

Ontologies in VIVO

As a semantic web application, VIVO uses ontologies to represent data. Many of the ontologies used by VIVO are developed by others. Some of the ontologies used by VIVO are developed by VIVO task forces in collaboration with OpenRIF, an ontology development group associated with VIVO. In particular, the [VIVO-ISF Ontology](#) is developed in collaboration with OpenRIF.

Advantages of using ontologies

Using ontologies has several distinct advantages over the use of traditional relational models for representing data:

1. Machine-readable Data definition and documentation. Data created using semantic web technologies represented by ontologies are "self-defining" – the data and its definitions are both available in machine-readable form at all times.
2. Inference. Using definitions represented in the ontologies, many assertions do not need to be entered explicitly, but can be inferred from the machine-readable definitions.
3. Data sharing. Data represented using common ontologies can easily be remixed and reused in data sharing. Data produced by different VIVOS, or different systems each using the ontologies used in VIVO, means the same thing, and can be formatted in the same way (using an RDF output format such as N3 or NT).

Issues using ontologies

Using ontologies for representing data has several disadvantages that must be managed to achieve the advantages above.

1. Changing ontologies is disruptive to those consuming the data. While changing data models is disruptive in all information processing work, the use of ontologies is relatively new, and the nature and extent of the disruption is not as well understood as changes in relational models.
2. Choosing useful ontologies can be difficult. There are many ontologies, and they often refer to the same things. Choosing one over the other can be difficult. As a result, changes may be needed, leading to the disruption previously described.
3. Creating ontologies and elements of ontologies can be difficult. As a result, improvements must be made in ontologies, must as improvements must be made in software. These improvements lead to the disruptions previously described.

Some current issues with ontologies in VIVO

As VIVO matures, and we gain experience with representing real-world data using ontologies, we have observed some issues that could be considered for eventual remediation:

1. Choice of ontologies
 - a. Can we use the w3c time ontology to replace VIVO dateTime? Using a standard ontology would improve data sharing.
 - b. Can we use the w3c org ontology to represent organizational concepts in VIVO? Using a standard ontology would improve data sharing.
 - c. Can we use the w3c prov-o ontology to represent provenance concepts in VIVO?
 - d. Can we use SPAR to represent scholarly works and citations?
2. Use of numbered predicates and entities
 - a. It is critically important that the objects and relationships in VIVO have lineage to fundamental information representation concepts. Currently, VIVO uses the Basic Formal Ontology as a top-level ontology. BFO is well-defined, well-structured, and is in wide use as a top-level ontology. But BFO, as with other ontologies, uses "numbered" predicates and class identifiers. Use of numbered predicates hinders human usage, both for reading data and for writing queries.
3. Non-informative predicates
 - a. Some predicates in VIVO do not convey a meaningful relationship between the subject and object. These can eventually be refined to provide meaning.
4. Non-domain taxonomies.
 - a. Academic degrees. VIVO needs a controlled vocabulary of academic degrees, but it is not VIVO's role to create one. When/if a controlled vocabulary of academic degrees is available, VIVO may want to move from its own vocabulary to a standard vocabulary.
 - b. Organizational types. Similarly, VIVO is not in the business of defining the types of organizations. Yet VIVO needs an organizational taxonomy to represent scholarship. As/if a standard organizational taxonomy emerges that could be used by VIVO, VIVO may choose to adopt it.