Third NeuroML Development Workshop

Summary

This workshop is being organised to finalise plans for the next major release of NeuroML: version 2.0. This version will be more extensible to allow more complex channel and synapse models to be developed and will expand the range of neuroscience models which can be expressed by the language. It will have greater interaction with languages for subcellular signalling pathways such as SBML and CellML, will support a wider range of 3D and abstract network descriptions and allow more simplified spiking neuron models to be expressed.

Practicalities

Dates:	**Thus 31th Mar - Fri 1st Apr 2011**
Location:	London - UCL (Thurs), Room 347, SSEES Building 16 Taviton Street, WC1H 0BW
	Goodenough College (Fri), see http://www.neuroml.org/workshop2011
Local organisers:	Angus Silver & Padraig Gleeson

Overview

Since last year's NeuroML workshop at Arizona State University, a paper on version 1.x of NeuroML has been published (Gleeson et al. PloS Comp Biol 2010). There have also been major advances in the next major release of the language (see http://www.neuroml.org/neuroml2 for more details). This meeting will be an opportunity to discuss these developments, decide what is else is required, and lay plans for a formal v2.0 specification document. Topics for discussion at the workshop will include:

Representations of morphologies: Are the proposed structures sufficient for the range of applications which will visualise/transform/generate neuronal morphologies? What will be the requirements on the specification in the age of high resolution reconstructions and massive data sets from connectomics?

Use of LEMS for defining spiking nodes, channels & synapses: Is the LEMS framework (Low Entropy Modelling Specification, http://www.neuroml.org/lems) sufficient for describing the range of neuron types and active membrane conductances required in NeuroML 2.0?

Compatibility with SBML/CellML: There are many tools available, databases of models and active communities for these systems biology languages. How best can NeuroML interact with these existing initiatives without reinventing the wheel? Is import & export of these models using the same underlying LEMS framework a viable option?

Hierarchical network descriptions: Network generation templates will be expanded in NeuroML to allow a greater range of compact network descriptions. Are the proposed structures sufficient for the wide range of network representations used by experimentalists and theoreticians in the literature? How will this part of the language interact with the emerging NineML language?

Annotations and metadata: The systems biology community have a number of established initiatives for the structured annotation of models (e.g. SBO, Gene Ontology, MIRIAM) and some are emerging in neuroinformatics (e.g. NeuroLex). How should these be used to add metadata to NeuroML v2.0 documents? How can this metadata facilitate searching through NeuroML files?

Movement to formalised standardisation process: The NeuroML initiative needs to move to a structured specification development process with elected editors. Volunteers will be required!

This workshop has been made possible with funding from:

The UK Neuroinformatics Node www.neuroinformatics.org.uk

National Institutes of Health

wellcome trust

Agenda

Morning Session: Thursday 31st March

8:30	Coffee & Tea	
9:00	Welcome	**Angus Silver**
	Goals of meeting	
9:15	Review of status of NeuroML v1.x	**Padraig Gleeson**
	Tool support & models available	
9:30	Brief introduction to proposed structure of NeuroML v2.0 and LEMS	**Robert Cannon**
	Motivation for LEMS; Definitions of ComponentTypes & Components; LEMS interpreter	
10:00	Mapping LEMS to & from other formats	**Padraig Gleeson**
	Converting LEMS & NeuroML 2 models to: NEURON, Matlab, Brian; Abstract/single compartment cell models specified in LEMS	
10:30	Introduction to NineML	**Ivan Raikov**
	Introduction to INCF initiative for spiking neuron & network modelling	
11:00	Coffee & Tea	
11:20	Roundtable discussion: Vision for the NeuroML Initiative	**Chair: Sharon Crook**
	What should be the scope for NeuroML version 2?	
	How much should we leave to other languages like SBML, CellML & SED-ML?	
12:30	Metadata annotations in v2.0 & linking to remote databases	
	MIRIAM Resources	**Mike Hucka**
	Brief introduction to NeuroLex	**Stephen Larson**
13:00	Lunch	

Afternoon Session: Thursday 31st March

13:45	Representations of detailed neuronal morphologies in v2.0	
	Proposed NeuroML v2.0 representations of neurons	**Sharon Crook**
	Requirements for a language for describing detailed neuronal morphologies	**Giorgio Ascoli**
	Circuit mapping using volume electron microscopy and high-throughput neurite reconstruction	**Moritz Helmstaedter**
15:00	Channel distributions on neuronal morphologies	**Padraig Gleeson**
	Current methods in v2.0 of defining channel distributions; Inhomogeneous cell properties	

This workshop has been made possible with funding from:

The UK Neuroinformatics Node www.neuroinformatics.org.uk

National Institutes of Health

wellcome trust

15:30 Coffee & Tea

16:00 Requirements for a language for multiscale cell model development **Upinder Bhalla**

16:30 Breakout sessions

A number of separate groups can form to assess the present NeuroML 2 support for, or to gather new requirements for language features in different areas: synapses, ion channels, morphologies, networks

18:00 Close of day

19:30 Dinner at Navarro's: http://www.navarros-tapas-london.co.uk

Morning Session: Friday 1st April

8:30 Coffee & Tea

09:00 Reports of breakout sessions

09:30 Ion channels & synapses in v2.0 specified using LEMS

Overview of what's possible so far **Robert Cannon**

Low entropy specification of reaction diffusion models **Avrama Blackwell**

11:00 Coffee & Tea

11:20 Continuing discussions on ion channels & synapses

12:00 Interaction with Systems Biology languages: SBML, CellML

libSBML and the benefits SBML has had as a result of it **Sarah Keating**

Export & import of SBML & CellML from/to LEMS & usage with NeuroML ComponentTypes **Padraig Gleeson**

12:45 The OpenWorm project **Stephen Larson**

Interesting possibilities for using NeuroML 2.0/LEMS in an open source model of C elegans

13:00 Lunch

Afternoon Session: Friday 1st April

14:00 Network representations

Work to date for network representations in NeuroML 2 **Robert Cannon/Padraig Gleeson**

Procedural & declarative network descriptions: experiences from developing PyNN **Andrew Davison**

Spinnaker & BIMPA Project: Biologically inspired massively parallel architectures **Andrew Brown/Dave Lester**

This workshop has been made possible with funding from:

The UK Neuroinformatics Node www.neuroinformatics.org.uk

National Institutes of Health

wellcome trust

15:30 Coffee & Tea

16:00 Next steps **Chair: Angus Silver**

Formalisation of NeuroML v2.0 specification process: volunteers!

Input from other standardisation processes, e.g. SBML

Towards a libNeuroML 2

Relationship to INCF Initiatives

17:30 Close of meeting

This workshop has been made possible with funding from:

The UK Neuroinformatics Node www.neuroinformatics.org.uk

National Institutes of Health

wellcome trust