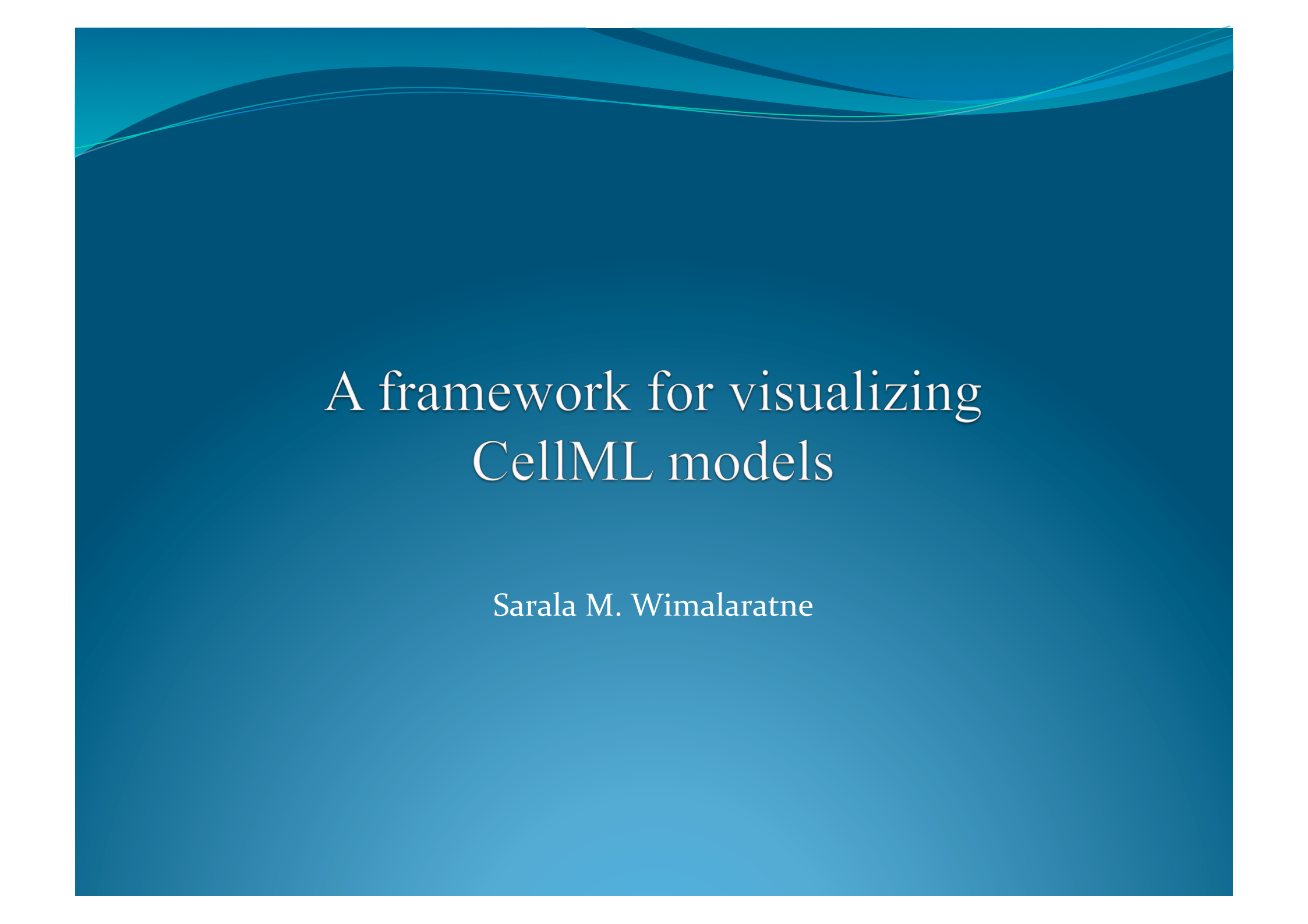


The background is a solid blue color with a gradient. At the top, there are several thin, wavy lines in lighter shades of blue and teal, creating a sense of movement and depth.

A framework for visualizing CellML models

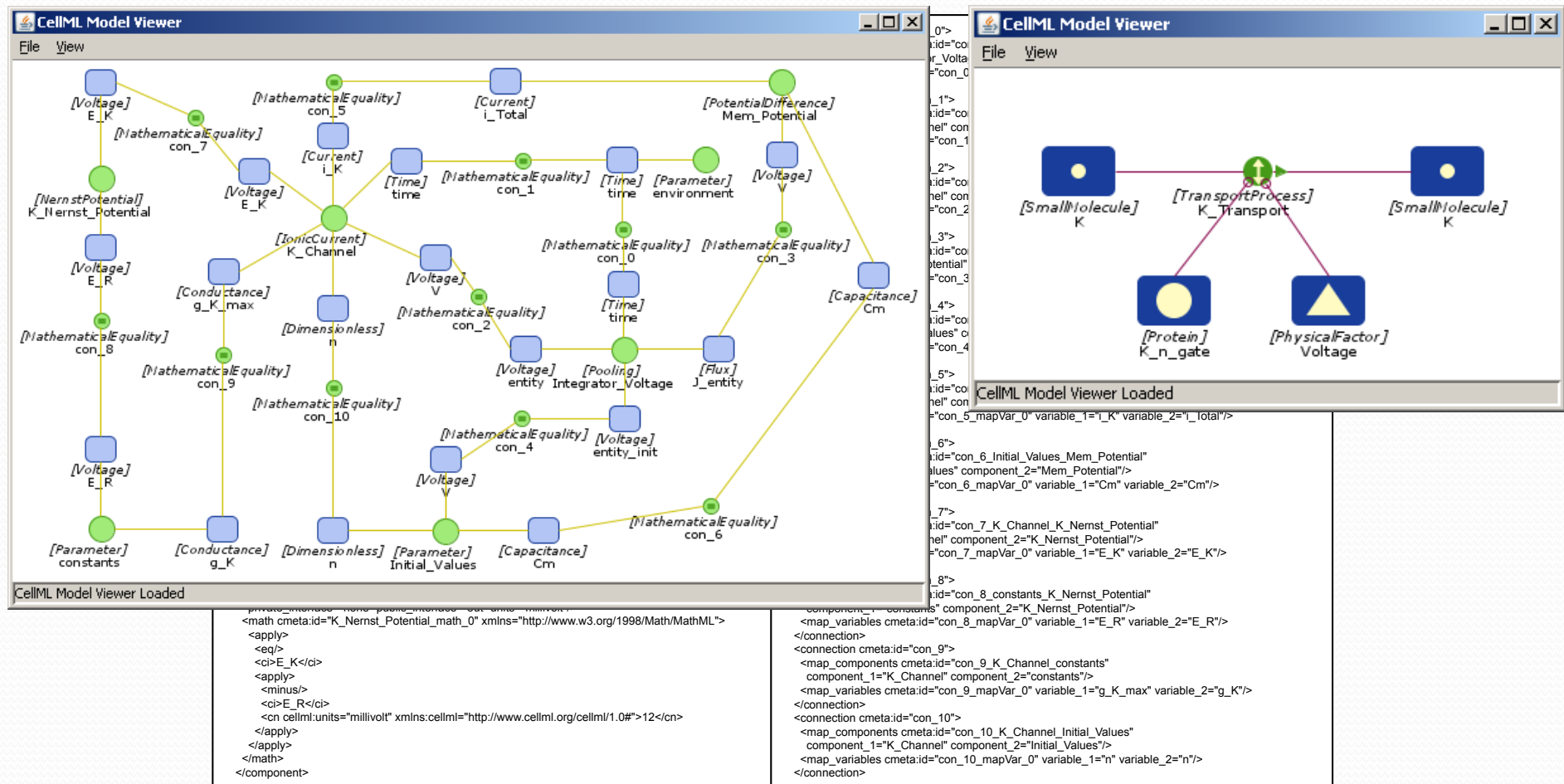
Sarala M. Wimalaratne

Visualizing CellML Models

Physical View

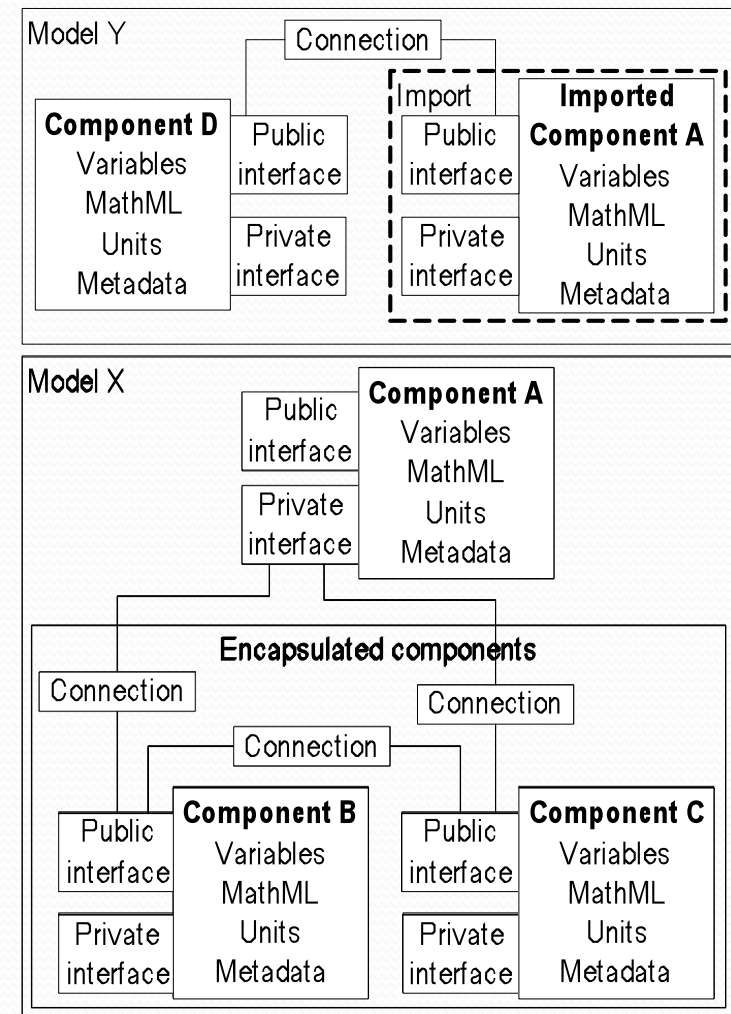
CellML/XML Model

Biological View



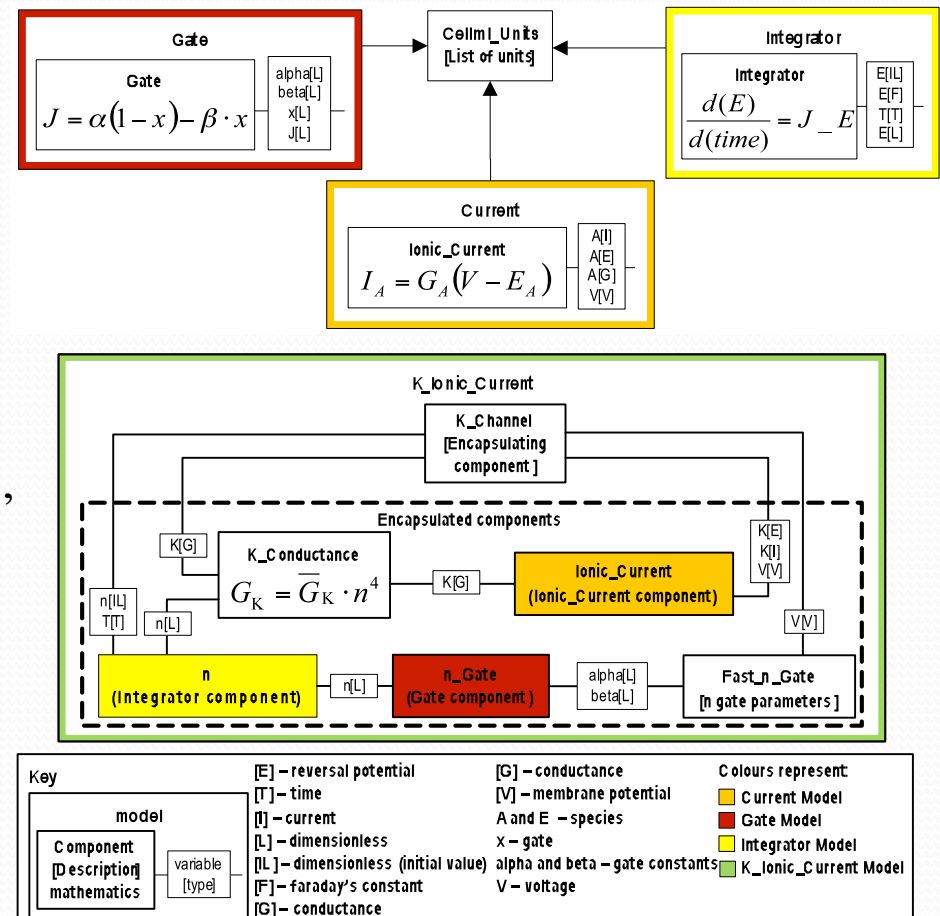
CellML

- CellML has a simple structure based upon connected *components*.
- *Connections* specify how variables are shared between the components.
- Encapsulation hierarchies are enabled using *private interfaces*.
- A *model* is the root element for a CellML document. It is a container for components, connections, units, and metadata.
- Model reuse is enabled by the *import* element.



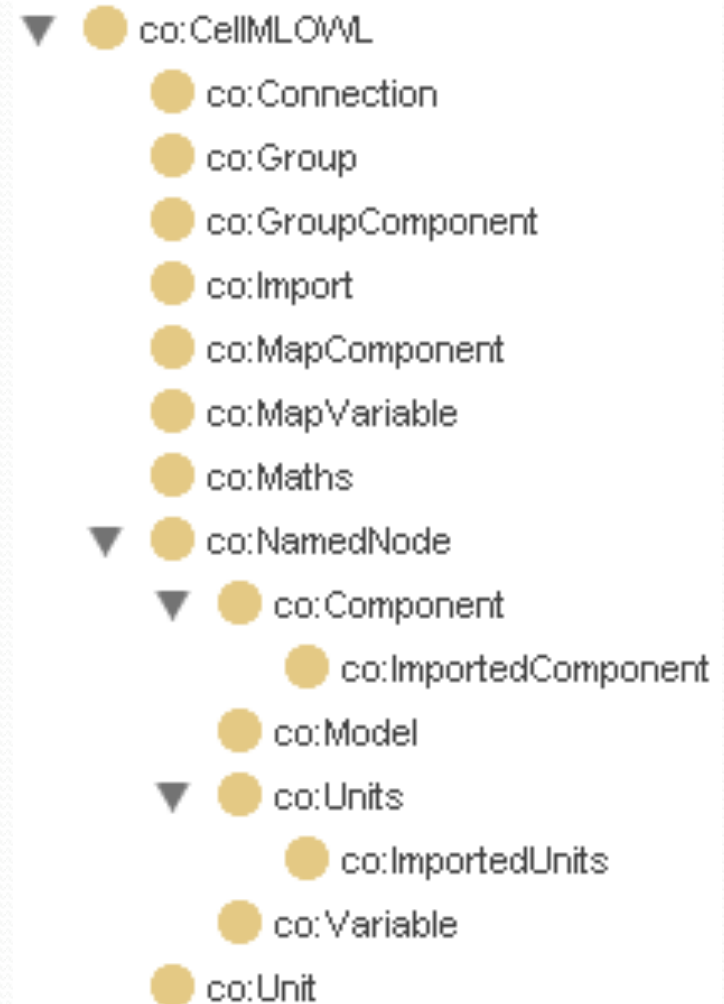
Modularising CellML/XML models

- Guidelines for enhancing model structure:
 - isolating biophysical concepts that can be shared between models at the component or whole model level;
 - constructing models combining the components, providing model-specific values and isolated biophysical concepts, which clearly identify the building blocks;
 - using encapsulation to reduce the complexity of models by creating sub-models or to expose points where different implementations of particular details can be swapped in and out.



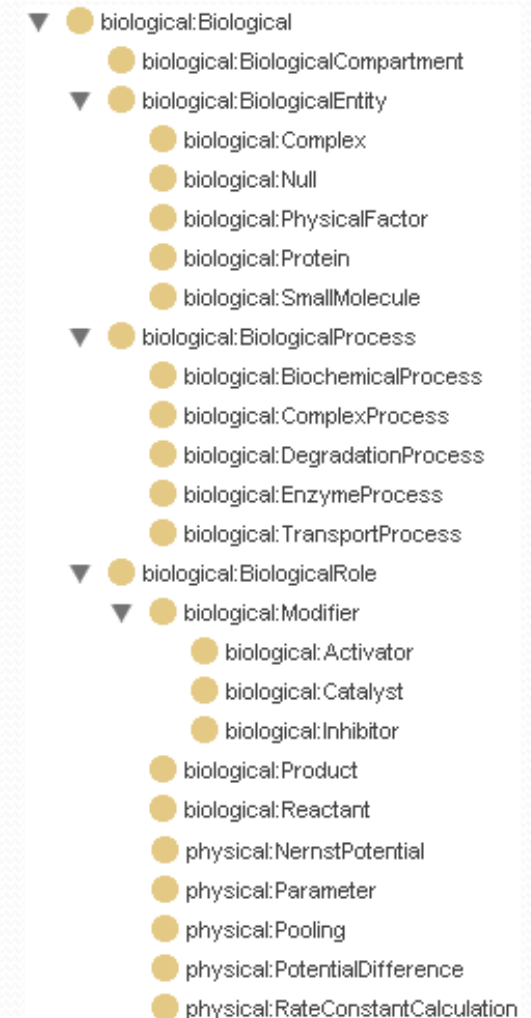
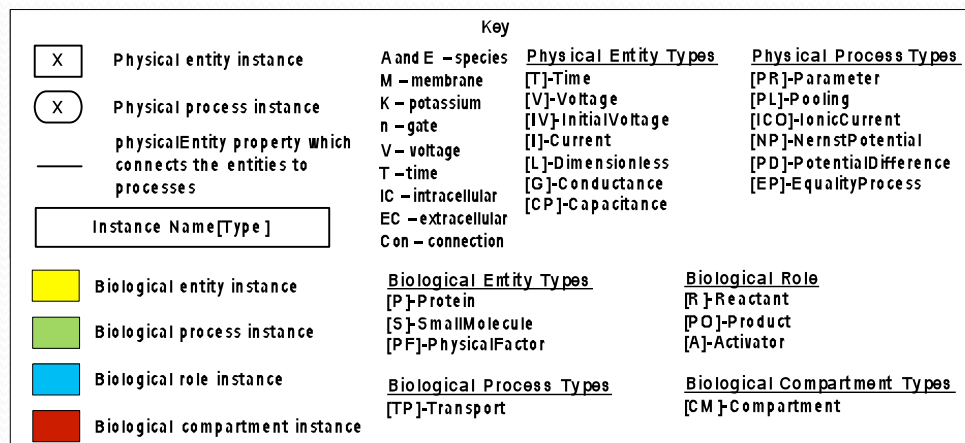
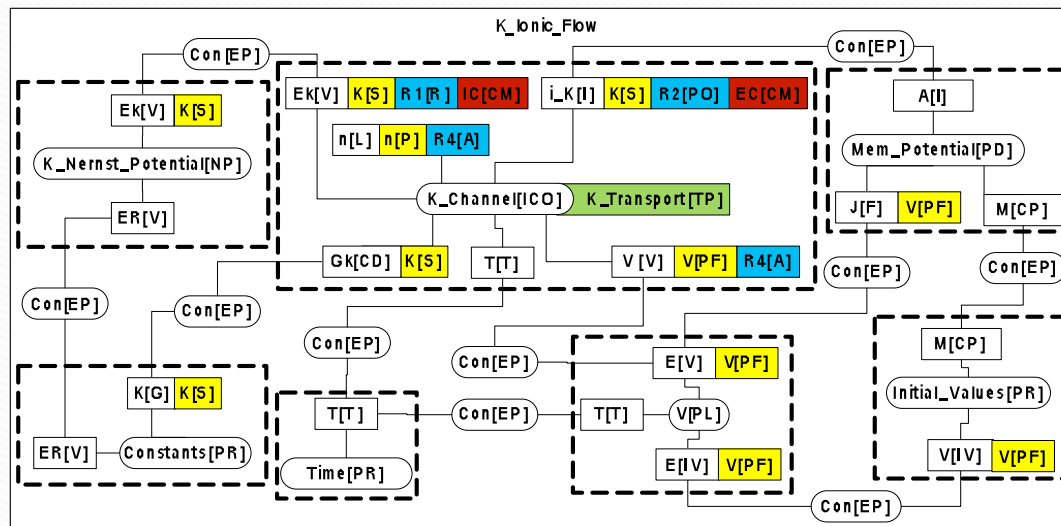
Transformation of the CellML/XML model into an OWL format

- This uses an ontology for representing CellML models and a method for binding elements of these back to the CellML/XML model



Annotation of the CellML/OWL model to an OWL model of biophysical concepts

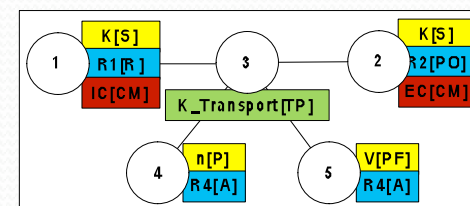
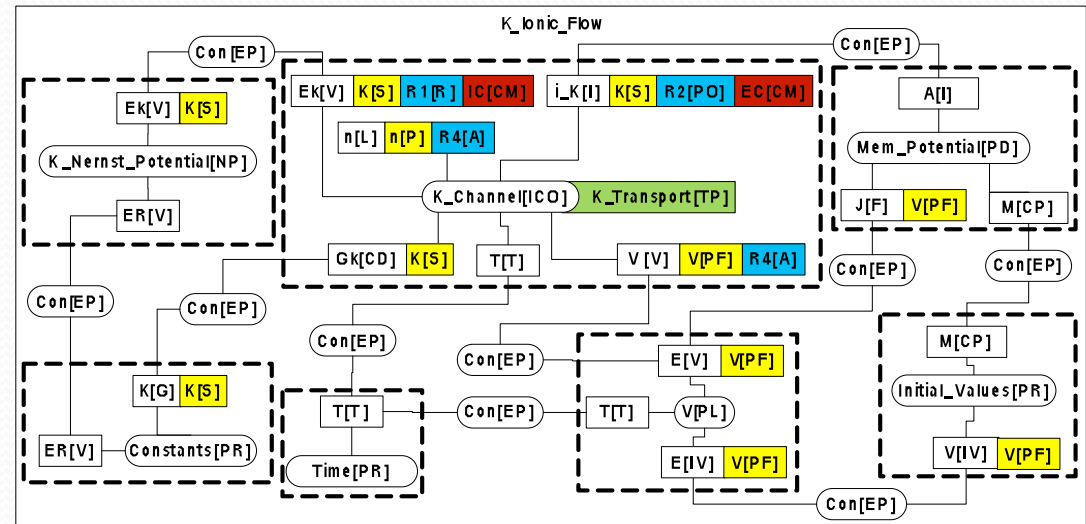
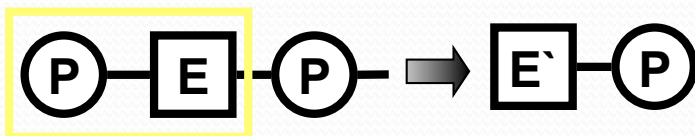
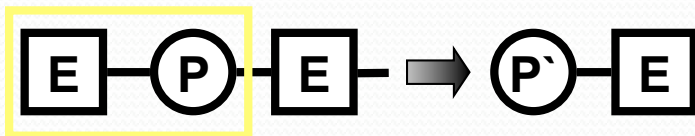
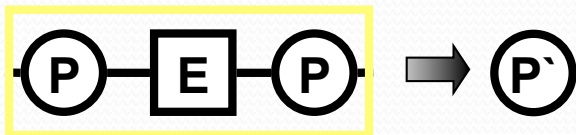
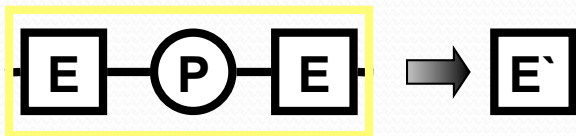
- This involves developing an ontology that represents the physical and biological concepts that are described in CellML models (CellMLBiophysical/OWL);



Generation of the biological model

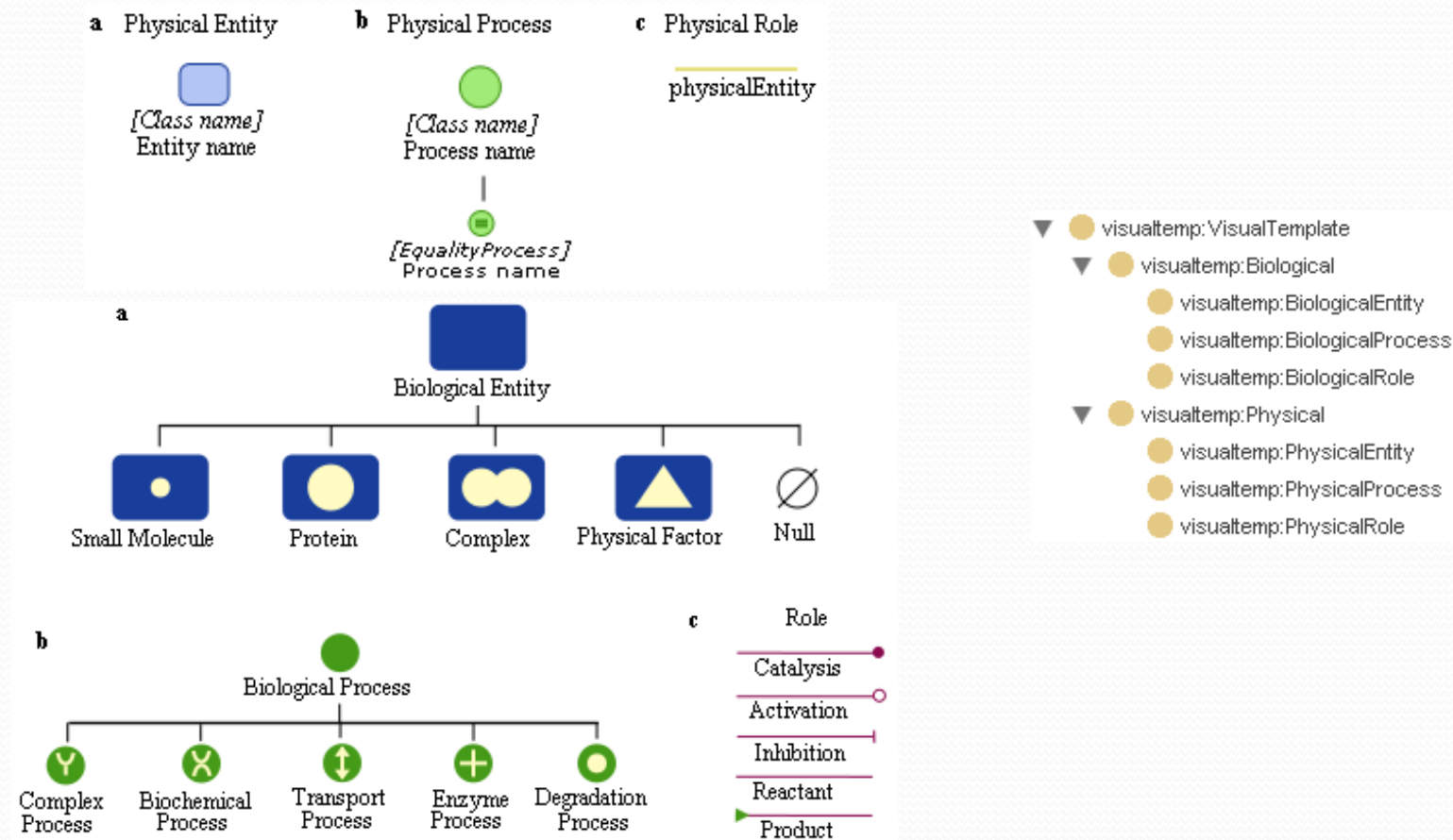
- Simplification of the CellMLBiophysical/OWL model using the ontological mappings, in combination with a set of graph reducing rules, to represent the underlying biological view of the CellML model.

Collapsing Patterns



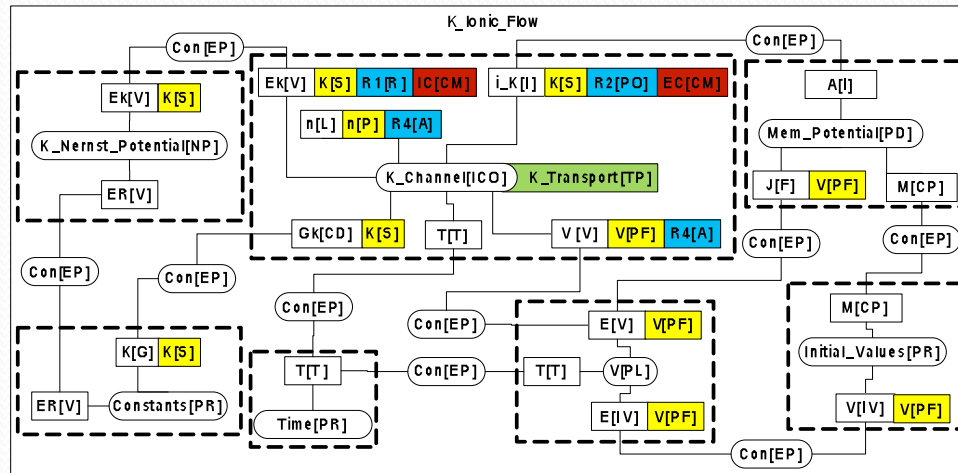
Visualization of CellML models

- A visual language to represent all physical and biological processes covered in CellMLBiophysical/OWL ontology.



Visualization of CellML models

Physical view generated from the annotated
CellMLBiophysical/OWL model



Biological view generated from the simplified
CellMLBiophysical/OWL model

