

GeoSemantic Resource Alignment Service

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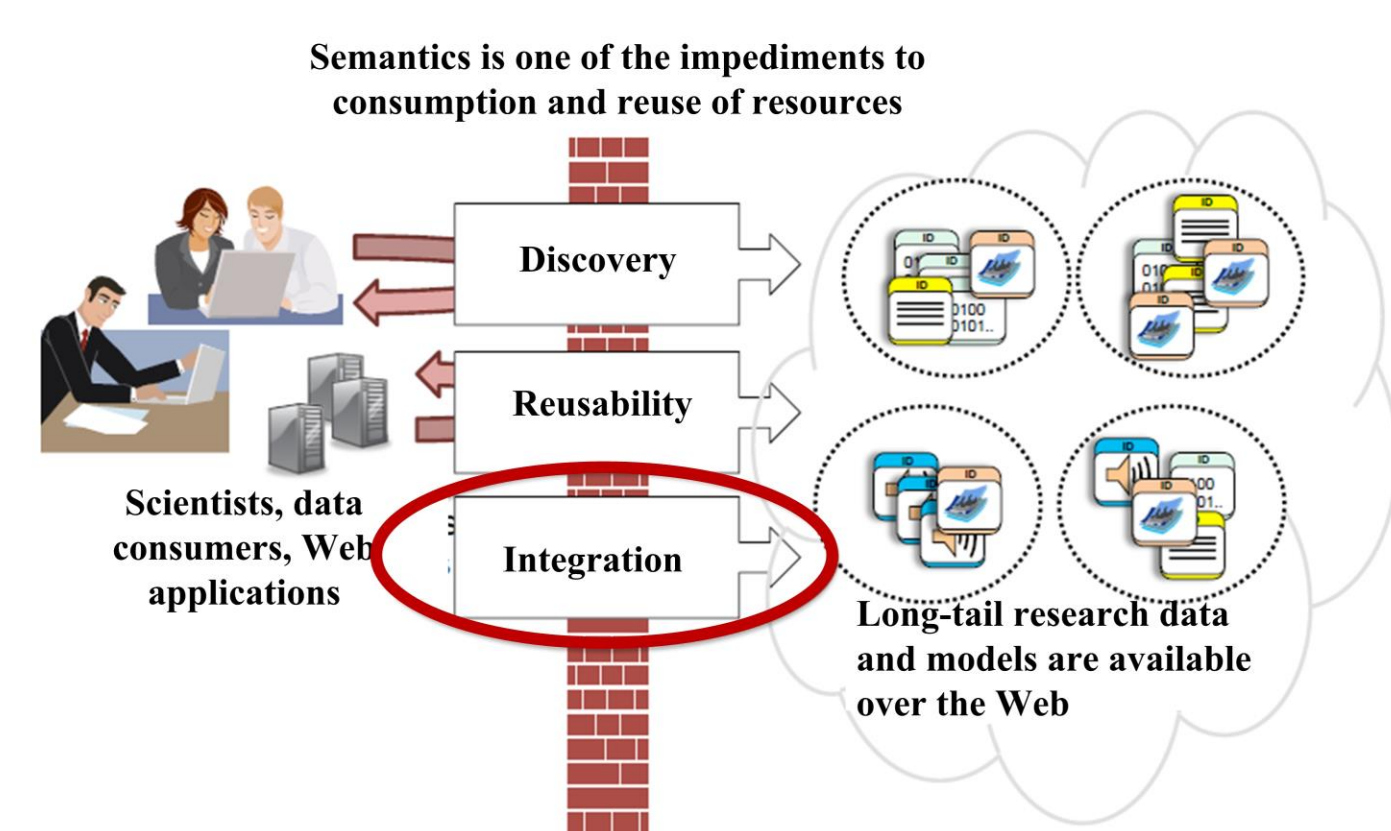
Introduction

Development of integrated Geoscience system increasingly requires the coupling of multidisciplinary models and integration between data and models. Many Geoscience communities have adopted an approach of disseminating their resources (models and data) over the web, which are known as Model as a Service (MaaS) and Data as a Service (DaaS). These resources can be easily (re)used, accessed, and extended. While there has been a notable increase in advancing the coupling of models and integration of models and data over the web, there has been less work on creating tools to allow their semantic consistency over the web. To address this need, we have designed a metadata-agnostic Web service for the geoscience communities named the Resource Alignment Service (RAS) in order to ensure the semantic consistency between the quantities exchanged between resources. RAS is one of the services that are provided by the Geosemantics framework, which aims to overcome the semantic heterogeneity among long-tail models and data collections. Here we (i) introduce the Semantically-Enabled Modeling (SEM) approach, (ii) present the design of RAS, (iii) demonstrate RAS application for semantic coupling of models and integration of models and data. To demonstrate the capabilities of RAS, first we create a workflow of heterogeneous collection of data and models. Then, we show how RAS can seamlessly align the semantics of quantities exchanged between these resources.

Research Challenge

Ensure the semantic consistency of the quantities that are exchanging between geoscience web resources. Semantic consistency requires includes:

- semantic mediation between variable names
- Conversion of mismatched units
- Temporal alignment of resources time horizon
- Spatial alignment of resources spatial attributes



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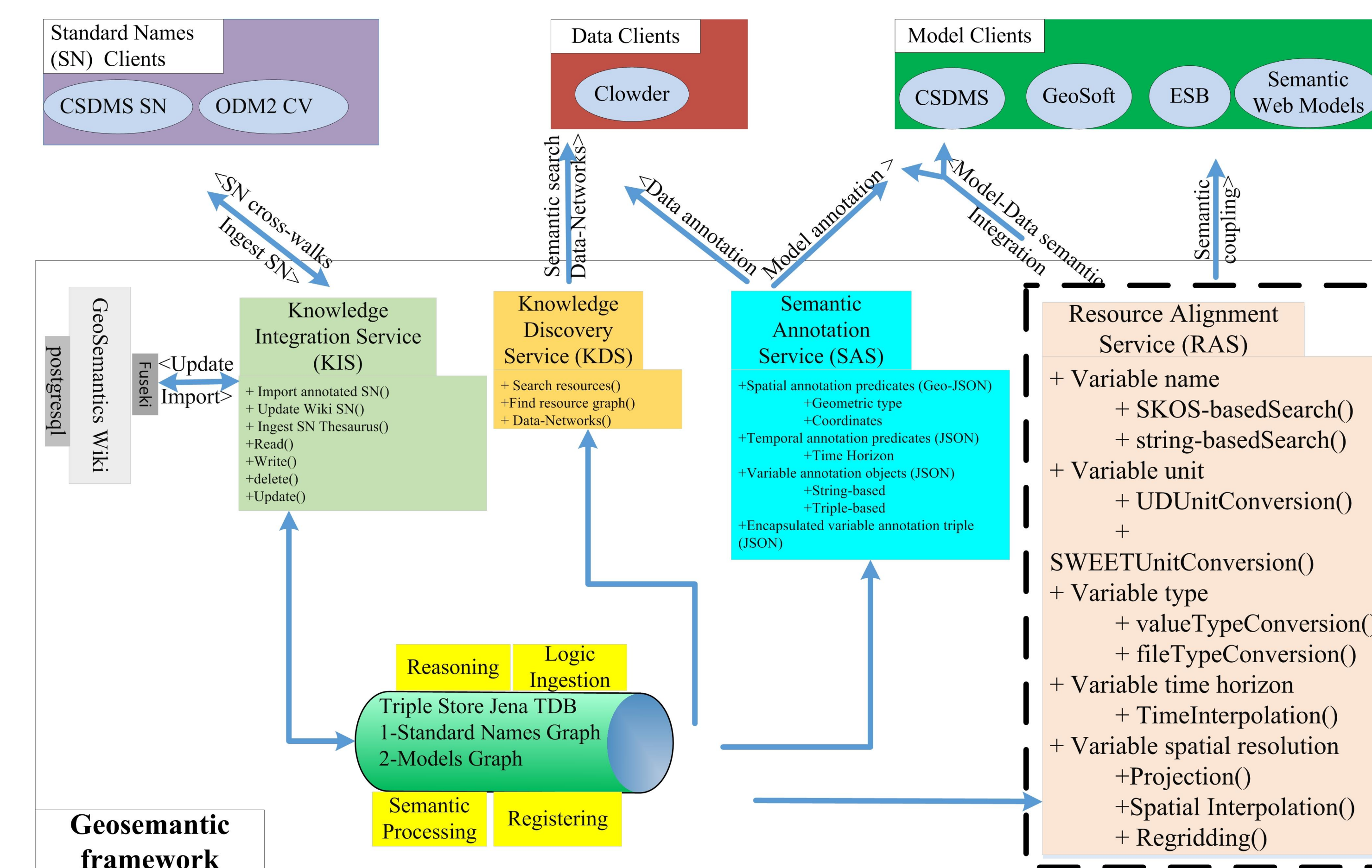
Semantically-Enabled Models

- It aims to add a semantic layer on top of the available or new web serviced models by creating a dynamic metadata schema for processing these models with minimum human intervention.
- JSON is used to store metadata values and link these values to the available standards
- It relies on RAS to ensure and do the required semantic alignment between the fields of the metadata schema



GeoSemantic Framework

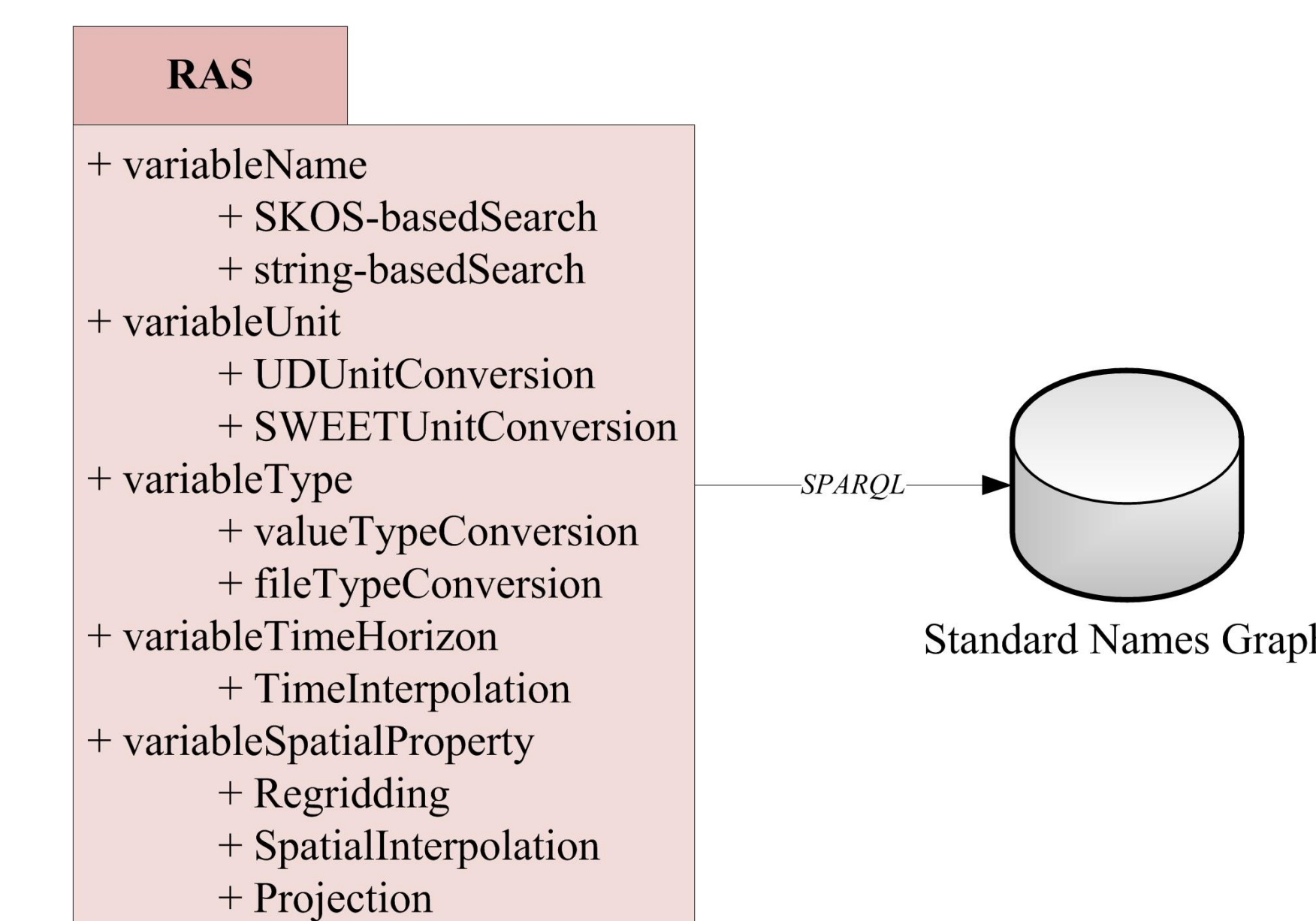
- GeoSemantic framework is an ongoing project that aims to integrate heterogeneous model and data by reducing their semantic misalignment. Resource Alignment Service (RAS) is one of these services.



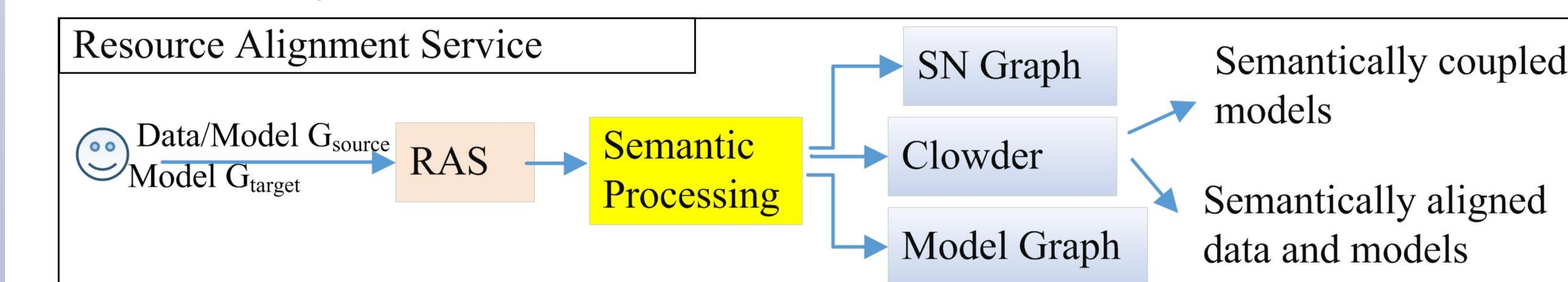
RAS Architecture and Functionality

• Architecture

- Playframework (Scala): Being used for constructing RAS web service
- Jena: Being used for sparqling the data graph



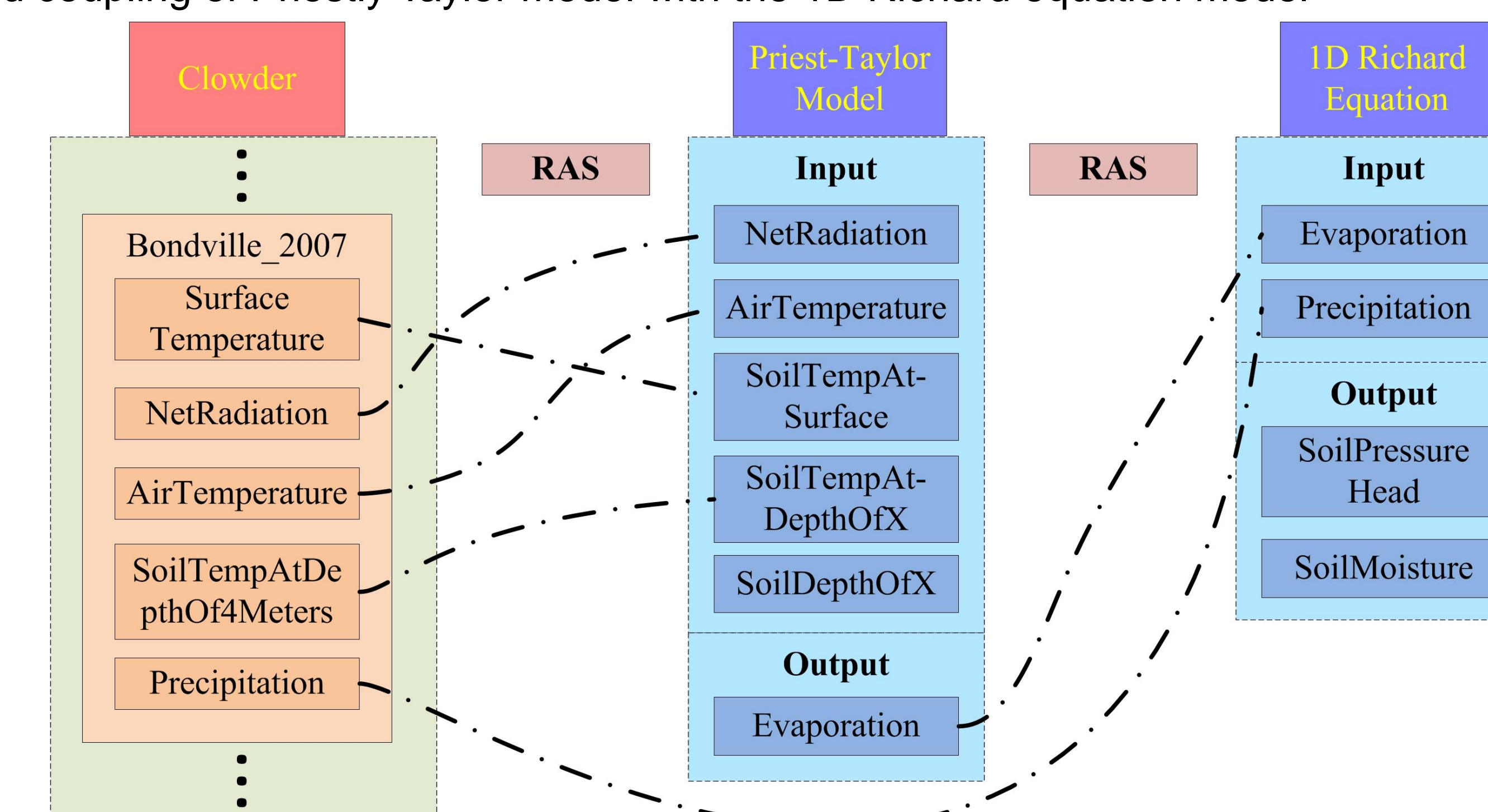
• Functionality



RAS Example Applications

Application 1: Data-model integration: DaaS→ MaaS
Integration of data coming from Clowder with PyWPS-serviced Priestley Taylor model

Application 2: Model-model integration: DaaS→ MaaS→MaaS
Integration of data from Clowder with with PyWPS-serviced Priestley Taylor and coupling of Priestley Taylor model with the 1D Richard equation model



Summary and Future Work

RAS is developed to (through HTTP request)

- check the misalignment of two variables in terms of their attributes,
- conduct a proper conversion
- return back the aligned result.

The future work will be focused on completing the application of RAS on the integration of both DaaS and MaaS.