

NeuroML is a standardised XML based language for computational neuroscience

Version 1.x allowed specification of:

- Detailed neuronal morphologies
- Ion channels
- Synapses
- 3D network structure

Version 2 features:

- Greater range of models
- Easier to extend using LEMS



Where is NeuroML used?

Simulators

NEURON
GENESIS
MOOSE
Brian

Initiatives

OpenWorm
Open Source
Brain

Interoperability

PyNN
neuroConstruct

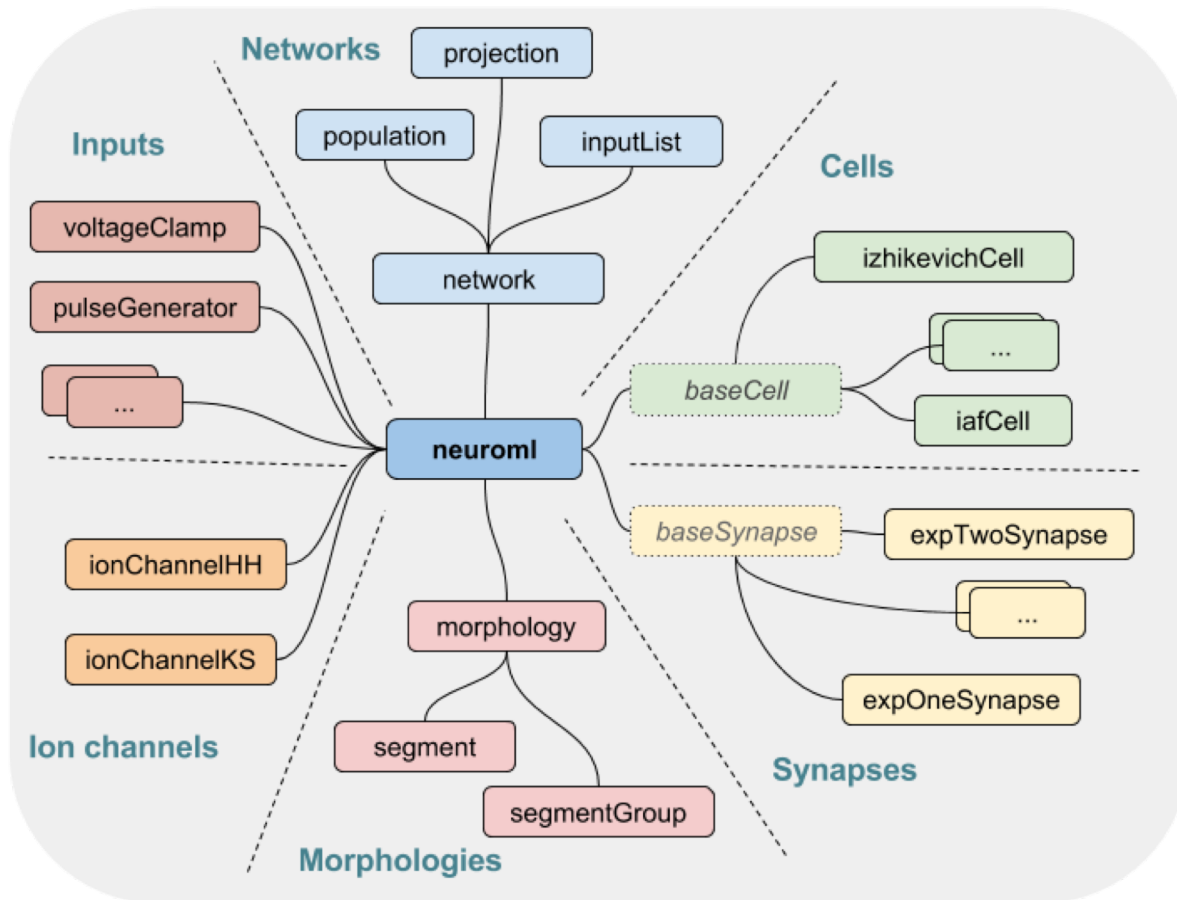
Morphological analysis/ generation

Cx3D
TREES Toolbox
NeuGen

Databases

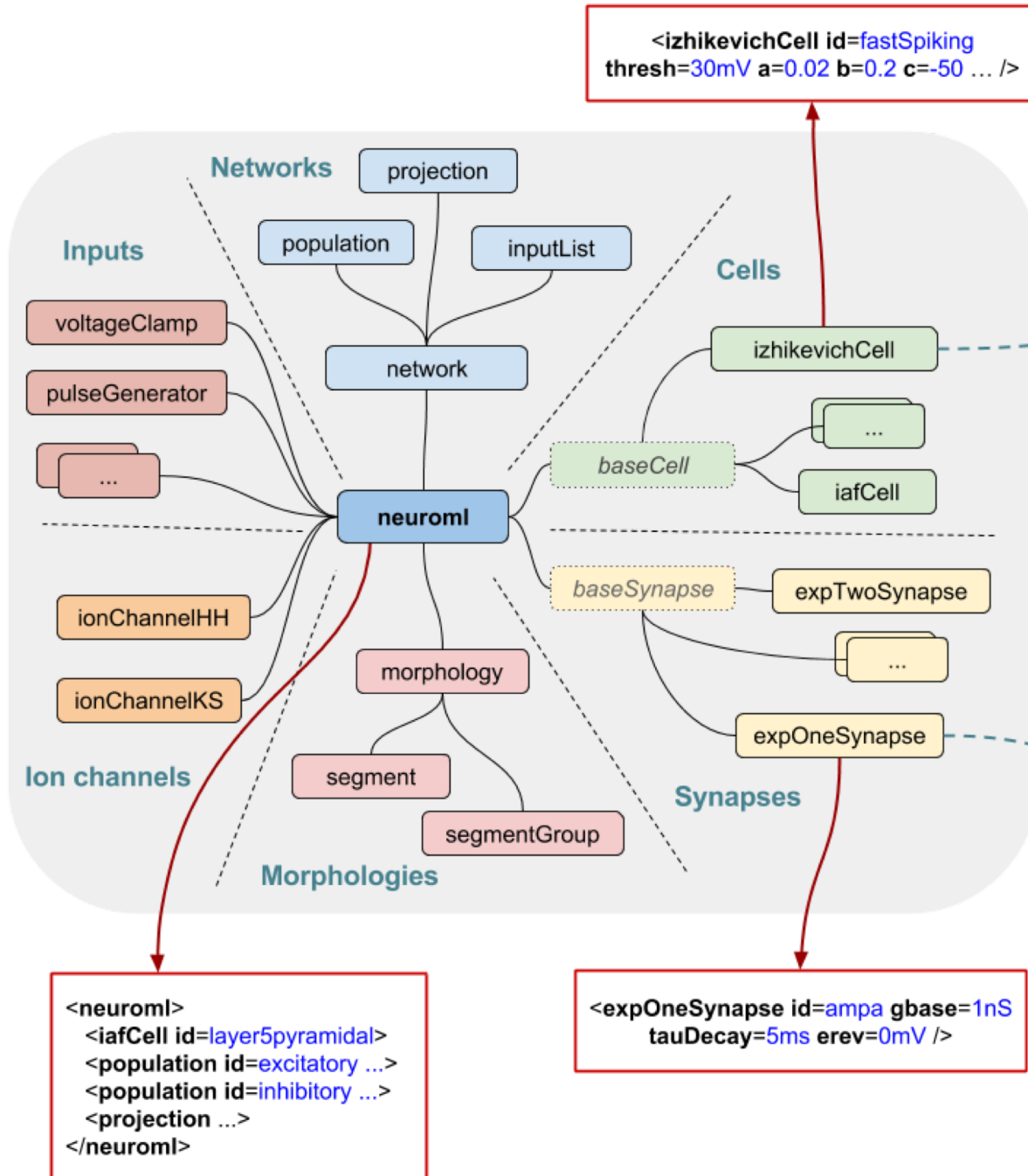
Channelpedia
BBP NMC
NeuroMorpho
Allen Institute
Cell Types DB

Scope of NeuroML 2: Ion channels, synapses, cells, networks...



NeuroML 2 files set parameters...

...LEMS files define the dynamics



Standard NeuroML 2 ComponentType definitions

Cells.xml

ComponentType: **izhikevichCell**

Parameters: **thresh, a, b, c, d, ...**

Dynamics

StateVariables: **v, U**

TimeDerivatives:

$$dv/dt = 0.04 * v^2 + 5 * v + 140.0 - U$$

$$dU/dt = a * (b * v - U)$$

OnConditions:

$$v > thresh \Rightarrow$$

$$v = c$$

$$U = U + d$$

Synapses.xml

ComponentType: **expOneSynapse**

Parameters: **gbase, tauDecay, erev**

Dynamics

StateVariables: **g**

TimeDerivatives:

$$dg/dt = -g / tauDecay$$

DerivedVariables:

$$i = g * (erev - v)$$

OnEvents:

$$g = g + gbase$$

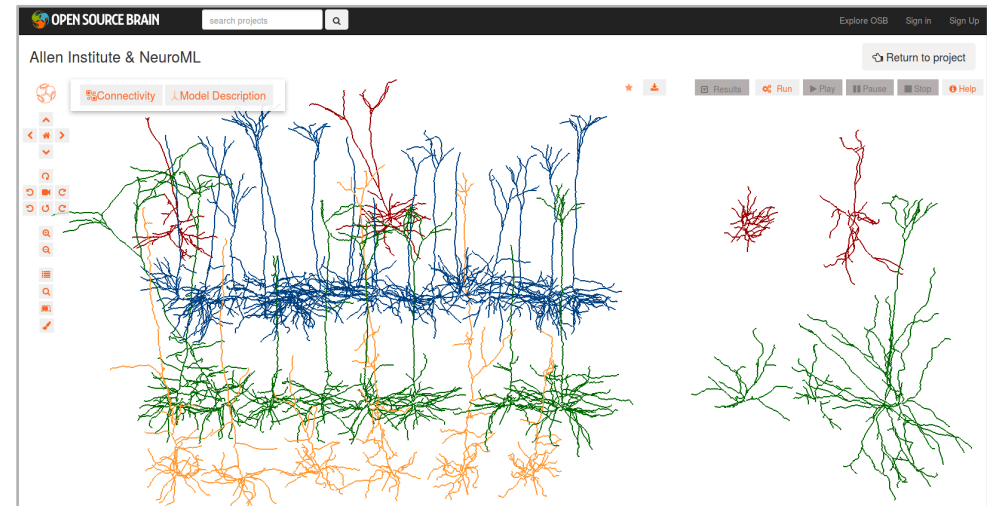
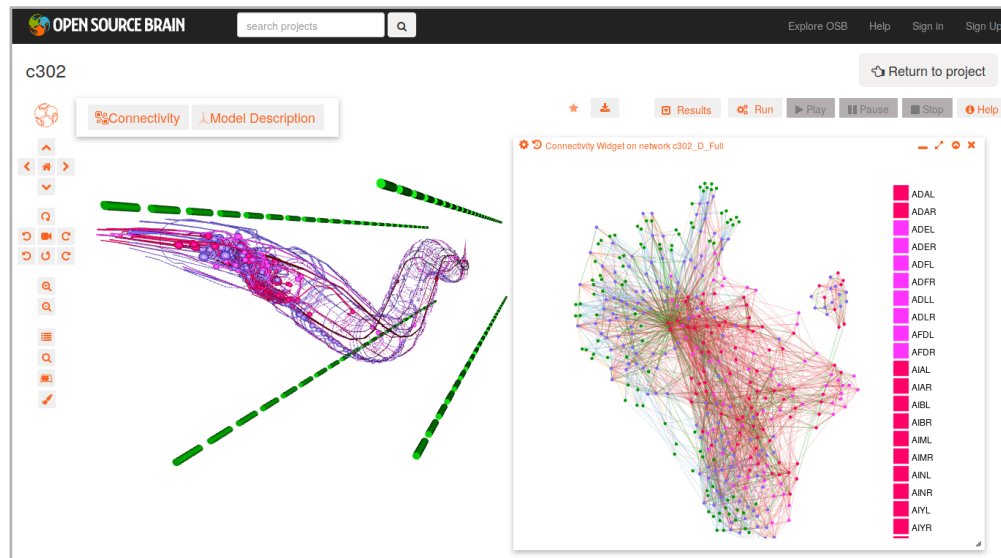
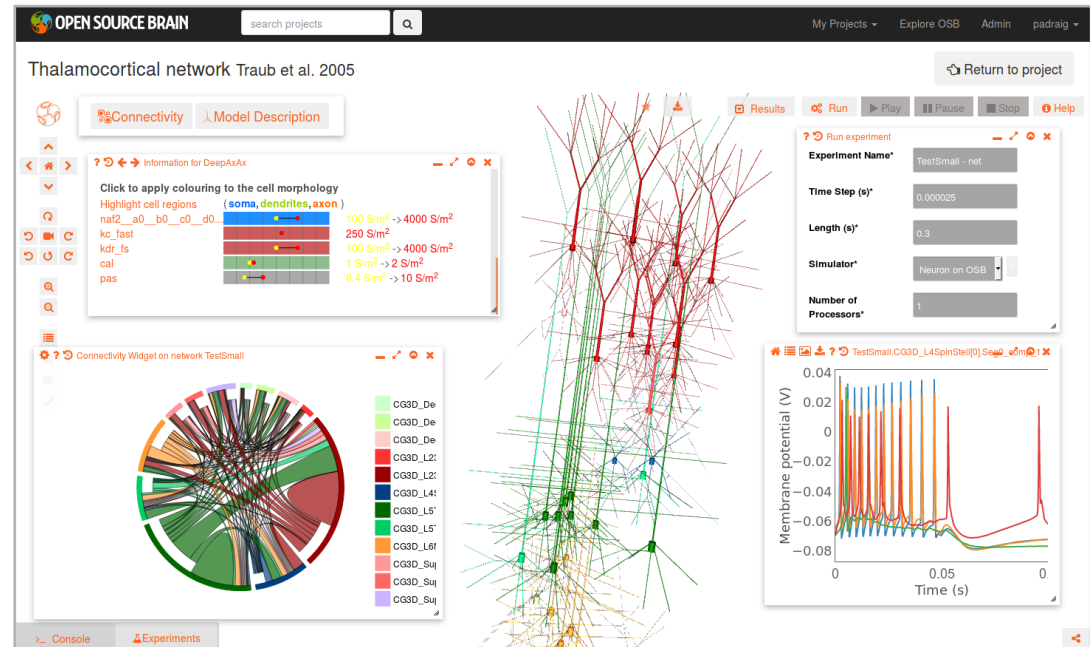
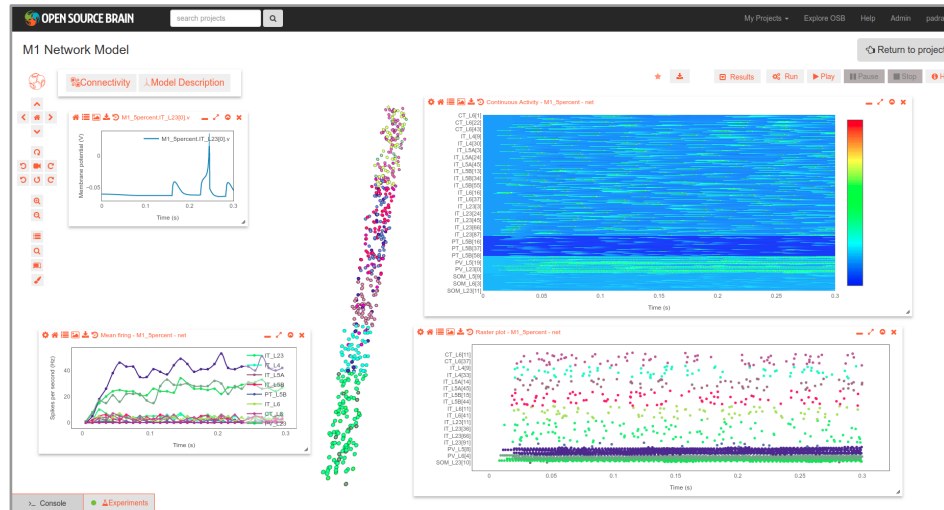
Networks.xml

Inputs.xml

...

...

Where can I find (and visualize/analyse/simulate) NeuroML 2 models?



Try <http://www.opensourcebrain.org!>