The OOR Initiative – An Introduction

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Ontology Representation Workgroup (ORWG)

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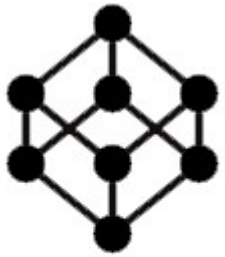
(v1.02)

Ref. https://wiki.nci.nih.gov/x/SLJiAw

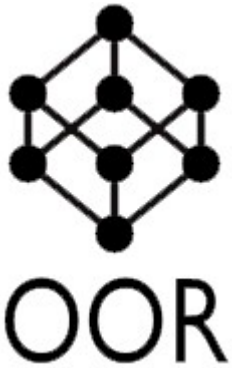


OOR Charter

Promote the global use and sharing of ontologies by:

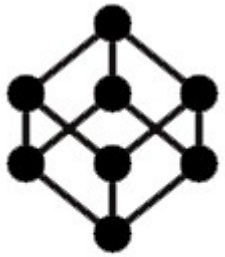
- Establishing a hosted registry-repository;
- Enabling and facilitating open, federated, collaborative ontology repositories, and
- Establishing best practices for expressing interoperable ontology and taxonomy work in registry-repositories.

http://OpenOntologyRepository.org



Open Ontology Repository

- Community effort since January 2008
- Promote global use & sharing of ontologies
  - Modular open source registry/repository software
  - 1 or more public instances
  - Best practices for ontology sharing and management
- The OOR Initiative … as
  - A public infrastructure/resource
  - An open source software project
  - A platform for value-added service
  - A global federation (of projects and institutions)

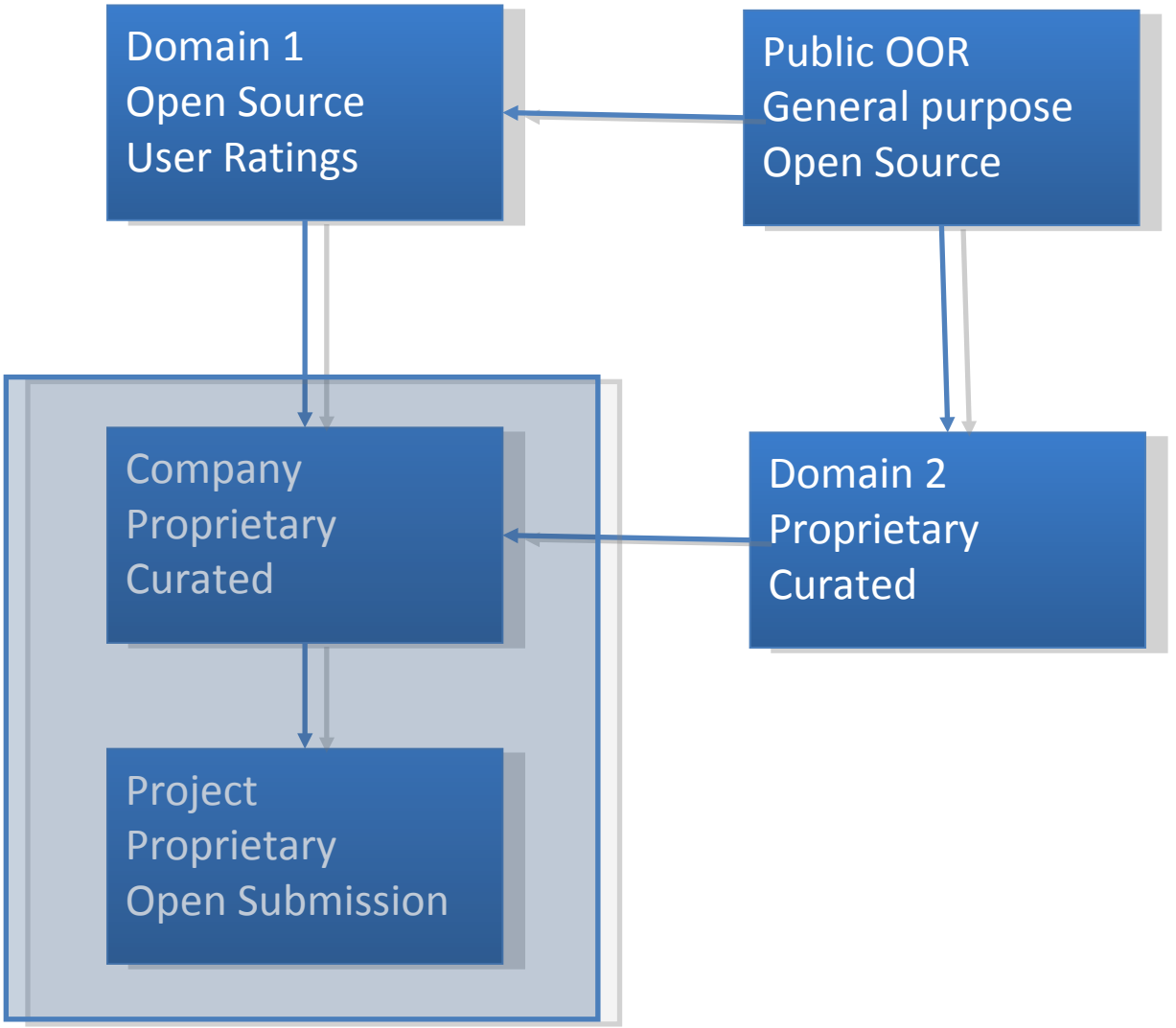


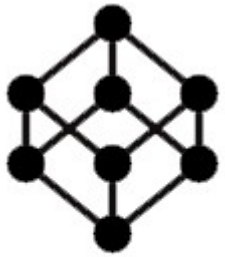
OOR Goals

- A well-maintained, high availability, high performance persistent store where ontological work can be stored, shared and accessed consistently;
- Mechanisms for registering and "governing" ontologies, with provenance and versioning, made available (logically) in one place so that they can be browsed, discovered, queried, analyzed, validated and reused;
- Services across disparate ontological artifacts supporting cross-domain interoperability, mapping, application and inferencing; and
- Registration of semantic services to support peer OORs

OOR

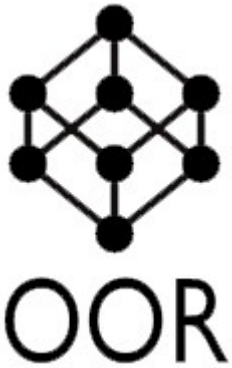
Deployment Example





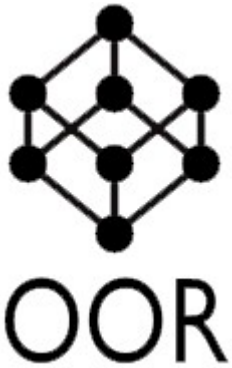
OOR Current Participation

- Technology contributions from
  - NCBO / Stanford-BMIR
  - CIM Engineering (CIM3)
  - Raytheon BBN
  - Northeastern University
  - University of Toronto
  - University of Bremen
  - SOCoP – Spatial Ontology Community of Practice
  - NeOn, ONKI, ICOM, SIO, OntoIOp … *more*
  - *… (Your OR Organization / Project?)*



Current Participation (con't)

- Mailing list with over 130 subscribers worldwide
- Between Jan 2008 and now: we've had 107 meetings and virtual events (team meetings, invited talks, panel discussions in the form of augmented conference calls)
- **OOR IPR Policy** adopted in 2010 – an IPR regime that encourages open collaboration and unencumbered reuse – Simplified (2 clause) BSD code License; acceptance of libraries under either "gift" or "reciprocal" software License; and Creative Commons "Attribution Only" (CC BY 3.0) content License for the Open Public OOR instance(s)
- Featured at workshops & conferences: OntologySummit2008, ISWC 2009, CENDI/NKOS 2008 & 2009, MBARI 2009, SemanticWeb-MeetUp 2009, SOCoP 2009, ORES 2010/ESWC 2010, SemTech 2010, SERES 2010/ISWC 2010, DataONE-ISWG 2011, ...
- Contributing to the discourse: communities and projects like BioPortal, NEU-Courses, COLORE, OMV, NeOn, ONKI, SIO, ORATE/HETS, SOCoP, ICOM, XMDR, MMI, ORNL, MetHet, … and dozens of individuals from the ontology, semantic web, data modeling, enterprise architecture and software engineering communities



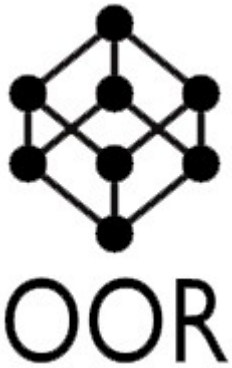
Goals

Provide an architecture, specification and infrastructure that supports

- Creation, sharing, searching, and governance-management of ontologies,
- Enabling and facilitating open, federated, collaborative ontology repositories,
- Multiple implementations

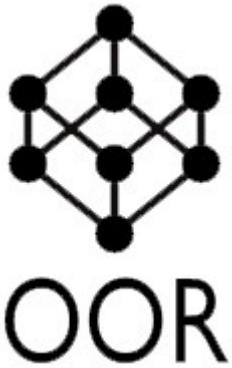
Complementary goals

- Fostering collaboration among all users of ontologies
- Identification and promotion of best practices for expressing and sharing interoperable ontologies
- Provision of services relevant to the RDFS and OWL ontologies and RDF instance stores.



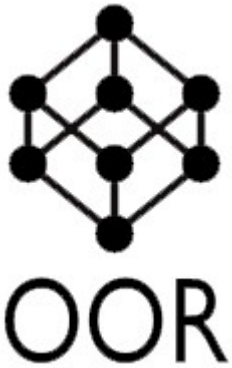
Assumptions

- OOR Supports Evolutionary Development
- Partitioning of Functionality
- OOR does not store instance data apart from that of the OOR infrastructure (**not resolved**)
- OOR Supports arbitrary representation languages
  - Repository architecture (mostly) independent of language
  - Initial support for OWL
- Meta/Provenance information crucial
- Standards based to extent possible



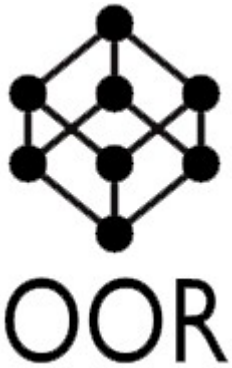
Architecture Principles

- OOR shall support evolutionary development
- OOR shall support distributed federatable instances
- OOR shall be scalable
- OOR shall support federation
- OOR shall provide services decoupled from core repository functionality
- OOR shall have no hierarchical dependencies
- OOR shall support arbitrary ontology representation languages
- OOR shall be ontologically driven
- OOR shall be platform independent



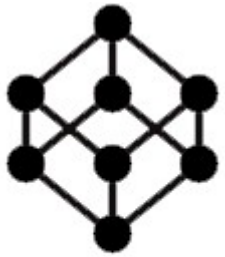
Use Cases

- Sources for use cases
  - OOR Requirements
  - ISO 11179
  - Existing ontology repositories
- Use cases are available at
  http://www.ccs.neu.edu/home/kenb/ontologies/oor-usecase.xml



Classification of Use Cases

- Administer user authorizations and privileges
- Assign identifiers
- Define workflows and policies
- Federate OOR instances
- Harmonize and map ontologies
- Publicize ontologies
- Query metadata
- Register ontologies
- Review and evaluate ontologies



OOR

Architecture Status

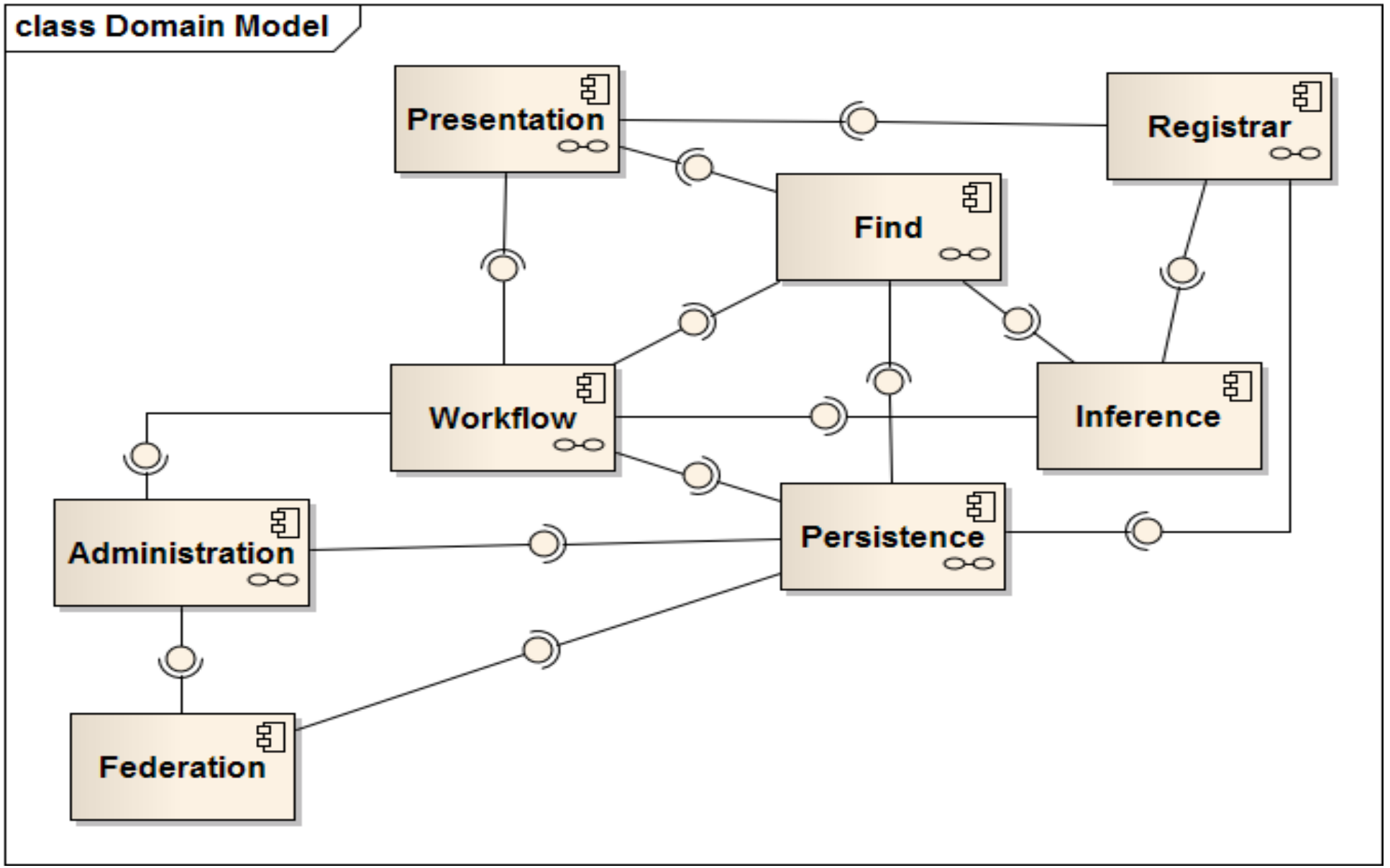
- Developed Requirements

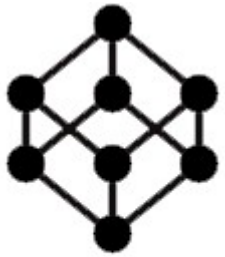
  http://ontolog.cim3.net/cgi-bin/wiki.pl?OpenOntologyRepository_Requirement
- Collected candidate architectures

  http://ontolog.cim3.net/cgi-bin/wiki.pl?OpenOntologyRepository_Architecture#nid184T
- Draft high level software architecture
- Held architecture & specification workshops
  - Ref. http://ontolog.cim3.net/cgi-bin/wiki.pl?OOR/ConferenceCall_2011_09_20#nid2WR7
  - and continuing …

OOR

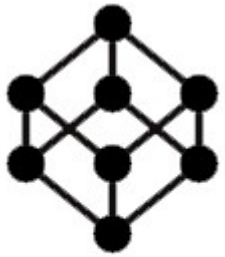
Current Architecture





OOR Ongoing Efforts

- Standing up an **OOR-sandbox** instance
  - http://sandbox.oor.net
- Standing up an **OOR-development server**
  - http://devbox.oor.net
- Positioning to stand up an **OOR-production** instance, which requires to be in place
  - Gatekeeping mechanisms
  - Proper policies
- Standing up an **OOR code-repository**
  - http://oor.semwebcentral.org/



OOR Ongoing Efforts (con't)

- **OOR-development instances**
  - NCBO: BioPortal - Stanford-BMIR / Mark Musen, Ray Fergerson, Natasha Noy, Trish Whetzel, et al. - whose technology we are running, as our code-base
  - NEU: gatekeeping and policy dev - Northeastern U. / Ken Baclawski, et al.
  - Raytheon BBN: federation - BBN / Mike Dean, Jim Chatigny, Dan Cerys
  - others: Bremen, MMI, Ryerson, ORNL, ...

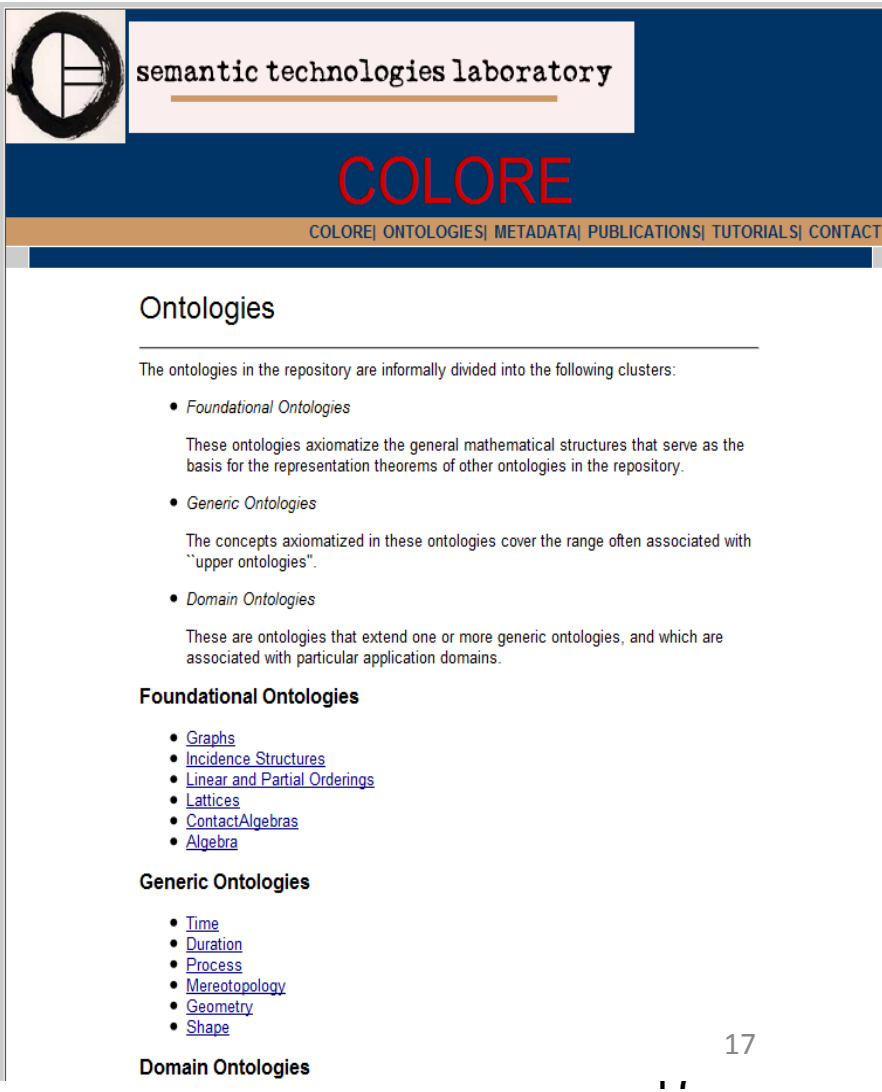
Ongoing Efforts (con't)

COLORE – Common Logic Ontology Repsitory

- –U of Toronto / Michael Gruninger
- –First order logic support for OOR
- –Modularization

http://stl.mie.utoronto.ca/colore/ordering/partial-ordering.clif

```
(cl-module partial-ordering.clif

(forall (x)
        (leq x x))

(forall (x y)
        (if     (and    (leq x y)
                        (leq y x))
                (= x y)))

(forall (x y z)
        (if     (and    (leq x y)
                        (leq y z))
                (leq x z)))

(forall (x y)
(iff    (lt x y)
        (and    (leq x y)
                (not (leq y x)))))

)
```

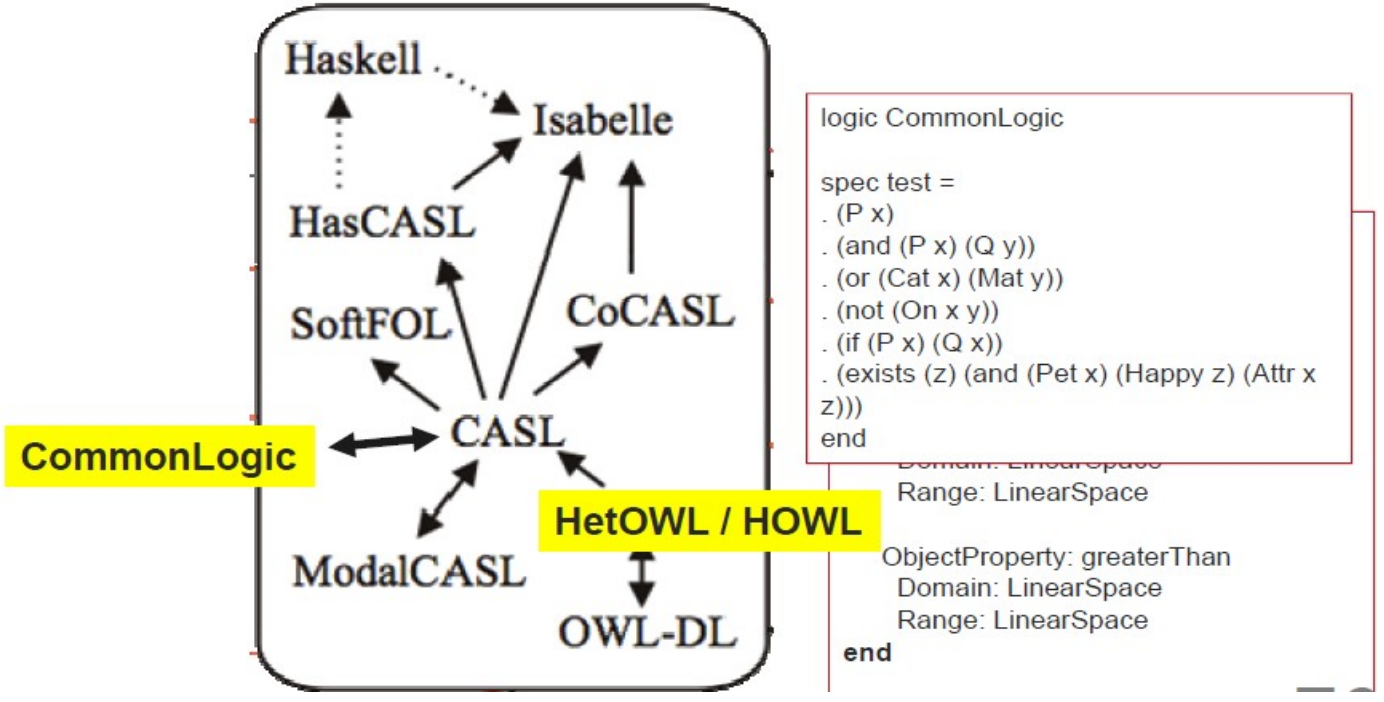


Ongoing Efforts (con't)

HeTS – the Heterogeneous Tool Set

- Bremen U (Germany) / John Bateman, et al.
- Inter-ontology mapping, … etc.
- a key contribution to the just (Jun-2011) agreement to start on **ISO** NP **17347 Ontology Integration and Interoperability** Standard (**OntoIOp**) development

HeTS: Continuing extension of the treated logics




```
logic CommonLogic

spec test =
. (P x)
. (and (P x) (Q y))
. (or (Cat x) (Mat y))
. (not (On x y))
. (if (P x) (Q x))
. (exists (z) (and (Pet x) (Happy z) (Attr x
z)))
end
```

```
    Range: LinearSpace

  ObjectProperty: greaterThan
    Domain: LinearSpace
    Range: LinearSpace
end
```

Next Steps:

- integration of HeTS 'behind the scenes'
  - access to reasoners
  - move beyond OWL
  - extension to our full complement of alignment shapes
- semantic versioning

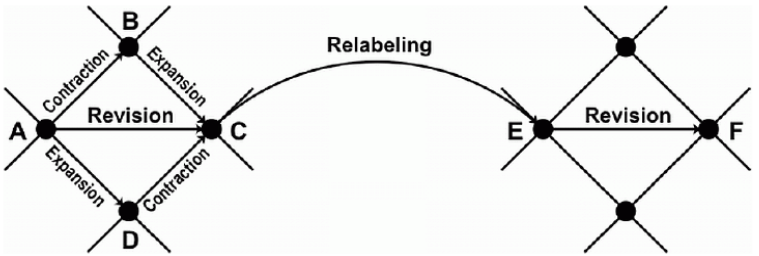
Ongoing Efforts (con't)

SIO – Sharing and Integrating Ontologies

- John Sowa and numerous contributors from the Ontolog Forum
- Applying the "Lattice of Theories" to resolving the classical challenges of interrelating disparate ontologies
- adopting a crowd-sourcing approach

Lattice of Theories

For any given logic, the set of all possible theories expressible in that logic forms a lattice.



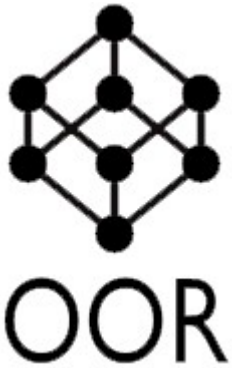
The ordering is defined by specialization and generalization.

Adding axioms to a theory creates a more specialized theory.

Deleting axioms creates a more generalized theory.

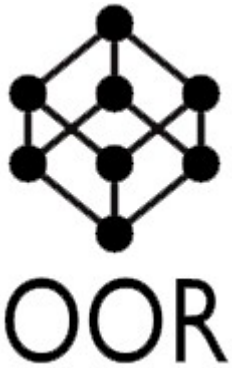
The SIO Players:
(the usual suspects: custodians from the UpperOntologySummit, ... etc.)

Pat Cassidy – COSMO, CDV, PIFO
Aldo Gangemi - DOLCE - Description & Situation extensions
Michael Gruninger - PSL / ISO 18629
Nicola Guarino - DOLCE
Barry Smith – BFO
Matthew West - ISO 15926
Adam Pease - SUMO
Doug Lenat - OpenCyc
John Bateman - Spatial Cognition, GUM, CASL, HeTS
John Sowa – Lattice of Theories
etc. … and YOU!



Current Priorities

- Continue in depth R&D in Architecture, API, metadata, CL support, ...
- Coordinate development efforts with the BioPortal team – now that we have recently reverted the “fork” back to a “branch” code development mode
- Continue to push OOR development and get more contributors
- Set up policies and process – to facilitate contributions to OOR work
  - Clear and easy policies and process to engage developers and have them contribute code
  - Build out "gatekeeping" and move from just having an OOR-sandbox to having available instances of an OOR-sandbox, an OOR-devbox and a high availability persistent public OOR-production server
  - Clear and easy policies and process to engage content stewards and have them contribute ontologies to our public instance of OOR
- Systematically solicit content contribution and engage major content communities
- Regularly review requirements and existing standards to make sure we are on track; and to promote and contribute to ontology standards efforts
- Continue efforts in publicity and outreach
- Get funding to continue and extend the work



To Join the effort

- Join the [oor-forum] mailing list - oor-forum-join@ontolog.cim3.net
- Come to our OOR-team weekly conference calls - Tuesdays 16:30 UTC (8:30am PST)

See: http://OpenOntologyRepository.org

- E-mail any one one of us if you have a question (our email addresses are on the cover slide)