

DataNet Preliminary Proposal: Open Ontology Repository for Semantically Interoperable Research Communities

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The science and engineering communities are producing very large data sets that can help solve many of the problems facing humanity and the natural environment. However, incorporating multiple data types from multiple sources to solve these problems is a significant interoperability challenge.

In addition to data sets currently being created, documents and other artifacts created in the past can have equal importance. The problem with such data sets is not just the differences in recording media (paper versus disks) but also the enormous changes in terminology over time. Current data sets run the risk of an even more rapid obsolescence as the meaning and formats of the data fields are forgotten or no longer available.

We believe in the promise of semantic technologies based on logic, databases and the Semantic Web as a means of addressing the problems of meaningful access to and integration of data both today and over decades and centuries. To achieve this we propose to develop a new interoperability infrastructure that we call the open ontology repository (**OOR**). This infrastructure will serve a vibrant community of scientific researchers with collections of controlled vocabularies and knowledge models that have been computationally encoded in RDF, OWL, XML and other knowledge representation languages. More specifically, we propose to develop an open repository that will support the full data management lifecycle for our existing and virtual community of researchers. The collaborative Ontolog community has existed for over 6 years and continues to grow in both size and diversity. Our initial metadata and data sets will support the following areas: (1) **Biology**, especially the genomics, proteomics and other “omics” communities now served by the highly successful BioPortal repository. (2) **Biodiversity**, especially the species pages in the Encyclopedia of Life. (3) **Climate and Environment**, including both natural and built environments. (4) **Human culture and sociology**.

To address the issue of long-term sustainability, we propose to leverage the vitality of our virtual collaboration to support a new paradigm for maintaining semantic linkages available through the Internet. Specifically, we will develop a federated knowledge repository that can collectively correct for multiple points of failure and can foster collaborative stewardship of scientific knowledge. Particular emphasis will be given to the development of technological solutions that build on existing, proven architectures and standards. The OOR itself will be a standard as well as a federated repository, and a organization will be instituted to ensure that the OOR properly maintained on a permanent basis.

While these data sets provide a compelling case for the proposed OOR, the prospect of broader impacts is even more compelling. As an integral part of the proposed project, we intend to foster a vigorous educational outreach program to bring other data-intensive research communities into the OOR initiative. Since the OOR will be an open, federated architecture and infrastructure, it is intended to be utilized by communities to host their own ontologies as well as to allow the communities to adapt previously established ontologies for their own purposes. Moreover, since ontologies formalize the language of a community, they can be the basis for education and training for their discipline, provided that the ontologies are properly annotated. We will pursue the exceptional opportunity for education and research represented by ontologies.