The OOR Initiative – An Introduction

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Presented at the

Ontology Representation Workgroup (ORWG)

17-November-2011

( v1.02 )

Ref. https://wiki.nci.nih.gov/x/SLJiAw
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)
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
Deployment Example

Domain 1
Open Source
User Ratings

Public OOR
General purpose
Open Source

Company
Proprietary
Curated

Domain 2
Proprietary
Curated

Project
Proprietary
Open Submission
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)
- 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
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
    – and continuing …
Current Architecture
Ongoing Efforts

- Standing up an OOR-sandbox instance
  - [http://sandbox.oor.net](http://sandbox.oor.net)
- Standing up an OOR-development server
  - [http://devbox.oor.net](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/](http://oor.semwebcentral.org/)
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
  • Raytheon BBN: federation - BBN / Mike Dean, Jim Chatigny, Dan Cerys
  • others: Bremen, MMI, Ryerson, ORNL, ...
Ongoing Efforts (con’t)

**COLORE** – Common Logic Ontology Repository
– 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)))))

Ontologies

The ontologies in the repository are informally divided into the following clusters:

- **Foundational Ontologies**
  - These ontologies axiomatize the general mathematical structures that serve as the basis for the representation theorems of other ontologies in the repository.

- **Generic Ontologies**
  - The concepts axiomatized in these ontologies cover the range often associated with “upper ontologies”.

- **Domain Ontologies**
  - These are ontologies that extend one or more generic ontologies, and which are associated with particular application domains.

**Foundational Ontologies**
- Graphs
- Incidence Structures
- Linear and Partial Orderings
- Lattices
- Contact Algebras
- Algebras

**Generic Ontologies**
- Time
- Duration
- Process
- Stereomorphology
- Geometry
- Shapes

**Domain Ontologies**
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

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

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!

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.
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)