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# NeuroFedora

Free Software for Free Neuroscience

NeuroFedora Contributors

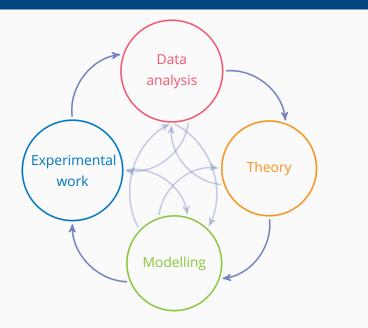
#### NeuroFedora



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# **How: Research Pipeline**

## **General** workflow



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How: Research Pipeline

Das analysis (hocoling)

☐General workflow

1. A simplified diagram. Actually a lot more complex

#### Tools of the trade

## Experimental:

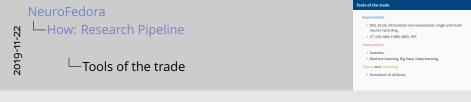
- EEG, ECoG, intracellular and extracellular single and multi neuron recording,
- CT, DOI, MRI, f-MRI, MEG, PET,

# Data analysis:

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

# Theory and modelling:

Simulators of all kinds,



1. Lots of hardware and software is required for basic neuroscience research.

## Tools of the trade: II

# Tools for the dissemination of knowledge<sup>4</sup>:

- visualisation,
- academic writing,
- non academic writing: blogging ...,
- podcasting,
- video making,
- · creating teaching materials,
- collaborative tools and utilities

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How: Research Pipeline

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Tools of the trade: II

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Tools for the dissemination of knowledge<sup>1</sup>

• It valuations

• academic verting,

• non academic writing;

• non academic writing;

• tools onaking,

• utdo making,

• creating teaching materials,

• collaborative tools and utilities

1. Often ignored, but not less important

<sup>&</sup>lt;sup>4</sup> also to a non-specialist audience.

# Free/Open (neuro) Science

## The ideal, in short:

NeuroFedora Free/Open (neuro) Science

Everyone should have the freedom to share, study, and modifi-The ideal, in short:

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The ideal, in short:

Free/Open Science:

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 software<sup>5</sup>.

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

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<sup>&</sup>lt;sup>2</sup>Free software foundation

## So we strive to use more and more FOSS

NEUROVIEW | VOLUME 96, ISSUE 5, P964-965, DECEMBER 06, 2017

A Commitment to Open Source in Neuroscience

Padraig Gleeson \* Andrew P. Davison \* R. Angus Silver \* Giorgio A. Ascoli △ □

Open Access \* DOI: https://doi.org/10.1016/j.neuron.2017.10.013 \*

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Free/Open (neuro) Science

—So we strive to use more and more FOSS

A Commitment to Open Source in Neuroscience

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So we strive to use more and more FOSS

<sup>&</sup>lt;sup>6</sup>Open source for neuroscience

NeuroFedora

└─NeuroFedora: why, how, what?

# NeuroFedora: why, how, what?

NeuroFedora

multidisciplinary

☐ Neuroscience community: highly

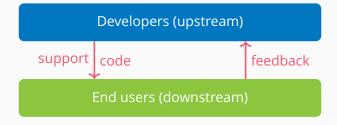
Neuroscience community: highly multidisciplinary

• various specialities: biologists, mathematicians, physicists, chemists, psychologists, ...,

• small proportion of trained software developers

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# **FOSS: Developers and users**







## (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

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└─NeuroFedora: why, how, what?

- (Anecdotal) notes on development of research

software

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 limeted code quality
 ilented use of established best practices
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 ilented testing for correctness (1)
 complies deprendency chains
 lack of documentation and support

ecdotal) notes on development of research software

- Give how interdisciplinary neuroscience is, most researchers are NOT trained in development
- 2. This implies, and this is based on anecdotal evidence, that the software used in research is not of the best quality

## (Anecdotal) notes on users of research software

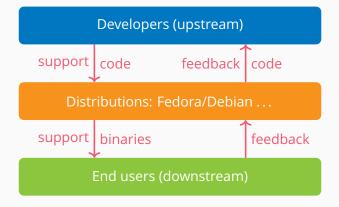
- waste time and effort installing (and reinstalling) their software stacks
- rarely run test suites (!)
- rarely report bugs upstream
- rarely send improvements upstream
- are unaware of helpful development tools

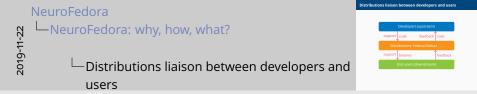
1. The other side of the bridge is the users

software

- 2. Because they aren't trained, they have a hard time setting up and using the software
- 3. If correctness of a tool cannot be verified, how can the correctness of the scientific result be claimed?

# Distributions liaison between developers and users





## 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

NeuroFedora

NeuroFedora: why, how, what?

I base better activated to be better process to sufficient development.

Contactly with an community for development.

Contactly with an community for dependence.

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position:

## NeuroFedora:

# Primary goal:

• Provide a ready to use, integrated FOSS platform for neuroscientists<sup>7</sup>.

## Secondary/collateral goals:

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

NeuroFedora

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└─NeuroFedora: why, how, what?

└─NeuroFedora:

uroFedora:

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<sup>1</sup>Sewanten, academin, holidysin, arquinel

<sup>&</sup>lt;sup>7</sup>Researchers, academics, hobbyists, anyone!

#### **NeuroFedora:** current metrics

- less than a year old<sup>8</sup>,
- 20 volunteers
  - 15 package maintainers
  - 5 designers, newcomers
  - only 5 from a neuroscience background
- software:
  - 120 tools (packages) ready to install<sup>9</sup>:
    - Neuron, InterViews, NEST, Genesis, Brian (v1 and v2), Moose, python-libNeuroML, PyLEMS, PyNWB, . . .
  - $\sim$ 170 in queue<sup>10</sup>.
    - NeuroMLlite, pyNeuroML, NetPyNE, ...

NeuroFedora: why, how, what?

NeuroFedora: current metrics



2019-

<sup>8</sup> in its second iteration

<sup>9</sup> src.fedoraproject.org: Neuro-SIG

<sup>10</sup> Pagure.io: Neuro-SIG: issues

#### Search: "NeuroFedora"

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NeuroFedora

└─NeuroFedora: why, how, what?

Mailing list: neuro-sig@lists.fedora
IRC: afedora-neuro on Freenode
Telegram: t.me/NeuroFedora
Documentation neuro.fedoraproj
Blog: neuroblog fedoraproject.org
Pagure Jo (FOSS Git forge): neuro-

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