OBI: Ontology for Biomedical Investigations

The OBI Consortium, http://purl.obofoundry.org/obo/obi

Abstract

OBI, the Ontology for Biomedical Investigations, is being engineered by a set of domain experts encompassing a wide array of biomedical science disciplines. The scope of this ontological effort is to close a gap in coverage in resources available to annotate scientific experimental practice and make it coincide with the evidence-based biology paradigm.

Introduction

The OBI consortium endorses the OBO foundry principles [1]. Those guidelines have positively impacted the work. First, by encouraging an open and inclusive approach, the OBI group proactively seeks partners and may act as an accretion point, avoiding work fragmentation. Second, by insisting on documentation, working practices are made explicit for a decentralized yet consistent development. OBI aims at representing various experimental processes (investigation, study, assay), the study design, the protocols and instrumentation used, the material used, the data generated and the type of analysis performed on the data. OBI supports the consistent annotation of biomedical experiments regardless of the particular field of study.

Results

OBI selected the Basic Formal Ontology (BFO[2]) as its upper-level ontology, and as a result is being developed following 3 main axes: *bfo:Process* covering assays and information processing, *bfo:MaterialEntity* encompassing instrument and other materials and *bfo:DependentContinuant*, (with children such as quality, role and disposition) which holds entities used to possibly qualify elements of the first two dimensions. OBI uses the Ontology Web Language (OWL[3]) and the Protégé editor [4] as development environment and is organized as a series of working groups tackling specific sub-domains.

Procedures have been devised to ensure consistent work across branches. Thus, OBI has agreed on a naming convention for representational artifacts, a minimal set of metadata to supply when submitting terms or creating classes and methods both for merging branch outputs and for cross referencing OBO foundry sister ontologies (e.g. CHEBI, CL, GO). OBI is currently being evaluated against competency questions and use cases collected from its members.

Biomedical experimental processes can involve numerous sub-processes, where each step can involve various material entities e.g., whole organisms, organ sections, cell culture, cell pellets, devices. Material entities realize distinct roles given the context of the process they are used in e.g. study subject role, host role, specimen role, patient role; and distinct functions e.g. measuring, separating, environment controlling. Use cases are employed to demonstrate how to model entities and their relations in OBI in order to describe experimental processes such as a blood glucose measurement assay, or a vaccine protection experiment.

Conclusion

OBI provides an approach to represent biological and clinical investigations in an explicit and integrative framework, which facilitates computational processing and semantic web compatibility.

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References

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