

TOWARDS A COMMON DESCRIPTION VOCABULARY FOR INDUSTRIAL DATASETS

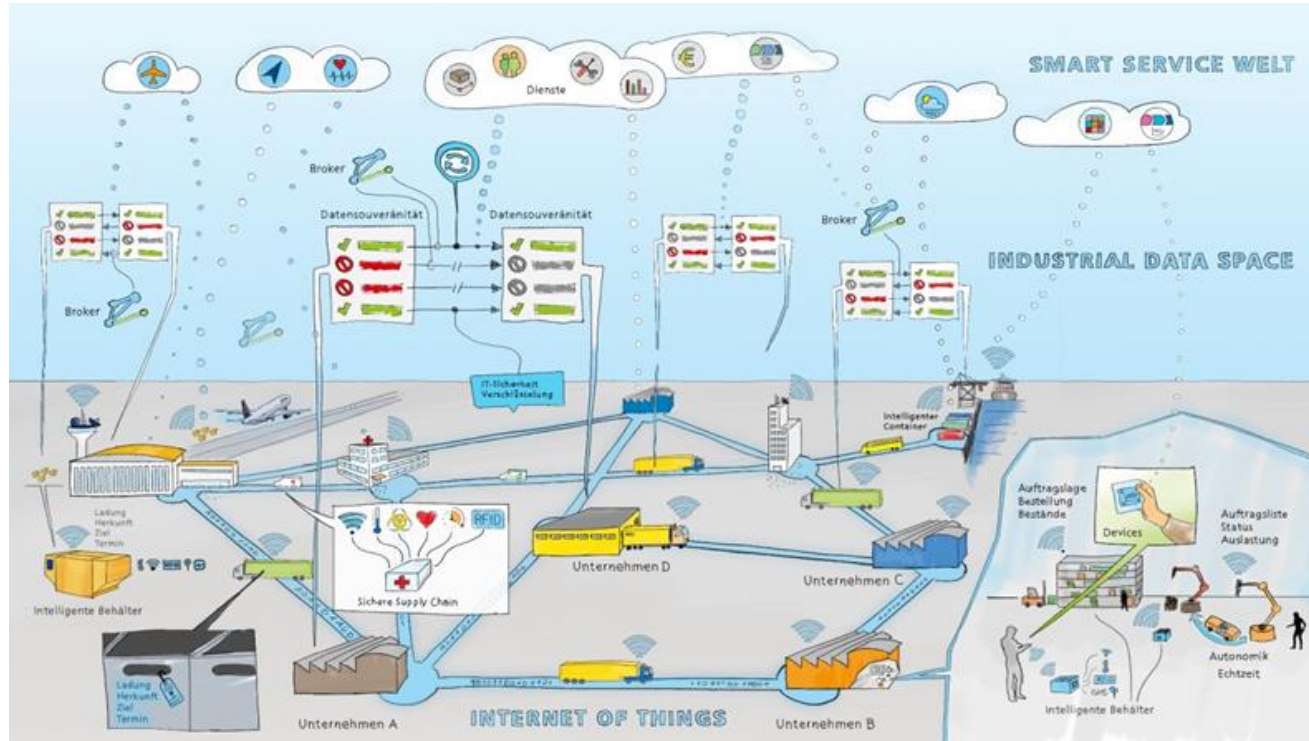
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and Sören Auer

Smart Descriptions & Smarter
Vocabularies (SDSVoc)

Amsterdam, November 30th 2016

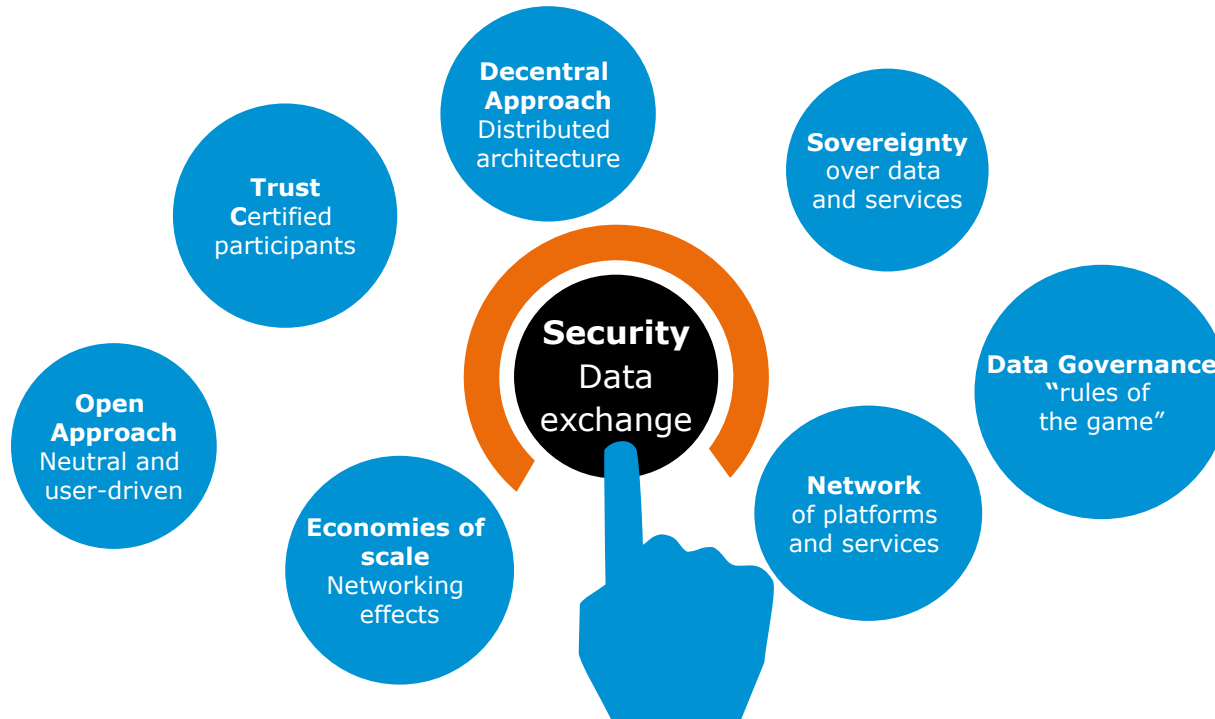
Retaining Sovereignty over Data in Industrial Communication

Smart Services and Industry 4.0



A Network of Trusted Data

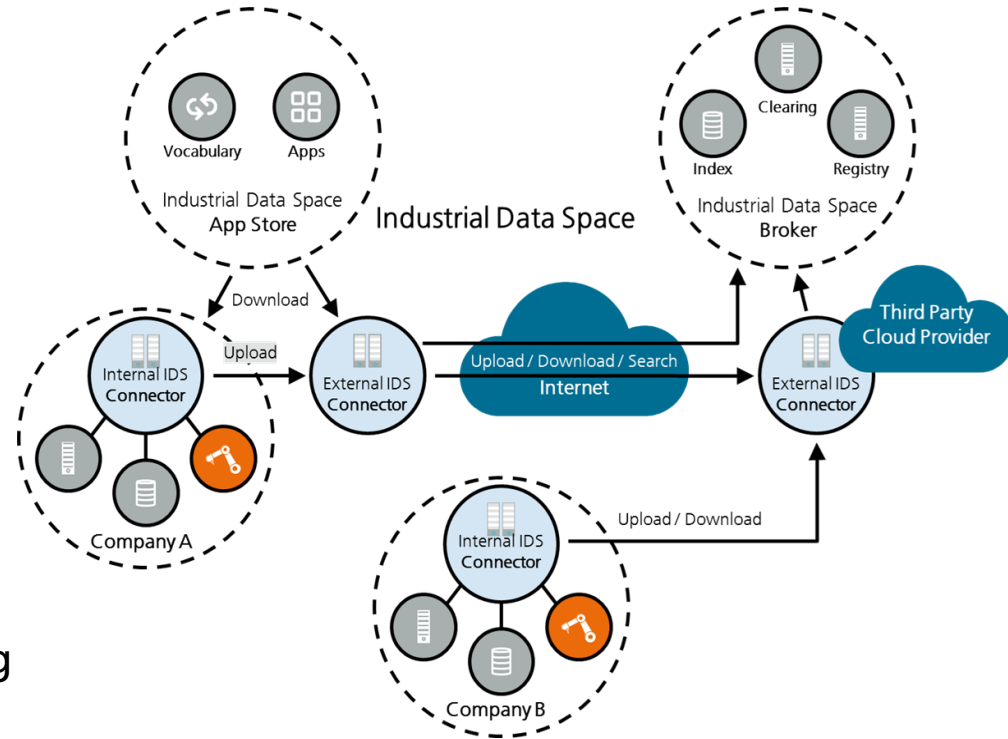
Goals of the Industrial Data Space (IDS)



Main Components and Interactions

IDS Architecture

- Connectors provide **data endpoints** to access Individual resources, data dumps, service calls,...
- Broker helps **finding endpoints** and establish bilateral connections
- Appstore provides **packaged applications** for usage in Connectors
- Vocabularies capture **domain-specific semantics** for establishing a common language between partners

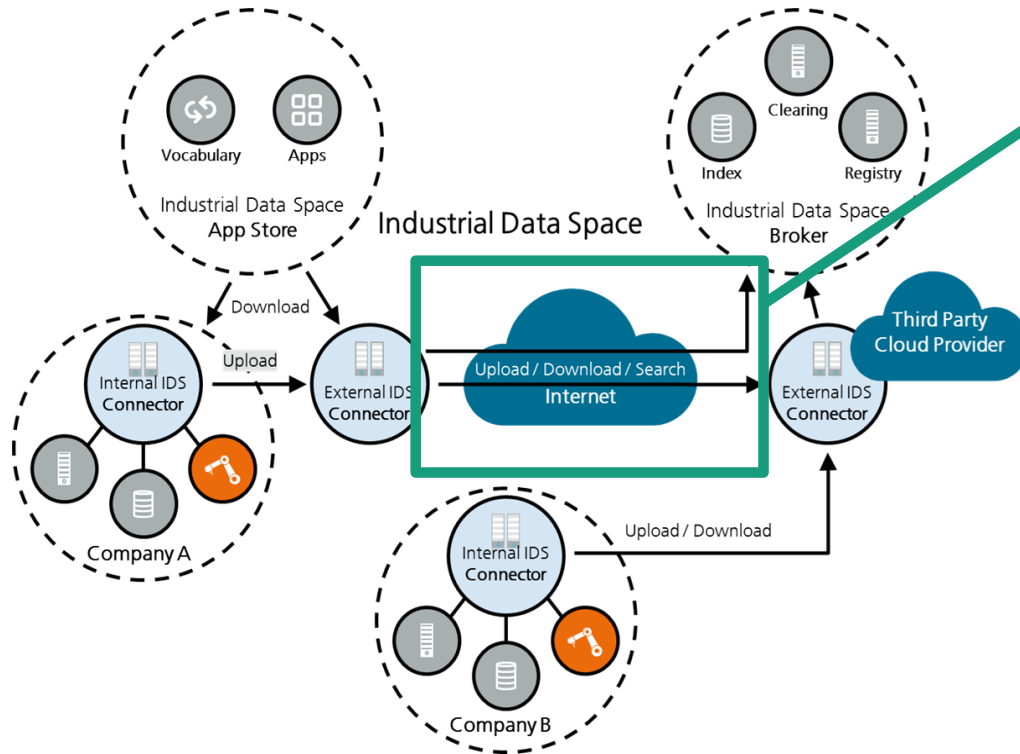


The Role of RDF Vocabularies and Metadata

- **IDS vocabulary** defines how to describe IDS components and data endpoints based on **Linked Data technologies**
- Ensures **interoperability** between communication partners **without a central authority**
- Drives **search and retrieval** for endpoints and data (describing data and service offerings)
- Essential for a component to be **IDS-compliant**
- Basis to establish and enforce **security**
- Metadata **accompanies** any IDS communication

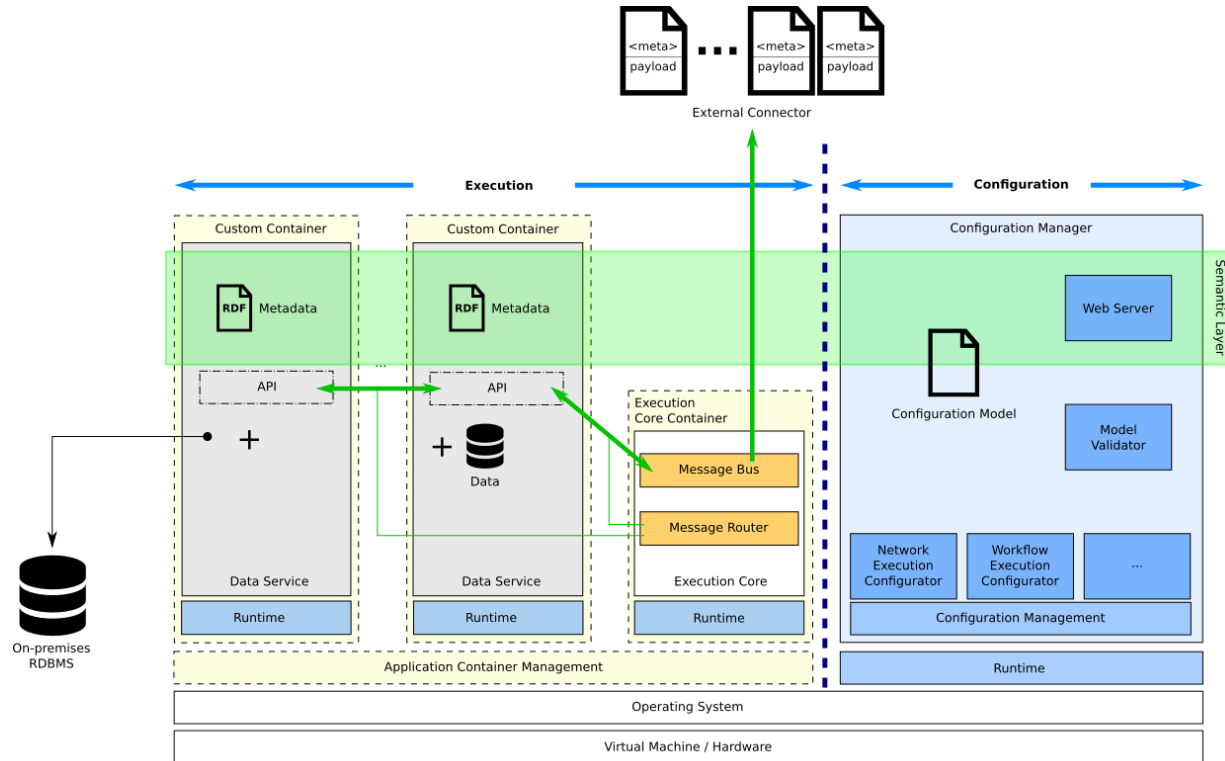
Establishing secure and traceable communication

Metadata on the Protocol Level



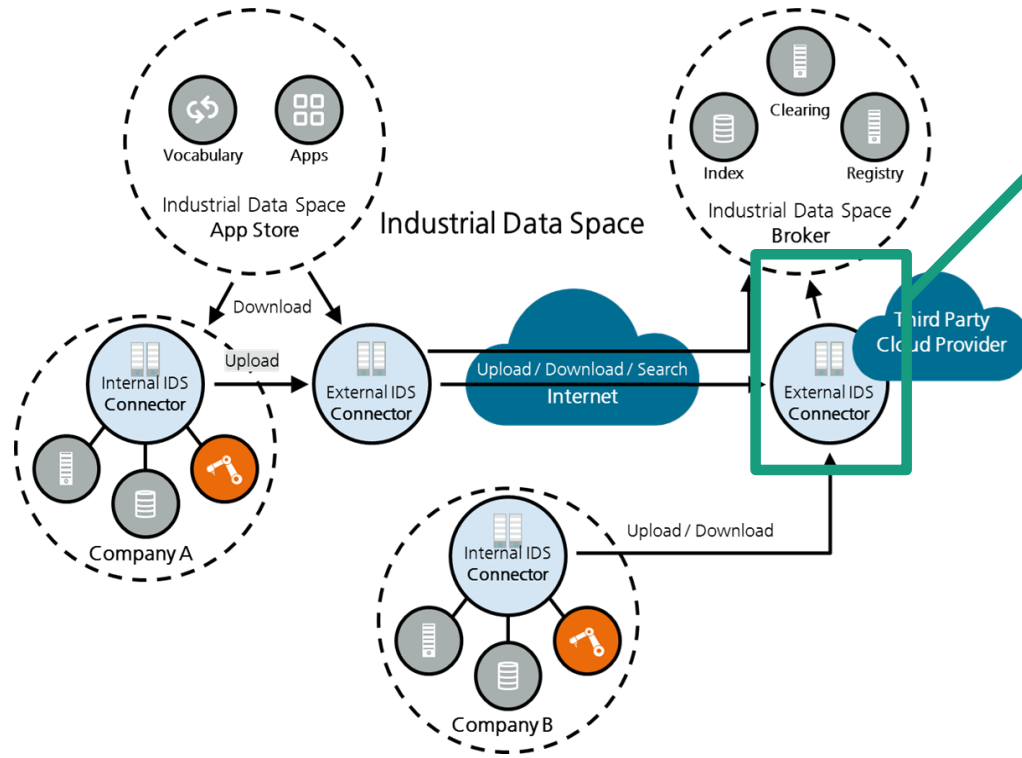
- Transfer metadata and payload data simultaneously
- Protocol header contains metadata:
 - Source & Destination Endpoints
 - ID Token
 - Usage policy (access restrictions, time-to-live,...)

Establishing secure and traceable communication Metadata on the Protocol Level



Building a Data and Service Marketplace

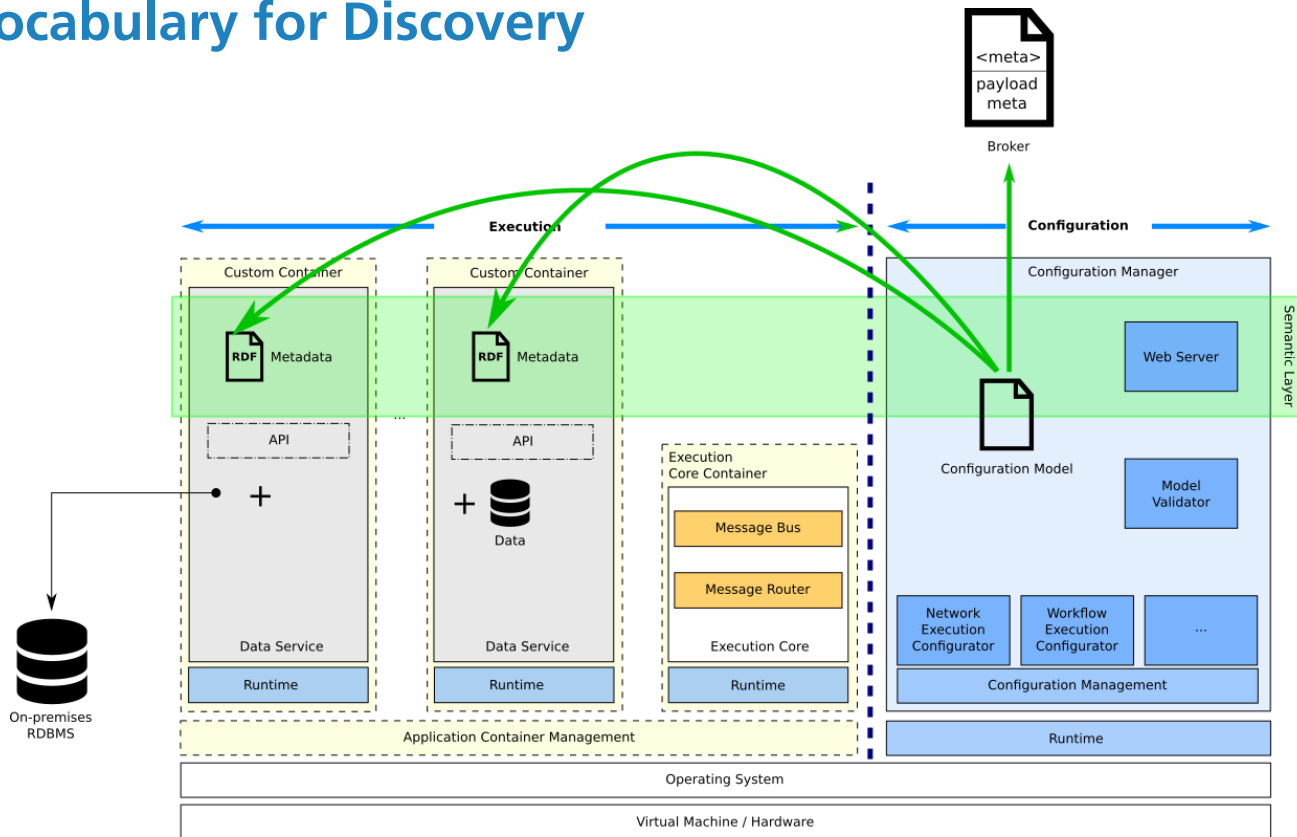
IDS Vocabulary for Discovery



- Metadata Vocabulary describes the connector configuration as Linked Data
- Announced to Broker on connector deployment
- Broker provides search interface (UI, SPARQL,...)
- Multiple Brokers possible

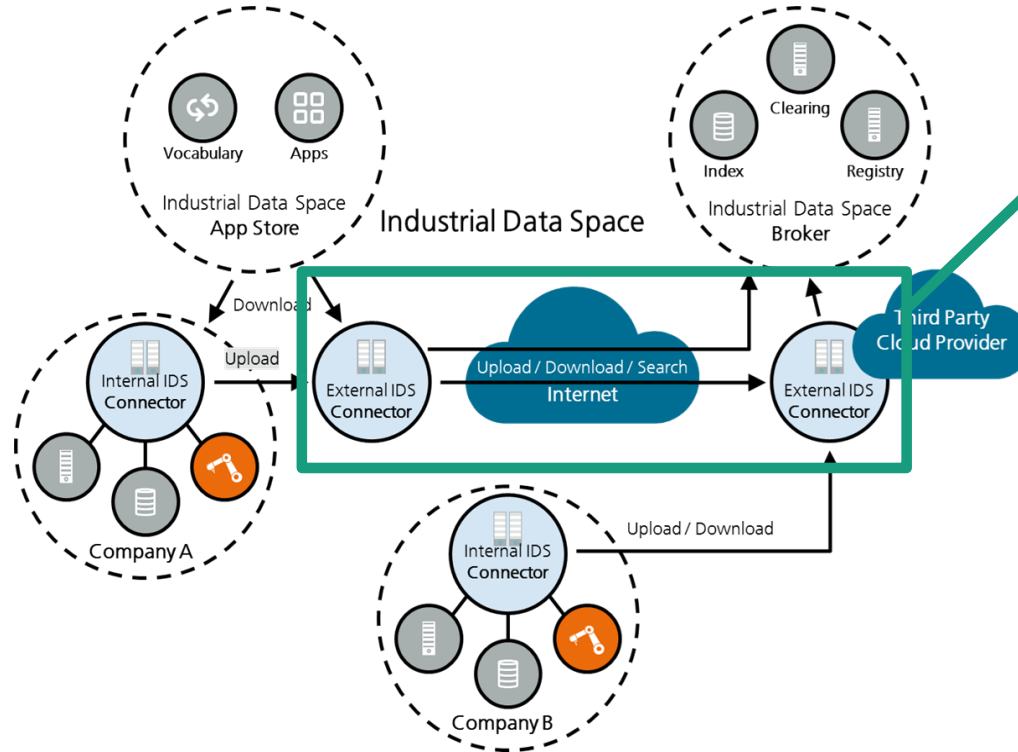
Building a Data and Service Marketplace

IDS Vocabulary for Discovery



Icon made by Freepik from www.flaticon.com

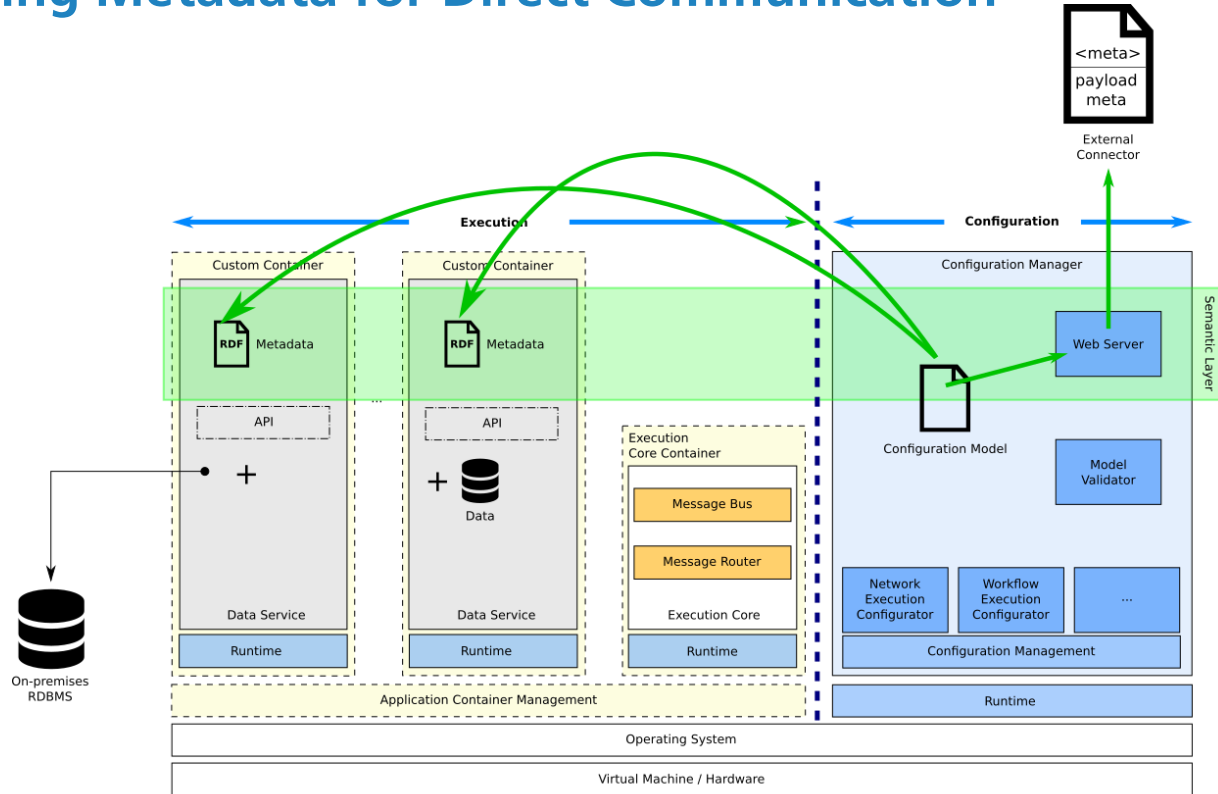
Supporting Bilateral Communication between Partners Leveraging Metadata for Direct Communication



- Communication works without Broker if Connector is known
- No SPOF
- Each connector runs a Web server
- Connector serves same configuration information as found on Broker

Supporting Bilateral Communication between Partners

Leveraging Metadata for Direct Communication



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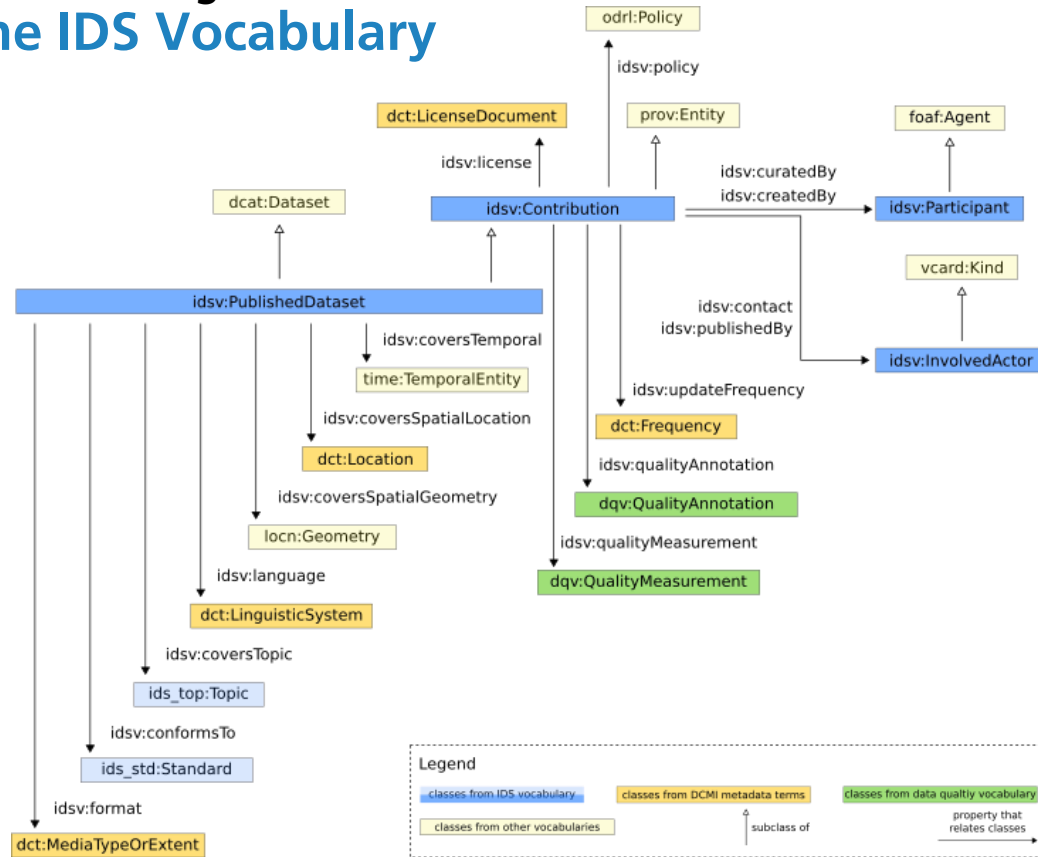
Supported Functionalities and Requirements

Current State of the IDS Vocabulary

- <http://ids.semantic-interoperability.org/>
- IDS Vocabulary is able to express
 - Endpoint origin and basic metadata (provider, service contact...)
 - Coverage and content (timely, spatial, topic)
 - Data formats
 - Policies (e.g., pricing, permissions, expiry)
- Aligned to existing vocabulareis
 - DCTerms, DCAT, PROV-O, ODRL, DQV, IANA, ...

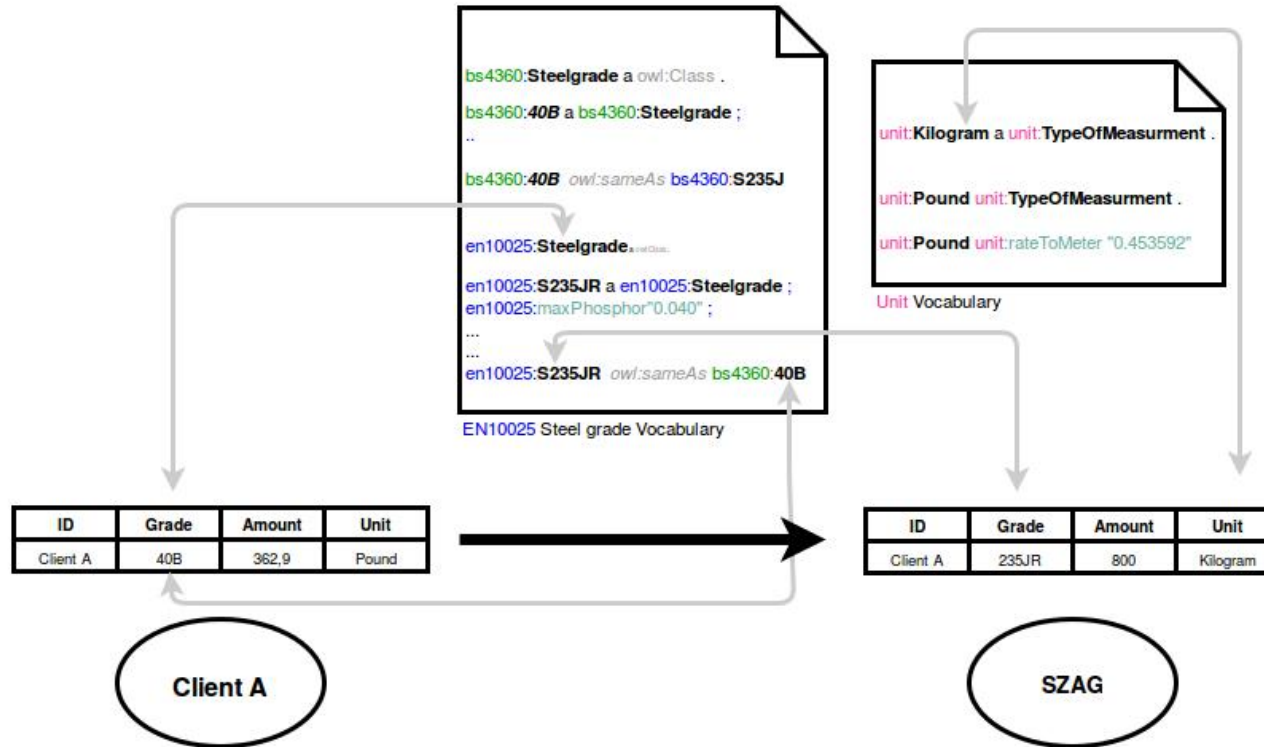
Classes and Alignment to Existing Vocabularies

Current State of the IDS Vocabulary



Exemplary Industrial Use Case

Metadata and Vocabularies – Practical Application



Current Tasks

- Extend with **service description** capabilities
 - URLs for parameter descriptions
 - Protocol bindings (WSDL-like)
- Include **protocol header specific properties**, e.g.,
 - Message payload digest
 - Authentication token

Open Questions

Next Steps and Future Work

- Vocabularies describing communication protocols? (e.g., typical header fields)
- Vocabularies for annotating
 - Industry branch (e.g., NAICS,...)
 - Content taxonomies (e.g., financial, research,...)
 - Standards (GS1,...)
 - Algorithms (MD5,...)
- Implementation & Software Integration
 - APIs needed to read/write/modify description documents
 - rml.io, Pinto, XSPARQL,...

Thank You!

**Towards a Common Description
Vocabulary for Industrial Datasets**

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