

#### **INFR/ABEL**

Using a datacentric approach for the greater good

Well, hopefully

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# The issue Our solution Hands on Enterprise data modelling



#### **1. The issue**



#### Infrabel is wide



1. The issue

#### Infrabel is old



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1. The issue

#### Infrabel stays fresh



#### 2. Our solution



#### Institutional answer : Data & Digital

#### Infrabel sample organigram CEO C-Strategy-C-Supply-C-HR-O CFO C-ICT-O COO C-Client-O PR-O Chain-O D&D Asset Op. Real time Projects Maintenance lifecycle Resources

#### D&D's baby : Asset360

- Golden record of infrastructure & assets
- Myriad of data sources



### **Behind Asset360 : Enterprise Data Model**

- 1. Use case of EDM : *everything* 
  - Inside Infrabel : all DB must map to EDM
  - Outside Infrabel : EDM must map to Rinf
- 2. The more general, the better : semantic modelling
  - Linked data technologies
     (RDF)







# 3. Hands on Enterprise data modelling

< me, hard at work, modeling

## **Start with friends !**

- We do not start from nothing : <u>https://app.ontorail.org/ontorail</u>
- Most are for

#### relational DB

Image: Source Ontologies:	al Search User's manual	Match Term Download Upload SPARQL OntoDiff Login
[ERA] v3.0.0       Image: Construction of the European Union Agency for Railways to describe the concepts and relationships related to the European railway infrastructure and the vehicles authorized to operate over it.         . 36 Classes       . 36 Classes         . 146 Object Properties       . Image: Construction of the European Infrastructure and the vehicles authorized to operate over it.         . 38 Classes       . 146 Object Properties         . 293 Data Properties       . Image: Construction Properties         . 0 DataTypes       . DataTypes	<ul> <li>[ERA] v3.0.1</li> <li>Vocabulary defined by the European Union Agency for Railways to describe the concepts and relationships related to the European railway infrastructure and the vehicles authorized to operate over it.</li> <li>36 Classes</li> <li>156 Object Properties</li> <li>290 Data Properties</li> <li>0 DataTypes</li> </ul>	[ EULYNX ] 09-Mar-2023 Extracted ontology from the release 1.2 of EULYNX DataPrep in XMI format. The EULYNX DataPrep model has been designed to define the format that Infrastructure Managers and suppliers/engineering companies will use to exchange information about signalling engineering and configuration data. EULYNX is an European initiative by 15 Infrastructure Managers to standardise interfaces and elements of the signalling systems. 113 Packages 882 Classes 2110 Properties - Incl. 953 ObjectProperties - incl. 1157 DatatyoeProperties
Creative Commons Attribution 4.0 International License.	Creative Commons Attribution 4.0 International License.	<ul> <li>- incl. 854 uml:Aggregations</li> <li>- incl. 702 uml:Association</li> <li>- 193 Enumerations</li> <li>- 8 DataTypes</li> <li>EUPL 1.2 International License.</li> </ul>
[RSM] v1.2 ext RailSystemModel (RSM) provides a structural backbone model to rolsystemModel foster digital continuity across railway domains and business processes. RSM cooperates with Expert Projects in their respective domains (for example Eulynx for signaling, ifCRail for BIM process,). • 36 Packages • 248 Classes	[ Transmodel ] v6.56 CEN European Reference Data Model for Public Transport Information Transmodel provides an abstract model of common public transport concepts and data structures that can be used for timetabling, fares, operational management, real time data, journey planning etc. • 316 Packages • 1093 Classes	[X2Rail-4] v2022-01-13 Advanced signalling and automation system - Completion of activities for enhanced automation systems, train integrity, traffic management evolution and smart object controllers. This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 881806.
303 Properties     incl. 98 uml:Aggregations     incl. 154 uml:Association     20 Enumerations     10 DataTypes     104 uml:Literal	1000 creative Commons Attribution 4.0	23 Packages     347 Classes     1801 Properties     - incl. 805 DatatypeProperties     incl. 996 ObjectProperties     173 Enumerations     15 DataTypes     X2RAIL 4

#### What is a topology ?

- Conceptual abstraction of the physical network
- Independence between skeleton of the network and its physical counterpart
  - Time & space consistency
- We can *hang stuff* to the topology
  - We need this because not everybody has the same definition of the network





# The railway network as a mathematical graph

#### Nodes & edges

- Nodes : straight trails and switches
- Edges : physical connections between nodes

Wait a minute, that's <u>RSM</u> !

There exists other abstractions

#### Asset modelling roadmap



#### Conclusion

- We have an old & wide company, but data should be unambiguous
- Importance of a general data model
- We do not start from nowhere, and we figure it out as we go
- It's important that the whole institution is on board

# Tooling

- Ontology management : protégé
  - <u>https://protege.stanford.edu/</u>
- Ontology presenting : widoco
  - <a href="https://dgarijo.github.io/Widoco/doc/tutorial/">https://dgarijo.github.io/Widoco/doc/tutorial/</a>
- Constraints management :
  - <u>https://shacl-play.sparna.fr/play/</u>
- UML modelling : Entreprise Architect (only one in list not free)
  - https://sparxsystems.com/