



Sodalite

Introduction to the SODALITE

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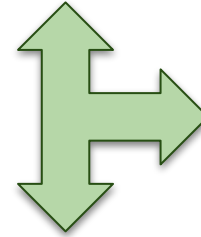
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SODALITE: Motivation

Complex applications



Trustworthy
deployment of
complex app
topologies in
heterogeneous
infrastructures




HPC




slurm
workload manager



Cloud



aws Google Cloud



openstack OPENFAAS

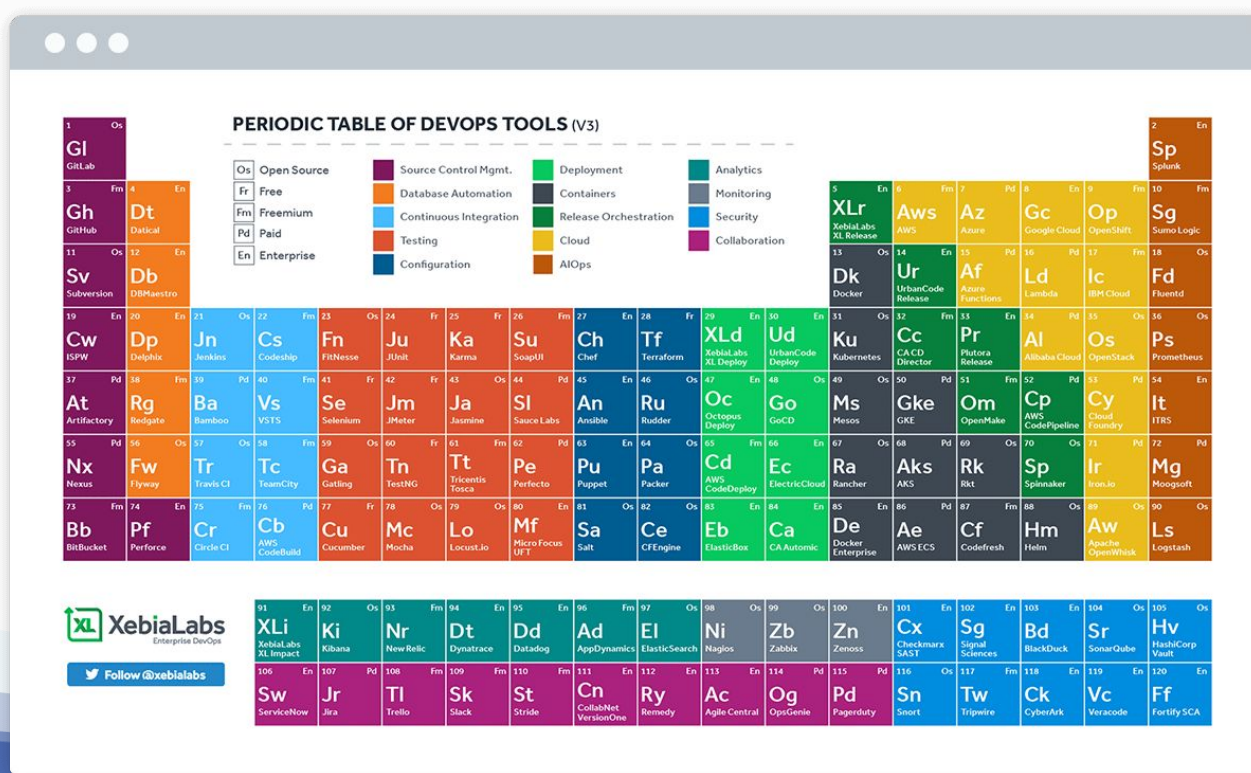


EDGE



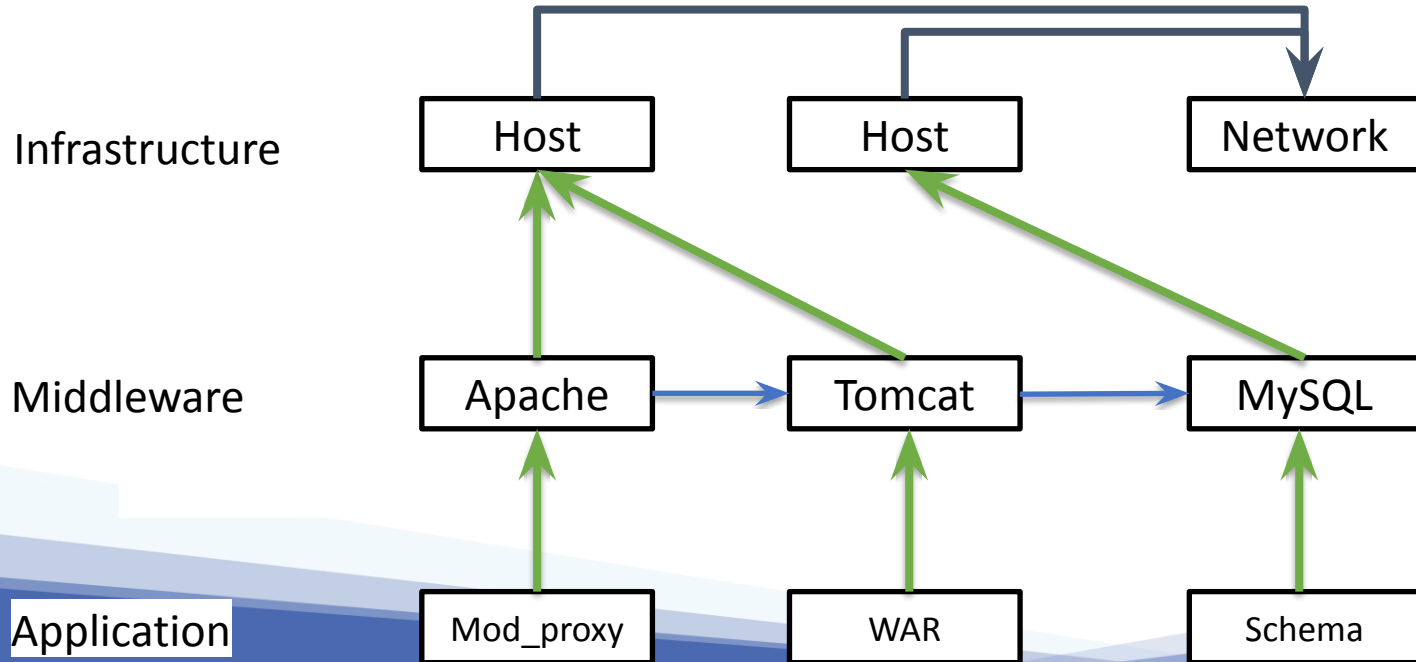
kubernetes

The Realm of DevOps Tools

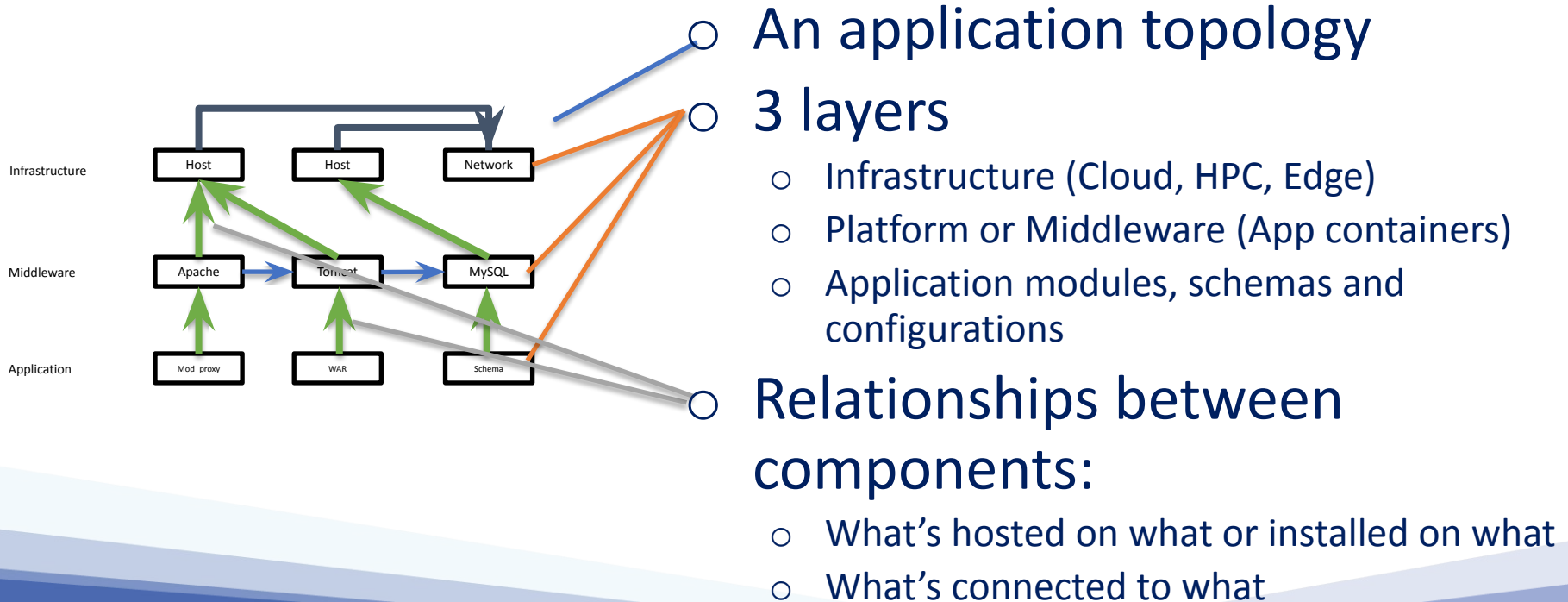


Towards Standard Infrastructure-as-Code Sodalite

→ **An Application Deployment Topology**, i.e., “a graph of physical artefacts that need support for several lifecycle phases (e.g., procurement, installation, configuration, deployment, undeployment, teardown, etc.)”



Where Does TOSCA fit into?



○ An application topology

○ 3 layers

- Infrastructure (Cloud, HPC, Edge)
- Platform or Middleware (App containers)
- Application modules, schemas and configurations

○ Relationships between components:

- What's hosted on what or installed on what
- What's connected to what

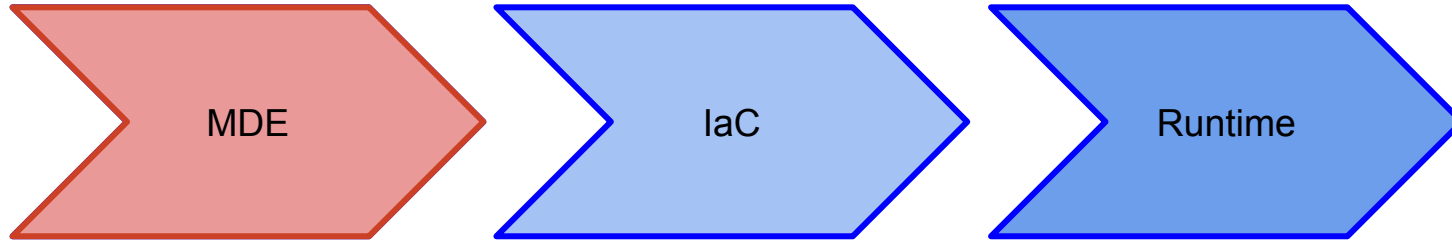
What is SODALITE?



SODALITE provides tools to enable **simpler and faster development of IaC and deployment and execution of heterogeneous apps in HPC, Cloud & SW** defined computing environments.

- Particular focus of SODALITE is on simplifying the authoring of application deployments by offering semantic-based **guidance** to the end users.

SODALITE Approach

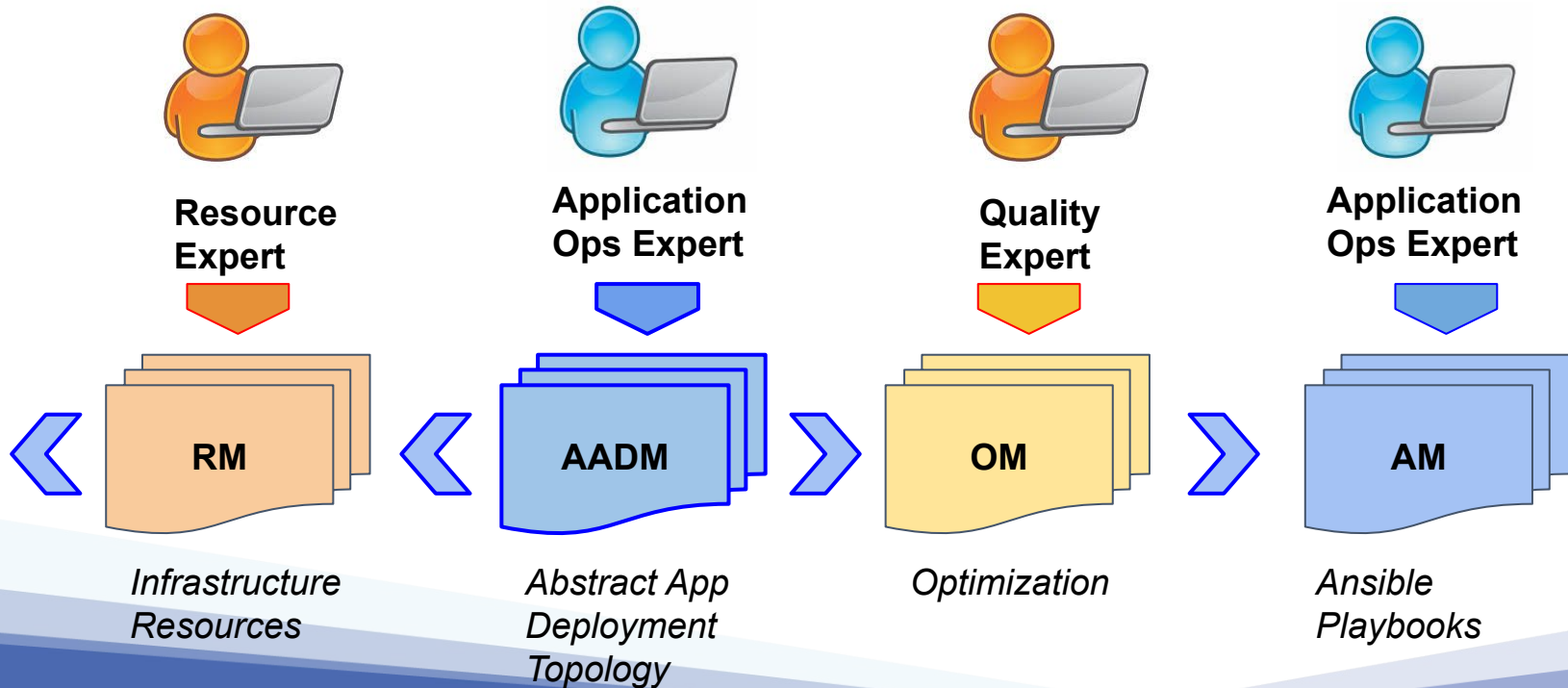


- ❑ **Infrastructure Resource** Modelling
- ❑ **Application Topology** Modelling
- ❑ **Optimisation** Modelling
- ❑ **Ansible** Modelling

- ★ **Image** building
- ★ **TOSCA blueprint** building
- ★ **Infrastructure discovering**
- ★ **IaC validation and smell detection**
- ★ **Ansible** building

- **Parallel, resumable** deployment **Orchestration**
- **Dynamic monitoring**
- **Deployment Refactoring**

SODALITE: Modeling Roles and DSLs

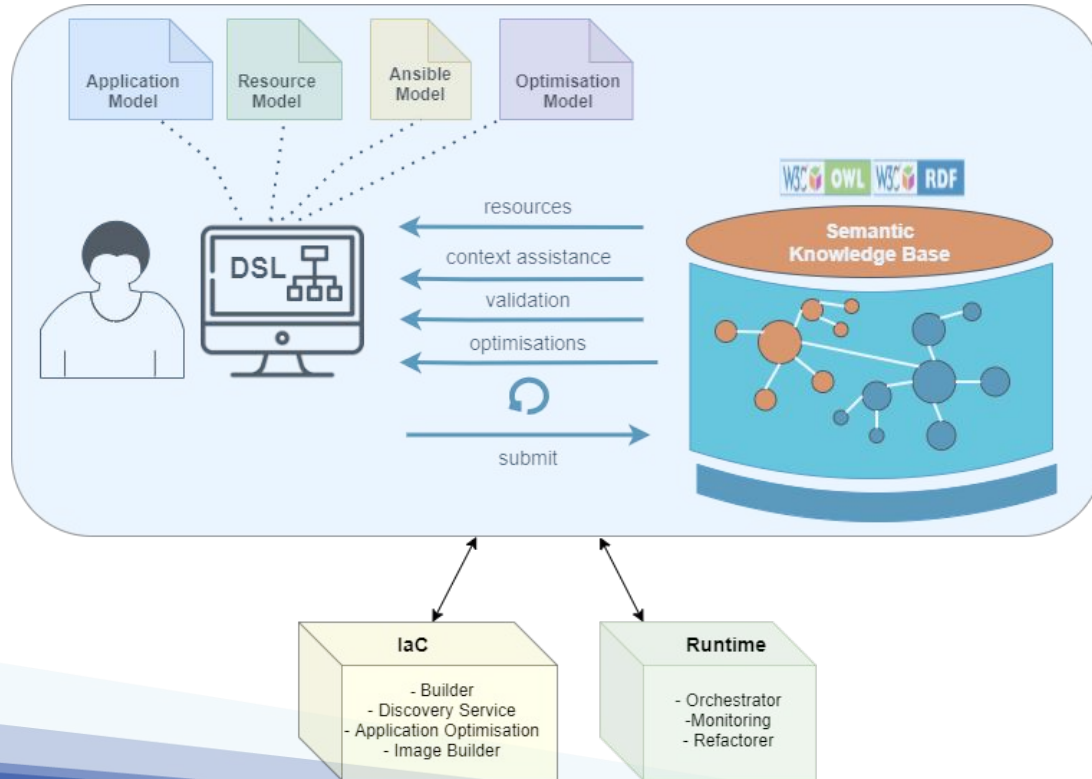


An Example Use Case Scenario



- Suppose that an Application Ops Expert (AOE) wants to design, deploy, execute and monitor a **complex** application in SODALITE
- The **AoE** needs to:
 - Define the deployment model
 - Select the resources to be used at runtime
 - Request for guidance during the authoring
 - For example, get the correct properties for an application - *instance of a specific type*
 - Submit the model for saving
 - If there are validation errors, correct them and resave the model (iterative)
 - Submit the model for deployment

SODALITE MDE



Why Ontologies?

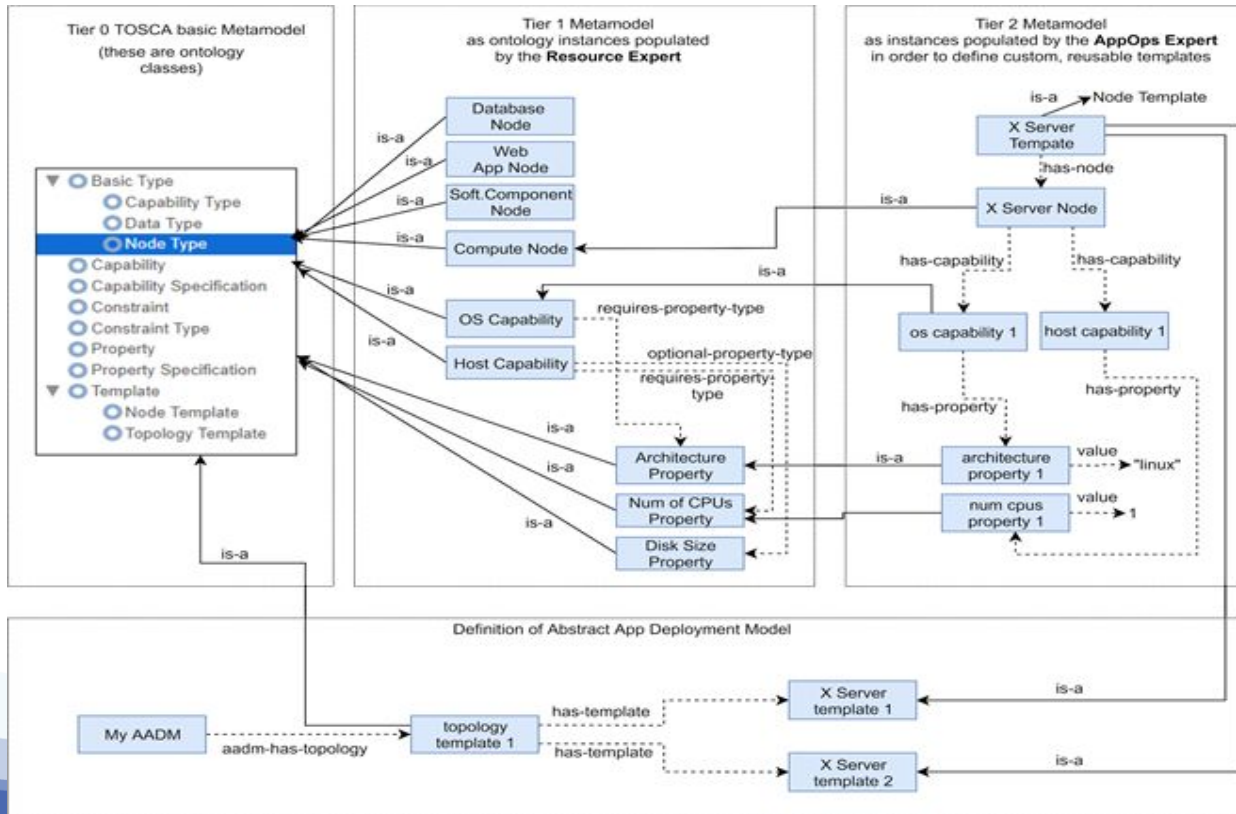


- Unified model represented as Knowledge Graphs
 - OWL2 ontologies + Ontology Design Pattern
 - subsumptions hierarchies, multi-roles
 - Easier to apply inference on the unified model for validation and suggestions/hints
 - Tools and technologies for reasoning
 - SPARQL, and DL reasoners
- Less error-prone models - Users get guidance

rdfs:subClassOf
owl:propertyChainA
xi:om



SODALITE Modelling Layers



SODALITE Design-time Features



- Model/abstract infrastructure resources
- Model/abstract application deployments
 - Applications as black-boxes
- Textual and graphical DSL for authoring application models
- **Semantic**-based suggestions, validation, abstraction, smell detection, performance optimization
- **IDE** the interaction point with the user:
 - Complete life-cycle support - design, deployment governance, runtime management

SODALITE IaC Features



- IaC acts as intermediary to the Design and Runtime.
- Generation of IaC from the Abstract model
- Automated TOSCA/ansible executable CSAR generation
- Deployment on multiple architectures
- **Platform Discovery** service automates the creation of the Resource/TOSCA models for the Resource Expert
- Creation of the container images for supporting **optimized** execution

SODALITE Runtime Features



- Orchestration over heterogeneous infrastructures
 - Cloud infrastructures, HPC clusters, data management
- Dynamic monitoring of target infrastructures and applications
 - On both Cloud infrastructures, and on HPC clusters
- Refactoring and adaptation of application deployment s
 - Supports the adaptation of the application topology with response to monitoring data and alerts

SODALITE: <https://www.sodalite.eu/>

Smart IDE: <https://github.com/SODALITE-EU/ide>

Semantic Models:

<https://github.com/SODALITE-EU/semantic-models>

Thank you
Q&A