# From Modeling the Earth to Terrain Simulation

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# Topics

- SWEET Ontologies
  - Interrelationship
  - Upper-level ontology
  - Some of our users

- AVM
  - Context Model Library
  - SWEET Integration

# Semantic Web for Earth and Environmental Terminology

- Enables scalable classification of Earth system science concepts
  - Expanded to Space science
- Promotes reuse - import, expand, and specialize
- Initially created (by Dr. Robert Raskin, JPL) to capture relationships between GCMD keywords
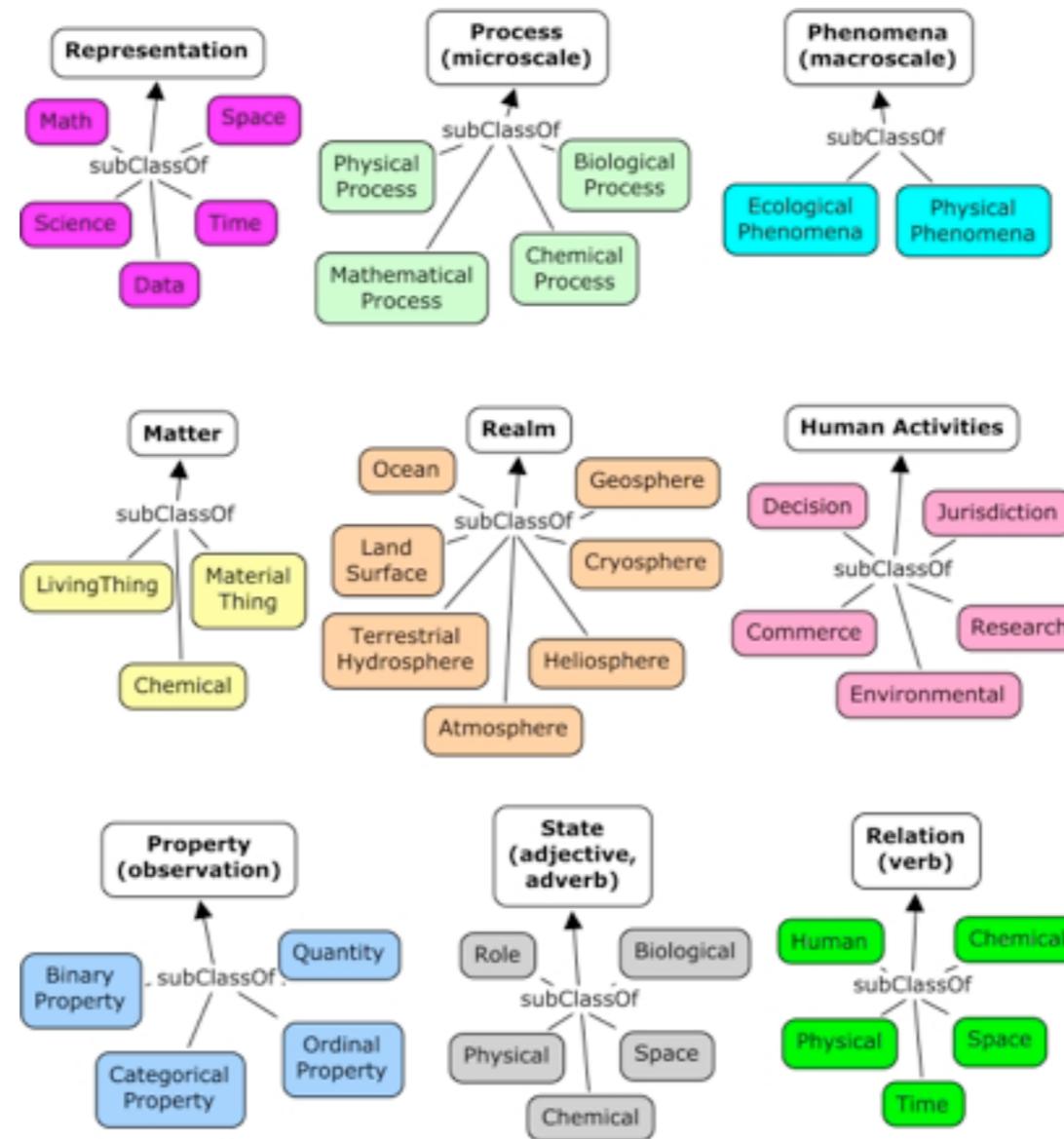
# SWEET Ontologies and Their Interrelationships

- ✓ v1.0 - 01/2004 DAML+OIL
- ✓ v2.0 - 03/2009 OWL
- ✓ v2.1 - 05/2011 OWL-DL
- ✓ v2.2 - 06/2011 OWL Full
- ✓ v2.3 - 09/2011 OWL Full
- ✓ v2.4 - ETA 02/2013
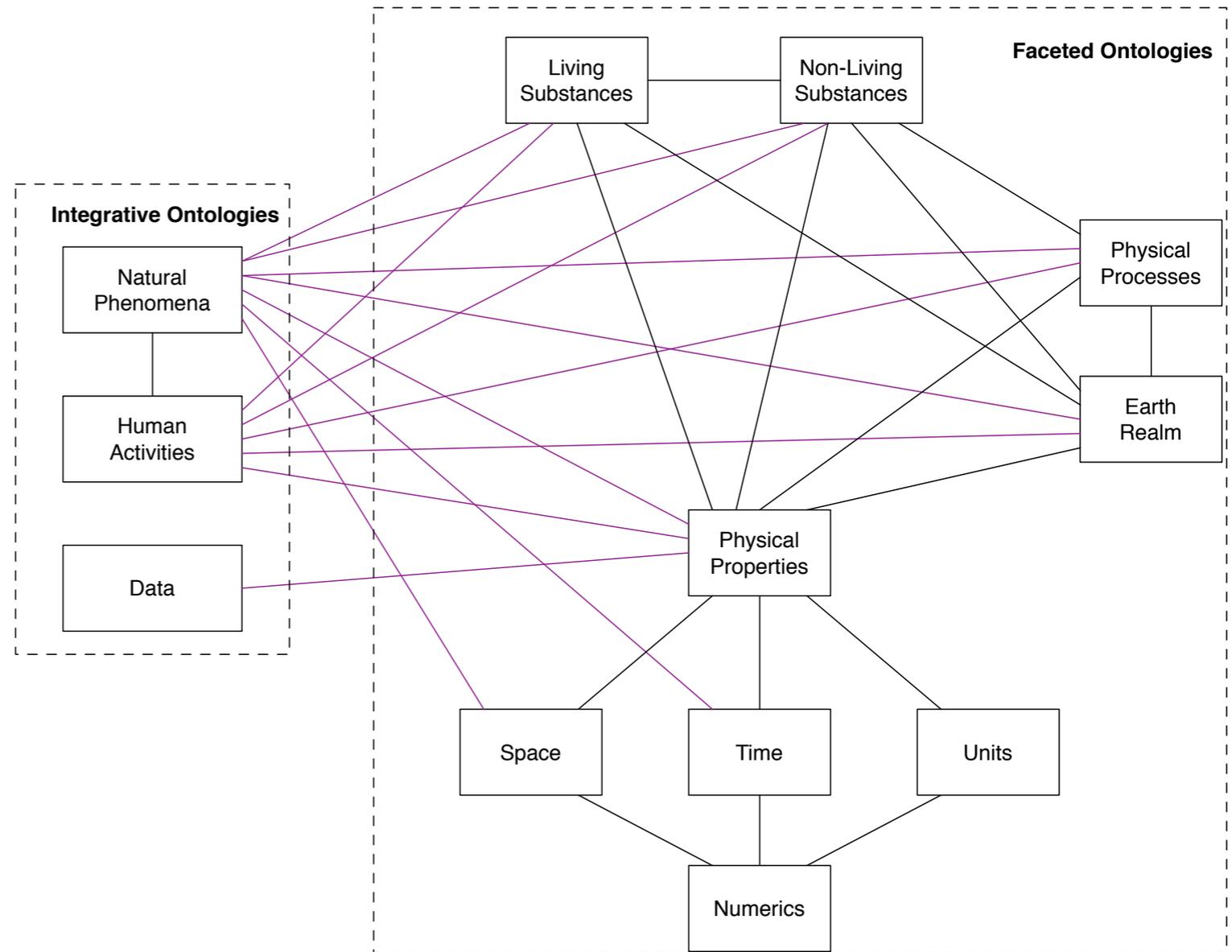
# SWEET as an Upper Level Earth Science Ontology
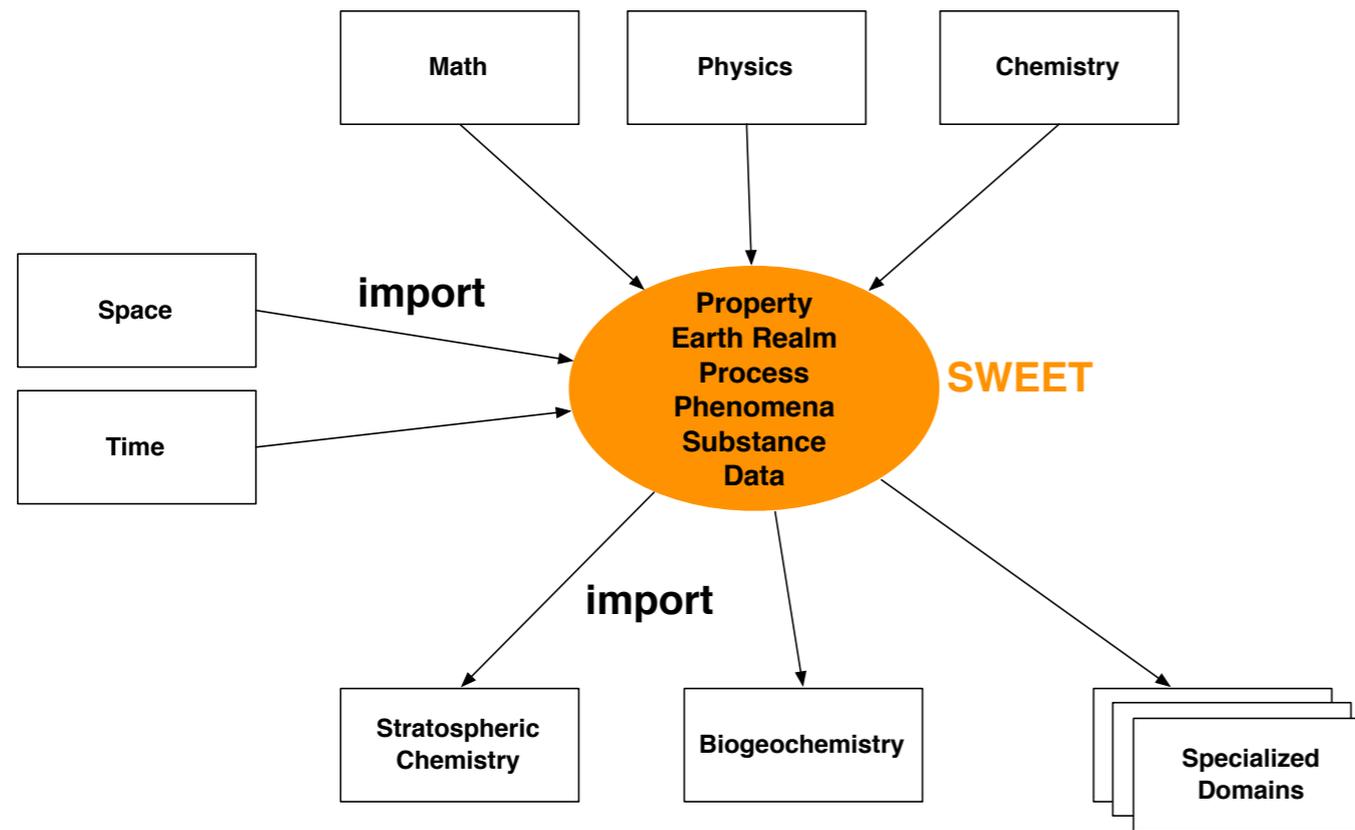


## Why an Upper-Level Ontology?

- Common definitions for terms use in multiple disciplines
- Common language in support of community and multidisciplinary activities
- Common 'properties' (relations) for tool developers
- Reduce burden on creators of specialized domain ontologies

- ESML - Earth Science Markup Language
- ESIP - Earth Science Information Partner Federation
- GEON - Geosciences Network
- GENESIS - Global Environmental & Earth Science Information System
- IRI - International Research Institute (Columbia)
- LEAD - Linked Environments for Atmospheric Discovery
- MMI - Marine Metadata Initiative
- NOESIS
- PEaCE - Pacific Ecoinformatics and Computational Ecology
- SESDI - Semantically Enabled Science Data Integration
- VSTO - Virtual Solar-Terrestrial Observatory
- **AVM - Adaptive Vehicle Make**

# Adaptive Vehicle Make (AVM)

- A portfolio of programs overseen by DARPA
- Revolutionary approaches to the design, verification, and manufacturing of complex defense systems and vehicles
- C2M2L (pronounced "camel") - Component, Context, and Manufacturing Model Library
  - develop domain-specific models needed the design, verification, and fabrication
  - Environmental Context Model Library
    - design and development an ontological system to capture and serve environmental models and data
    - to be used to serve the Fast Adaptable Next-Generation Ground Vehicle (FANG GV) programs
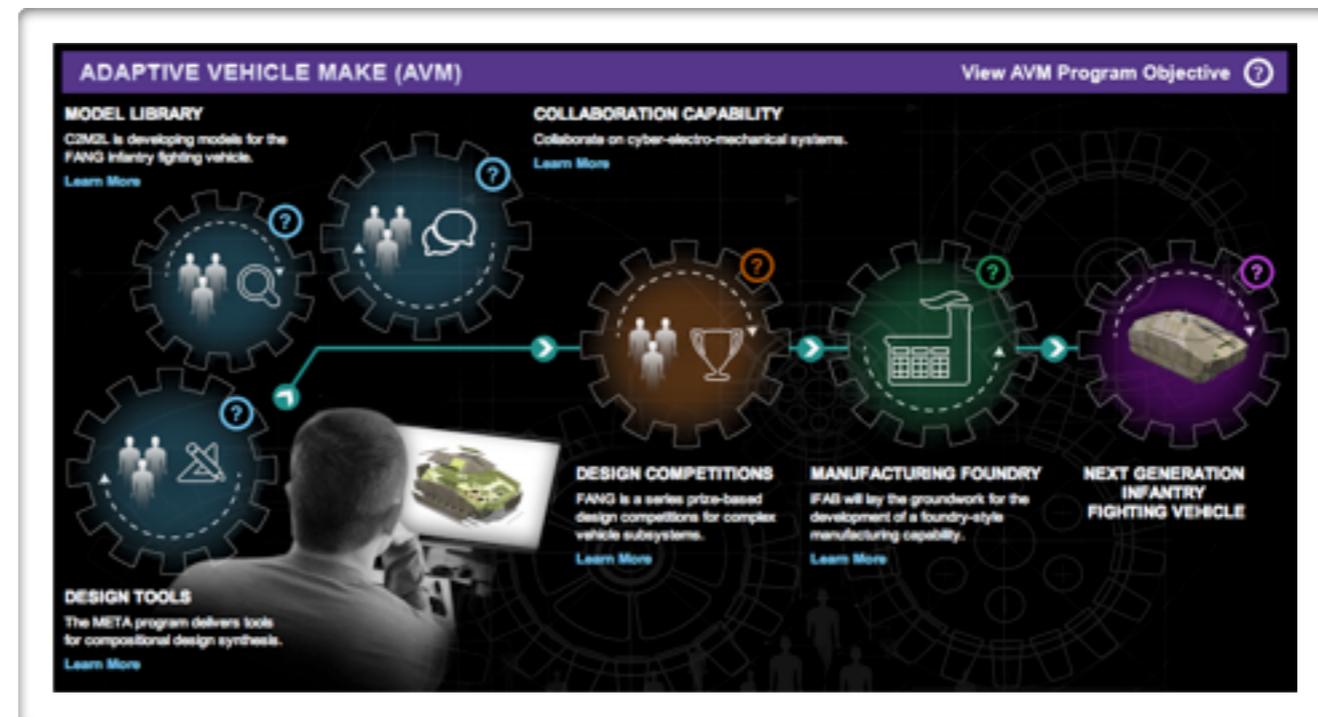


*http://www.darpa.mil/our_work/tto/programs/adaptive_vehicle_make__(avm).aspx*

# Context Model Library Goals

- Web Application
- RESTful Interface
- Provide knowledge-based linkage between environmental context and models
- Provide knowledge-based linkage between requirements and environmental context
- Provide guided discovery of associated models to be used in simulation
- Provide CRUD archival functionalities



Aquatic

Environment

Atmospheric

Land

Rocky

Salinity

Temperature

Water Density

Wave Height

Concrete

Asphalt

Slope

Snow

Paved

Buoyancy
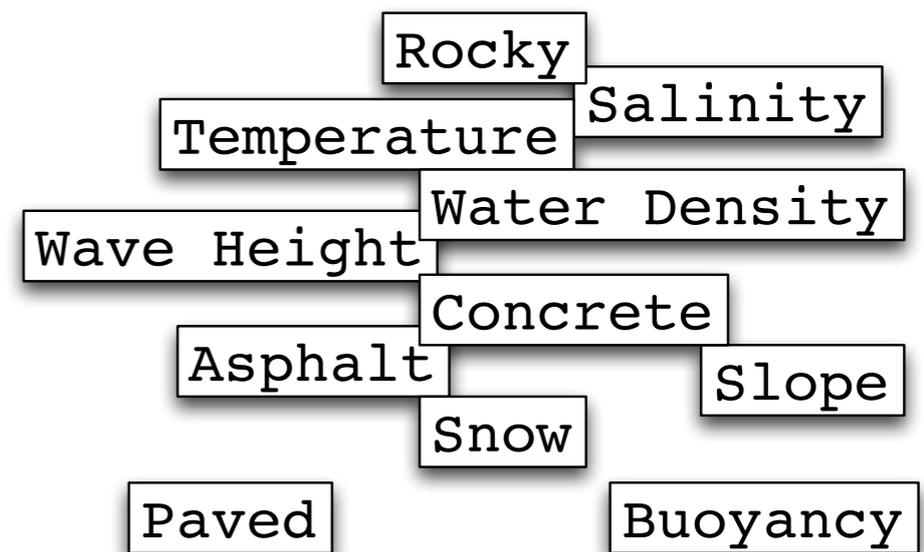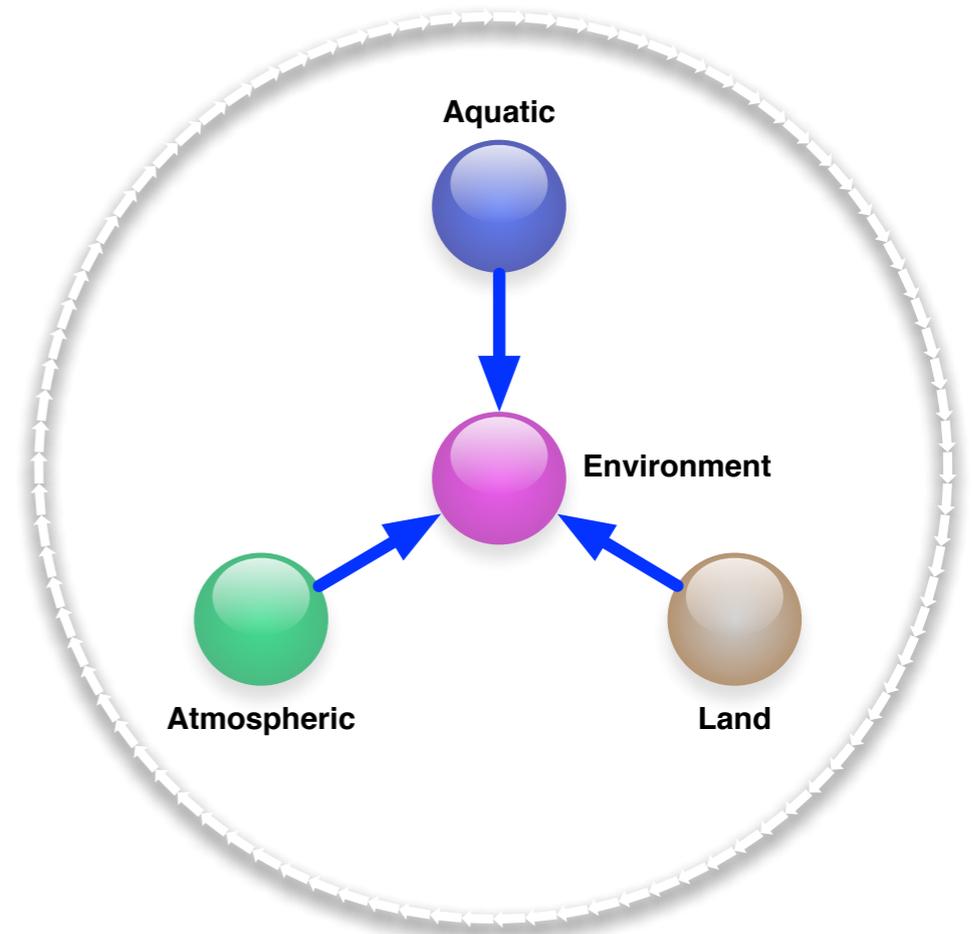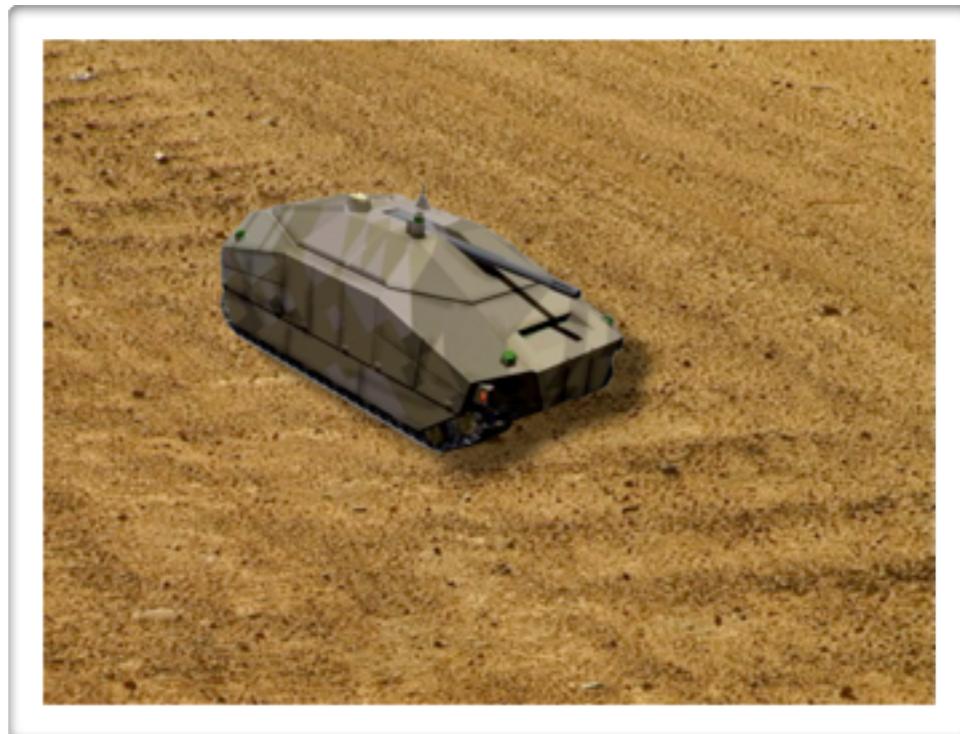
# Environmental Context Knowledge System
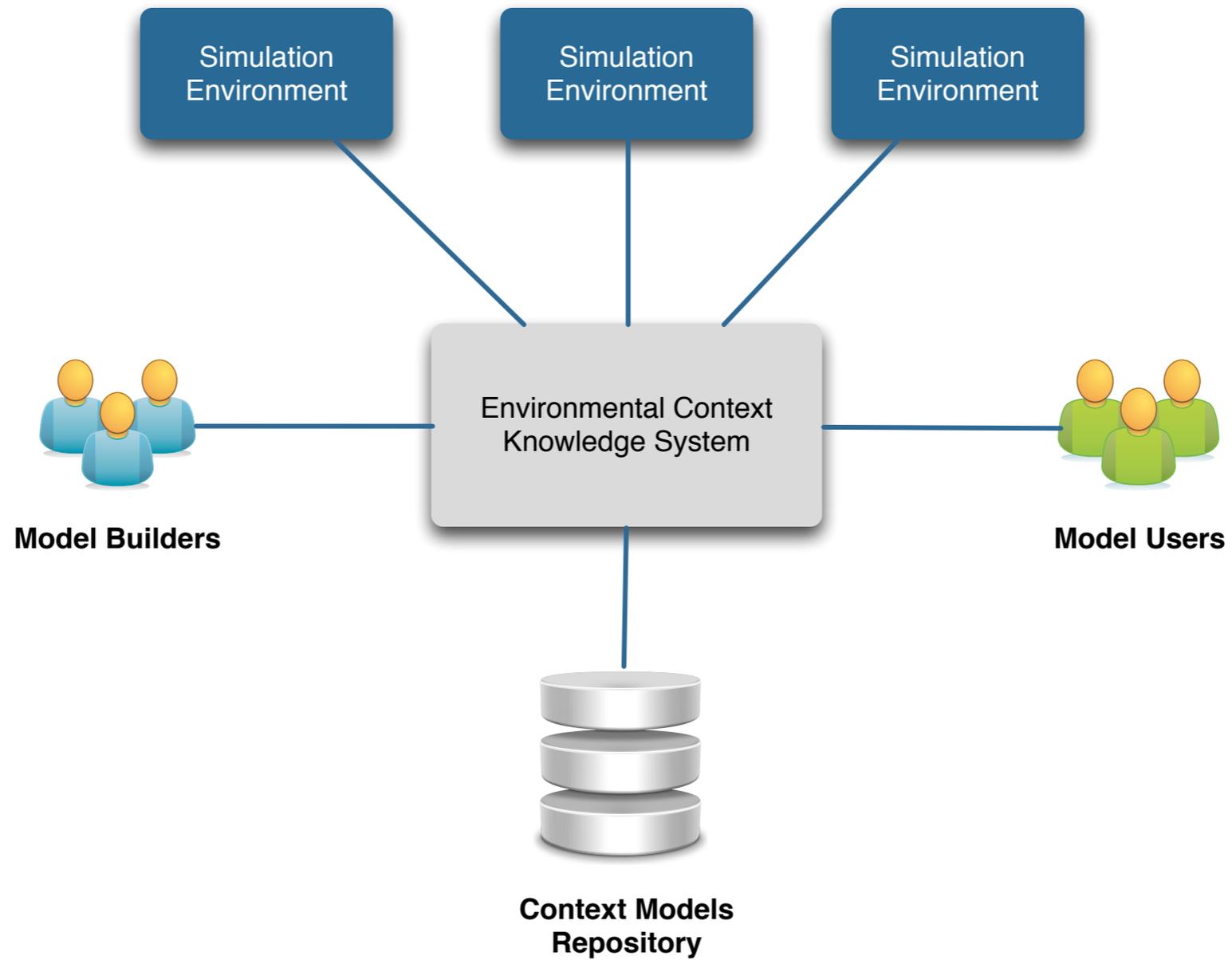
# Top-Level Environmental Context
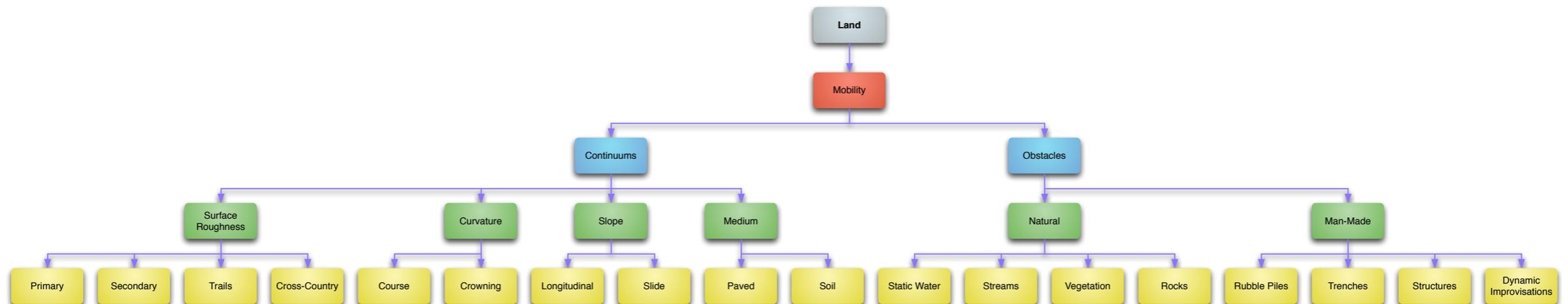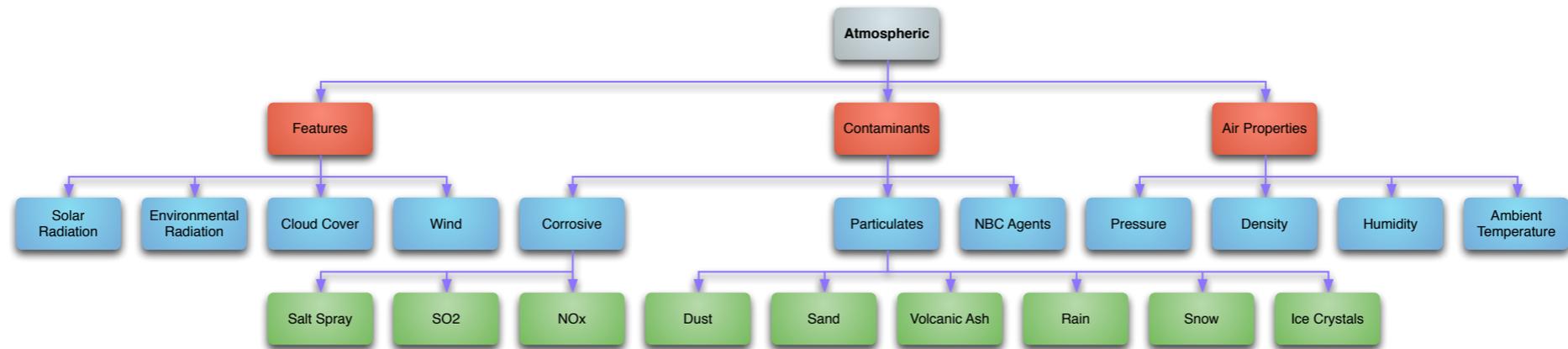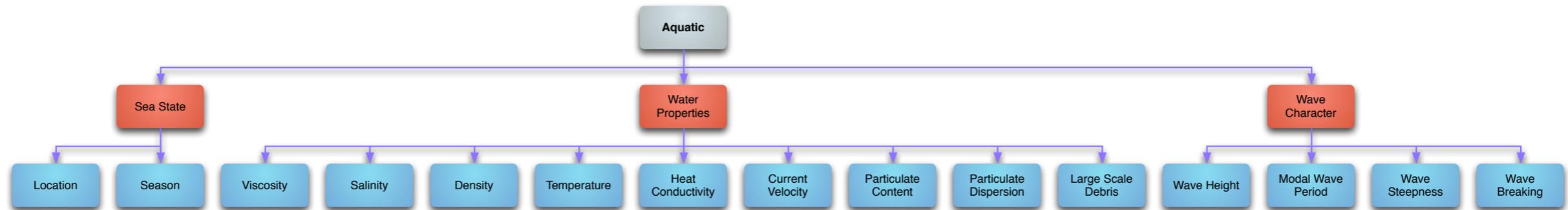
# Integration with SWEET
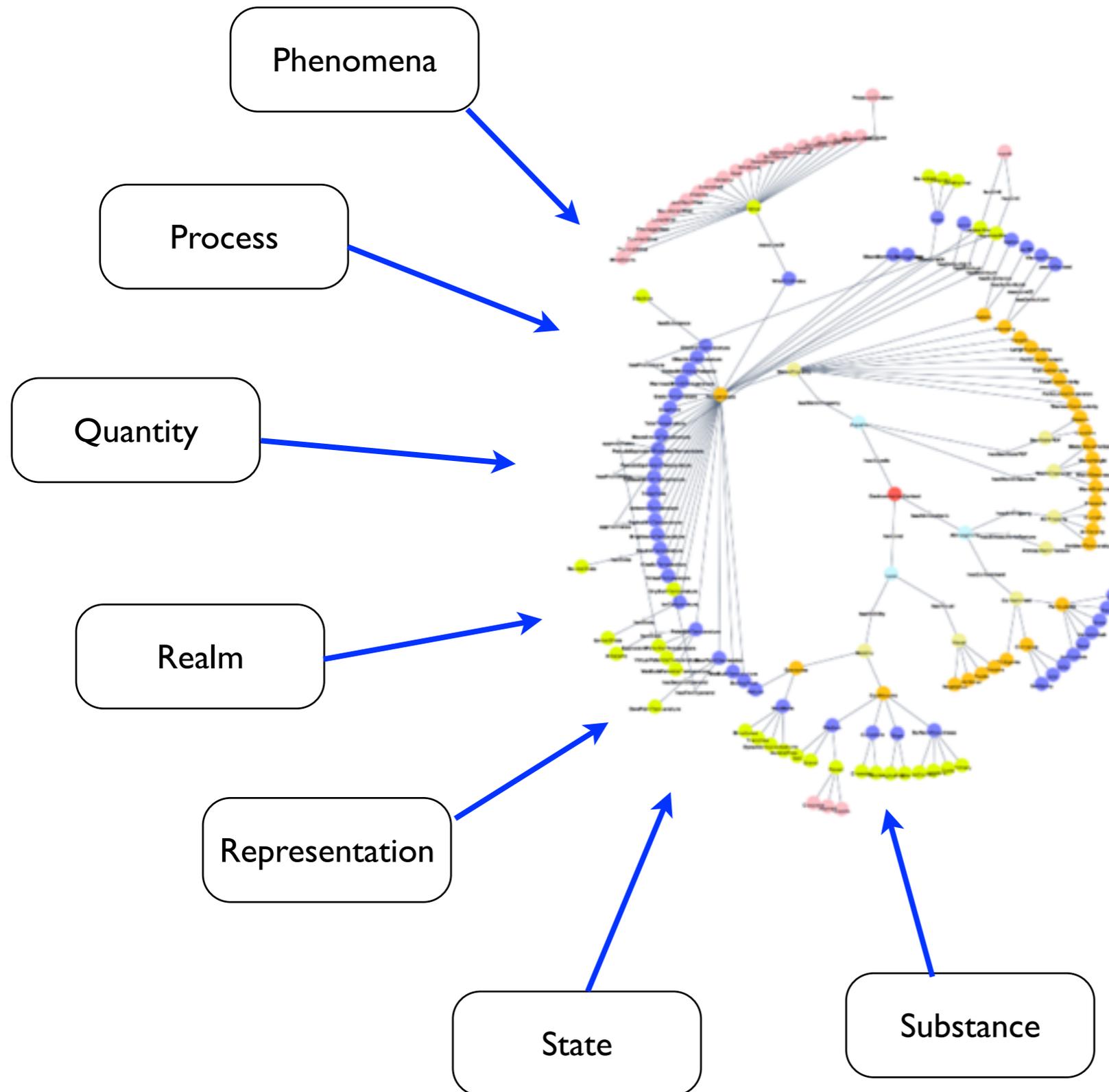


- IMPORT
- EXPAND
- SPECIALIZE

Phenomena

Process

Quantity

Realm

Representation

State

Substance

**National Aeronautics and Space Administration**

**Jet Propulsion Laboratory**
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Pasadena, California



# IN53D. Semantics and Cyberinfrastructures for Next Generation Science II
## 12.07.2012 @1:40pm

EarthScienceOntolog: Panel Session-04

- **SWEET Ontologies**

  *http://sweet.jpl.nasa.gov*

- **ESIP Federation Semantic Web Cluster**

  *http://wiki.esipfed.org/index.php/Semantic_Web*

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