**Abstract:** With the increasing development and use of ontologies in the bioinformatics domain, opportunities for their utilization in applications and workflows are being created. In our effort, we discuss how the Ontology for Biomedical Investigations (OBI) can be enriched to support annotation of Web services. The methodology includes designing ontology analysis diagrams for Web services and analyzing them to find the terms that are need to be added to the ontology. The enriched ontology is then used for annotating the Web services. Using annotated Web services to perform service discovery and make service suggestions provides a way to evaluate the validity of the annotations made and the terms added to the ontology.

**Motivation**:
- Real world data analysis tasks often require coordinated use of multiple tools.
- There has been a dramatic increase in Web services and tools in the biomedical community but there is a need for an easy way to design workflows.
- A large number of tools are available for the construction of workflows (e.g. in the Galaxy system) and additional tools can be added with Web services. However, the user must know how, a priori, to construct them into a logical workflow (Figure 1).
- Semantic annotation of Web services and tools can be used to assist the user in creating bioinformatics workflows [1] as it can adequately describe the input, output and functionality of the tools.

**Methodology to Enrich OBI**
1. Analyze WSDL/WADL Documentation
2. List the proposed terms in the Terms Template
3. Create a Web Service specific Ontology analysis diagram based on generic model
4. Provide the textual definition
5. Add terms to OBI

**Concepts added to Ontology**
Once we have proposed the term, defined it, determined its relationships with other terms, and determined the hierarchy in the ontology, it can be added, we add the term to the ontology using Protégé.

**Evaluation and Application of Semantic Annotations**
- We have a standard template which we populate as we proceed with proposing terms, defining them and determining the hierarchy.
- We are collaborating with EDAM [4] group in our efforts to enrich OBI. (EDAM is an ontology that provides a controlled vocabulary for description of bioinformatics tools and data.)

**Effective annotations: Evaluation from Rui Wang et al. [5]**
- The figure above confirms that the annotated Web services perform better for service discovery and suggestions than un-annotated ones.
- Evaluations indicated functionality annotations (annotations on operations) contribute the most towards suggesting correct Web services, followed by input/output annotations and finally precondition/effects annotations.

**References**