



Semantic technology helps computers understand data like humans understand language.

FEDeRATED Semantics

FEDeRATED semantic deliverables

- 1. Developed Semantic Model:** Standardized data representation for transport and logistics.
- 2. Alignment of Ontologies:** Integrated diverse data standards for interoperability.
- 3. Implemented Semantic Web Technologies:** Utilized RDF and SPARQL for data linking.
- 4. Digital Twins and Event Data:** Translated logistics operations into digital formats.
- 5. Created Semantic Adapter:** Transformed data to align with the semantic model.
- 6. Supported Linked Data Principles:** Enhanced data interpretability and actionability across systems.



Semantic interoperability



European Interoperability Framework

Semantic interoperability facilitates scalable, seamless data exchange across transport and logistics networks.



Digital twins and Events

Digital Twin is a taxonomy of real-world objects and infrastructure:
Product, Custom Item, Cargo, Equipment, Transport Means, Person, Business Service, Node/Hub/Place

Event is the association between two or more Digital Twins in time and space.



Ontology, the language of semantics



An ontology is a structured framework that defines and organizes concepts within a domain enabling clear communication and data processing.

- Terms & Concepts
- Relationships
- Hierarchy
- Rules

The screenshot shows the FEDeRATED NETWORK OF PLATFORMS website. The main navigation bar includes Home, News, Activities, Agenda, Products, Living Labs, Library, Join us, Contact, and Login. The secondary navigation bar includes TNOVoc, Home, Documentation, Visualization, Querying, Evolution, Analytics, Validation, and Repository. The main content area features a search bar with the text "Type a concept to search...", a search icon, and a "Choose File" button. Below the search bar are two filter panels: "Type" and "View". The "Type" panel has radio buttons for "All" (484), "Classes" (198), "Properties" (286), and "Individuals" (100). The "View" panel has radio buttons for "RDF(S)" and "SKOS". Below these panels is a "Show others" button and two toggle switches for "Show Type" and "Show File". The main content area is divided into two sections: a list of ontology terms on the left and a detailed view of a term on the right. The list of terms includes "deviationDuration", "DigitalTwin", "documentbillOfLadingNumber", "documentID", "documentVersion", and "dryBulk". The detailed view shows the "Documentation" tab selected, with a "Source" tab and a "Graphical Depiction" tab. The "Documentation" tab displays the RDF triple for "DigitalTwin":

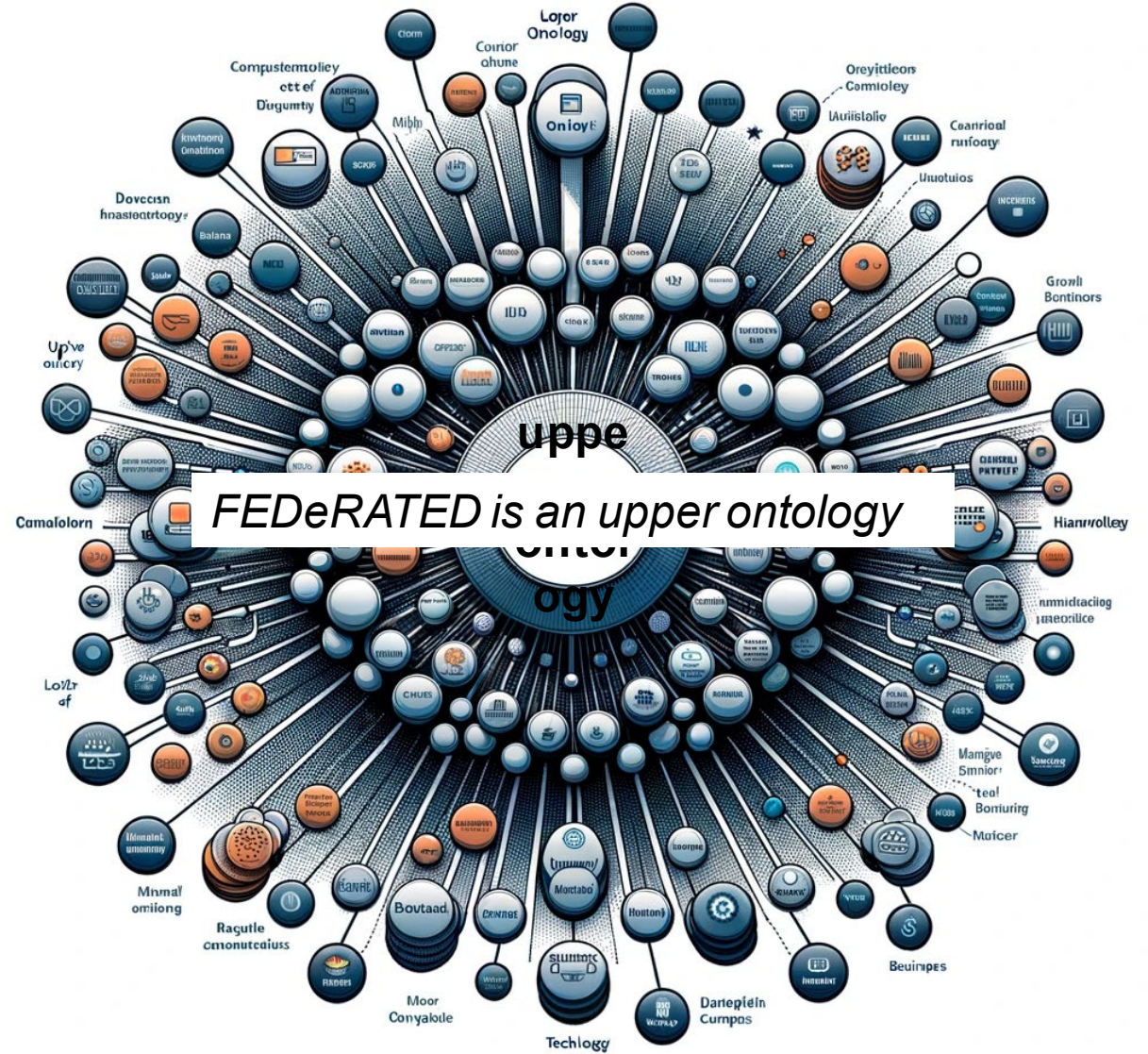
```
<https://ontology.tno.nl/logistics/federated/DigitalTwin>
a
  <http://www.w3.org/2002/07/owl#Ontology>
;
  <http://purl.org/dc/elements/1.1/creator>
    "Dena Tahvildari, Cornelis Bouter, Maaïke
    Burghoorn" ;
  <http://ourl.org/dc/terms/created>
```

15/10/2023

Upper vs Lower ontology

Upper Ontologies: Abstract, general concepts universal across varied domains, including overall logistics domain

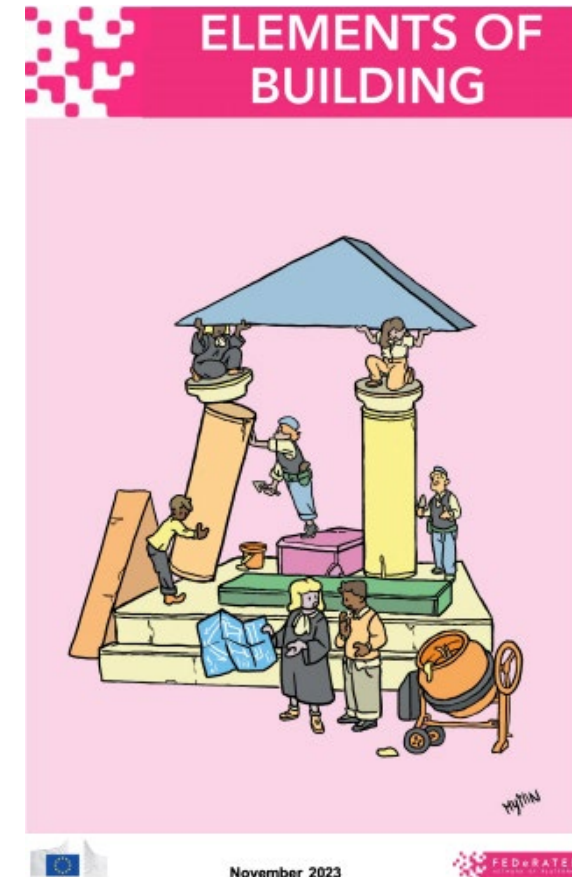
Lower Ontologies: Detailed, specific to branches of logistics, defining industry-relevant terms and relationships.



FEDeRATED references

isRequiredBy	https://ontology.tno.nl/logistics/federated/Event
requires	https://ontology.tno.nl/logistics/federated/Classifications
owl:versionIRI	https://ontology.tno.nl/logistics/federated/PhysicalInfrastructure-v-0.1
description	This ontology contains classes, attributes, relation about physical infrastructure objects that are used in Logistics Events.
creator	Dena Tahvildari, Maaïke Burghoorn, Cornelis Bouter
language	en
type	http://www.w3.org/2002/07/owl#Ontology
created	2021-02-11
issued	2021-03-15
isRequiredBy	https://ontology.tno.nl/logistics/federated/PhysicalInfrastructure
isRequiredBy	https://ontology.tno.nl/logistics/federated/DigitalTwin
isRequiredBy	https://ontology.tno.nl/logistics/federated/BusinessService
requires	https://ontology.tno.nl/logistics/federated/PhysicalInfrastructure

<https://www.federatedplatforms.eu/index.php/products/developer-portal/documentation>



https://www.federatedplatforms.eu/images/Library/Activity2/Elements_of_Building_final.pdf

The road ahead

Assess **digital maturity**; develop personalized transformation roadmaps.

Standardize data formats; establish common frameworks.

Ensure new solutions are **backward compatible**.

Adopt **incremental** digital integration steps.

Provide stakeholder **education** and training.

Use **collaborative platforms** for system connectivity.

Initiate **pilot projects** to showcase benefits.

Align with **regulatory compliance**; offer incentives.

Implement **scalable**, modular digital solutions.

Create **feedback loops** for continuous improvement.

