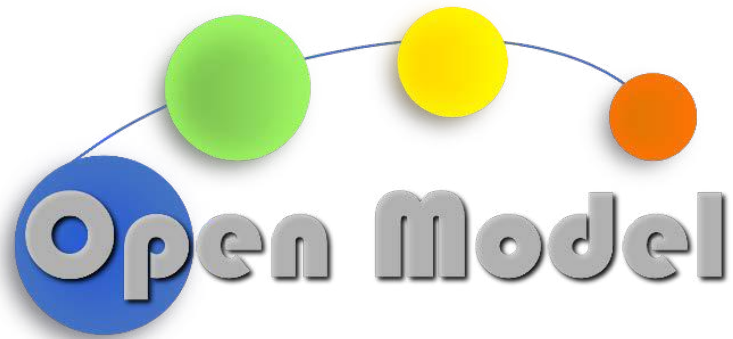


Francesca L. Bleken, SINTEF  
Jesper Friis, SINTEF  
Welchy Leite Cavalcanti, Fraunhofer



OpenModel@  
OntoTrans Workshop  
16.03.2022



# Motivation: Provide technology for running advanced innovation workflows

**Project coordinator:**  
Welchy Leite Cavalcanti (Fraunhofer)

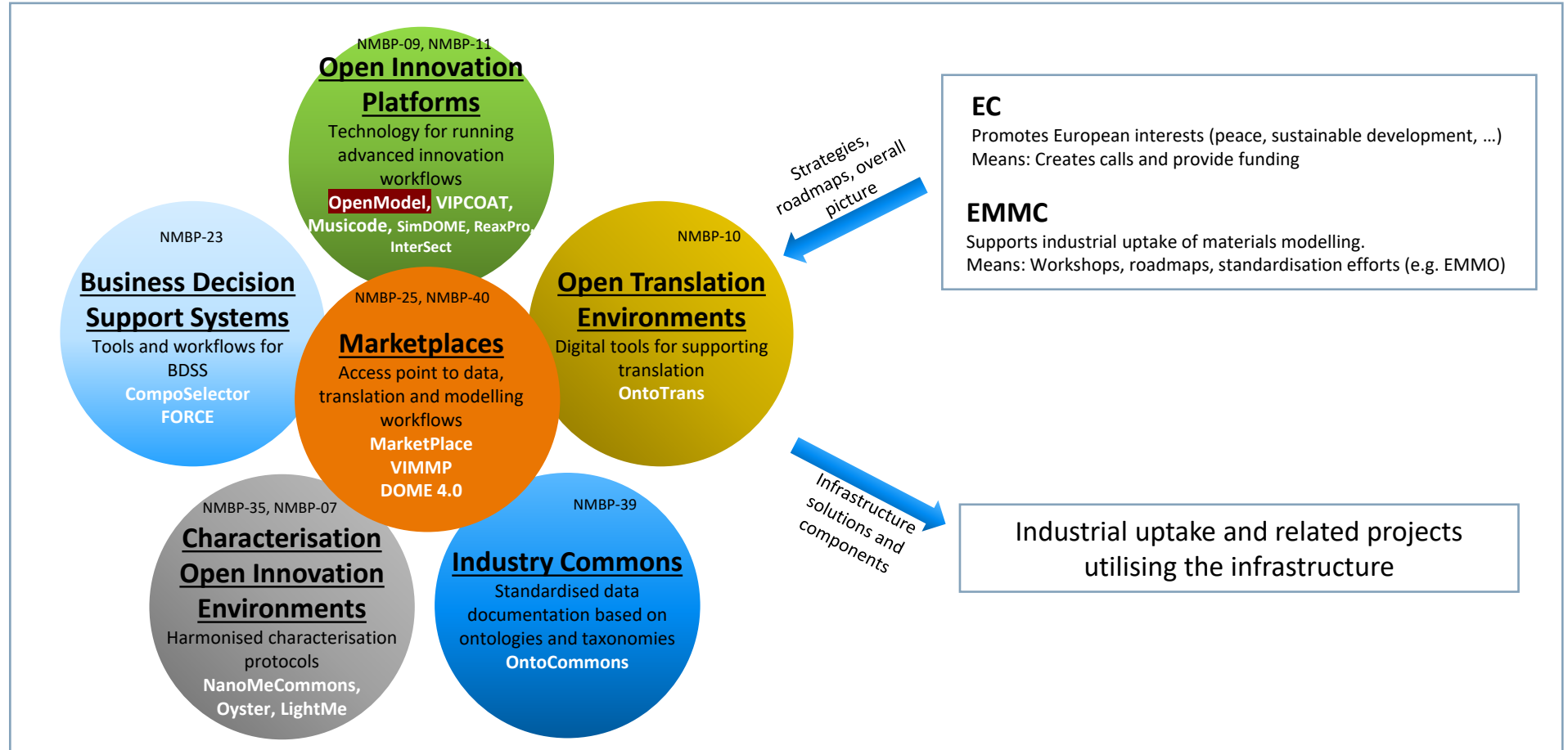
**Technical coordinator:**  
Jesper Friis (SINTEF)

**Call identifier:**  
DT-NMBP-11-2020

**Topic:**  
Open Innovation Platform for Materials Modelling (RIA)

**Project duration:**  
Feb 1 2021 – Jan 31 2025

**Estimated budget:**  
~5 mill Euro

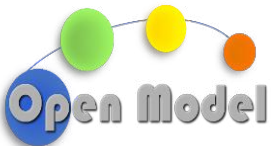


## What is OpenModel:

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Design, create, provide and maintain a sustainable integrated open platform for innovation.

- Deliver **predictable, validated**, and **traceable** simulation workflows.
- Integrate third-party physics-based models, solvers, post-processors and databases seamlessly.
- **OpenModel** thus bridges the gap from industry challenge via translation to **actionable results** that **enable well informed business decisions**.



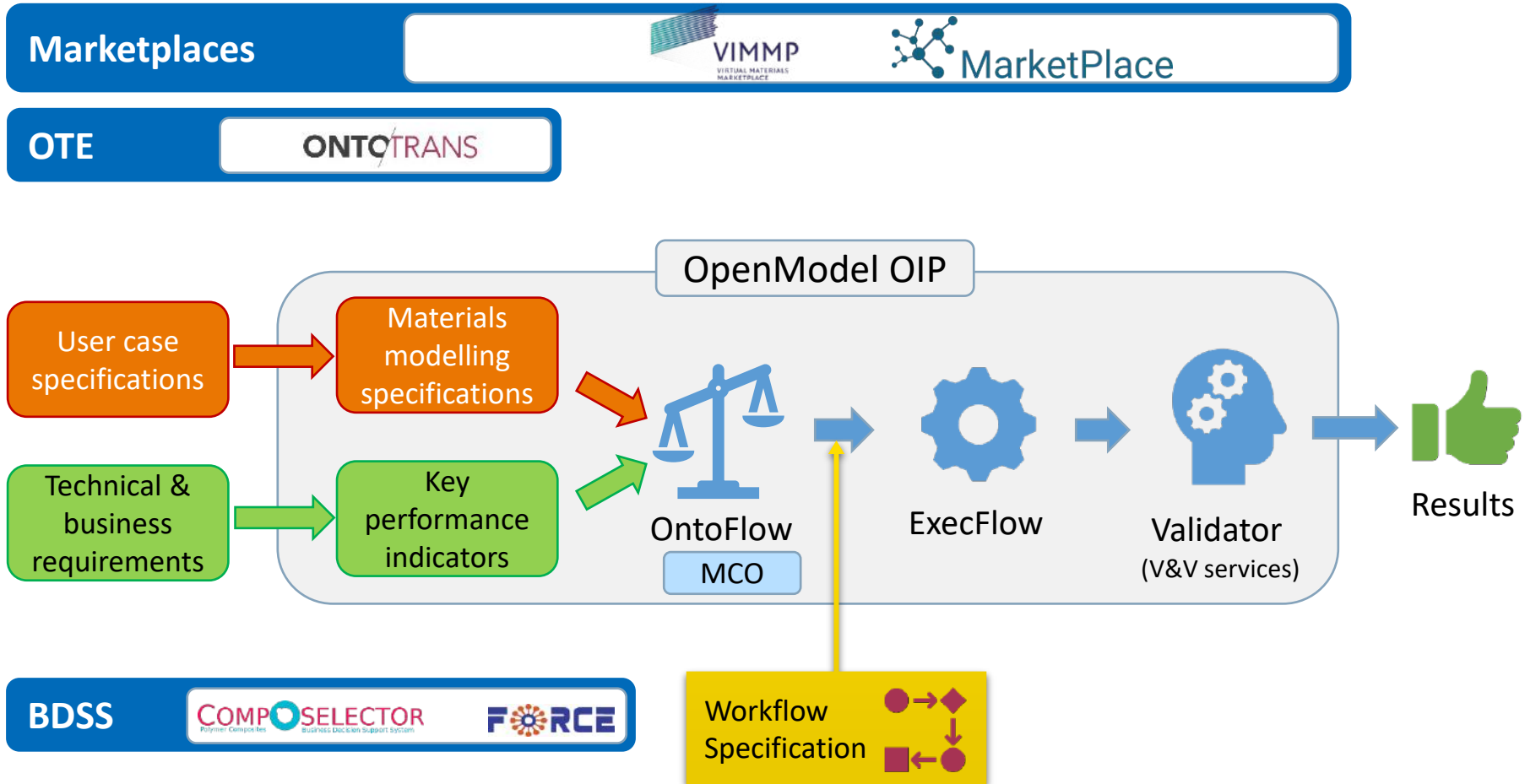
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## Key aspects

- Open Innovation Platform
  - Building and executing concrete workflows.
- OpenModel will build **optimized** workflows.
  - KPIs, Material modelling specifications
  - Semantic AI-aware MCO-supported workflow designer and builder.
- OpenModel reuses and further develops technology used in OntoTrans
  - based on the translation environment capabilities developed in OntoTrans.
  - OTEAPI/Dlite/CUDS
  - OntoKB -> OntoFlowKB (TripleStore)



# Workflow Builder



## Workflow Executor

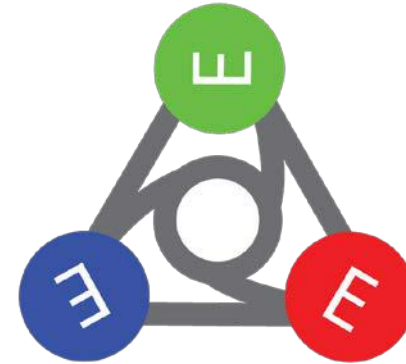
- Workflow runner based on AiiDA
  - Workflow manager
  - Provenance
  - Connection to HPC
- Semantic interoperability incorporated as part of OpenModel.



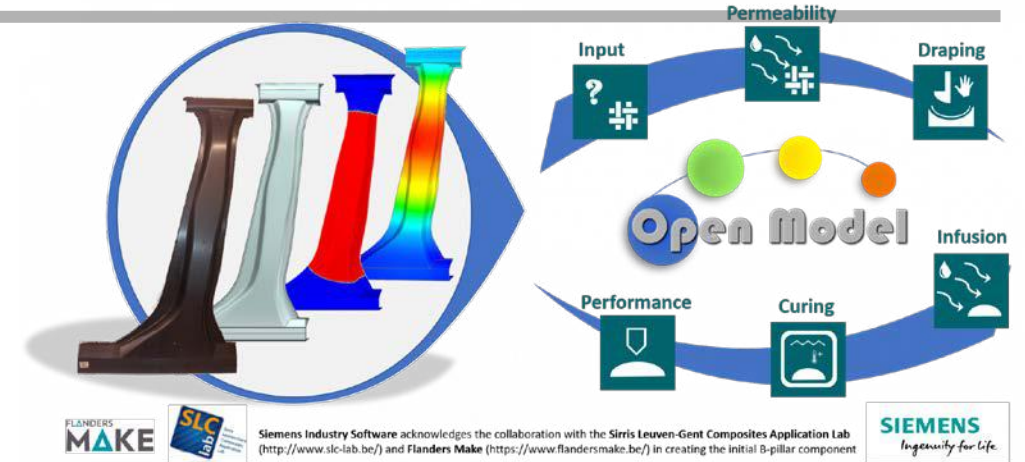
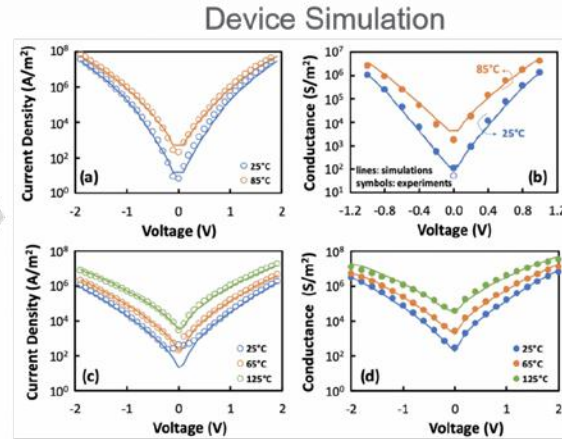
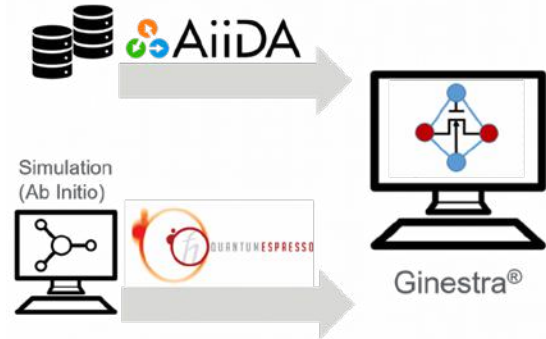
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## Ontologies

- Currently developing workflow and model basics in EMMO-middle, jointly with OntoTrans.
- Generic workflow ontology.
- Generic KPI ontology.
- Generic V&V ontology.
- Application ontologies
  - Specified (workflow, KPI, V&V)
  - Domains
  - Application



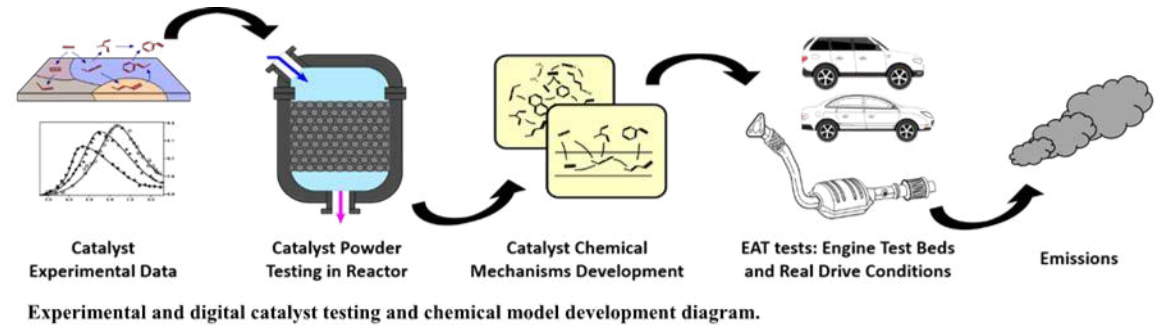
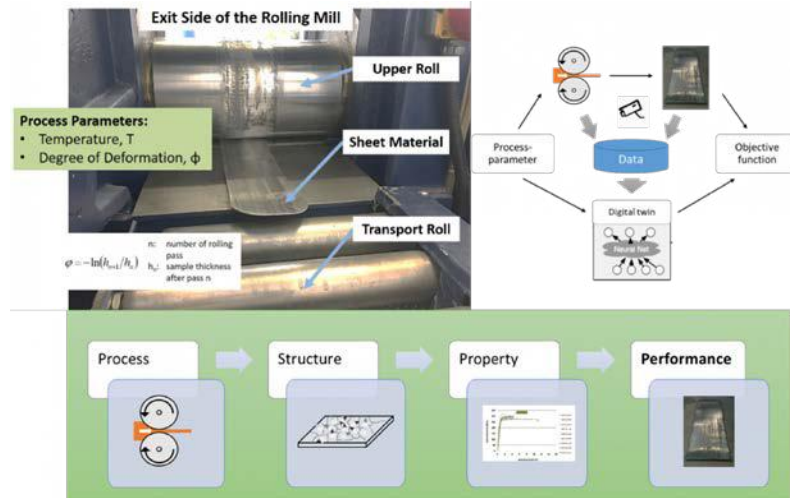
# Ontologies – OpenModel domains of interest



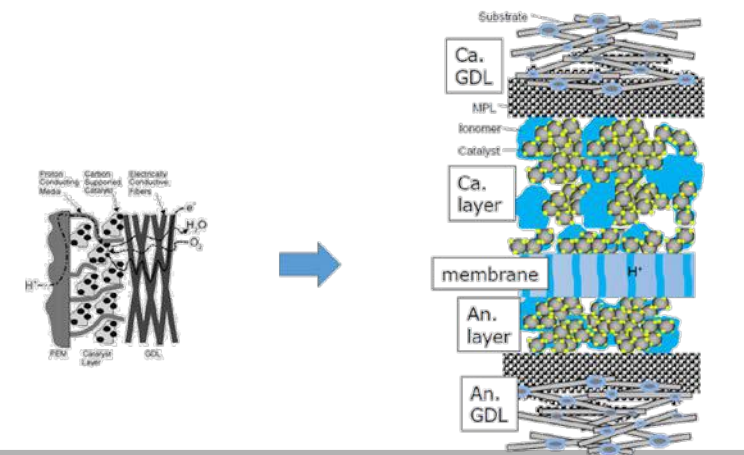
Success story	Long-term goals	Partners
SYNAPTIC ELECTRONICS	Development of next-generation memory devices	CNR, AMAT
COMPOSITE MANUFACTURING	Virtual manufacturing for automotive composite components	SISW
ALUMINIUM REINFORCED CONCRETE	Competitive and environmentally friendly constructions with aluminium reinforcement	Hydro, SINTEF, HEREON



# Ontologies – OpenModel domains of interest

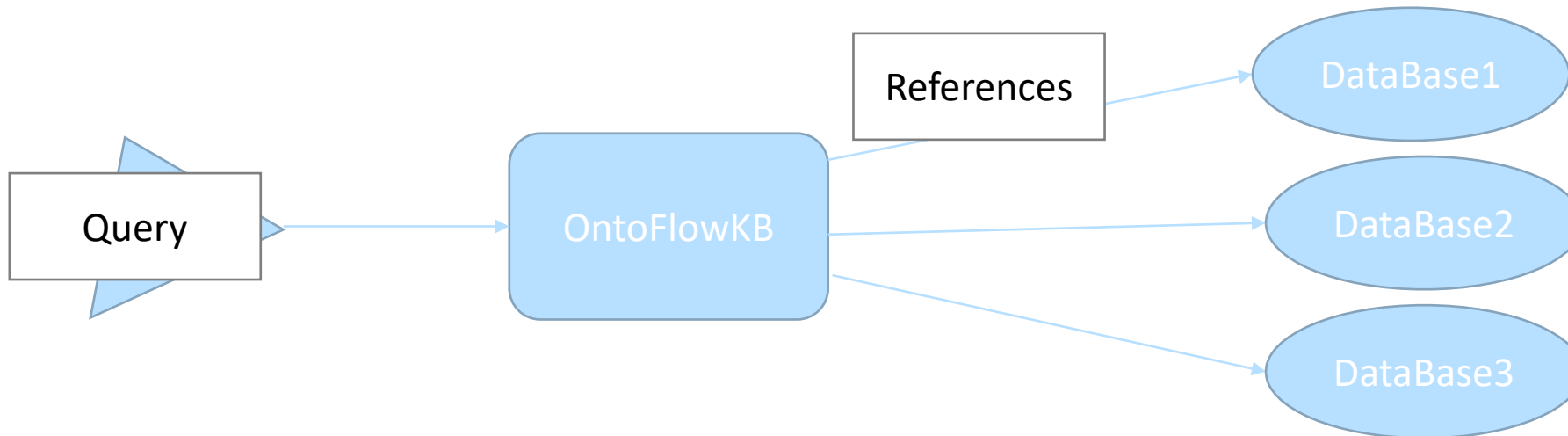


Success story	Long-term goals	Partners
METAL FORMING	Resourcing efficient metal processing and manufacturing	HEREON
DIGITAL POWDER TESTING	Development of efficient catalytic powders	CMCL
FUEL CELL TECHNOLOGY	Improved hydrogen fuel cells for transportation	DCS, TOYOTA, HEREON

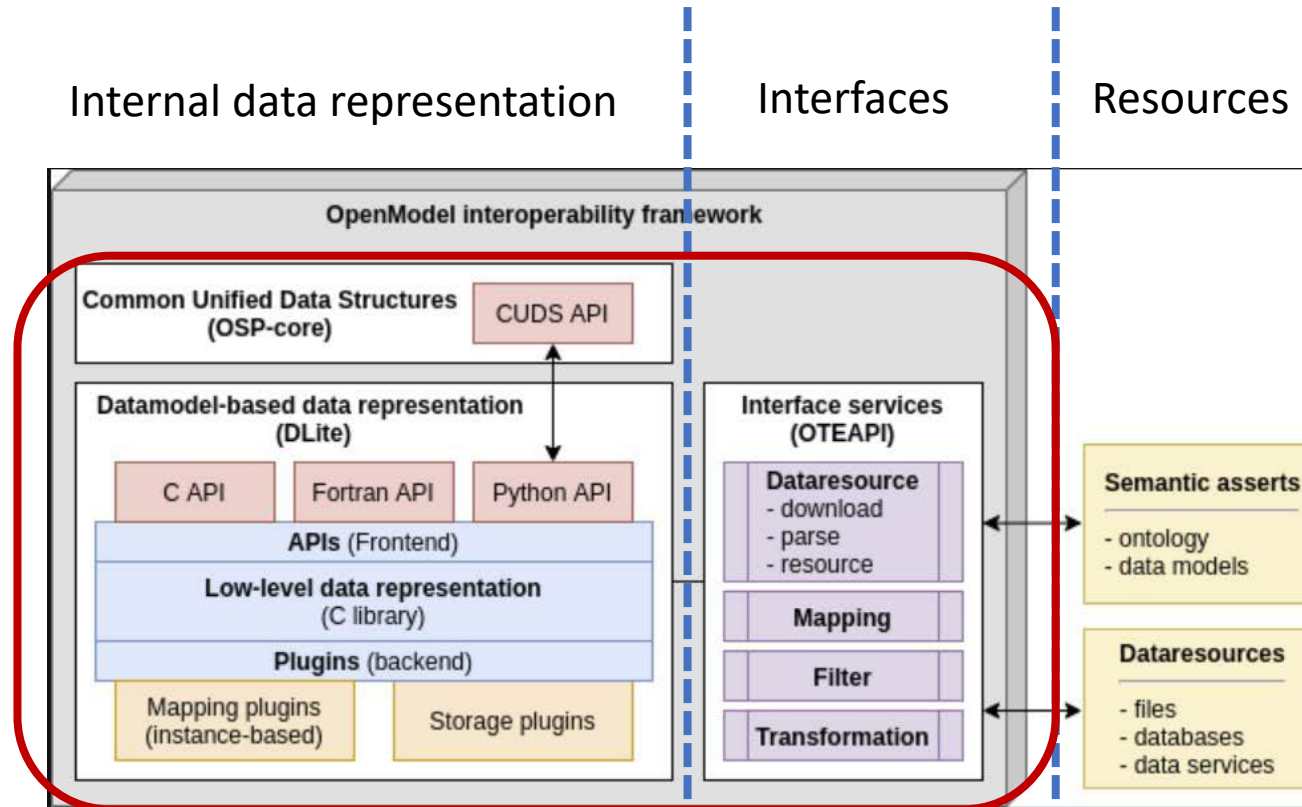


## Connectors (how are different knowledge sources connected)

- OntoFlowKB, data catalogue.
  - References to third party databases.
- The search capabilities in OntoFlowKB make it possible to couple data sources.



# OpenModel interoperability foundation



<https://github.com/SINTEF/dlite>

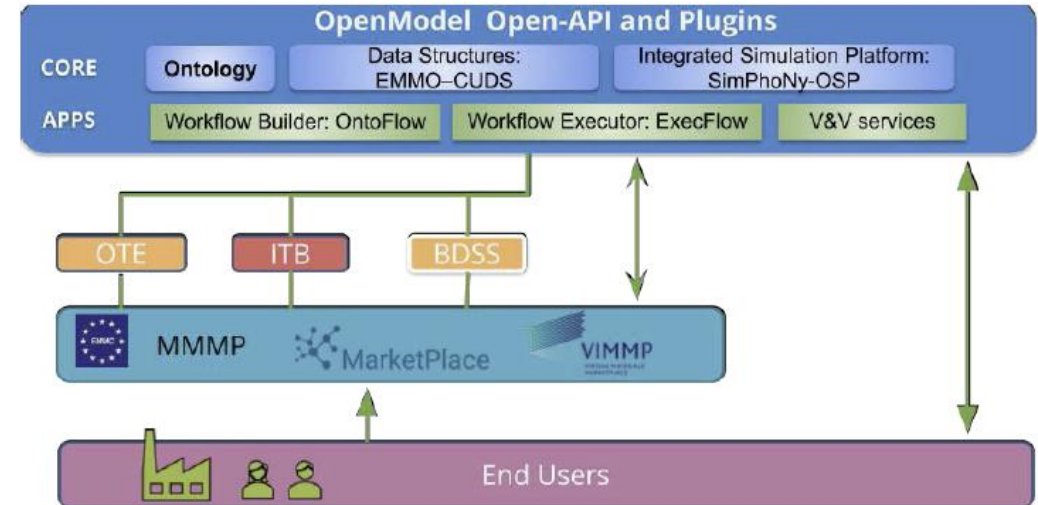
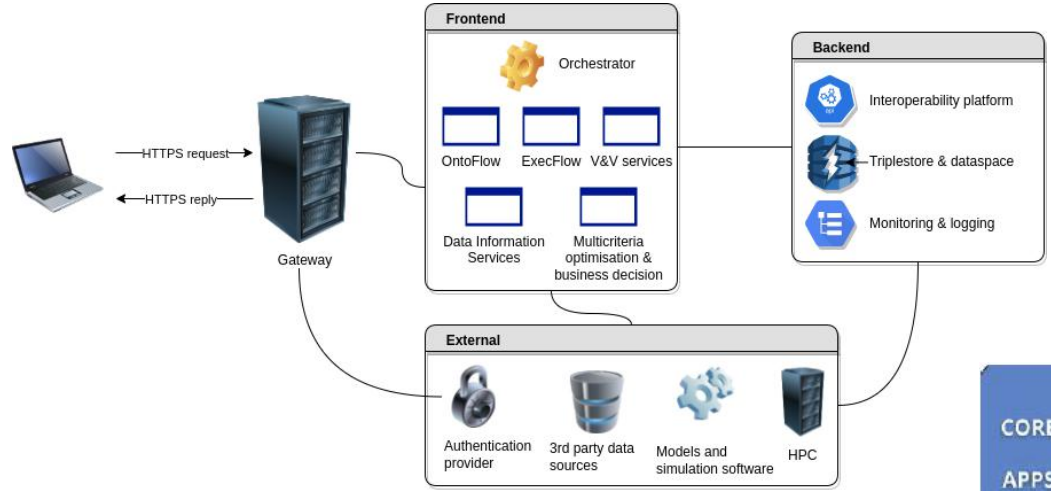


<https://simphony.readthedocs.io/en/latest/>



# Interfaces

- WEB-API
- WEB-GUI



- OTEAPI: Strategies
- AiiDA: Plugins

Figure 3: Main architecture concept and connections of OpenModel OIP to MMMP and other innovation platforms.





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