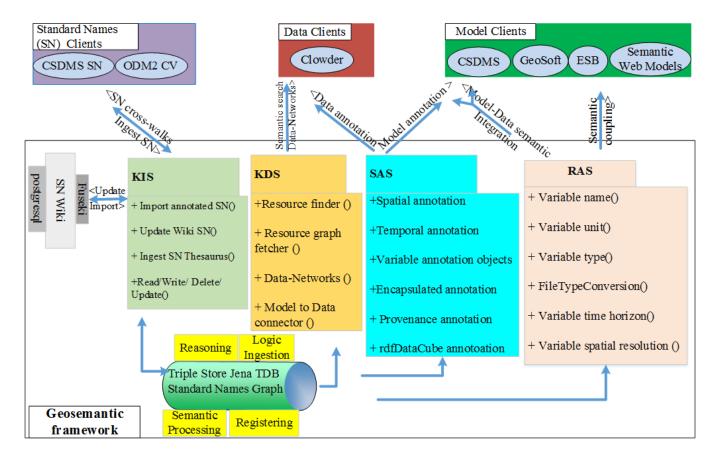
Architecture

- A- Services Framework:
 - o Knowledge-base:
 - o Knowledge management:
 - Reasoner: ECGS-19 Getting issue details... STATUS
 - Semantic processor: ECGS-21 Getting issue details... STATUS
 - Logic ingestion: ECGS-22 Getting issue details... STATUS
 Registrar: ECGS-20 Getting issue details... STATUS
 - Web services:
 - Semantic Annotation Service (SAS):
 - Resources Alignment Service (RAS):
 - Knowledge Discovery Service (KDS):
- Knowledge Integration Service (KIS):
- B- Standard Names Wiki (SNW):-



The Geosemantics framework skeleton consists of two components:

- Services framework to include the services and their related components. Play framework (https://www.playframework.com/) is used to create the services framework.
- Standard Names wiki (SNW) to annotate SN and allow the crosswalks between them. Semantic Media Wiki (https://semantic-mediawiki.org/) is used to create the wiki system.

A- Services Framework:-

It consists of three layers:

1. Knowledge-base:

a. It uses JenaTDB to develop a graph database to store ontologies and Standard Names.

2. Knowledge management:	
a. Reasoner: ECGS-19 - Getting issue details STATUS	
i. It validates the categories and datatypes of the SN stored in the Knowledgeii. Pellet reasoner will be used but, we can add more reasoners such as KAON	
b. Semantic processor: ECGS-21 - Getting issue details	STATUS
 i. It identifies semantic similarity and matching between resources (semantic semantic in matching between models) ii. A resources matchmaker script is required iii. It provides semantic mediation between SN based on SKOS standards iv. SPARQL query 	earch for SN, matching between models and data,
c. Logic ingestion: ECGS-22 - Getting issue details STA	TUS
 i. Bulk upload of SN to the SNW ii. Grouping of SN and identification of the crosswalks to create the Linked Vociii. Annotation of a SN in its original schema. 	cabularies network
d. Registrar: ECGS-20 - Getting issue details STATUS	
 i. It is a catalog for storing information about external resources including serving Geosoft) ii. It provides a form to register a new resource 	ces, data, models, and SN (e.g. the database of
3. Web services:	
a. Semantic Annotation Service (SAS):	
 i. It contains five functions, each function needs to be linked with specific stand ii. Spatial Annotation: It connects to the GML standards to bring predicates and 	
shape (http://www.opengeospatial.org/standards/gml)	
iii. Temporal Annotation: Same as above but using predicates and objects from	the time ontology(http://www.w3.org/TR/owl-time/)
ECGS-25 - Getting issue details STATUS	
iv. Standard Names Annotation: It brings an object from the related stand name ECGS-26 - Getting issue details STATUS	schema (e.g. CSDMS standard names ontology)
v. Provenance Annotation: It connects with provenance ontology to annotate sin	mulation results (http://www.w3.org/TR/prov-o/)
ECGS-28 - Getting issue details STATUS	
vi. Statistical data Annotation: it uses predicates and objects from RDF Data Cu	be Vocabulary to annotate statistical data (http://ww
w.w3.org/TR/vocab-data-cube/) ECGS-29 - Getting issue details STA	TUS
vii. Encapsulated annotation: Similar to the SNA but this function needs to be co	nnected with our triple store to bring the attributes
of a SN, such as units. ECGS-27 - Getting issue details STATUS	
b. Resources Alignment Service (RAS):i. It checks the consistency of the attributes of quantities exchanged between to	wo resources (model and/or data)
ii. Variable names: It finds synonymous of a SN using SKOS or NGram	GS-31 - Getting issue details STATUS
iii. Unit conversion: converts units of exchanged items based on SWEET unit o	ntology and NetCDF unit schema. SWEET is used
to address URL-based units and NetCDF is used to address string-based	ECGS-32 - Getting issue details STATUS
iv. Temporal Alignment: This function can do the temporal alignment between tw	wo variables using CSDMS and OpenMI external
packages ECGS-35 - Getting issue details STATUS	
v. Spatial Alignment: same as above but for spatial attributes of two variables	ECGS-36 - Getting issue details STATUS
vi. Variable Type: This function checks the type of variables and can do convers	
ECGS-33 - Getting issue details STATUS	,
vii. File Type: Same as above but for the text-based files (RAS/FT). It may call the	ne Brown Dog service to convert file types
ECGS-34 - Getting issue details STATUS	-0
c. Knowledge Discovery Service (KDS):	

i. Searches resources: it searches Clowder for resources. This function needs to add more search functions in the Cloweder API such as search by metadata and spatial predicates

| ECGS-42 - Getting issue details... | STATUS |

- ii. Finds a resource graph: It searches in the registered database for data and models that are related to a specific resource ECGS-43 Getting issue details... STATUS
- iii. Data Networks: It pragmatically aggregates data around environmental events

ECGS-44 - Getting issue details... STATUS

iv. Model to Model annotation: It annotates models that can be coupled together based on their attributes

ECGS-45 - Getting issue details... STATUS

v. Model to Data: It identifies serviced models that can run on a specific data and annotate and assemble the related data that are required to complete a simulation ECGS-46 - Getting issue details... STATUS

d. Knowledge Integration Service (KIS):

- i. It is internal service to collect vocabularies from the SNW and recommend relationships between controlled vocabularies
- ii. Imports annotated SN from the Wiki: This function imports the attributes that are associated with a SN in the wiki database (Fusaki) and store them in the JenaTDB **ECGS-38** Getting issue details... **STATUS**
- iii. Updates the wiki with relationships between SN: This function return grouped and linked Standard Names based on their attributes and update pages that are associated with the related SNs.

 ECGS-39 Getting issue details...

 STATUS
- iv. Ingests SN Thesaurus: Convert SN in an ontology to a wiki page

ECGS-40 - Getting issue details... STATUS

B- Standard Names Wiki (SNW):-

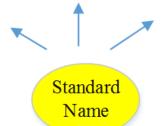
- 1. http://ecgs-dev.ncsa.illinois.edu/wiki
- 2. It has three levels of annotation: Primary, Secondary, and Inferred annotations as shown in the below figure
- 3. The annotation is implemented in a SN annotation wiki template

Primary Annotation

- + SKOS: Definition
- + Unit
- + Synonyms
- + Label
- + Realm
- + Medium
- + Process

SecondaryAnnotation

- + Spatial features
- + Temporal features
- + Input for a model
- + Output for a model
- + Measured by



Inferred Annotation

- + SKOS: Preferred label
- + SKOS: Narrow match
- + SKOS: Narrower
- + SKOS: Narrower transitive
- + SKOS: Broader match
- + SKOS: Broader transitive
- + SKOS: Close match
- + SKOS: Top concept of
- + SKOS: Related match
- + SKOS: Note