

Using and Developing Ontologies: Methods and Tools

Cogan Shimizu

cogan.shimizu@wright.edu

Knowledge and Semantic Technologies Lab
Wright State University





Modular Ontology

Patterns & Interfaces

Tools & Resources

Methods and Tools



Modular Ontology

Patterns & Interfaces

Tools & Resources

Methods and Tools

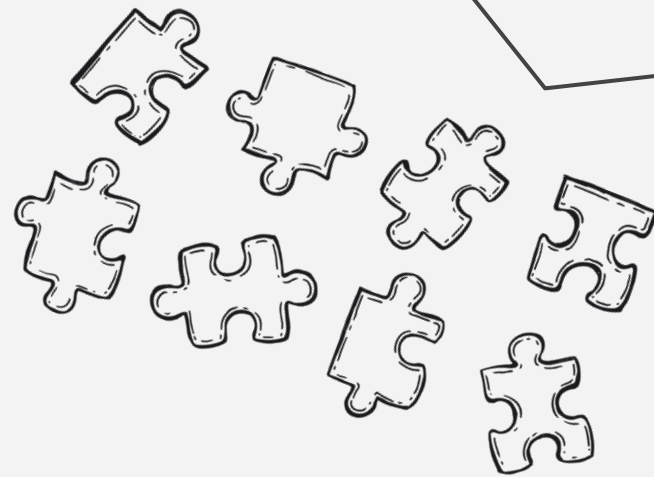
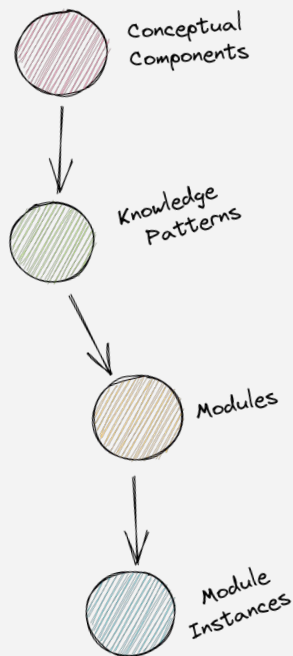
Modular Ontology: A Bridge & Methodology

Modular Ontology can act as a bridge between human conceptualization and data.

- We have designed the modular ontology modeling methodology (right)
 - Focuses on empirical reality (i.e., which data actually exists)
 - Is a pattern based method
 - Limits exposure to formal logics

1. DEFINE THE USE CASE
2. MAKE COMPETENCY QUESTIONS
3. IDENTIFY KEY NOTIONS
4. MATCH PATTERNS TO KEY NOTIONS
5. INSTANTIATE THE PATTERNS
6. SYSTEMATIC AXIOMATIZATION
7. ASSEMBLE THE MODULES
8. REVIEW FINAL PRODUCT
9. PRODUCE THE OWL ARTIFACTS

Modular Ontology: Scaffolding

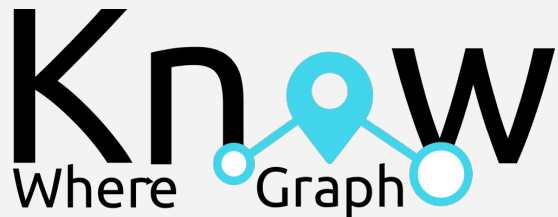


The scaffolding allows us to quickly:

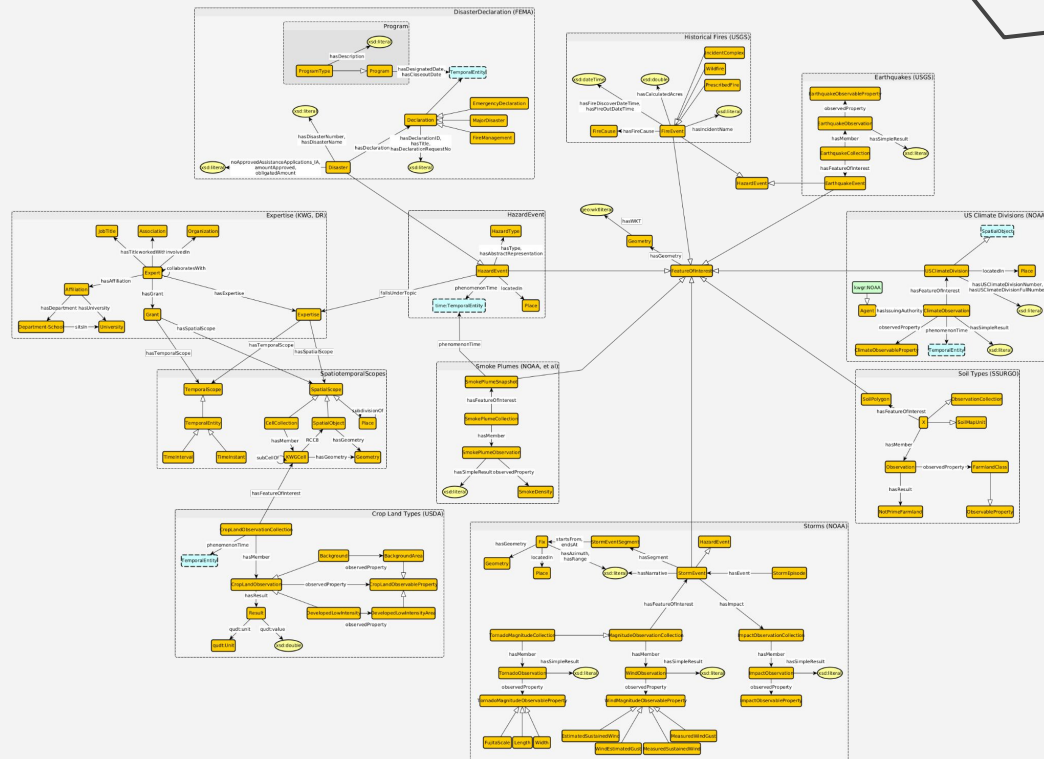
- assemble modules into an initial schema (like puzzle pieces);
- maintain, evolve, and extend the schema; and
- improve discoverability and navigation of the data

We use OPLa to formalize this scaffolding.

Example: The KnowWhereGraph



www.KnowWhereGraph.org





Modular Ontology

Patterns & Interfaces

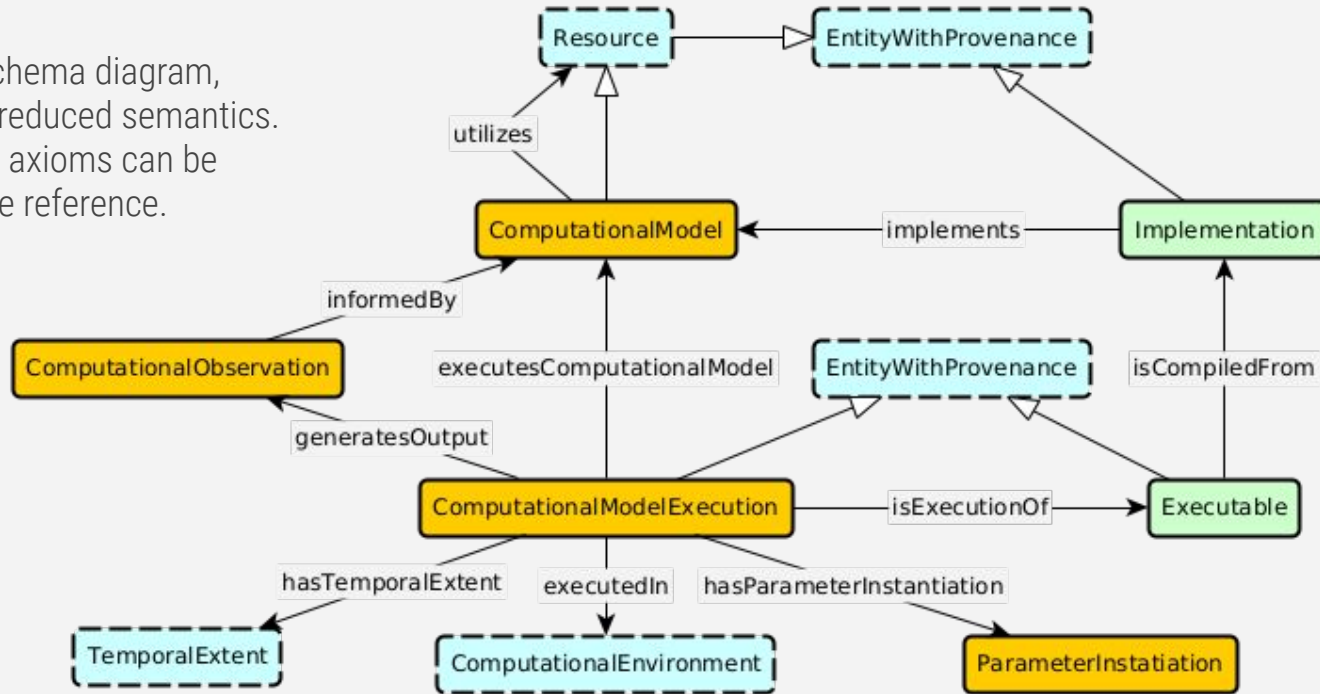
Tools & Resources

Methods and Tools

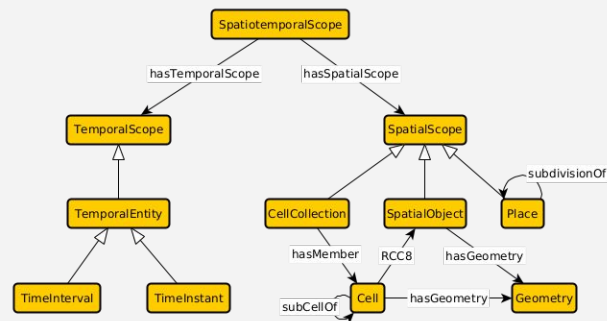
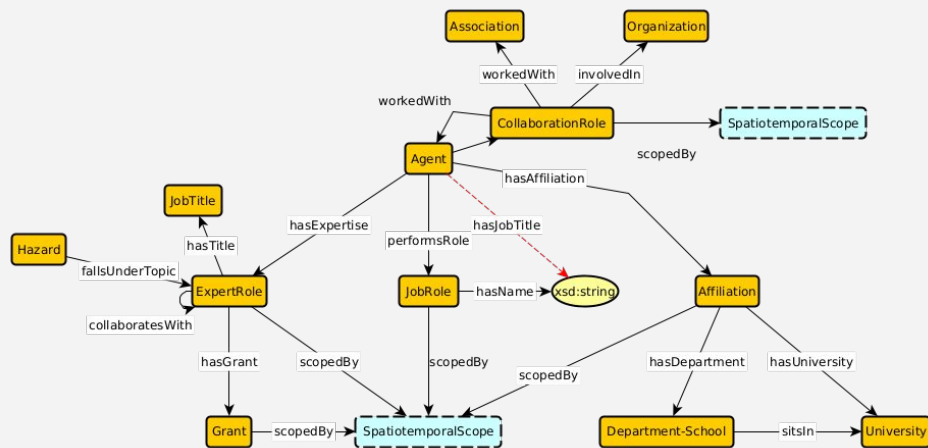
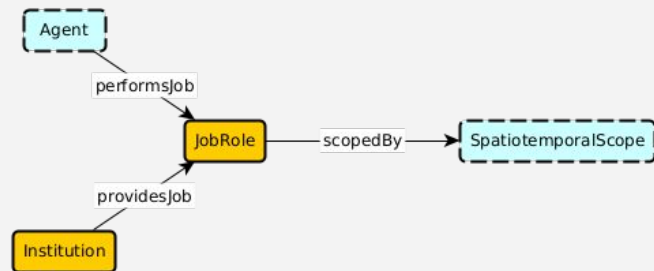
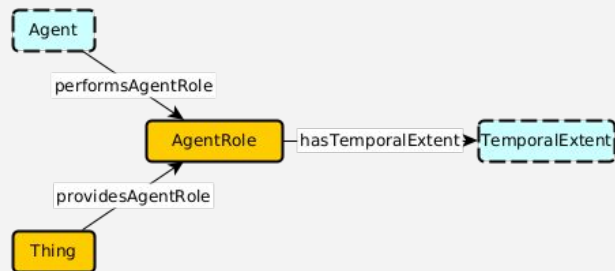
Example: The “Computational Observation” Pattern



This is a schema diagram, which has reduced semantics. The logical axioms can be found in the reference.



Example: Interfaces





Modular Ontology

Patterns & Interfaces

Tools & Resources

Methods and Tools

MODL: The Modular Ontology Design Library

- * MODL can also be viewed as an OPLa Ontology
- * Contains 13 patterns, two of which are novel
- * Not just an artifact, but also a template

Category	Patterns
Metapatterns	Explicit Typing Property Reification Stubs
Organization of Data	Aggregation, Bag, Collection Sequence, List Tree
Space, Time, and Movement	Spatiotemporal Extent Spatial Extent Temporal Extent Trajectory Event
Agents and Roles	AgentRole ParticipantRole Name Stub
Description and Details	Quantities and Units Partonymy/Meronymy Provenance Identifier

The Ontology Design Patterns Portal

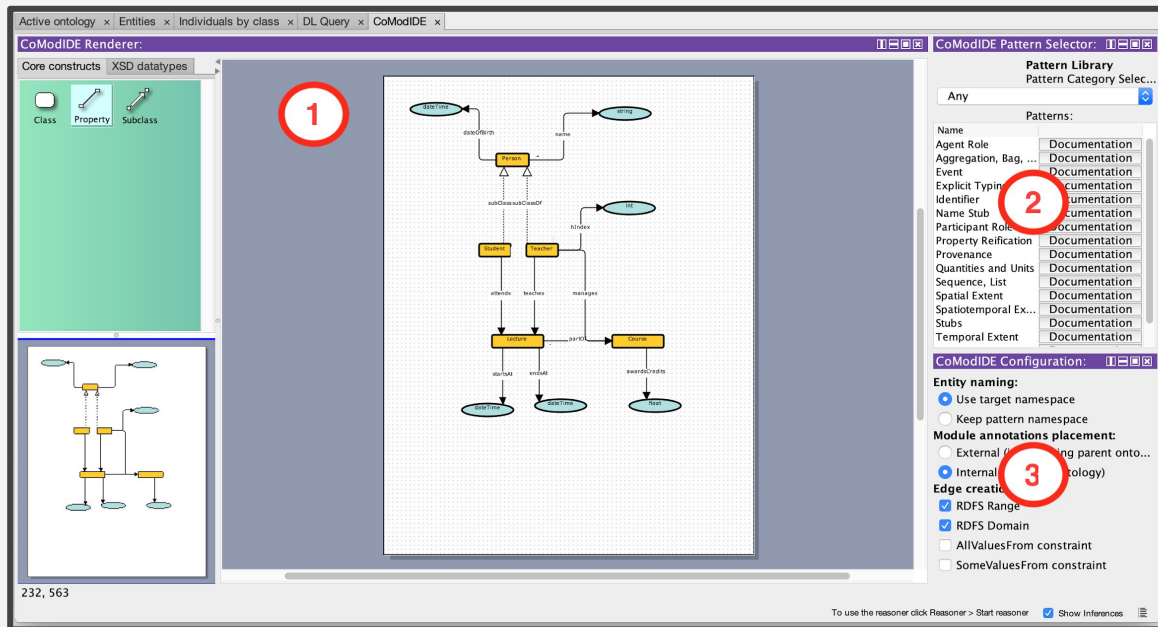
<https://ontologydesignpatterns.org/>



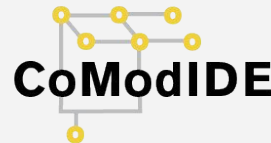
<https://github.com/odpa/patterns-respository>



Year	Percentage of people who have ever been in a romantic relationship
1990	85%
1995	65%
2000	68%
2005	69%
2010	70%



1. A Graphical Paradigm
2. A Pattern Library
3. Customizable Semantics



A thin, dark grey line starts from the left edge of the slide, slopes upwards to the right, and then turns sharply downwards to the right edge.

Thanks!

cogan.shimizu@wright.edu