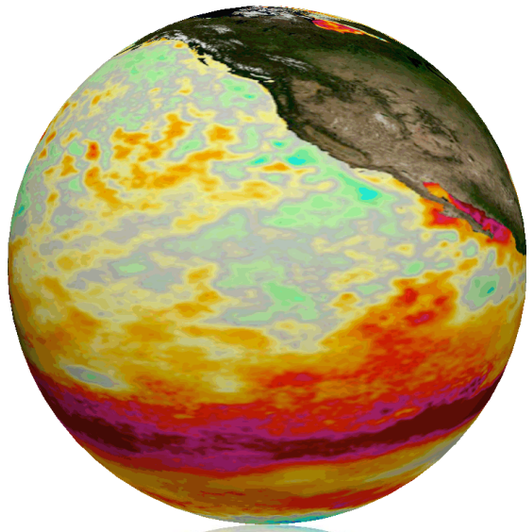
National Aeronautics and
Space Administration

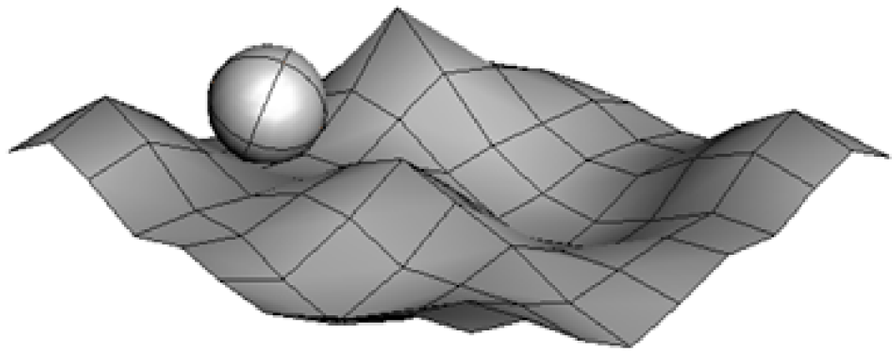
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California



From Modeling the Earth to Terrain Simulation

Thomas Huang

Jet Propulsion Laboratory, California Institute of Technology



Copyright 2012 California Institute of Technology. Government sponsorship acknowledged.

Topics

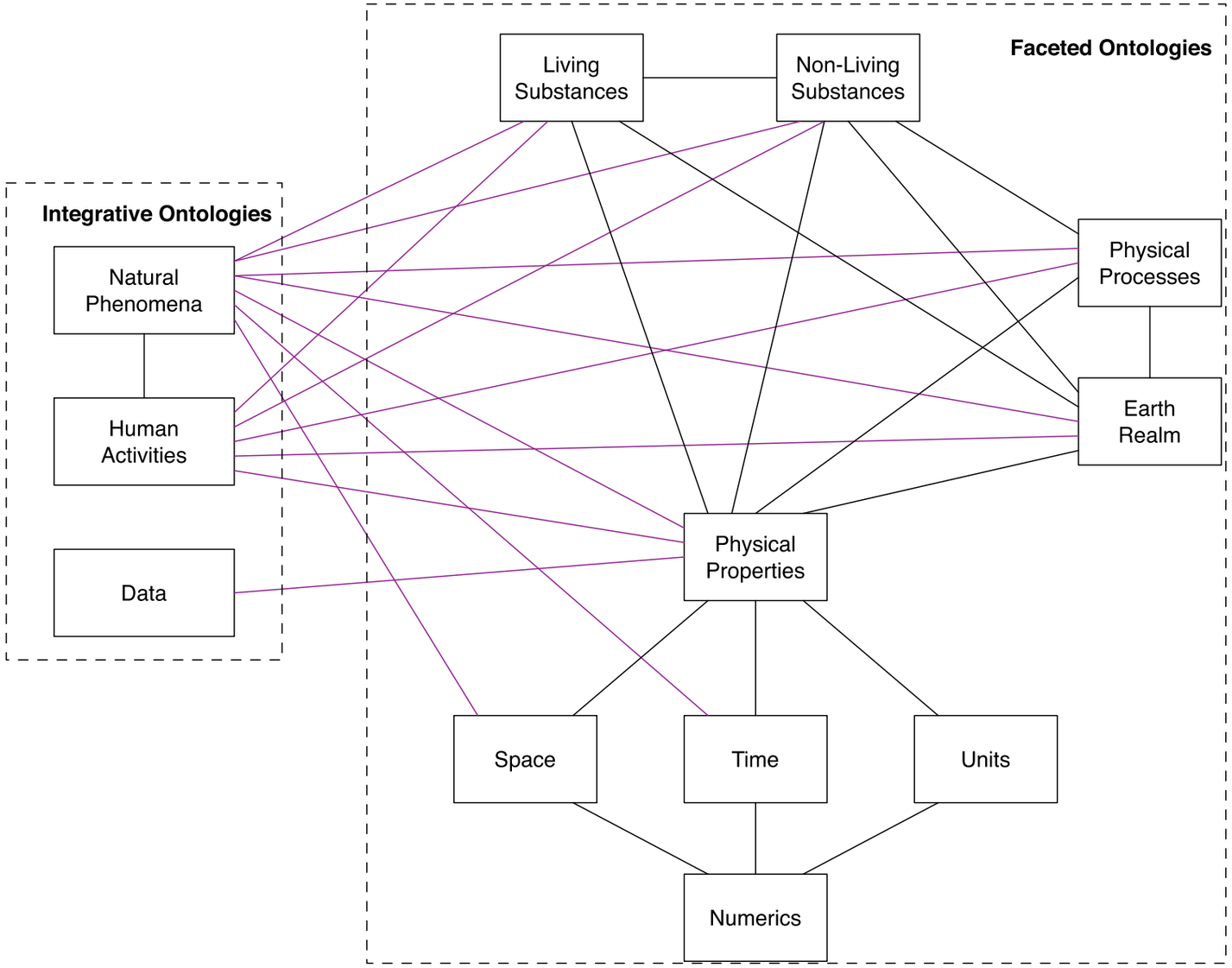
- SWEET Ontologies
  - Interrelationship
  - Upper-level ontology
  - Some of our users
- AVM
  - Context Model Library
  - SWEET Integration

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

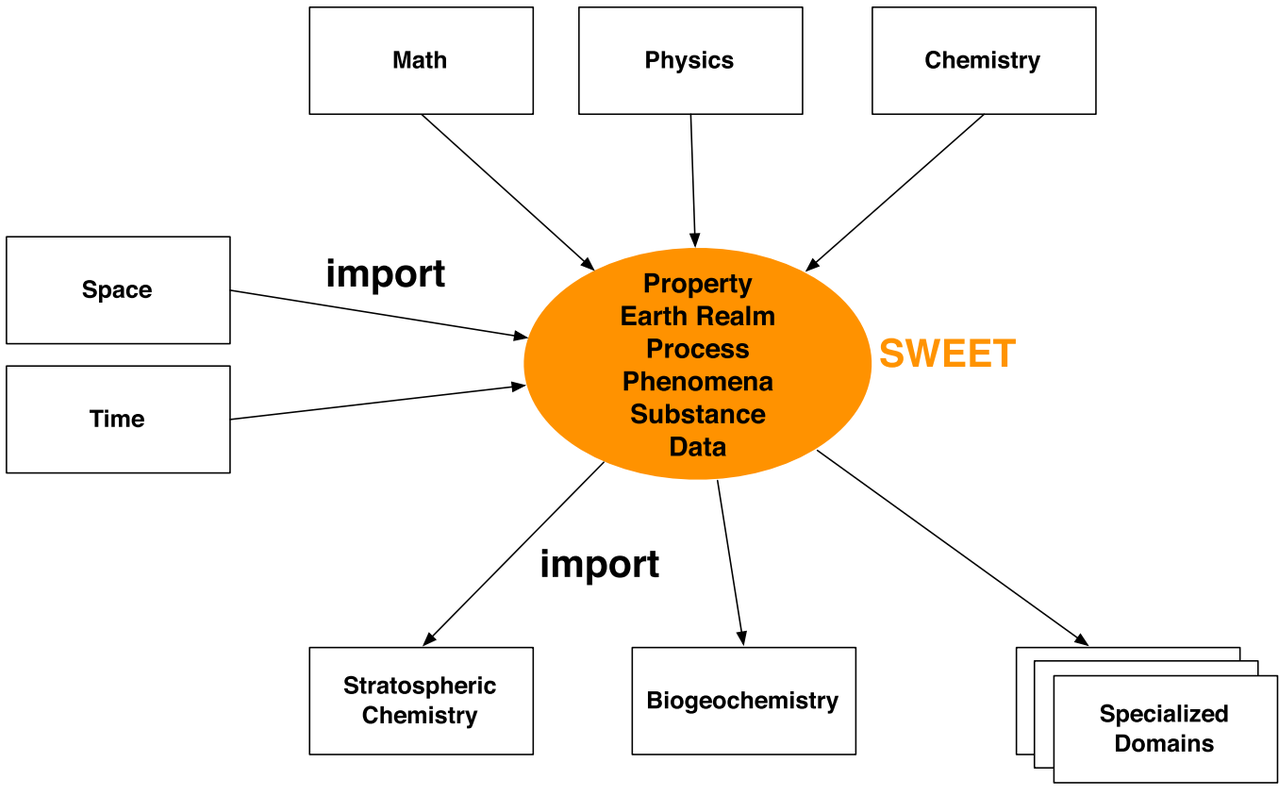
- ✓ v1.0 - 01/2004 DAML+OIL
- ✓ v2.0 - 03/2009 OWL
- ✓ v2.1 - 05/2011 OWL
- ✓ v2.2 - 06/2011 OWL Full
- ✓ v2.3 - 09/2011 OWL Full
- ✓ v2.4 - ETA 02/2013



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

SWEET as and Upper Level Earth Science Ontology



Why an Upper-Level Ontology?

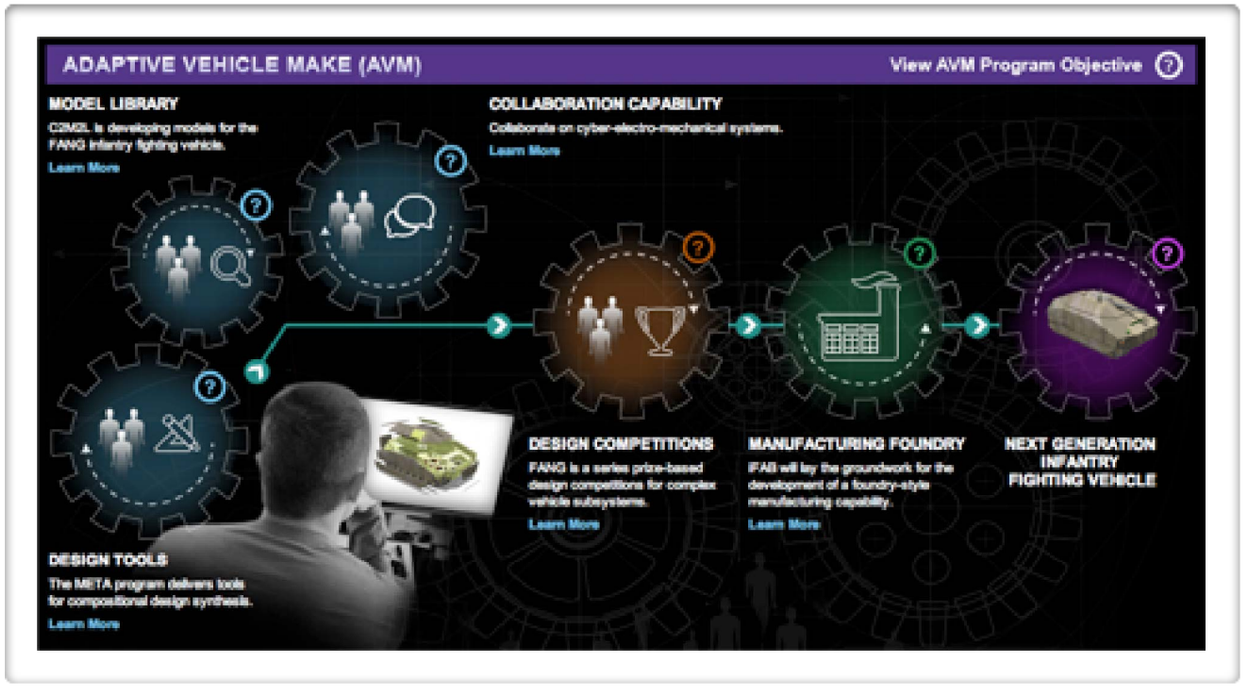
- Common definitions for terms use in multiple disciplines
- Common language in support of community and multidisciplinary activities
- Common ‘properties’ (relations) for tool developers
- Reduce burden on creators of specialized domain ontologies

Some SWEET Users

- 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)

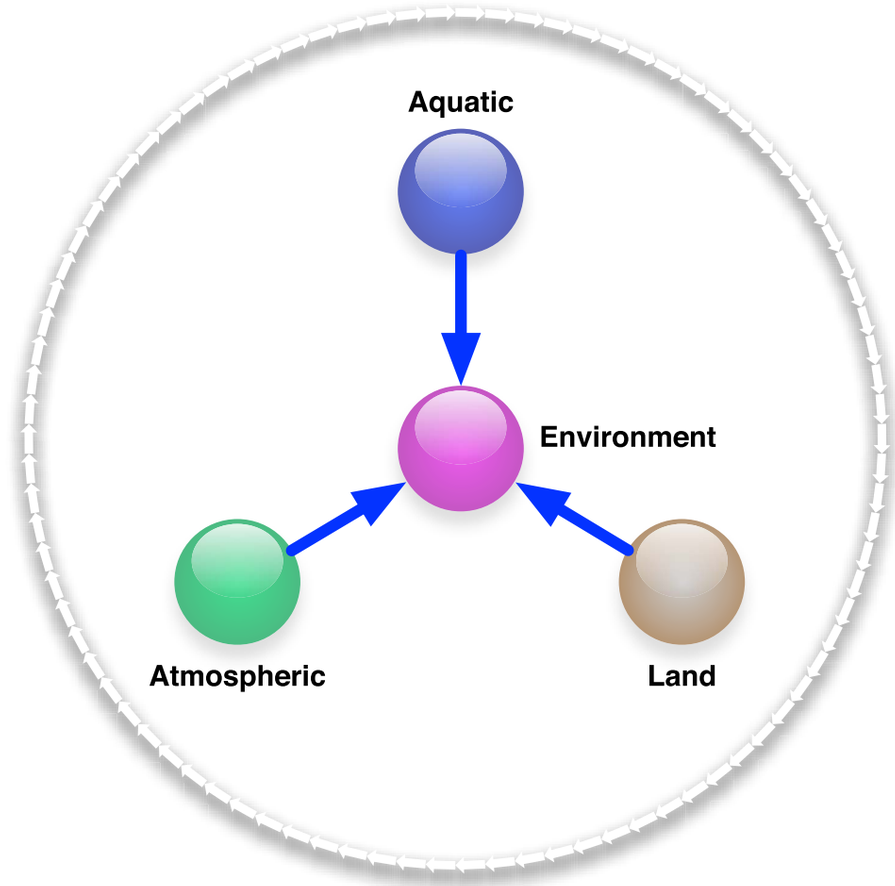
- A portfolio of programs overseen by DARPA
- Revolutionary approaches to the design, verification, and manufacturing of complex defense systems and vehicles
- C2M2L (pronounced “camel”) - Component, Context, and Manufacturing Model Library
  - develop domain-specific models needed the design, verification, 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

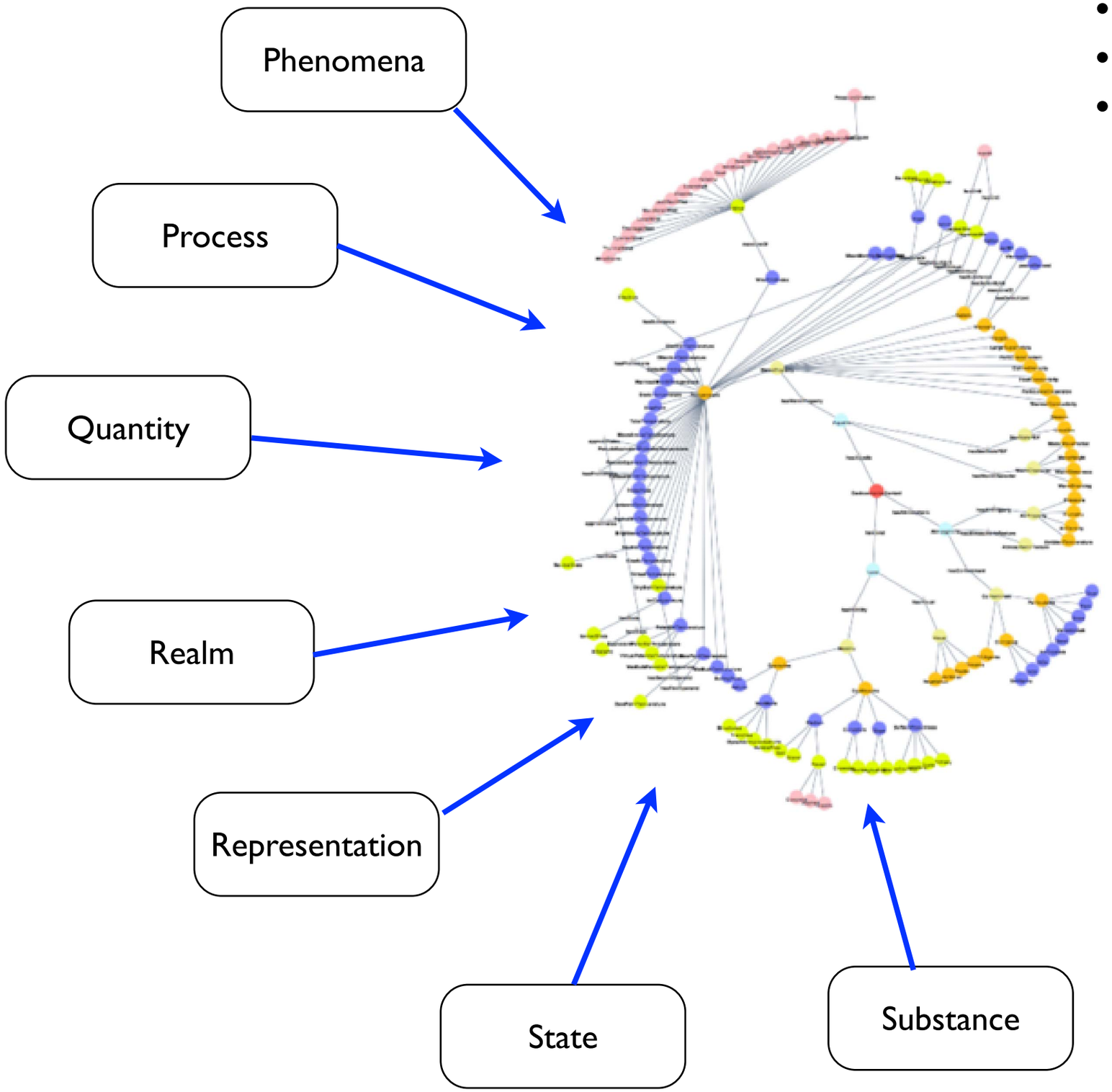
Context Model Library Goals

- 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



Rocky
Salinity
Temperature
Water Density
Wave Height
Concrete
Asphalt
Slope
Snow
Paved
Buoyancy

Integration with SWEET



- IMPORT
- EXPAND
- SPECIALIZE

Upcoming Presentation

AGU FALL MEETING
San Francisco | 3–7 December 2012

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