



NeuroFedora

FOSS and Free and Open (Neuro)Science

NeuroFedora contributors
neuro.fedoraproject.org

1/18

Open Science

Everyone should have the freedom to study, modify, and share scientific material¹.

Scientists, academics, students, researchers, non-scientists, and non-academics should all have access to scientific material—irrespective of social status, location, age, nationality

¹<http://opensourceforneuroscience.org/>

2/18

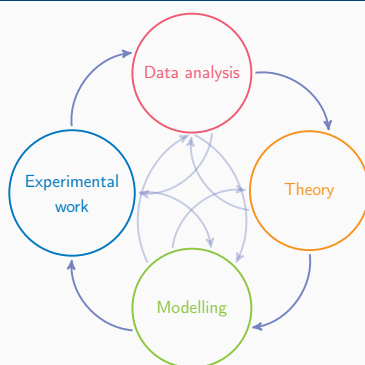
Neuro Science

- How the brain functions (physiology)
- How it is structured (anatomy)
- About its chemicals (pharmacology, biochemistry)
- How it processes information (computational)
- About behaviours, and cognition (behavioural, cognitive)

3/18

How: Research Pipeline

Basic Workflow



4/18

Tools of the trade

Experimental:

- EEG, ECoG, intracellular and extracellular single and multi neuron recording,
- CT, DOI, MRI, f-MRI, MEG, PET,

Data analysis:

- Statistics,
- Machine Learning, Big Data, Deep learning,

Theory and modelling:

- Simulators of all kinds,

5/18

Free/Open (neuro) Science

The ideal, in short:

Free/Open Science:

Everyone should have the freedom to share, study, and modify scientific material.

FOSS:

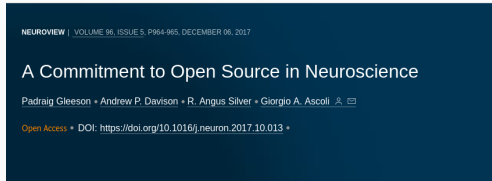
Everyone should have the freedom to share, study, and modify software².

Free/Open Science includes and relies heavily on Free/Open Source Software (FOSS).

²Free software foundation

6/18

So we strive to use more and more FOSS



⁶Open source for neuroscience

7/18

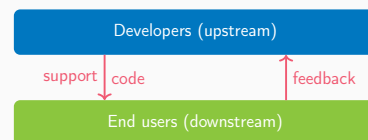
NeuroFedora: why, how, what?

Neuroscience community: highly multidisciplinary

- **various specialties:** biologists, mathematicians, physicists, chemists, psychologists, ...
- **small proportion of trained software developers**

8/18

FOSS: Developers and users



9/18

(Anecdotal) notes on development of research software

- often **single developer**, or small development teams
- limited **maintenance**, short-lived projects
- limited **access to hardware/resources**
- limited **code quality**
- limited **use of established best practices**
- limited **testing for correctness (!)**
- **complex dependency chains**
- lack of **documentation and support**
- lack of **community development know-how**

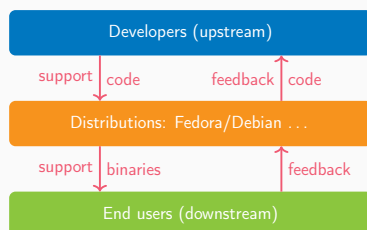
10/18

(Anecdotal) notes on users of research software

- **waste time and effort** installing (and reinstalling) their software stacks
- **rarely run test suites (!)**
- **rarely report bugs upstream**
- **rarely send improvements upstream**
- **are unaware of helpful development tools**

11/18

Distributions liaison between developers and users



12/18

Distributions, like Fedora, are in a unique position:

- **liaison between upstream and users**
- have the **infrastructure**
- **follow best practices** in software development
- constantly **work on community development**
- **learn from one another**—train while working
- **disseminate** information to end-users

13/18

NeuroFedora:

Primary goal:

- Provide a **ready to use, integrated FOSS platform** for neuroscientists⁷.

Secondary/collateral goals:

- help **improve the standard and maintenance** of tools
- help users **develop software development skills**
- **make neuroscience accessible** to non-specialists

⁷ Researchers, academics, hobbyists, anyone!

14/18

NeuroFedora: What we offer?

Comp-Neuro Lab



- An OS to enable neuroscience
- Contains a plethora of computational neuroscience tools
- Packed with analysis and general productivity tools
- Integrated with GNOME

<https://labs.fedoraproject.org/en/comp-neuro/>

15/18

Comp-Neuro Container

- A ready-to-use comp-neuro container
- Can be used with Podman/Docker
- Can be obtained from standard public container image registries like Docker Hub



<https://docs.fedoraproject.org/en-US/neurofedora/containers/>
<https://podman.io/>
<https://www.docker.com/>

16/18

NeuroFedora: current metrics

- **Will be 3 years old, in September 2021!**⁸,
- **30 volunteer contributors**
- **software:**
 - ~200 tools (packages) ready to install⁹:
 - NeuroMLite, pyNeuroML, NetPyNE, Neuron, InterViews, NEST, Genesis, Brian (v1 and v2), Moose, python-libNeuroML, PyLEMS, PyNWB, ...
 - ~200 in queue¹⁰.
 - EDEN, NeuroMynerva, FlyBrainLab, GeNN, ...

⁸ in its second iteration

⁹ [src.fedoraproject.org: Neuro-SIG](https://src.fedoraproject.org/Neuro-SIG)

¹⁰ [Pagure.io: Neuro-SIG: issues](https://pagure.io/Neuro-SIG/issues)

17/18

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Mailing list: neuro-sig@lists.fedoraproject.org
IRC: [#fedora-neuro](https://libera.chat/#fedora-neuro) on LiberaChat
Telegram: t.me/NeuroFedora
Documentation neuro.fedoraproject.org
Blog: neuroblog.fedoraproject.org
Pagure.io (FOSS Git forge): [neuro-sig/NeuroFedora](https://pagure.io/NeuroFedora)

18/18