

The UK
Neuroinformatics Node

● ● ● www.neuroinformatics.org.uk



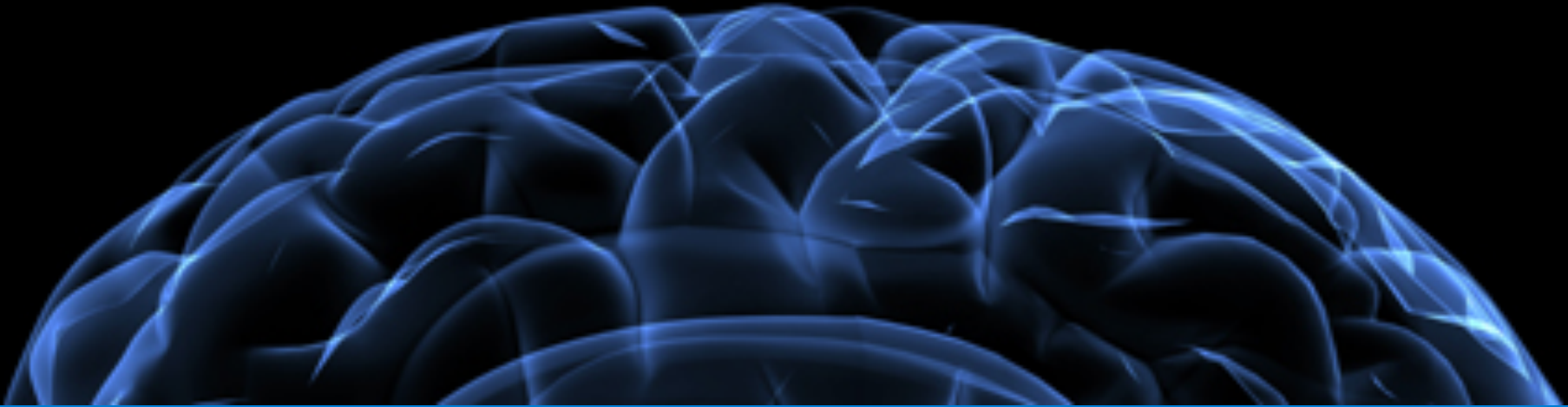
The UK INCF Node

<http://www.neuroinformatics.org.uk>

Presenter: Leslie Smith

l.s.smith@cs.stir.ac.uk

Website: <http://neuroinformatics.org.uk>



Overview of UK Node

- Currently an Associate Node
 - Remaining very involved in INCF activities
 - And hoping to become a governing node again
- UK view of *Neuroinformatics* relatively broad
 - Data and code sharing, reproducibility in experimental and clinical neuroscience
 - And all that required to enable this
 - Computational modelling, simulation environments
 - At all levels
 - Neuromorphic systems, brain-inspired engineering
- 2016 Neuroinformatics Symposium: about 170 delegates
- Importance of training & education
- This talk:
 - Recent activities
 - Some examples on UK neuroinformatics
 - Future events

UK Node Steering Group

- Leslie Smith (Co-Chair), University of Stirling
- Stephen Eglén (Co-Chair) , University of Cambridge
- J. Douglas Armstrong, University of Edinburgh
- Rafal Bogacz, University of Oxford
- Ingo Bojak, University of Reading
- Ari Ercole, University of Cambridge
- Bruce Graham, University of Stirling
- Marc de Kamps, University of Leeds
- David Menon, University of Cambridge
- Thomas Nowotny, University of Sussex
- Rasmus Petersen, University of Manchester
- Evelyne Sernagor, University of Newcastle
- Angus Silver, University College London
- V. Anne Smith, University of St. Andrews
- David Willshaw, University of Edinburgh

Recent UK Node activities

- **London Meeting, 3 May 2016**
 - See <http://neuroinformatics.org.uk/EventsandProjects.html>
- **FENS 2016 Neuroinformatics Social**
 - Presentations at <https://www.incf.org/news/incf-social-at-fens>

London Meeting

- **London Meeting, 3 May 2016**
 - Along with eFutures (co-funded by Wellcome Trust), the UK brought together different types of neuroscientists ...
 - (from clinical to experimental to computational modellers to neuro-engineers)
 - ...to enable co-operation.
- Talks on different areas of neuroinformatics
 - From clinical to neuro-engineering
- Good discussion of ways forward
- Is leading to better collaboration with British Neuroscience Association
 - SIG, also Symposium at biennial meeting of BNA

Towards a New Neuro- Network meeting
3 May 2016, University of Liverpool Campus, London

Final Programme

09:30 -10:00	Registration and coffee <i>7th Floor social space</i>	
10:00 -10:10	Meeting aims & objectives <i>Lecture Theatre Rm 4, Floor 2</i>	Prof Leslie Smith
10:10 -12:45	<i>Session 1</i> Setting the scene: the need for collaboration across the neuro-area.	Dr Rasmus Petersen (10.10) Dr Piotr Dudek (10.30) Dr Ari Ercole (10.50)
11:10 -11:25	Coffee	
11:25 - 12:45	Session 1 - continued	Dr Simon Schultz (11.25) Dr Evelyne Sernagor (11.45) Prof Narender Ramnani (12.05) Dr Kathryn Adcock (12.25)
12:45 -13:00	Introduction to the breakout sessions	
13:00 -13:45	Lunch - <i>7th Floor social space</i>	
13:45 -16:45	<i>Session 2</i> Breakout sessions & discussion Two sets of breakout groups ; 1) What particular sets of neuroscience areas have to gain from collaboration? 2) What might the obstacles to such collaboration be & what activities might overcome these obstacles?	
15:15 -15:40	Coffee	
15:40 -16:20	Reports back from rapporteurs.	
16:20 -16:45	Discussion (and decisions) on how to go forward. <i>Lecture Theatre Rm 4, Floor 2</i>	
16:45	Close of meeting	

Forward from London

- How to take the node forward to that
 - UK INCF funding is reinstated
 - UK Node actually has specific funds
- Many views:
 - We should be broad/narrow
 - We should be pushing Neuroinformatics harder
 - More training
 - Directly working with experimental and clinical neuroscientists
 - We should work directly with other organisations
 - Specifically the British Neuroscience Association

FENS 2016 Social

- **FENS 2016 Neuroinformatics Social**

- Data sharing: whether time--series, images, or pharmacological, data sharing is becoming more and more important
- Code sharing: both to enable other researchers to replicate analyses, and to enable the same tools to be applied to different datasets
- Sharing clinical data across and beyond Europe (using the European CENTER--TBI traumatic brain injury project as an example)

- *Speakers:*

- Stephen Eglen, David Menon, Daisuke Miyamoto

Some of the activities in the UK

- Neurological aspects: specifically TBI.
 - David Menon & Ari Ercole, Department of Medicine, University of Cambridge
 - Issues on Neuroinformatics and critical care (post TBI)
- Neural activity during natural behaviour
 - Rasmus Petersen group, Neural Coding Laboratory, Faculty of Life Sciences, University of Manchester
- Neuroinformatics opportunities and challenges in in vivo and ex vivo imaging of neural circuits
 - Schultz group Bioengineering, Imperial College London
- Open code initiatives
 - Stephen Eglen, Cambridge (working with Wellcome)
- Atlassing for embryonic animals
 - Burger (Heriot-Watt, Edinburgh), Baldock (London)
 - Working with Elixir (EU project: sharing data in the life sciences)

Some activities in the UK (continued)

- Portal-based co-laboratory
 - Data sharing, code sharing in neuro-electrophysiology
 - Jim Austin (York), Evelyne Sernagor (Newcastle)
- Neuromorphic engineering
 - Biologically inspired circuitry: Piotr Dudek (Manchester).
- Neuroinformatics in targetting epilepsy surgery
 - Kaiser et al (Newcastle)
- Neuro-computational modelling in Psychiatry
 - Dayan et al (Gatsby and UCL, London)
- Synapse atlas of the brain
 - Seth Grant, Genes2Cognition
- MRC Brain dynamics group
 - Rafal Bogacz, Oxford.
- Connections to Bioinformatics
 - Anne Smith St Andrews, Armstrong, Edinburgh (integrative physiology)



International, major contribution from the UK

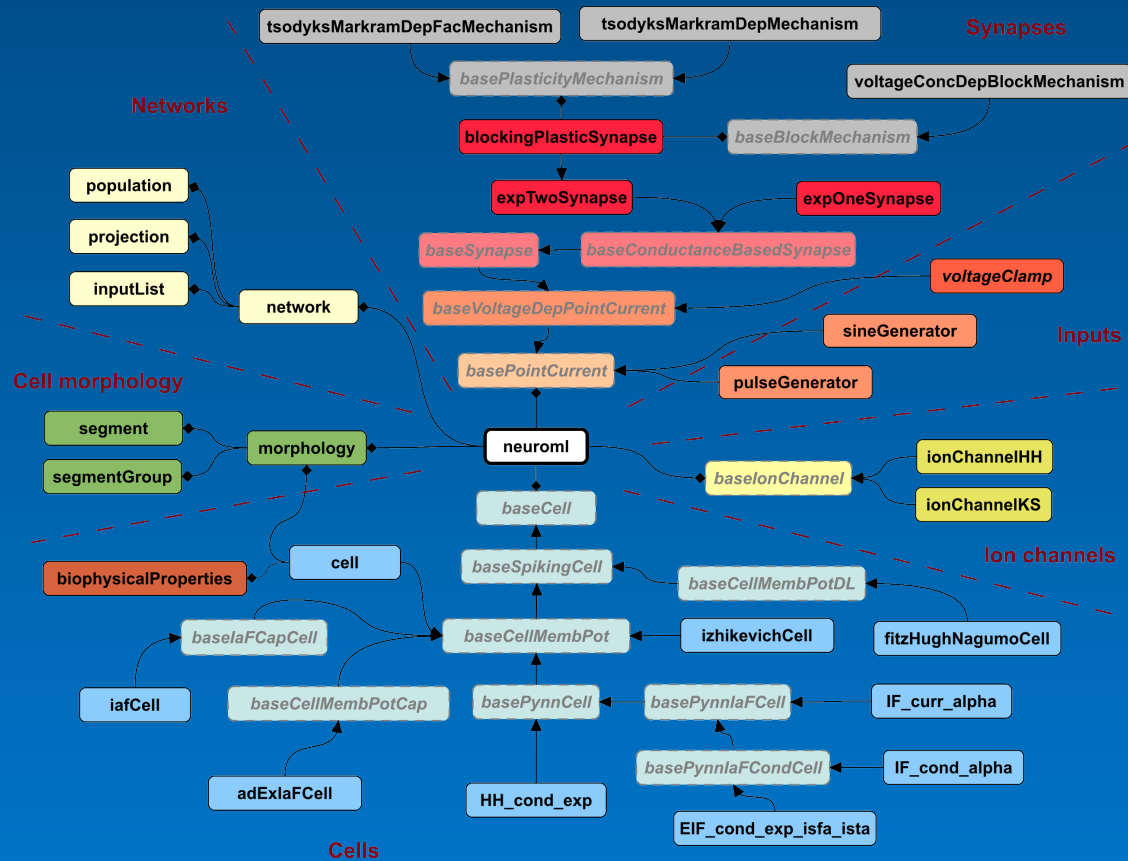
Standardised XML language for computational neuroscience

Models range from point
neuron networks to
complex 3D
multicompartmental cells

Open source & contributors from around the world

Models from Allen Institute, Blue Brain Project &

Neuromorpho converted to NeuromL



Cell, channel, synapse and network models

supported by NeuroML

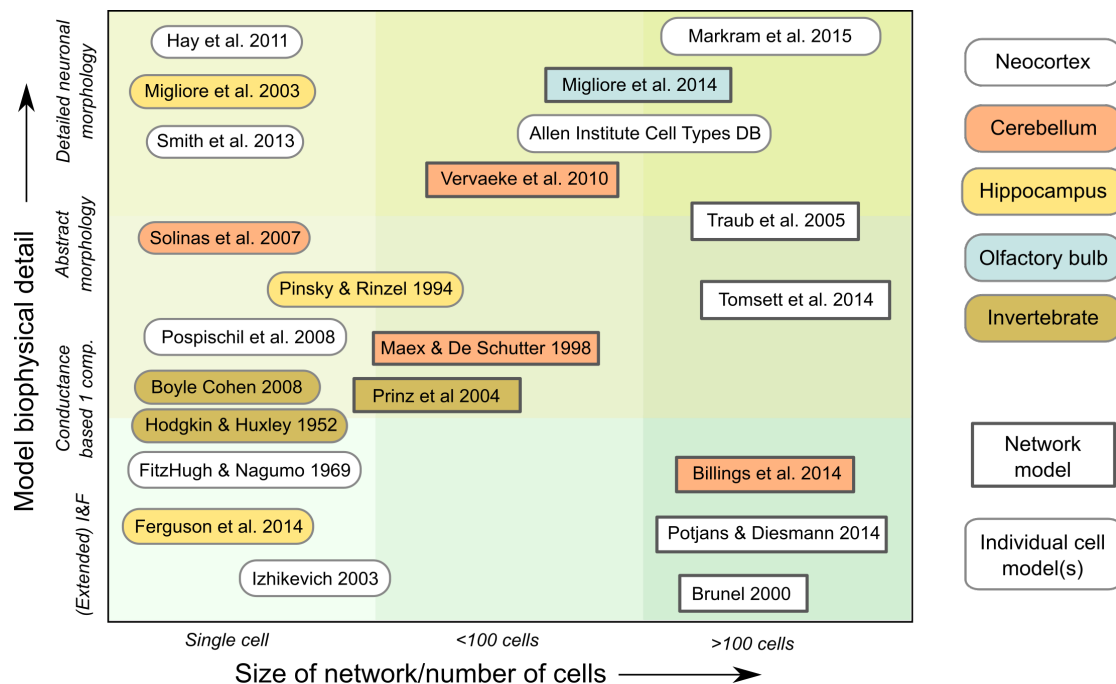


OPEN SOURCE BRAIN

Structured database of well tested spiking neuron & network models in NeuroML & PyNN

Allow anyone to comment on, extend, reuse models & run them across multiple simulators: a collaboration platform

—Funded by Wellcome Trust & based at Silver Lab at UCL



—Neuron and network models at different scales available on OSB



HUMAN FRONTIER SCIENCE PROGRAM
FUNDING FRONTIER RESEARCH INTO COMPLEX BIOLOGICAL SYSTEMS

- In the Odor Objects project we investigate how animals can use the fine-structure of odor plumes to identify odor sources

–(with Szyszka, Uni Konstanz; Smith, Arizona State; Kanzaki, U of Tokyo)

–<http://www.odor-objects.org>

GeNN

- GeNN is a meta-compiler for the efficient simulation of neuronal network models on modern GPU accelerator hardware.

–(with Yavuz, Turner, Sussex)

–<http://genn-team.github.io/genn>

–Other current topics include: GPU accelerated FLIM analysis, Dynamic Observers/hybrid systems, E-Noses



Engineering and Physical Sciences
Research Council

- The Green Brain project is developing drone controllers that mimic honeybee brains

–(with Marshall, Vasilaki, Gurney, Sheffield)

–<http://greenbrain.group.shef.ac.uk/>



Human Brain Project

Co-funded by
the European Union



- As part of sub-project 9 of the Human Brain Project, we investigate applications of neuromorphic computing

–(with Schmuker, Diamond, Sussex; and over 100 partner institutions in Europe)

And...

- Contributions to training
 - Particularly David Willshaw, Bruce Graham, Hariye Kagnan
- Contribution to data sharing and imaging initiatives
- Farr Institute
 - Sharing clinical data

Future events

- Professor David Willshaw will receive the third Valentino Braitenberg Award for Computational Neuroscience.
 - It will be presented on September 21, 2016, at 3 p.m. at the the Bernstein Conference in Berlin.
- The UK Node will be organising a Neuroinformatics Symposium at the forthcoming BNA Festival of Neuroscience 2017 event.
- The UK Node is working with the British Neuroscience Association to found a Neuroinformatics Special Interest group, intended to be launched officially at the BNA 2017 meeting