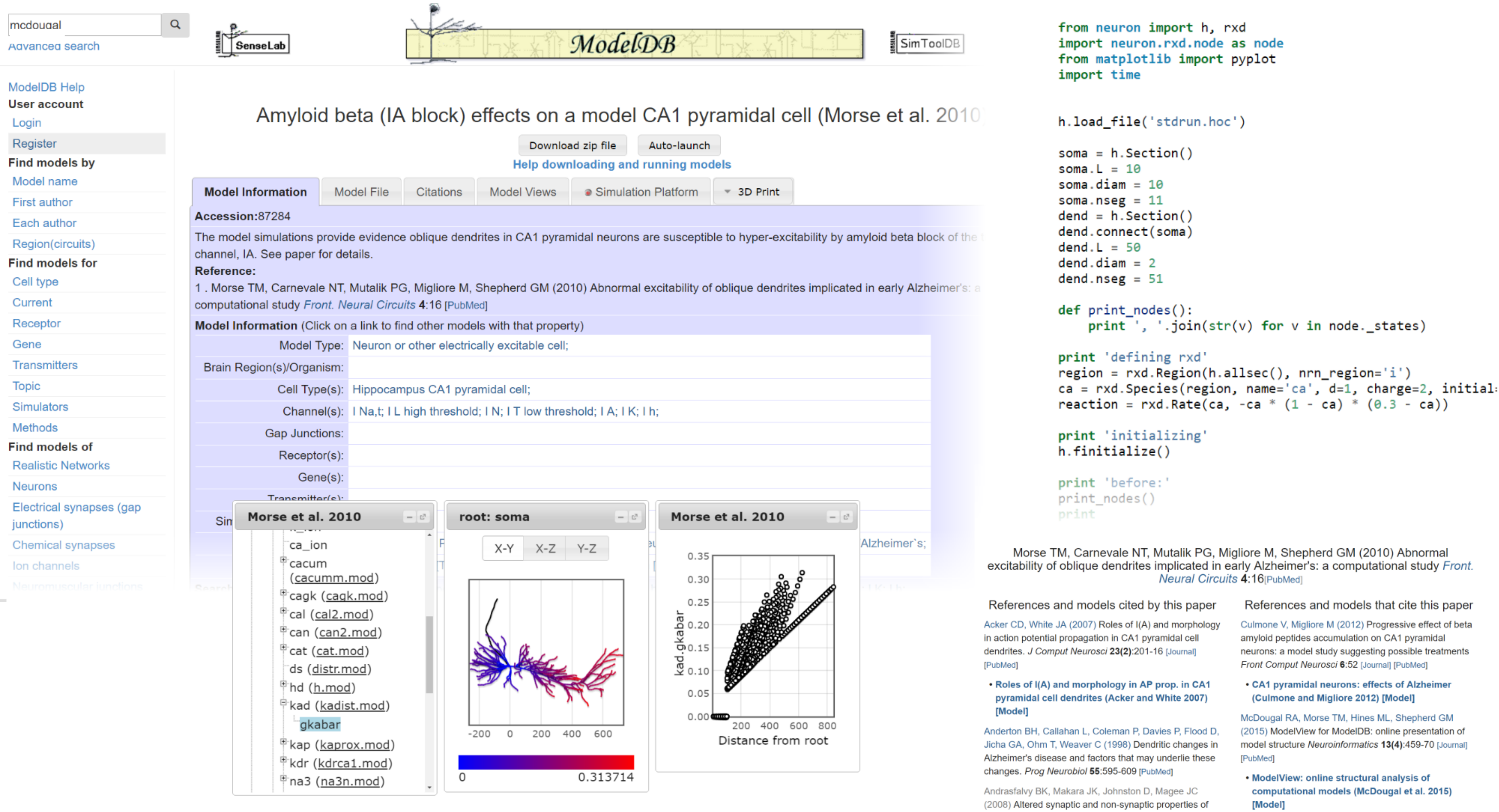
ModelDB

http://modeldb.yale.edu

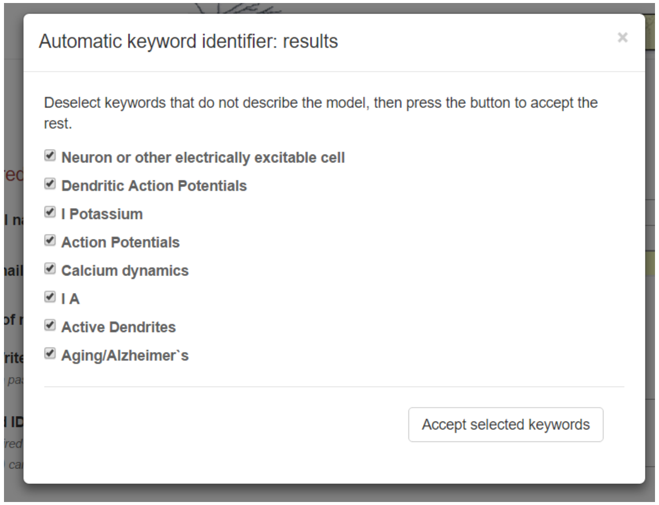
ModelDB promotes discoverability and reproducibility of computational neuroscience research by serving as a platform for curated sharing and visualization of published models.

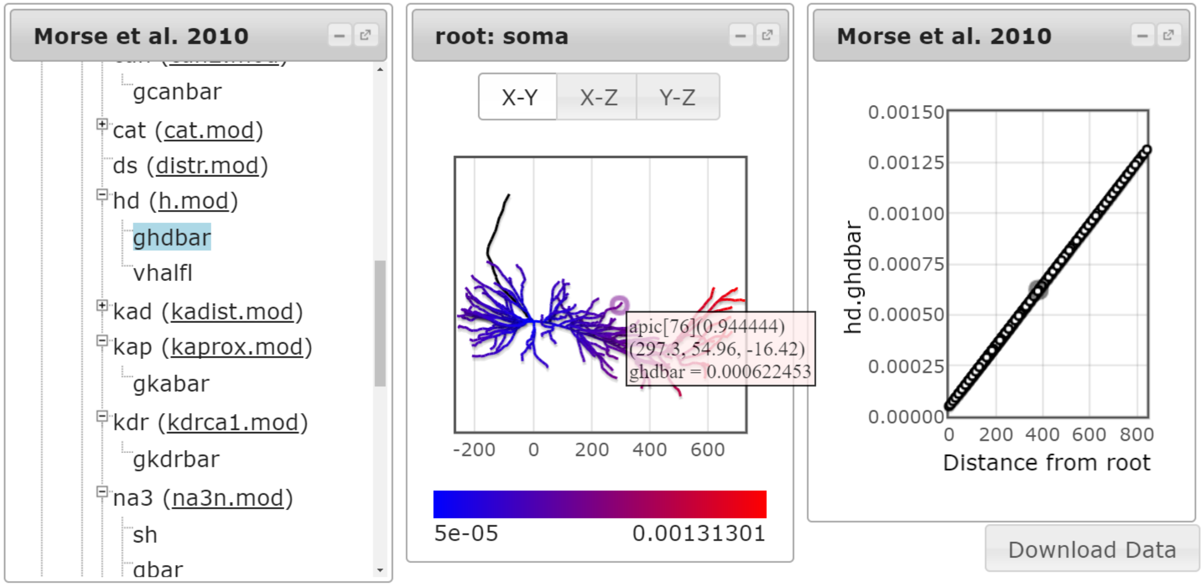


Over 1200 models · 76 simulation environments · 178 cell types · 145 topics (Alzheimer's, STDP, etc) · 16+ species · 54 ion channels, pumps, etc · 24+ mammalian brain regions

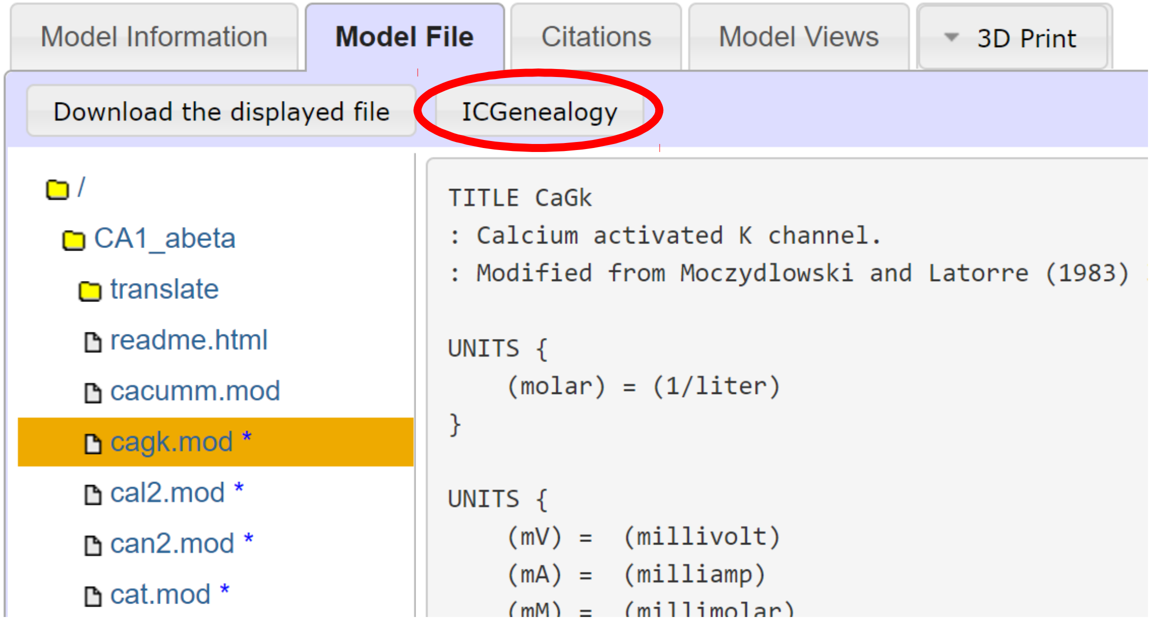
Ongoing ModelDB projects

Improving quantity and quality of model entries *by actively identifying new modelling literature and providing NLP tools to assist entry of descriptive metadata.*





Model visualization tools *make models more accessible by allowing insight into the model structure without reading code.*



General data

- **ICG id:** 2464
- **ModelDB id:** 87284
- **Reference:** *Morse TM, Carnevale NT, Mutalik PG, Migliore M, Shepherd GM (2010)*: Abnormal Excitability of Oblique Dendrites Implicated in Early Alzheimer's: A Computational Study.

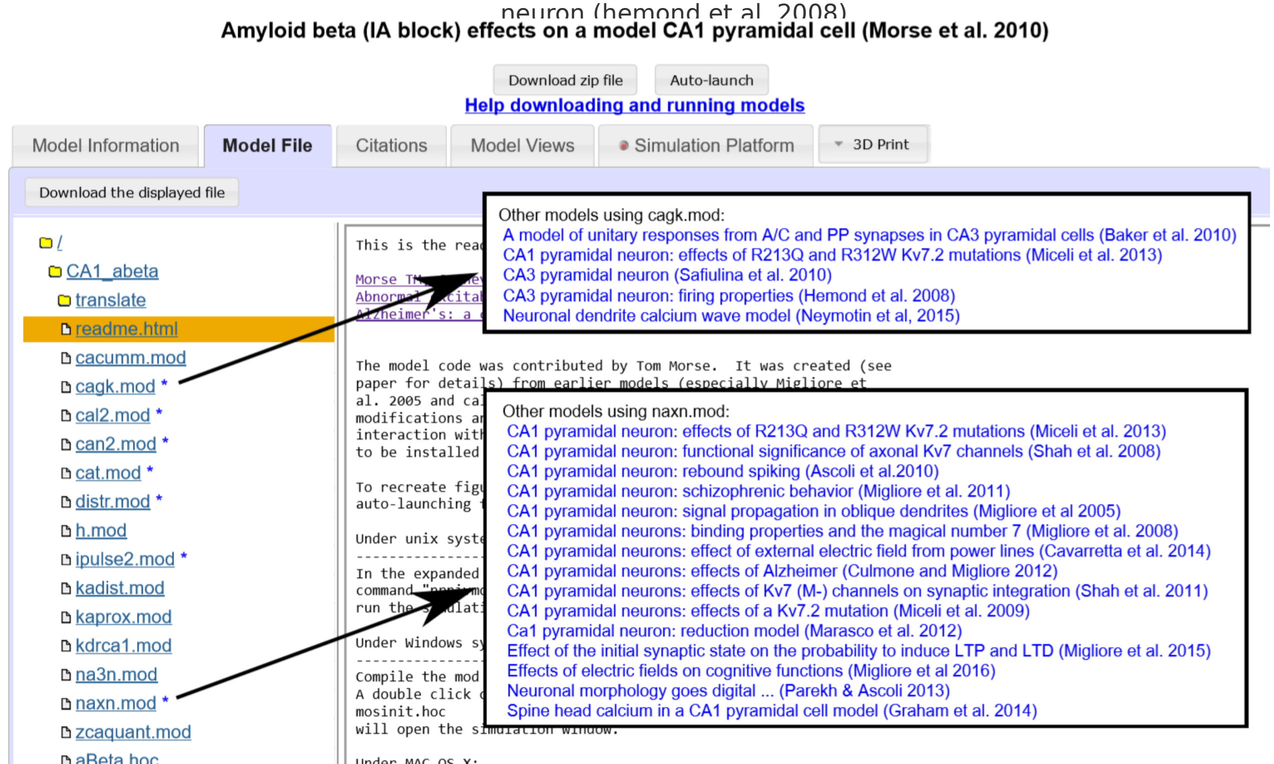
Metadata classes

- **Animal Model:** rat
- **Brain Area:** hippocampus, CA1
- **Neuron Region:** unspecified
- **Neuron Type:** pyramidal cell
- **Runtime Q:** Q4 (slow)
- **Subtype:** not specified

Metadata generic

- **Age:** 7-14 weeks old.
- **Authors:** M Migliore.
- **Comments:** Calcium activated k channel, modified from moczydlowski and latorre (1983). From hemond et al. (2008), model no. 101629, with no changes (identical mod file). Animal model taken from chen (2005) which is used to constrain model. Channel kinetics from previous study on hippocampal pyramidal neuron (hemond et al. 2008)

Better model context *through partnerships with external neuroinformatics resources like the Ion Channel Genealogy (above) and through identifying repeated patterns within ModelDB itself (right).*



Open Source Brain

http://www.opensourcebrain.org

Open Source Brain is…

One slide giving an overview of the resource, example datasets, etc.

One slide discussing current work/future plans

Optional 3rd slide…

General requests:

- Please favour graphical content over text where possible

- Please don't use animation (use multiple slides if required)

- Try to keep to font Arial

- Save slides as .pptx (Powerpoint 2007-2013); slides will be concatenated into a single PDF presentation

NeuroML

http://www.neuroml.org

NeuroML is a language for expressing models in computational neuroscience in a simulator independent, standardised format. It can express models from integrate and fire cells to complex networks of multicompartmental neurons.

Standardised XML language for computational neuroscience

Version 1.x allowed specification of:

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

30+ simulators/applications/databases/libraries support NeuroML

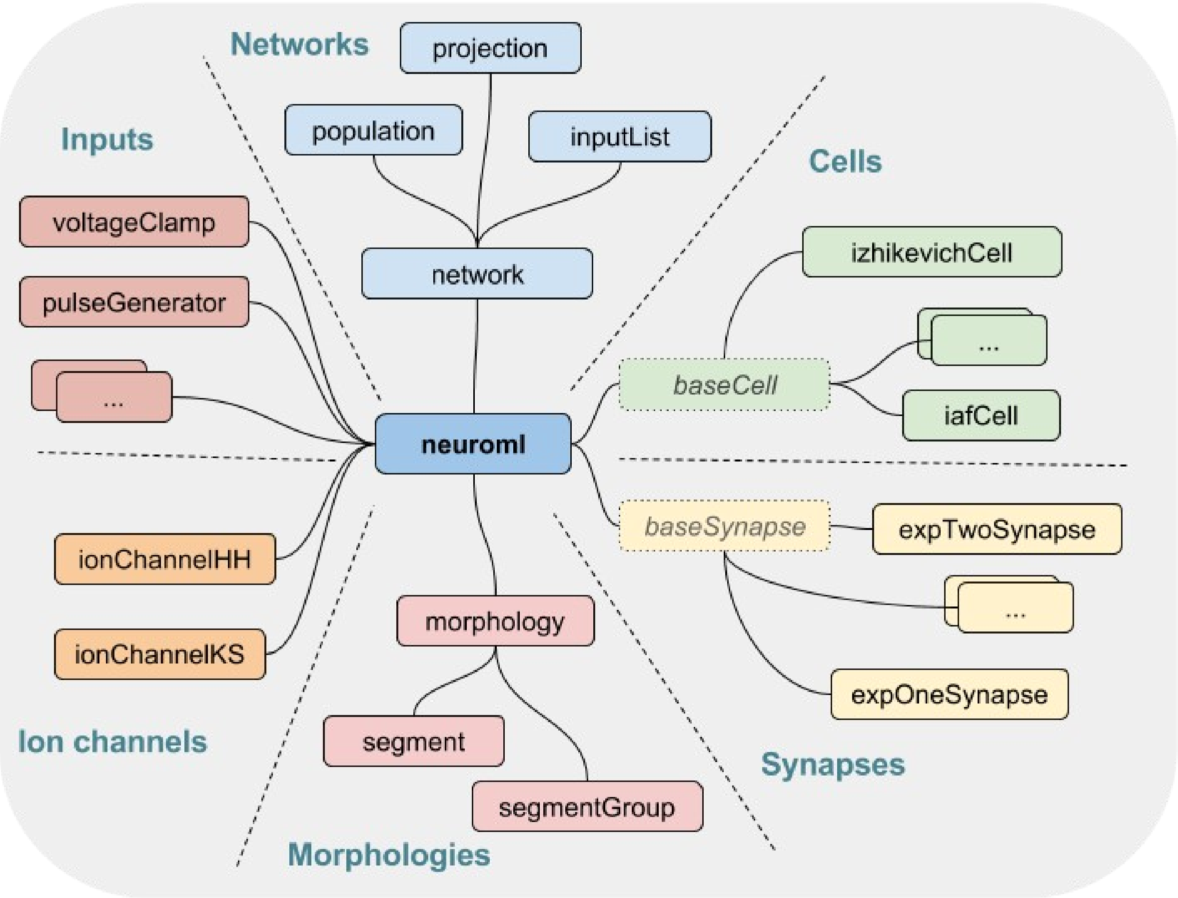
Simulators
NEURON
GENESIS
MOOSE
Brian

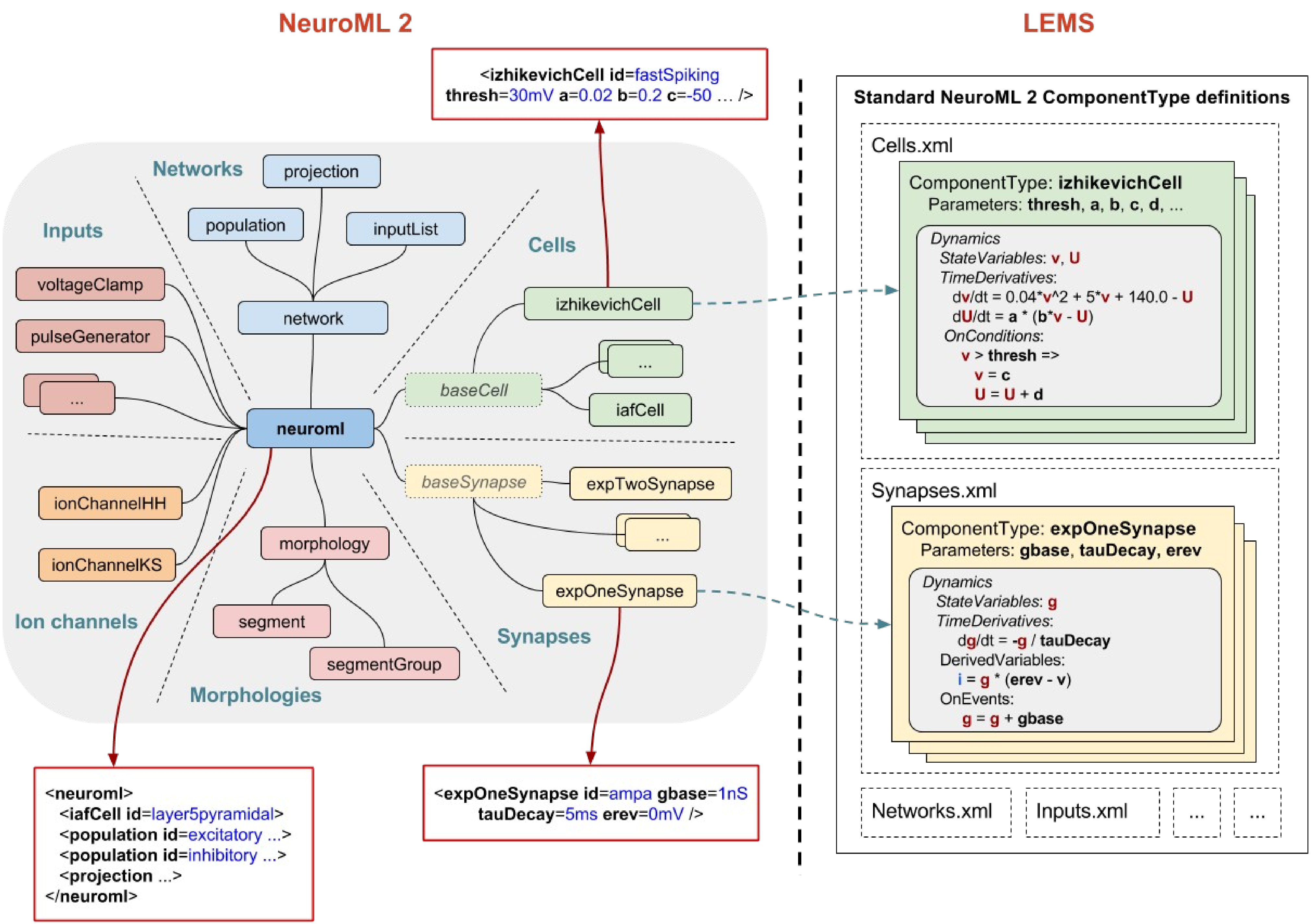
Interoperability
PyNN
neuroConstruct

Initiatives
OpenWorm
Open Source Brain

Databases
Channelpedia
BBP NMC
NeuroMorpho
Allen Institute Cell Types DB

Morphological analysis/ generation
Cx3D
TREES Toolbox
NeuGen


Networks
projection
population
inputList
network
Inputs
voltageClamp
pulseGenerator
...
Cells
izhikevichCell
...
baseCell
iafCell
neuroml
baseSynapse
expTwoSynapse
...
expOneSynapse
ionChannelHH
ionChannelKS
morphology
segment
segmentGroup
Ion channels
Synapses
Morphologies


NeuroML 2
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Networks
projection
population
inputList
network
Inputs
voltageClamp
pulseGenerator
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Cells
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iafCell
neuroml
baseSynapse
expTwoSynapse
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expOneSynapse
ionChannelHH
ionChannelKS
morphology
segment
segmentGroup
Ion channels
Synapses
Morphologies
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<population id=excitatory ...>
<population id=inhibitory ...>
<projection ...>
</neuroml>
<expOneSynapse id=ampa gbase=1nS
tauDecay=5ms erev=0mV />
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 =>
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
...
...

ReScience

http://rescience.github.io

Reproducible Science is good, Replicated Science is Better.

ReScience is a scientific journal dedicated to the publication of replication in computational sciences.

Journal Philosophy

ReScience is a peer-reviewed journal that targets computational research and encourages the explicit replication of already published research, promoting new and open-source implementations in order to ensure that the original research is reproducible.

To achieve this goal, the whole publishing chain is radically different from other traditional scientific journals. ReScience lives on GitHub where each new implementation of a computational study is made available together with comments, explanations and tests. Each submission takes the form of a pull request that is publicly reviewed and tested in order to guarantee that any researcher can re-use it.

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Publishing fees

None. Zero. Nada. 0$. 0€.

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- Replicability
- Rigorous methodology
- Original source code
- Substantial evidence for replication of the original results

Furthermore, you cannot submit the replication of your own research, nor the research of your close collaborators. We believe such restrictions will favor the cross-fertilization of research and the spread of knowledge.

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We redo Science !

ReScience

Reproducible science is good. Replicated science is better.