Biological annotation of systems biology models

Abhishek Tiwari
Auckland Bioengineering Institute
Both CellML and SBML use RDF for metadata/annotation representation.

In SBML biological information is embedded as RDF in the language elements using annotation element while in CellML use of RDF is freestyle.

To report Biological informations SBML uses BioModels.net/ MIRIAM qualifier elements while CellML employs a `cmeta:bio_entity` element.

SBML elements can be annotated with `sboTerm` which adds additional semantic information.

Ongoing efforts to adopt the BioModels.net/ MIRIAM qualifier in CellML (proposed `cmeta:biomodels` ?)
Annotating while developing

- Software tools like CellDesigner, SBMLeditor and COPASI support MIRIAM annotations
- These tools can be used for annotation during the model development process itself
- Wizard or Form based metadata/annotation editor interface
COPASI
Minimal vs Well annotated

- Tools described in previous slides require massive web hunting for the identifier values, for instance: *In urn:miriam:uniprot:P62158 modellers have to find the uniprot id P62158 for the corresponding protein using keyword search*
- Finding identifier values of all miriam:dataType for all components/elements in a large model can be mammoth task
- Additional complexity introduced due to relationship between MIRIAM resources in form of “has a”, “is version of”, “is homolog to”, etc.
- Not good enough for full fledged annotation process resulting into a well annotated model
So how do we annotate model with these many resources?
Creating annotation pipeline using webservices

- Individually querying web service for each of these databases using keywords and update the model
- Unified interface which allows to interact with a list of web services in an asynchronous way.
- Tools such as libAnnotationSBML, Saint and semanticSBML can automate this process
- Dynamic linking of model to databases is in early stage
libAnnotationSBML

- Java library and tools
semanticSBML
Wish list?

- MIRIAM annotation in CellML
- Better web services