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Vocabulary Hub for semantic interoperability in data spaces

A concept, method and implementation

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THE EUROPEAN DATA CONFERENCE ON REFERENCE DATA AND SEMANTICS

1. Positioning the Vocabulary Hub

Supporting component for semantic interoperability in data spaces

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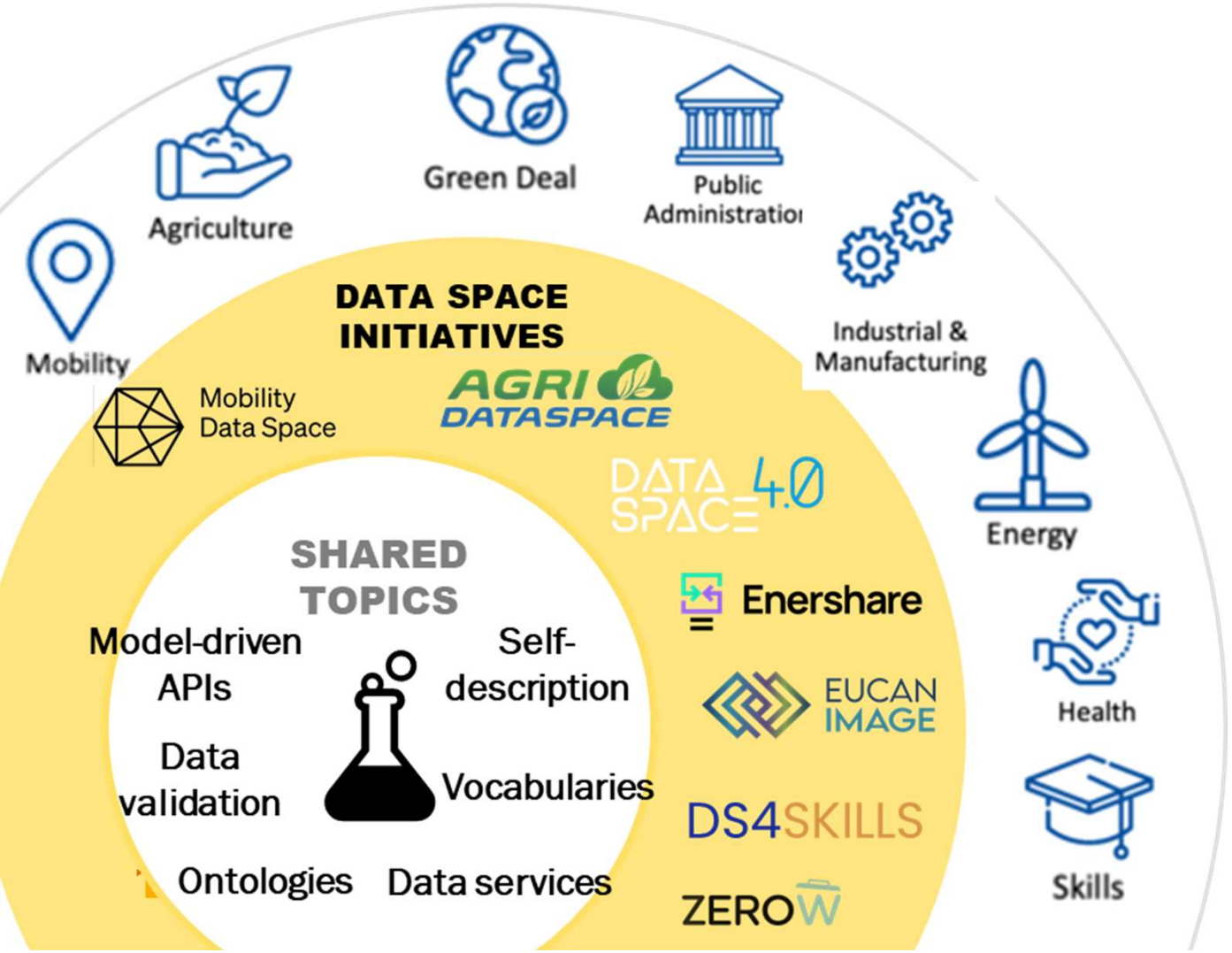
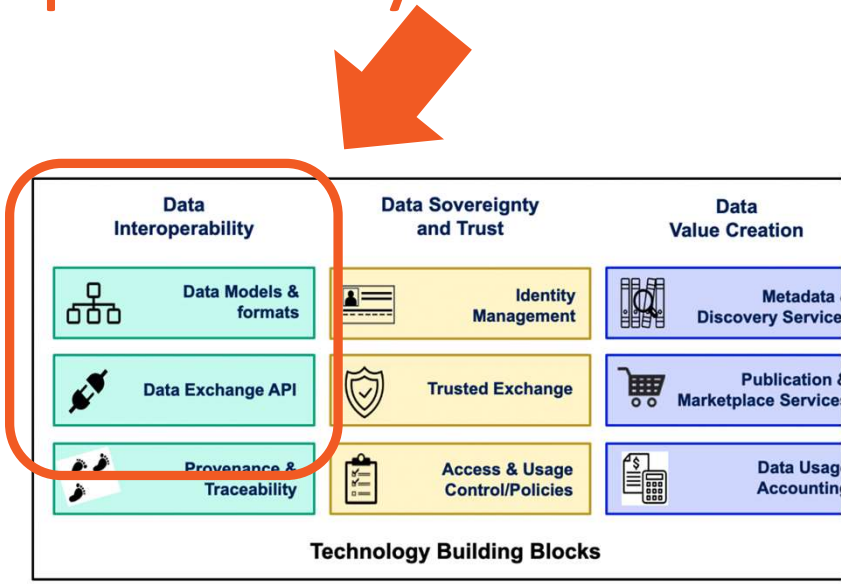
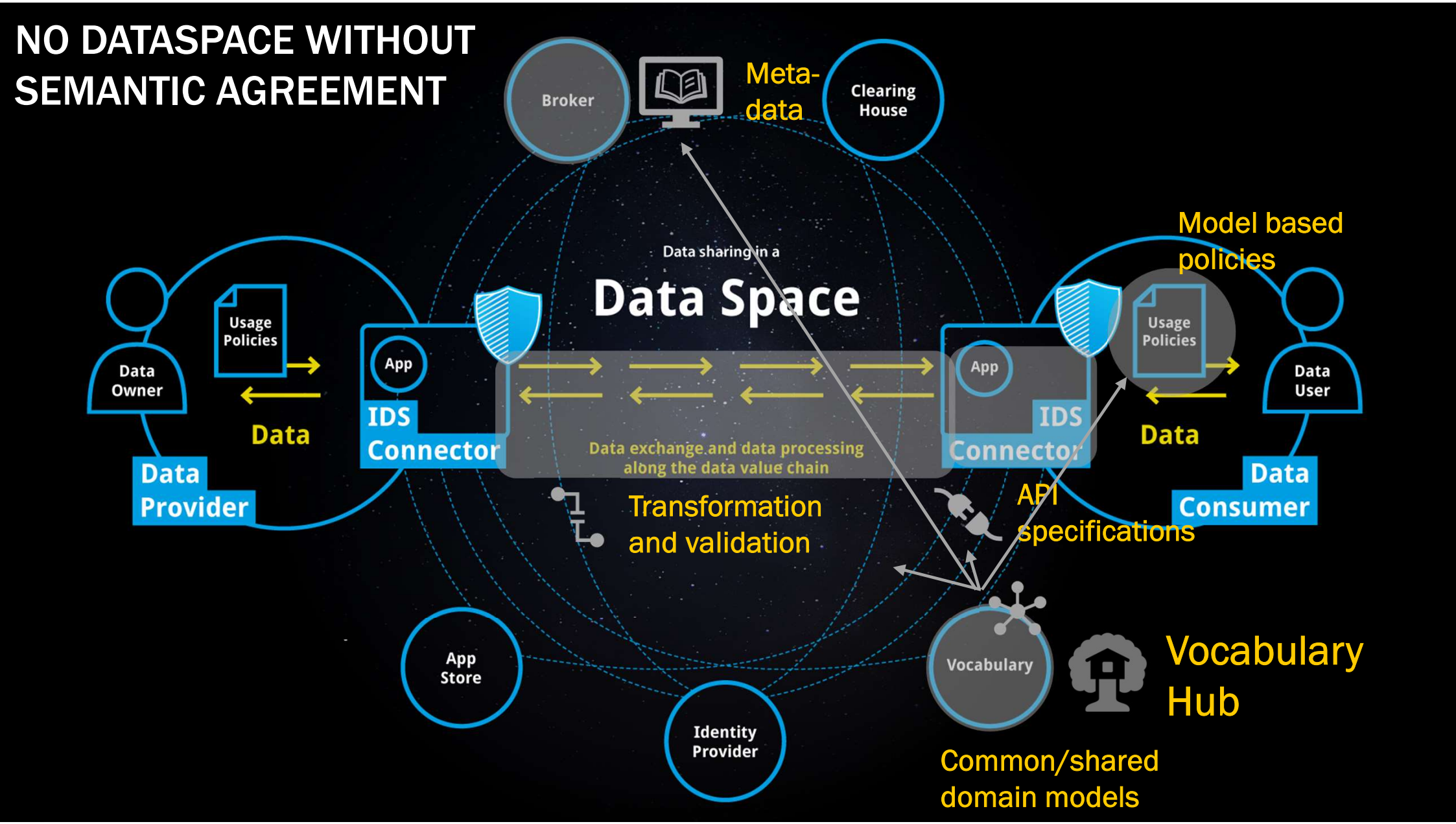
Data spaces require data interoperability

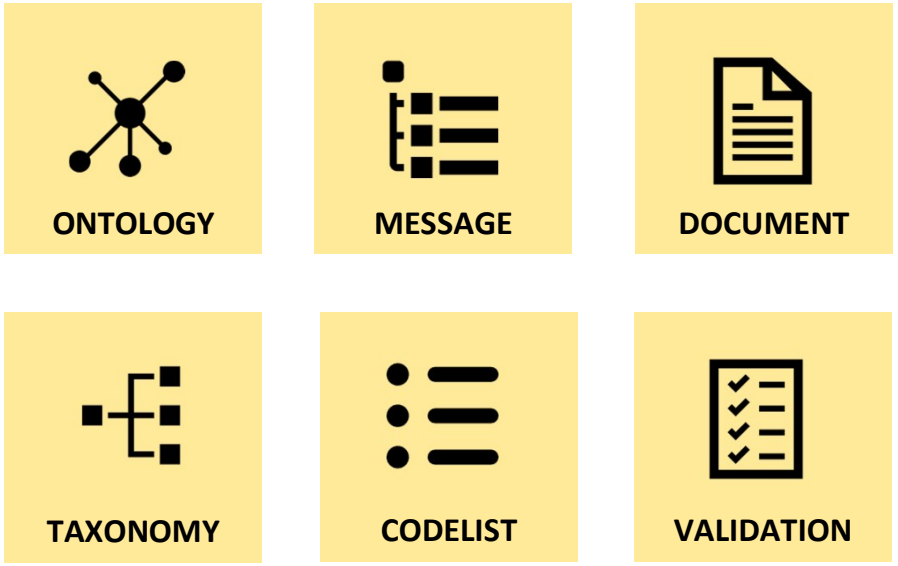





NO DATASPACE WITHOUT SEMANTIC AGREEMENT
Broker
Meta-data
Clearing House
Data sharing in a
Data Space
Model based policies
Usage Policies
Data Owner
Data
Data Provider
App
IDS Connector
Data exchange and data processing along the data value chain
App
IDS Connector
Usage Policies
Data User
Data
Data Consumer
Transformation and validation
API specifications
App Store
Identity Provider
Vocabulary
Vocabulary Hub
Common/shared domain models

Broad range of vocabularies and semantic interoperability specifications

- It's about more than ontologies and a glossary
- It includes all (in)formal specifications for semantic interoperability
- Those specifications need to be designed, documented, published, shared and maintained



Vocabulary Hub explained

Vocabulary Hub

A registry service providing facilities for publishing, editing, browsing and maintaining vocabularies and related documentation.

- Vocabularies incl. ontologies, reference data models, schema specifications, mappings and API specifications that can be used to annotate and describe data sets and data services.
- The vocabulary hub can mirror a set of third-party vocabularies ensuring availability and resolution for participants in a data space.

Related components

Transformation Engine

Service that provides semantic transformation/conversion between data formats. It uses vocabularies and mapping specification as provided by the vocabulary hub. The component can be integrated at the data consumer or -provider implementation or offered as a service in a dataspace.

Dataspace Connector Configurator

Service to configure the semantic interoperability of dataspace connector implementations.

- Creating ontology based API-specifications to specify the semantic interface between data provider and -consumer.
- Additionally the dataspace connector configurator can assist in creating mapping specifications if needed. These can be used in the Semantic Transformation Engine.

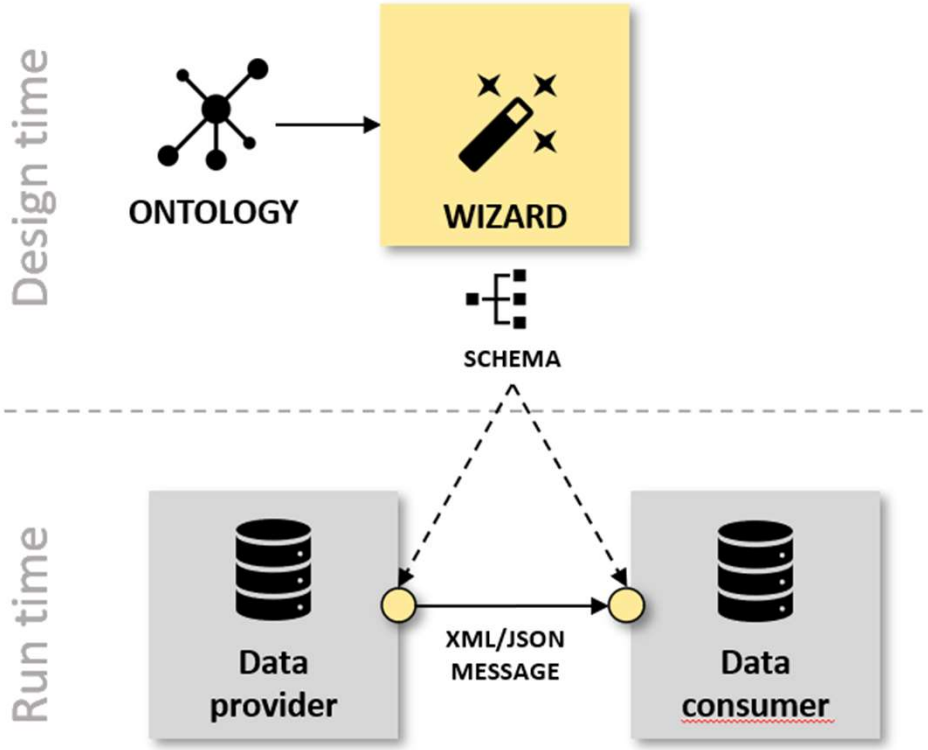
Semantic Validation and Certification

Validation service to determine if implementations comply to the specifications. The service uses formal schema/constraint specification languages to perform the validation steps. Examples of such specification languages are: XML schema, Schematron, JSON schema, SHACL and CSV schema.

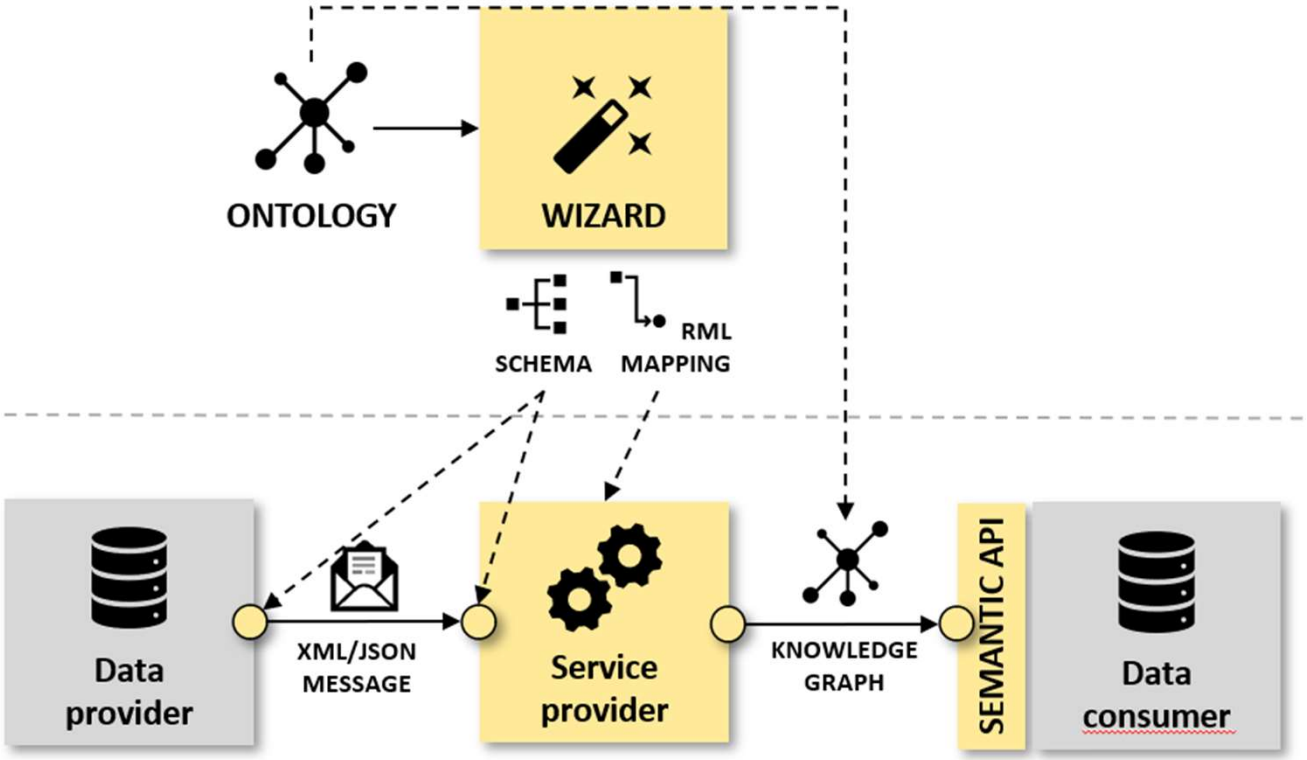
2. Configuring data space connectors using semantic technology

Overview

Dataspace Connector Configurator

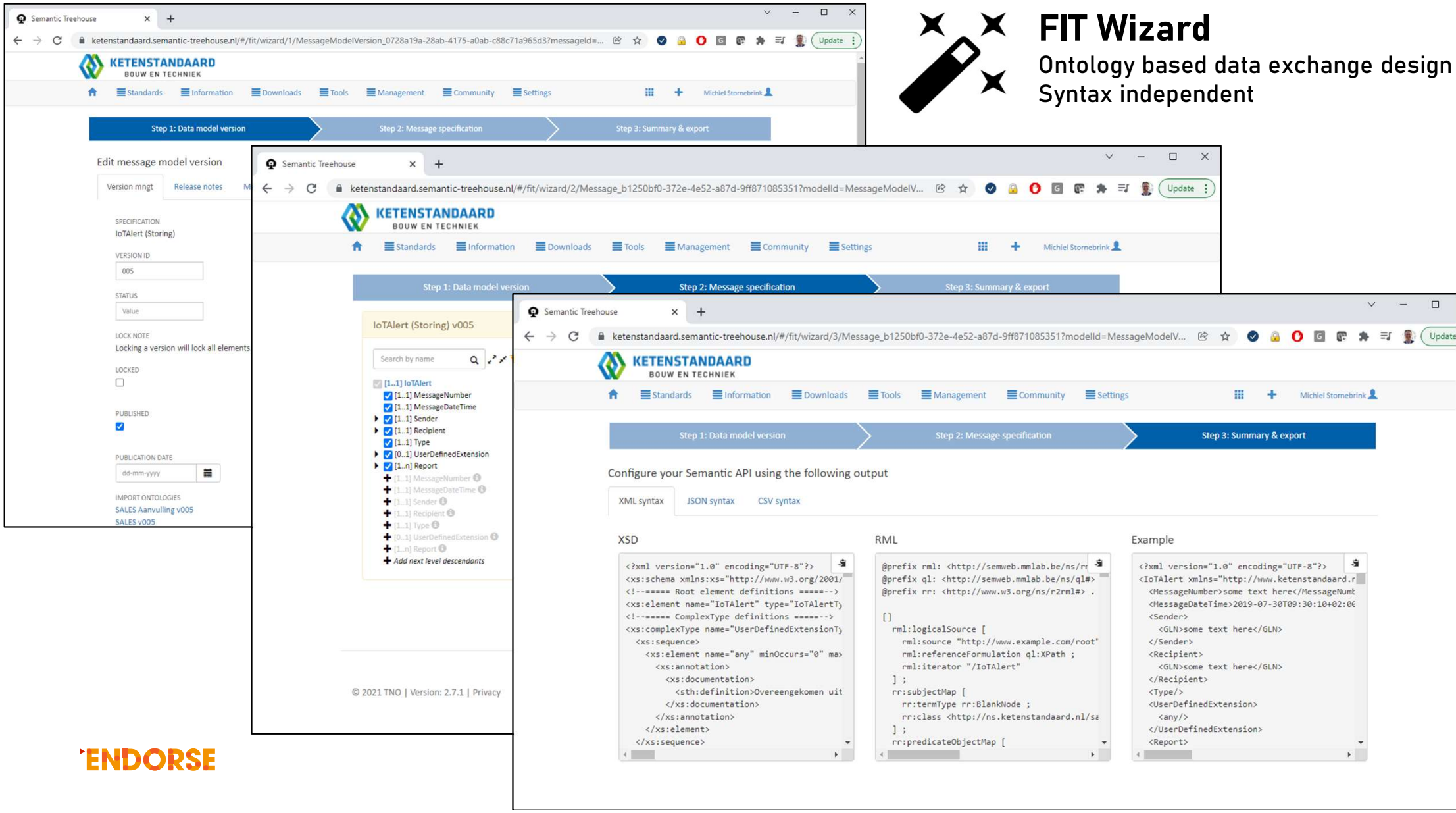


Scenario with transformation to RDF



Dataspace Connector Configurator

Transformation Engine



FIT Wizard

Ontology based data exchange design
Syntax independent

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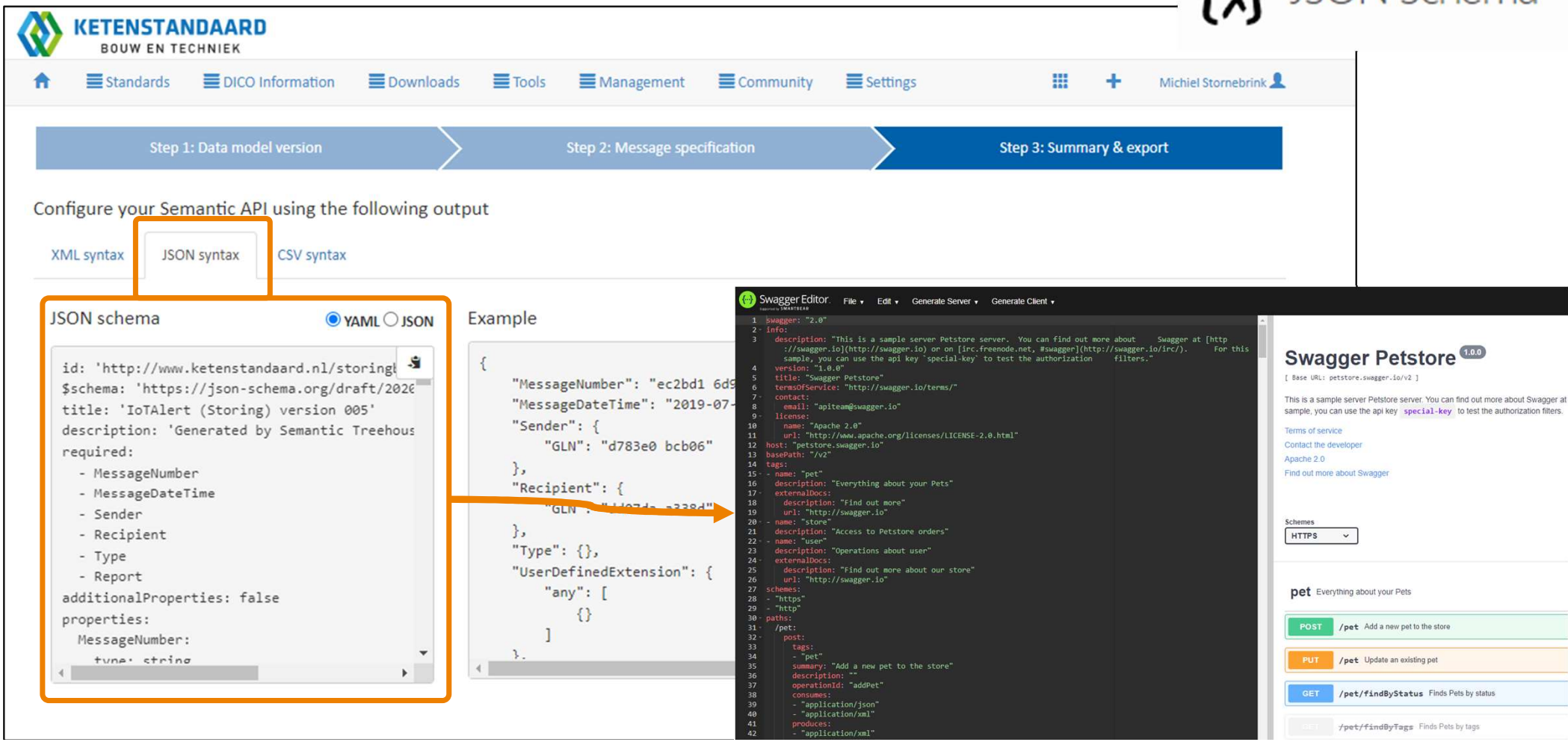
Ontology based generated REST APIs



3. Next steps

Research & development

- Together with the IDSA community we are elaborating on the Vocabulary Hub functionality
- TNO is open sourcing its implementation: Semantic Treehouse
- Together with industry partners we are applying and experimenting with Vocabulary Hub in different sectoral data spaces

INTERNATIONAL DATA SPACES ASSOCIATION

SEMANTIC TREEHOUSE

TNO innovation for life

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Find our position paper at
https://www.semantic-treehouse.nl/vocabulary-hub

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