Progress of the FEDeRATED Semantic **Modelling** Group

Henk Mulder

Chair of Semantic Modelling Group

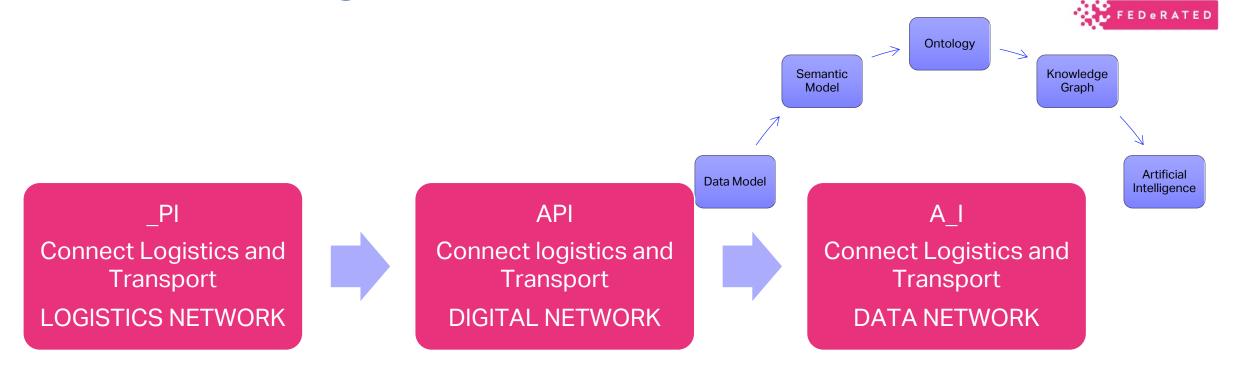
Head Digital Cargo, International Air Transport Associaton (IATA)







The challenge: data interoperability



ALICE PI



IATA ONE Record Internet of Logistics



FEDeRATED Semantic Model



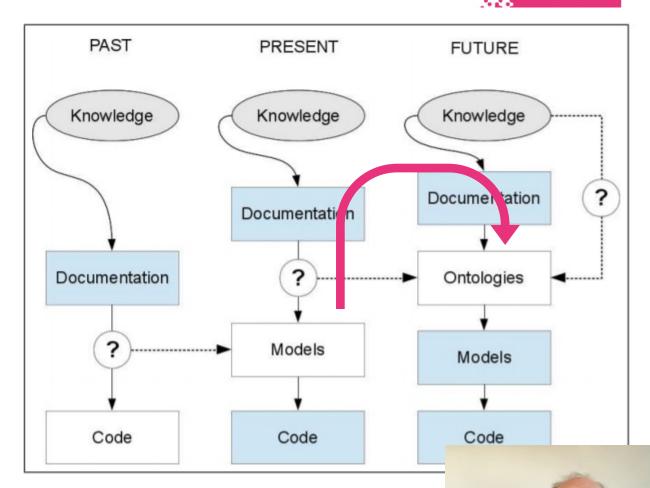


Moving on from data models

Knowledge about transport and logistics are anchored in data models, including from the biggest standard setting setting bodies.

Many of these entities – but not all – are now transiting to ontologies as a foundation for interoperability between supply chain partners.

Image credit: Ontology for complex railway systems application to ERTMS/ETCS system Olimpia Hoinaru, Georges Mariano, Christophe Gransart



FEDeRATED Semantic Modelling Group

It's objective:

"Integrating existing models, standards and ontologies such that the FEDeRATED semantic model acts as a common and uniting model"

How it works:

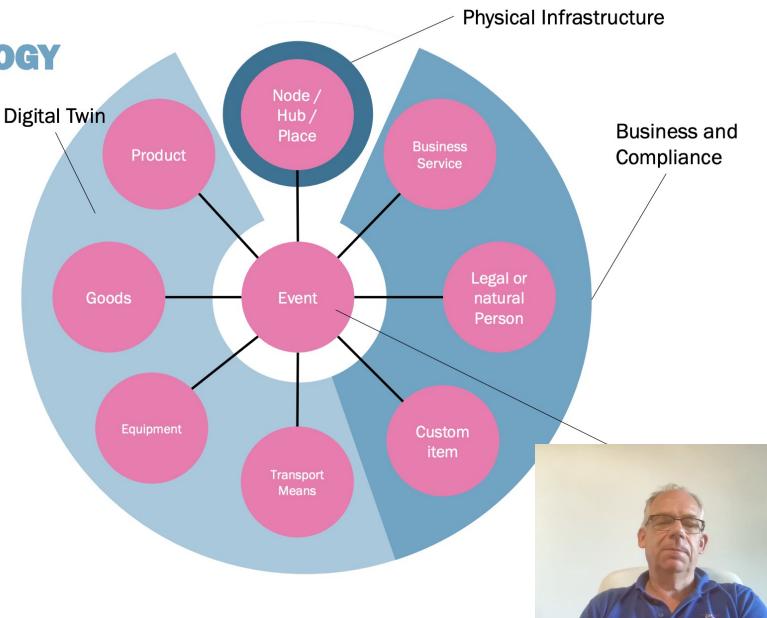
- Analyze a representative set of data models and draft a common semantic model (air, road, maritime, rail)
- 2) Validate the model through mapping with 3rd party data model alignment with other ontologies
- 3) Test the mapping and alignment with the FEDeRATED Living



FEDeRATED high level semantic model

LOGISTICS ONTOLOGY

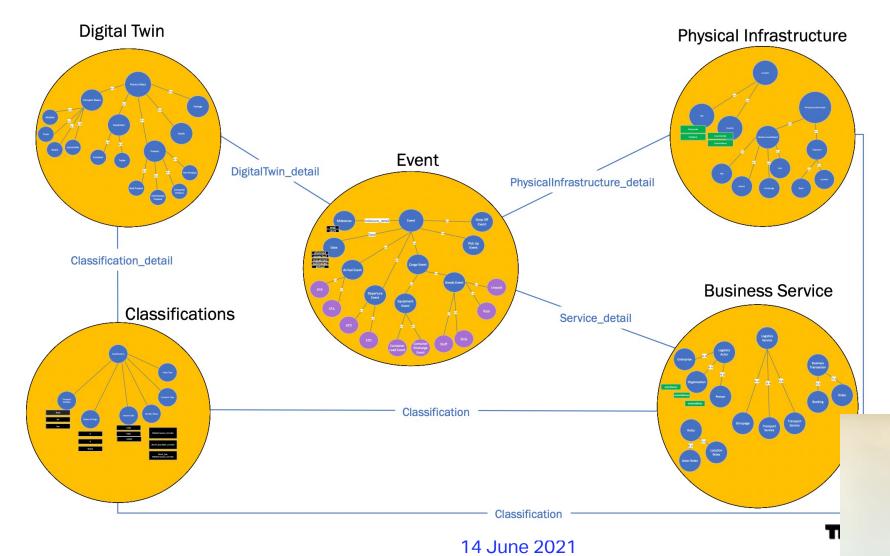
- Network of 5 ontology modules
 -) Event
 - Digital Twin
 -) Physical infrastructure
 -) Business and compliance
 - Classification



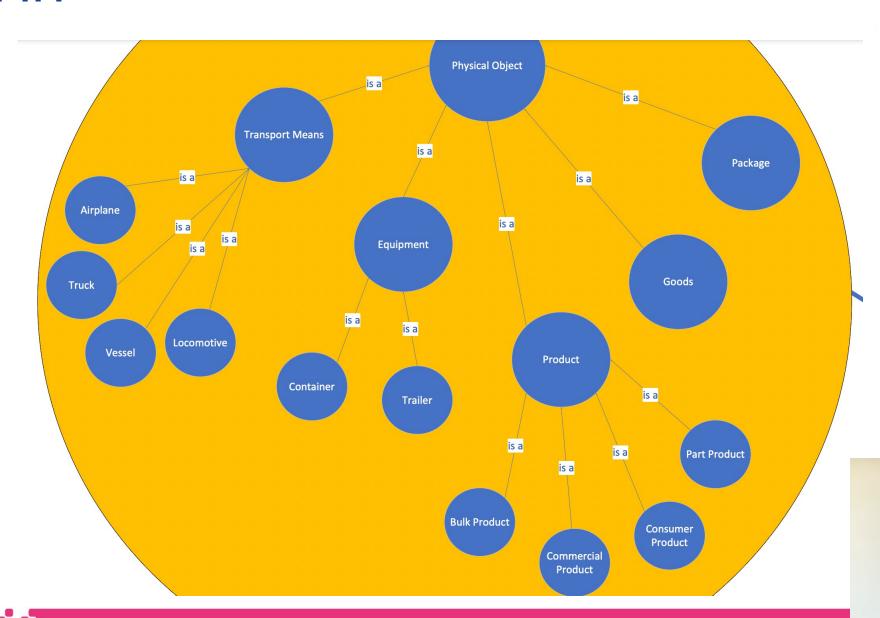


Zoom in





Zoom in ++





Zoom in +++



```
Event: ATDEvent
  rdf:type owl:Class ;
  rdfs:comment "An ATD Event (Actual Time of Departure Event) is a departure event with the actual date-time.";
  rdfs:label "ActualTimeOfDepartureEvent";
  rdfs:subClassOf Event:DepartureEvent ;
Event: Arrival Event
 rdf:type owl:Class;
  rdfs:comment 'An Arrival Event is an association between a Digital Twin type TransportMeans and a location. It should ha
  rdfs:label "Arrival Event";
  rdfs:subClassOf Event:Event ;
Event:BulkDischarge
  rdf:type owl:Class ;
  rdfs:label "Has Manager" ;
  rdfs:subClassOf Event:BulkTransportEvent ;
```



What can you do with the ontology?

14 June 2021



- Align it with other ontologies
- Map to data models
- Generate data models
- Generate APIs

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- Create graphs, like Knowledge Graphs (KG)
- Query and reason with Knowledge graphs





Aligning ontologies



ALIGNMENT OF MODELS ERA ONTOLOGY



Definition:

Process of comparing two models and determining how they relate to each other.



era:Manufacturer

era:VehicleKeeper (1)

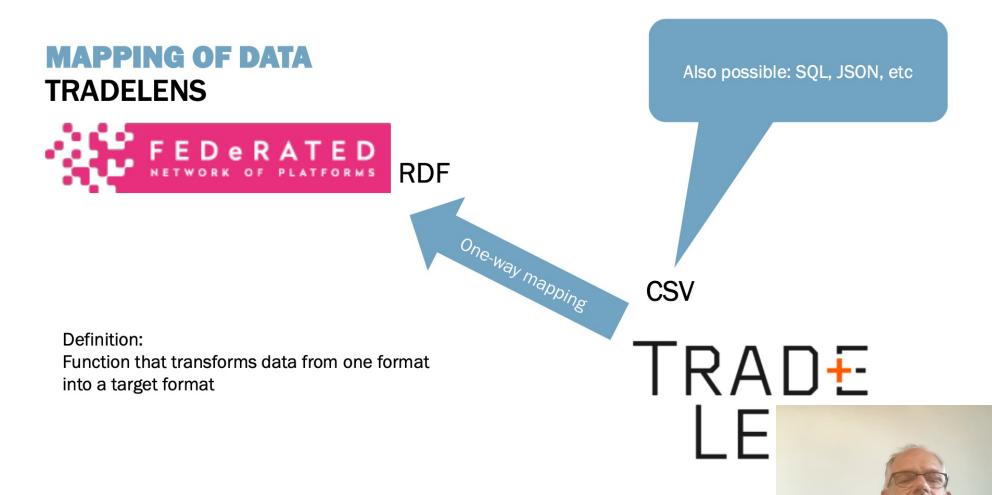






Map to data models





Generate data models



ሦ master ▼

ONE-Record / working_draft / API / json-ld / Cargo related models / co2CalcMethod.json



Andra Blaj Remove @language from JSON-LD samples

As 0 contributors



Generate API's

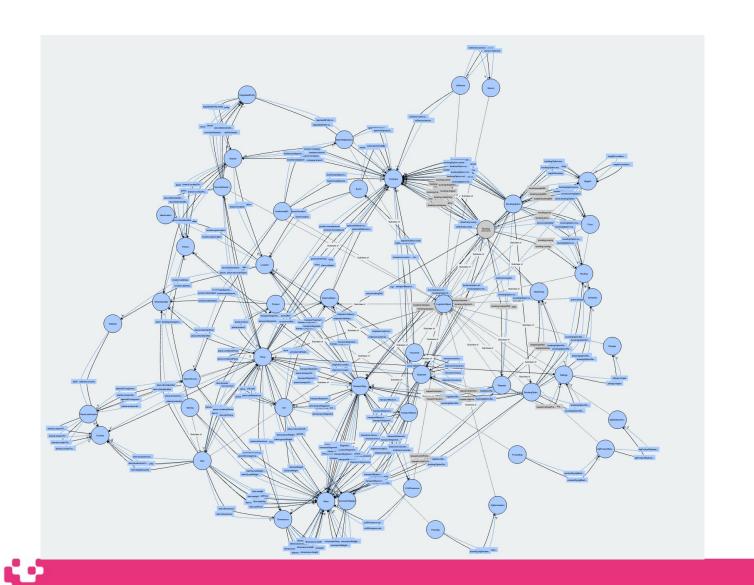


⊕ swagger	Select a spec default
ONE Record API Documenta	Responses
[Base URL: onerecord.iata.org/] https://onerecord.iata.org/v2/api-docs ONE Record Server autogenerated Swagger API documentation. Note! By testing this API documentation you agree the data and actions tha	Code Description
commercial or other sensitive information in this sandbox since its exposur documentation. Please download and run the <u>ONE Record Java sandbox</u> low	200
ATA ONE Record - Website iend email to IATA ONE Record	Example Value Model
MIT License	{ "https://onerecord.iata.org/cargo/LogisticsObject#companyIdentifier": "string", "https://onerecord.iata.org/cargo/LogisticsObject#event": [
companies-resource Companies Resource	{ "@type": [
delegation-resource Delegation Resource	"https://onerecord.iata.org/cargo/Event"], "https://onerecord.iata.org/cargo/Event#dateTime": "2021-06-14T16:05:55.972Z",
logistics-objects-resource Logistics Objects Resource	"https://onerecord.iata.org/cargo/Event#eventCode": "string", "https://onerecord.iata.org/cargo/Event#eventName": "string", "https://onerecord.iata.org/cargo/Event#eventTypeIndicator":
/companies/{companyId}/los Creates a logistics obje	"https://onerecord.iata.org/cargo/Event#linkedObject": "string" "https://onerecord.iata.org/cargo/Event#location": {
/companies/{companyId}/los/{loId} Retrieves a	"@tvpe": [



Create Knowledge Graphs (KG)

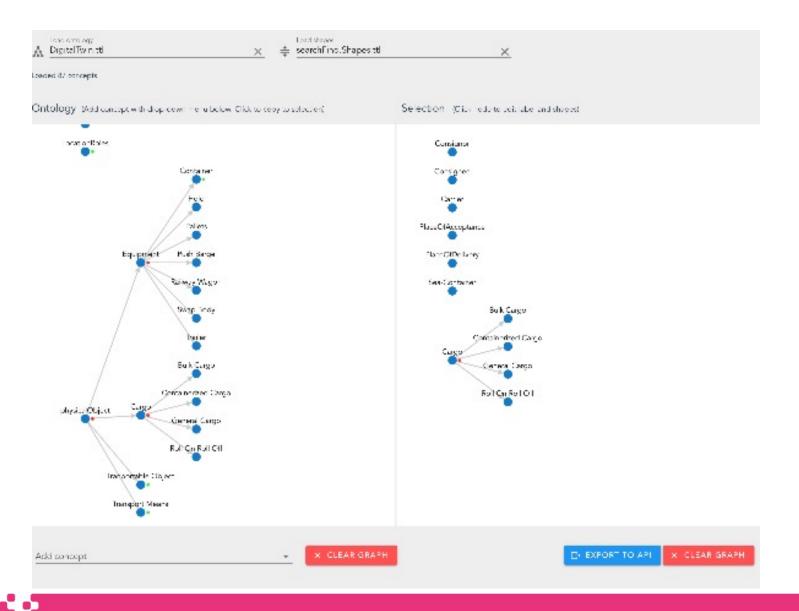






Query and reason with graphs

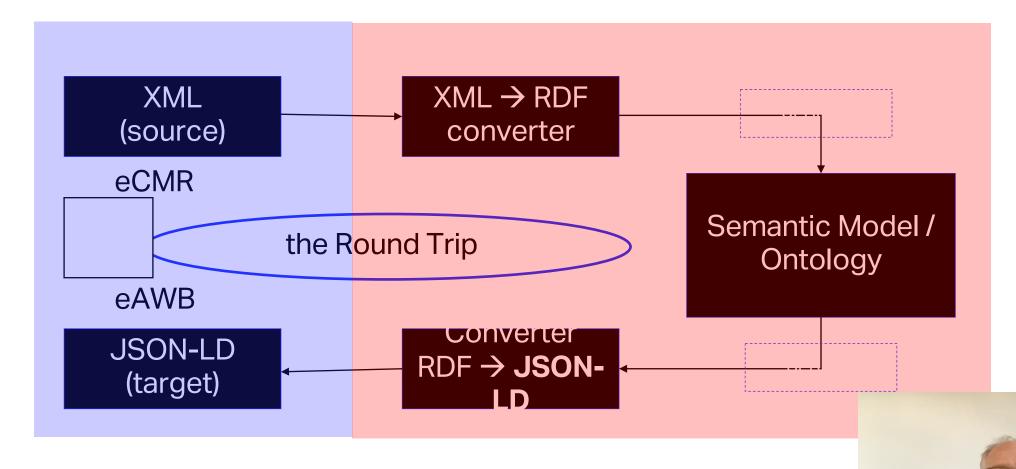






Semantic model in practice



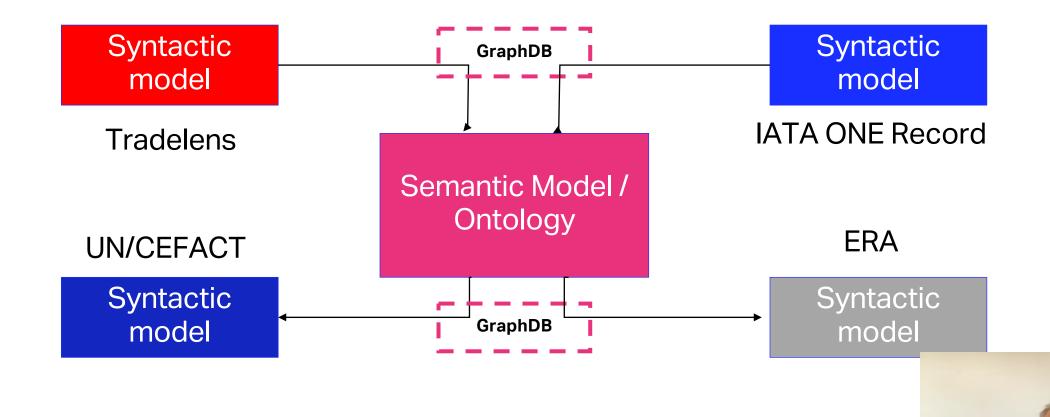


(example only)



Semantic interoperability

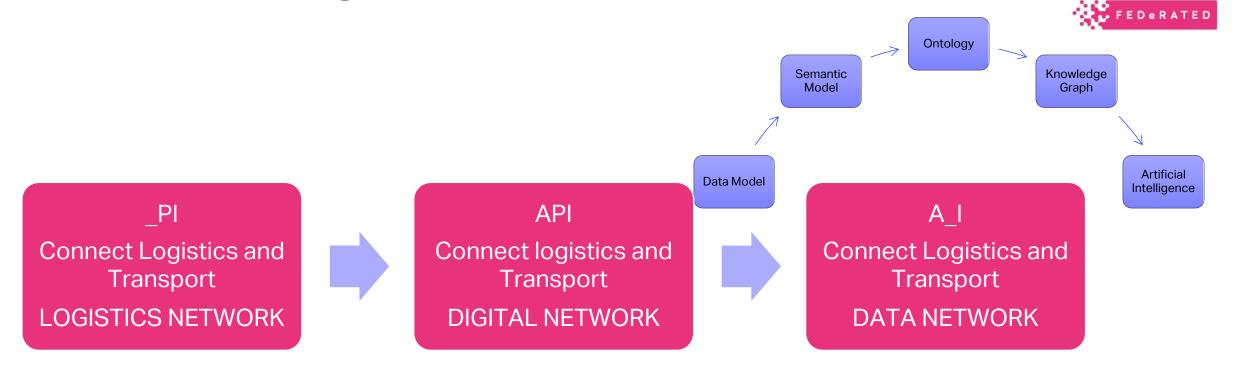




(example only)



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FEDeRATED Semantic Model



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3 June 2021



