Interacting and Visualizing Ontologies: The VOWL Notation

Stefan Negru
MSD IT Global Innovation Centre Prague, Czech Republic

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Team Behind VOWL

Stefan Negru

Steffen Lohmann

Florian Haag

David Bold

Vincent Link

Eduard Marbach

Thomas Ertl

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Ontology Visualization

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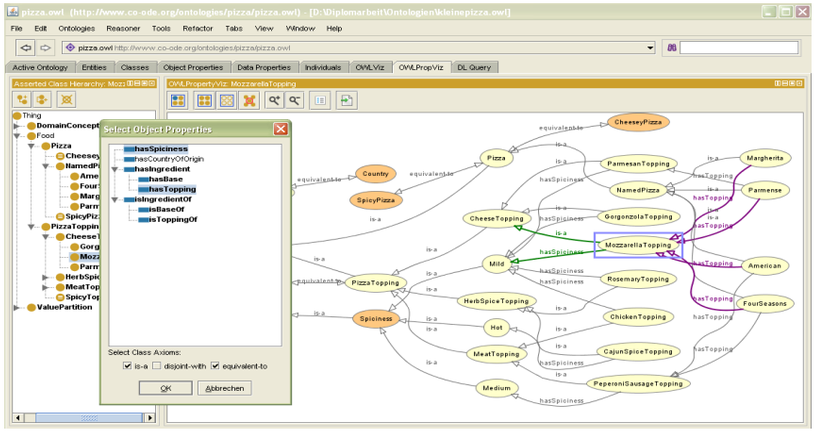
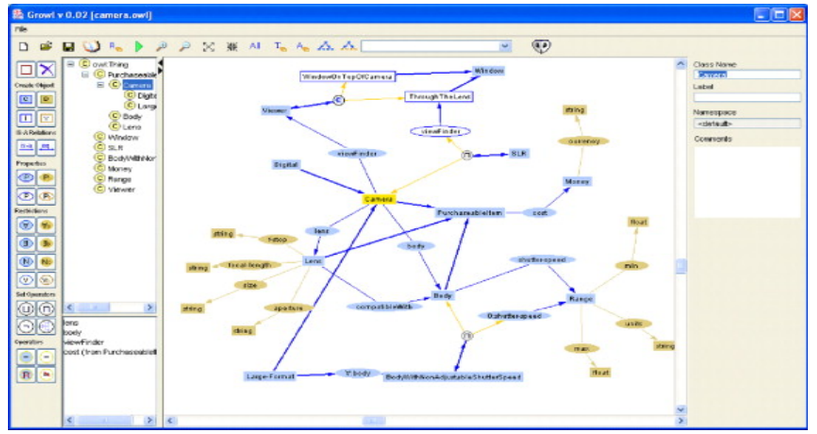
Ontology Visualization (State-of-the-Art)

- Different types of diagrams (mostly node-link diagrams)
- But: lack in…
  - … OWL completeness / expressiveness
  - … intuitiveness / understandability

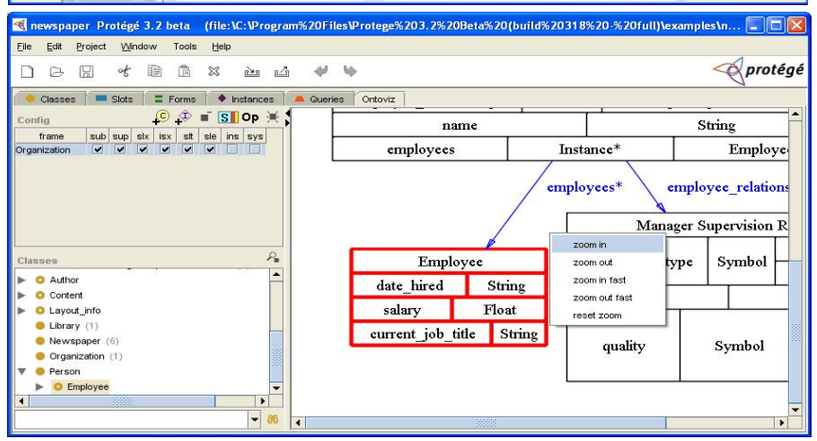
OWLViz



Growl

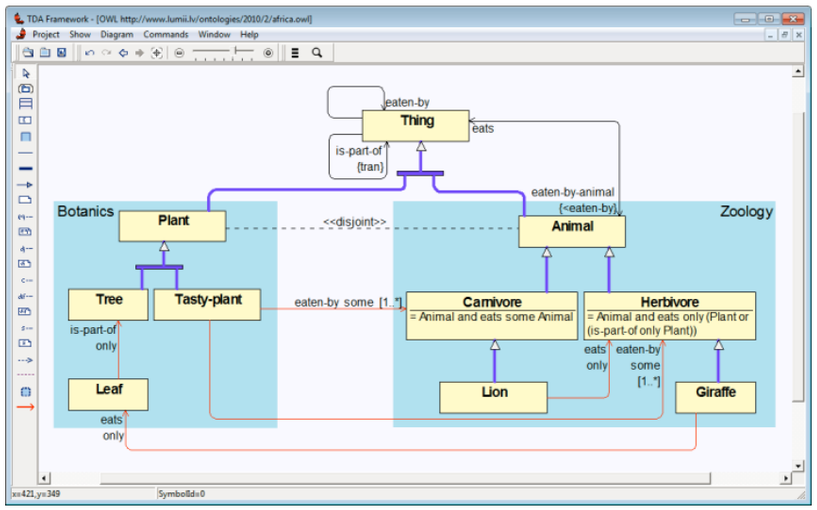


OntoViz

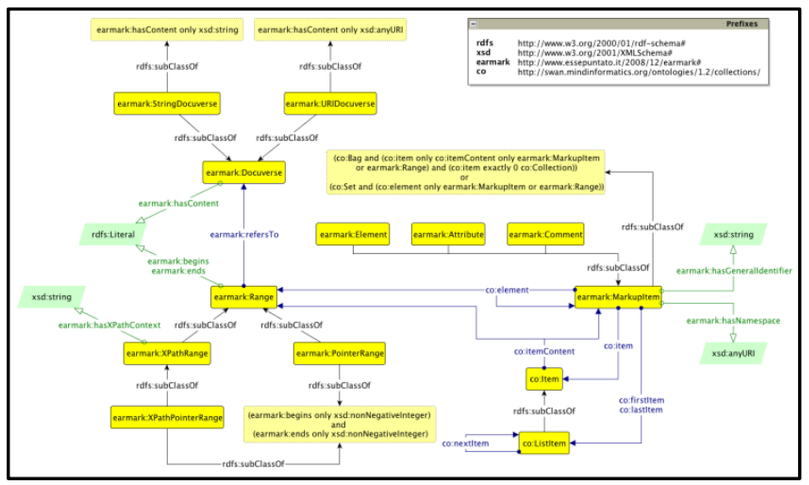


Ontology Visualization (State-of-the-Art)

- UML-based ontology visualization
  (reusing UML class diagrams)
- Well-defined mappings
  (e.g. Ontology Definition Metamodel of OMG)
- Several UML-based ontology editores
  (e.g. OWLGrEd, VOM, TopBraid Composer)
- BUT:
  - UML was not designed for OWL
  - Requires knowledge on UML
  - Limited scalability and manual layout
  - Focus: ontology modeling, not visualization
  - Latter also true for other visual notations
    (e.g. Graffoo, Concept Diagrams)



OWLGrEd



Graffoo

And many more…

- http://www.essepuntato.it/graffoo/
- http://protegewiki.stanford.edu/wiki/SOVA
- http://www.ontologyengineering.org/
- http://growl.novasemantics.it/
- http://www.omg.org/spec/ODM/1.0/
- etc.

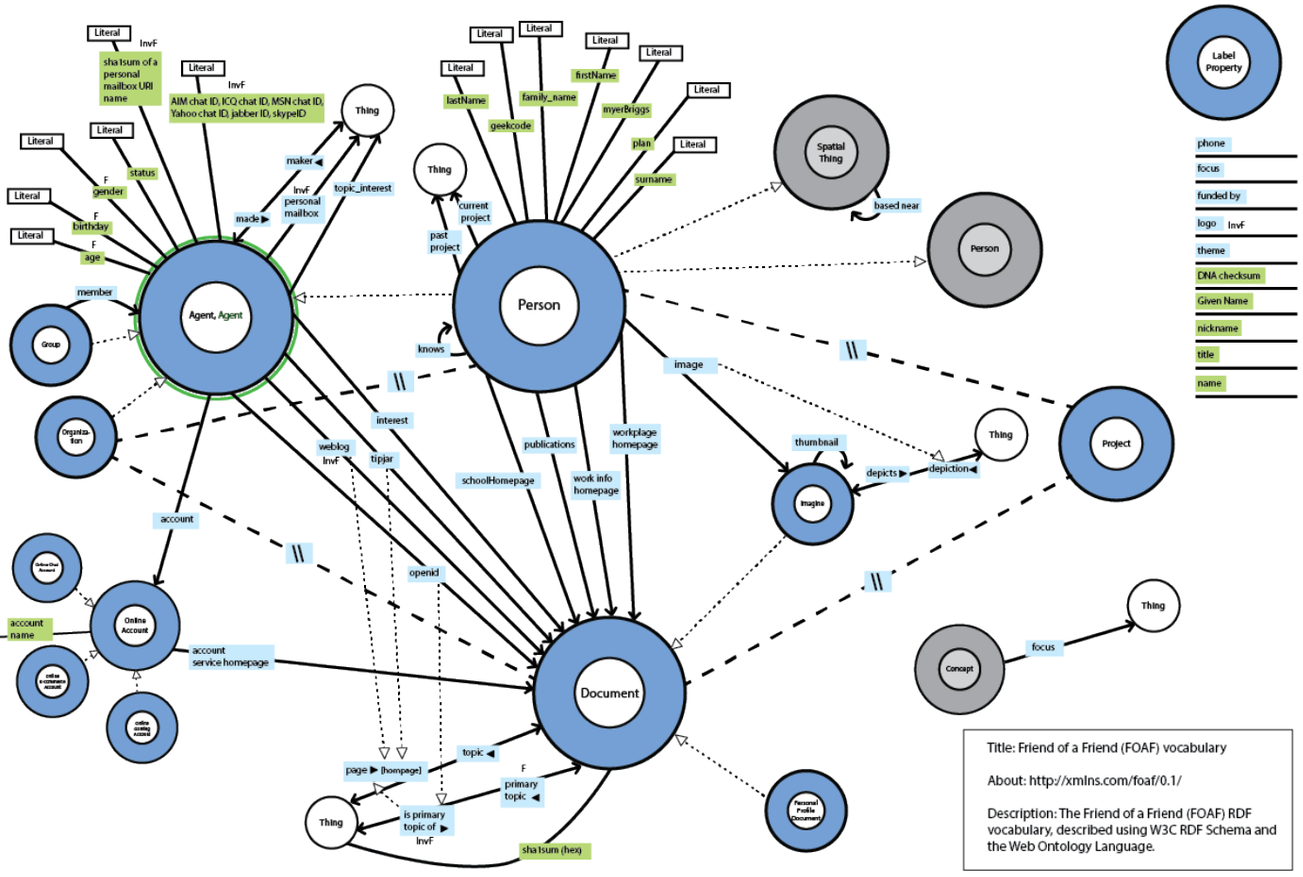
Visual Notation for OWL Ontologies VOWL

- Well-specified visual language designed specifically for OWL
- Focus: intuitiveness and user-orientation (casual ontology users)
- focuses on the visualization of the TBox while it also includes recommendations on how to depict individuals and data values (the ABox)
- http://vowl.visualdataweb.org/index.html

VOWL Evolution

- VOWL 1: Focused on provided on integrated representation of OWL ontologies
  - Conceptual Layer – Represents the classes, properties, and their relationships;
  - Instance Layer – Represents the individuals and their relationships;
  - Integrated Layer – Represents the classes populated with individuals.
- VOWL 2: Updated specification with new elements and interactive features
  - (mayor) design revision
  - interactive features
  - implementation
  - evaluations
- VOWL 3 - work in progress

FOAF vocabulary visualized with VOWL 1 and VOWL 2



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VOWL Notation

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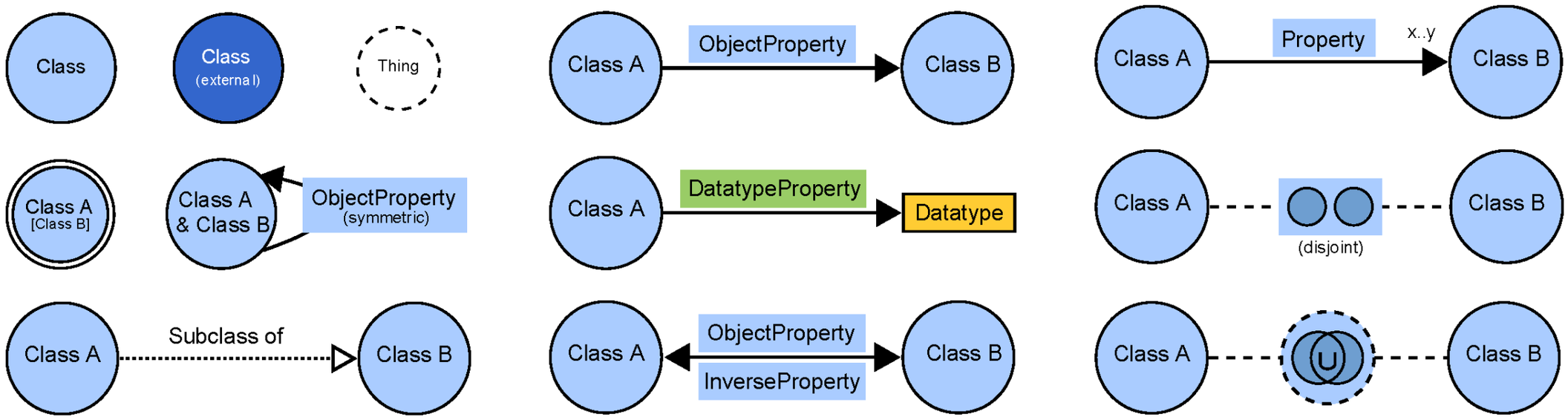
Graphical primitives and colour scheme used in VOWL

Primitive	Application
	classes
	properties
	properties directions
	datatype, property labels
	special classes and properties
text, number, symbol	labels, cardinalities

Color	Application
General	classes, object properties, disjoint relations
Rdf	elements based upon RDF and RDF Schema
Deprecated	deprecated classes and properties
External	external classes and properties
Datatype	datatype, literals
Datatype Property	datatype properties
Highlighting	highlighted elements
Indirect Highlighting	subproperties, interactive elements

VOWL 2: Visual Notation



- Size of circles = number of instances (if any)
- Intuitive symbols (Venn diagrams), not just formal ones
- Adoption of known notations (cardinality, subclass relation)
- Precisely specified at: http://vowl.visualdataweb.org
- Visual elements are combined to a graph (representing the ontology)

A few design decisions

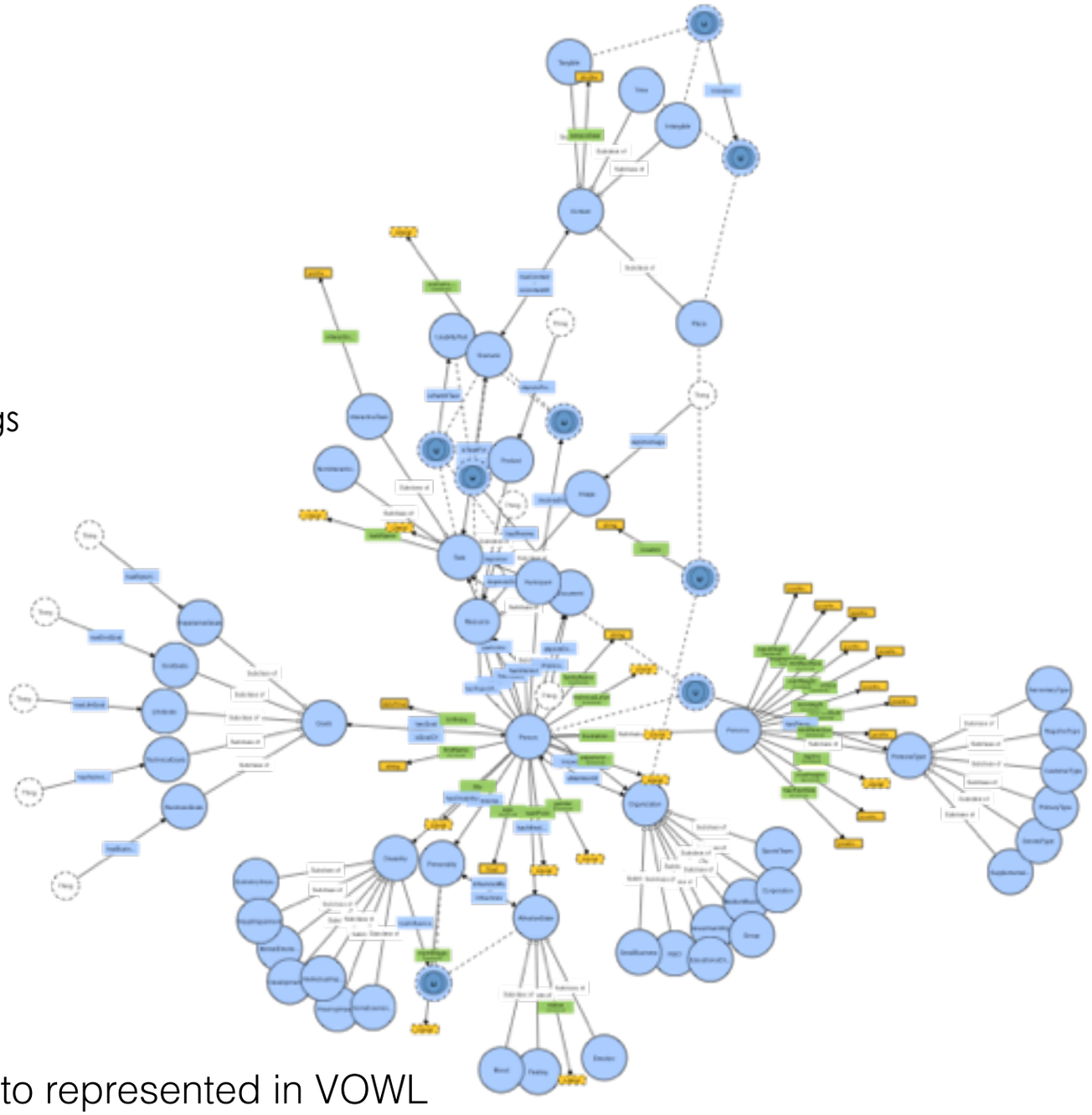
Element multiplication:
- improved graph topology
- reduced graph energy

Element aggregation:
- less edges
- increased readability

Force-directed layout:
- uniform, symmetric edges with few crossings
- highly connected classes = central position

Deliberate redundancy:
- colors, shapes, and text
- self-explanatory, colour not required for interpretation

Static vs. interactive:
- interactive highlighting
- details on demand

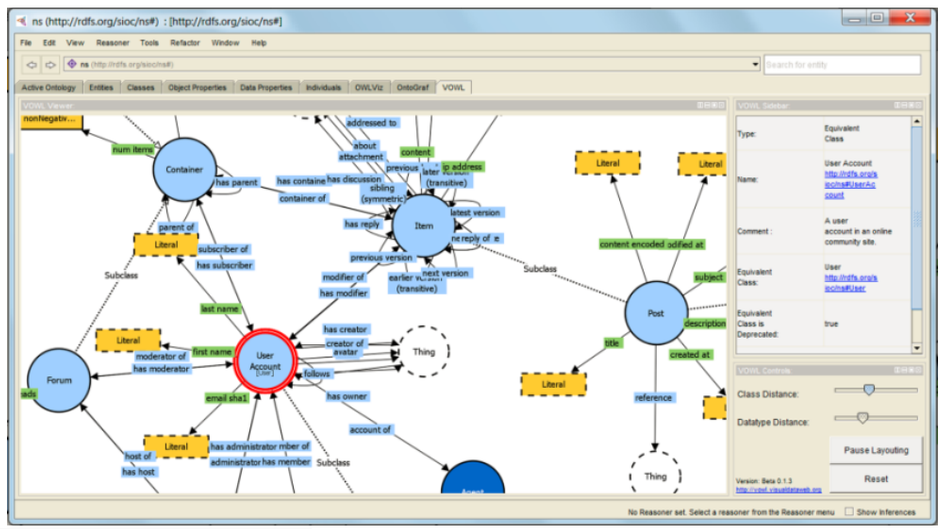


PersonasOnto represented in VOWL

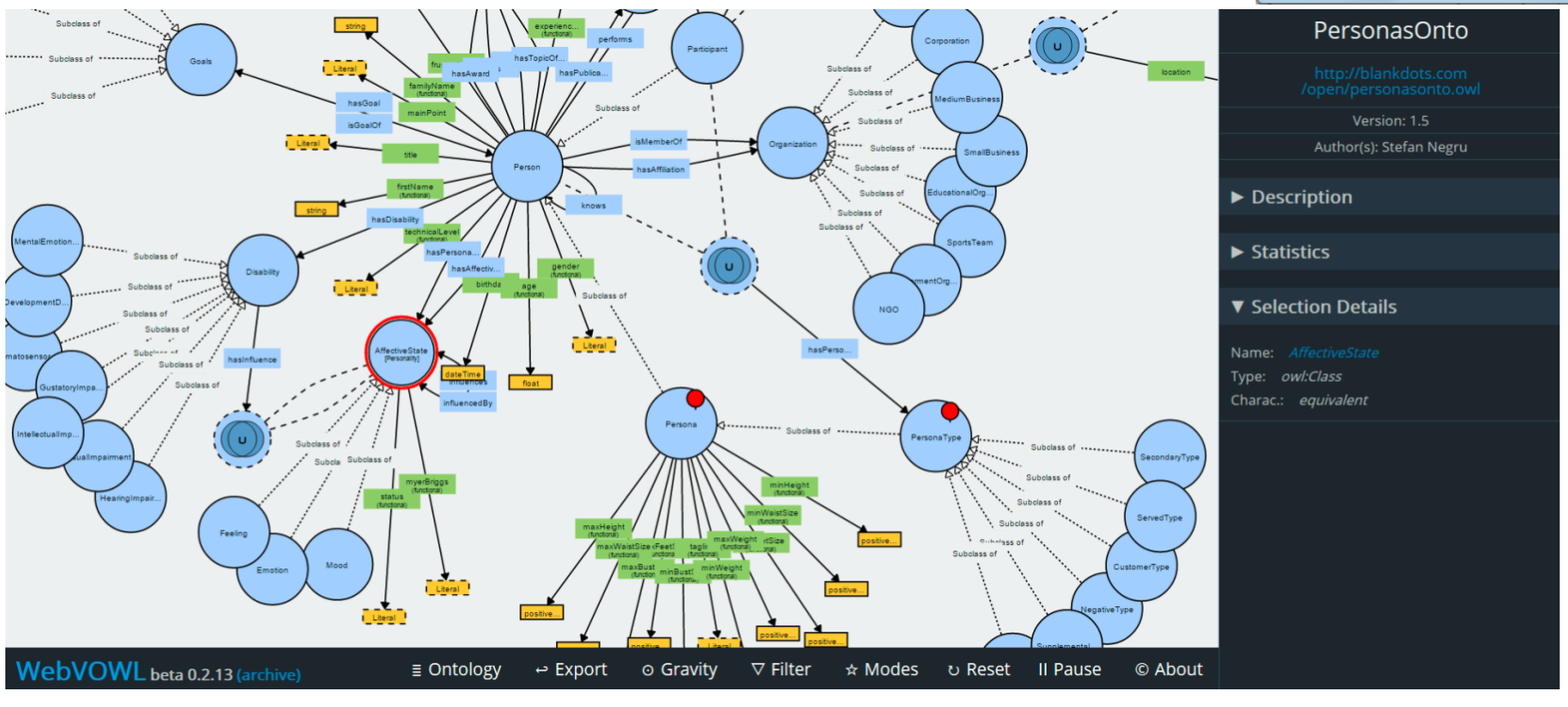
ProtegeVOWL and WebVOWL

Protégé plugin (Java + Prefuse)
http://vowl.visualdataweb.org/protegevowl.html
Web application (Web standards + D3)
http://vowl.visualdataweb.org/webvowl.html

ProtégéVOWL



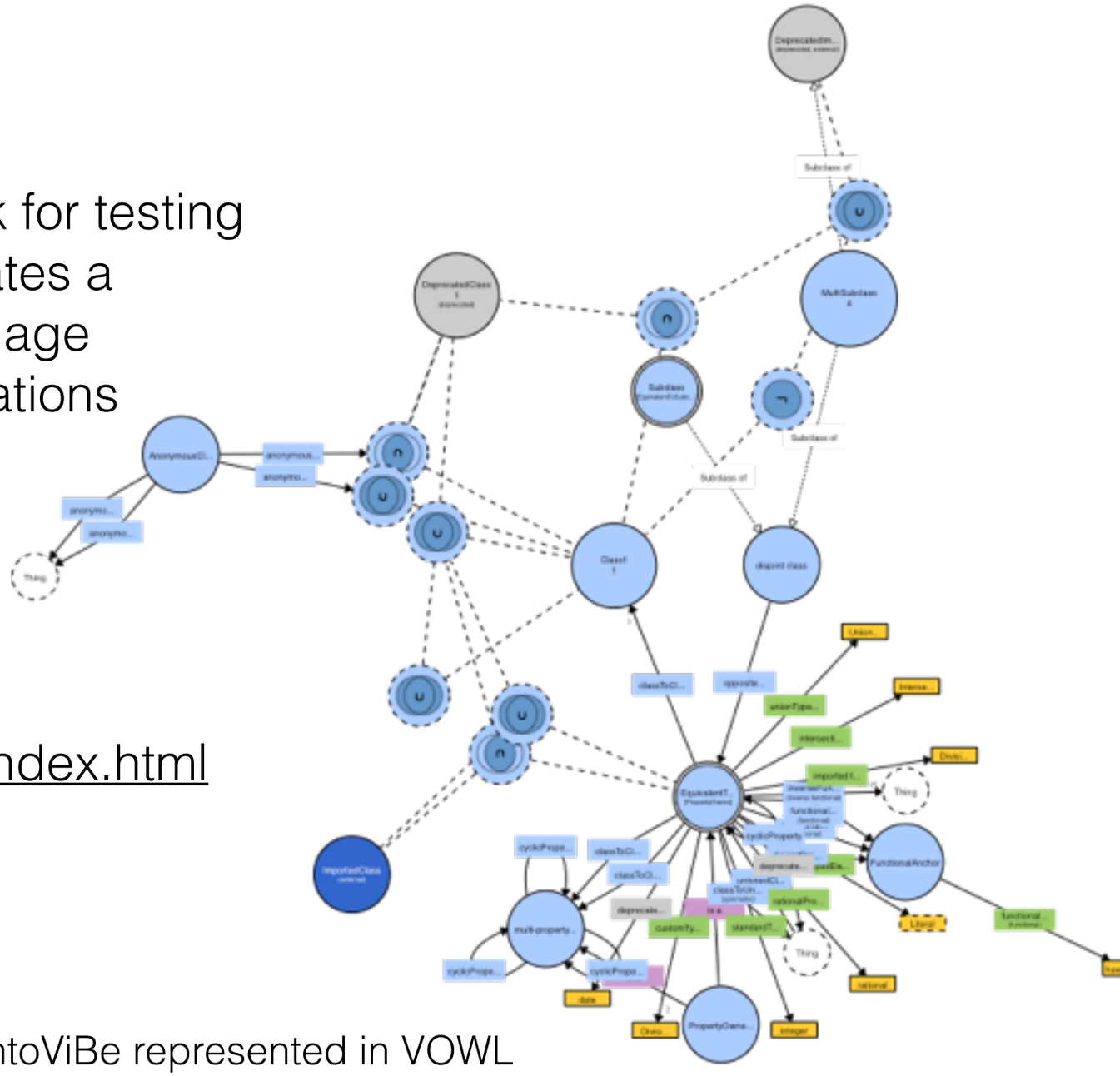
WebVOWL



OntoViBe: Ontology Visualisation Benchmark

- “OntoViBe represents a benchmark for testing ontology visualizations. It incorporates a comprehensive set of OWL 2 language constructs and systematic combinations thereof.”

- http://ontovibe.visualdataweb.org/index.html



OntoViBe represented in VOWL

Demo

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Challenges and Future (Work)

Thank you!