Digital Twin as validation tool

Using the BIM model, this tool will allow the **design validation** of the grid plants and infrastructure, before a single brick is placed.



A virtual behaviour simulation of flexibility resources in a realistic scenario will allow the **prequalification of DERs**, before accessing the market.



E-D, TRI, ARETI, ENEL X, EXW, RSE



T6.2



D6.2



M3-33



ENEL

Dynamic stability in the energy system of the future



Static analysis

Grid conditions after critical network events



Dynamic assessment

Real time assessment based on current conditions, providing a forecast of dynamic stability

AI Algorithms

To provide suggested actions for critical contingency situations



Enabling a **more reliable operation** of TRANSMISSION grid in **highly dynamic** operating conditions and enhanced **network planning** on DISTRIBUTION level



T6.7



D6.6



M3-33



ELES



EG, EIMV, HSE, UL

Conclusions

- DataSpaces are changing the way we manage data
- A clear deployment plan is on the way
- TwinEU is a concrete application of the technology enabling new data-centric services

