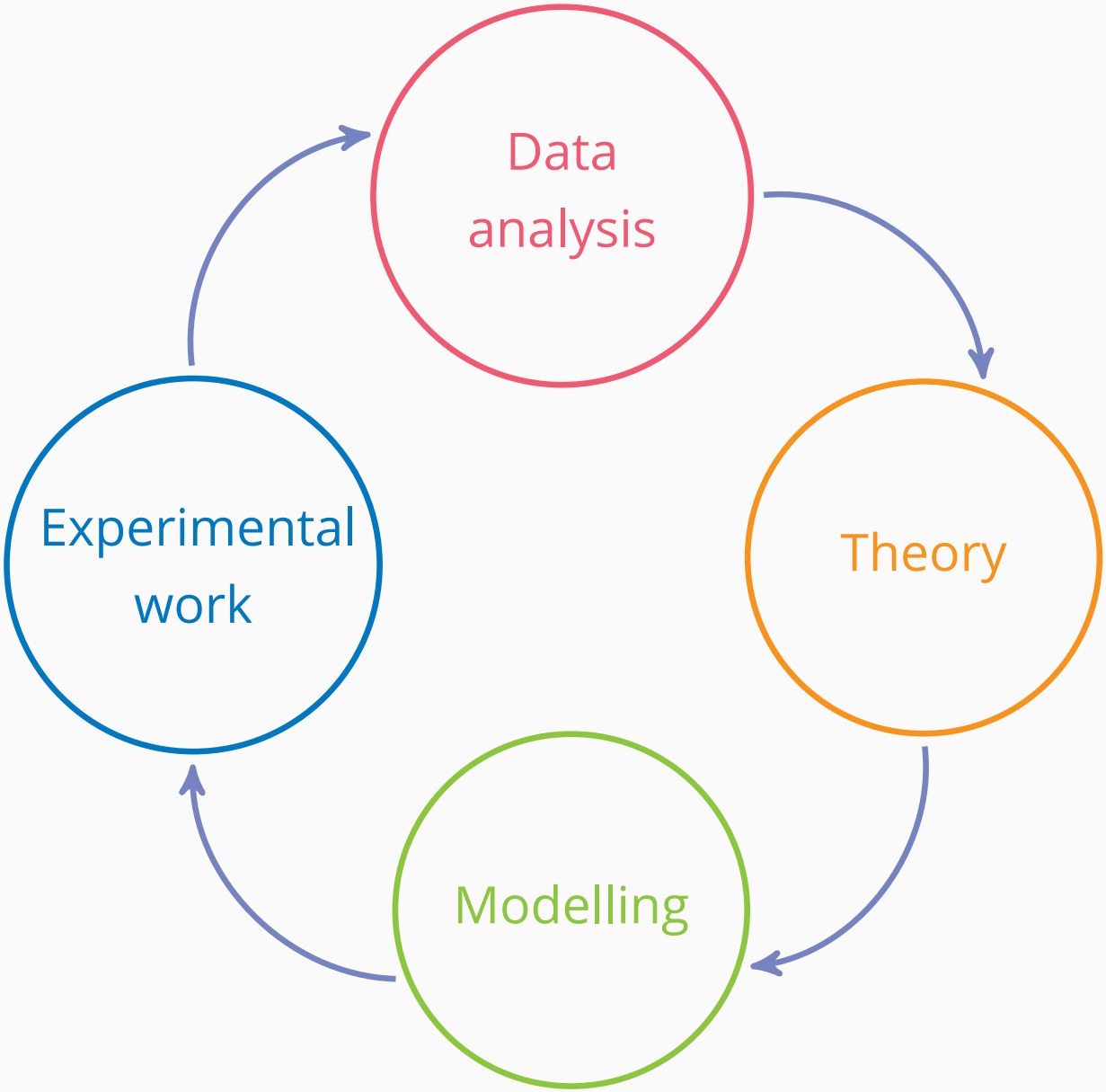
Standards and Tools in Neuroscience

A summary of the Open Source Brain workshop, September 2019

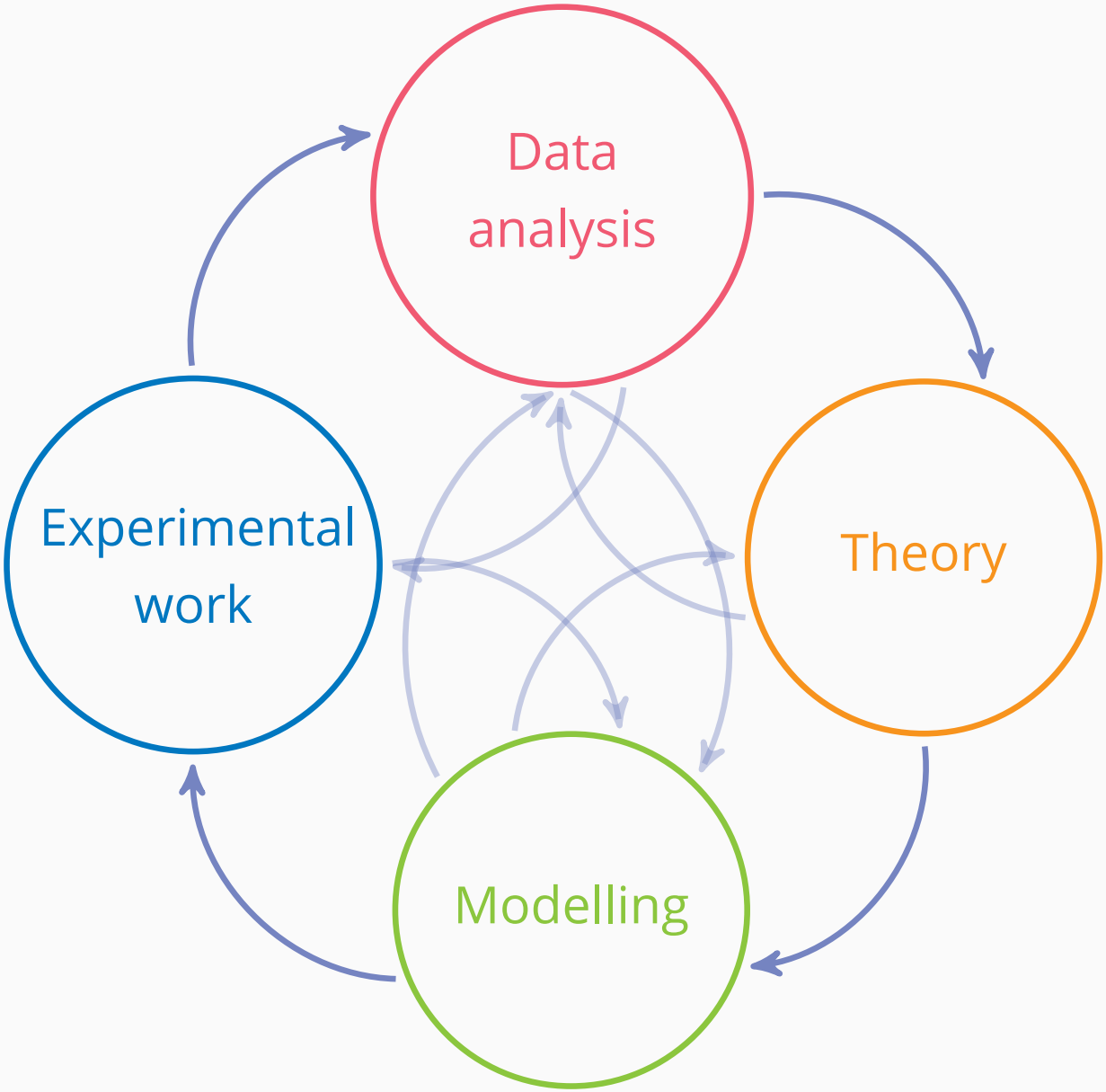
Ankur Sinha
Ph.D. candidate: UH Biocomputation Group, UK,
Volunteer: Fedora Project.

The problem statement

Neuroscience is massive



Neuroscience is massive



Free/Open Neuroscience

Free/Open science:
Everyone should have the freedom to share, study, and modify scientific material.

Free/Open Neuroscience

Free/Open science:
Everyone should have the freedom to share, study, and modify scientific material.

Experimental research: data

Angus's slide 22

Modelling: scales

Angus's slide 4

Modelling: reuse

Angus's slide 5

Standards: the common tongue

NWB: Neurophysiology data standardisation

Oliver's slides

The NeuroML Eco system

Padraig's slides, Boris's slides, Netpyne paper.

NeuroFedora: why, how, what?

FOSS: Developers and users

Neuroscience community: highly multidisciplinary

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

Neuroscience community: highly multidisciplinary

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

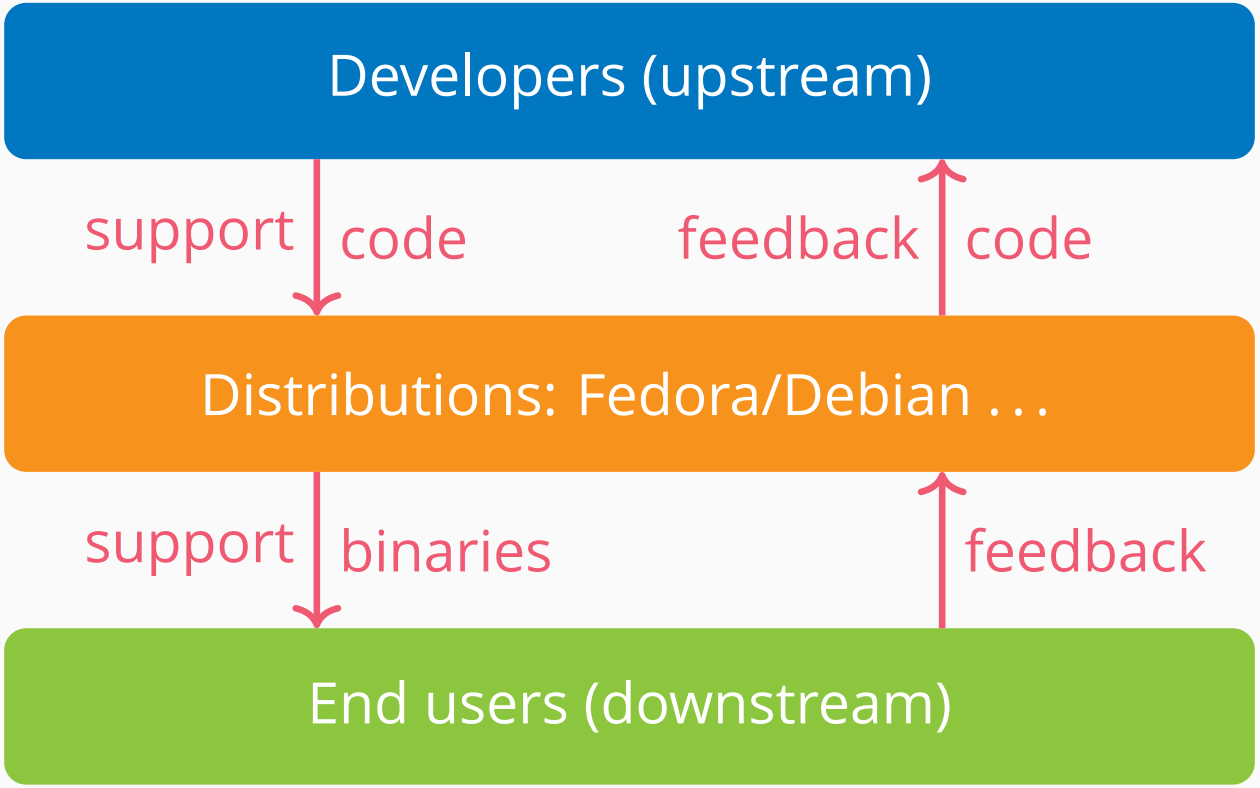
(Anecdotal) notes on development of research software

- 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

(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

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:

Primary goal:

- Provide a ready to use, integrated FOSS platform for neuroscientists[7].

[7] Researchers, academics, hobbyists, anyone!

NeuroFedora:

Primary goal:

- Provide a ready to use, integrated FOSS platform for neuroscientists[7].

Secondary/collateral goals:

[7] Researchers, academics, hobbyists, anyone!

NeuroFedora:

Primary goal:

- Provide a ready to use, integrated FOSS platform for neuroscientists[7].

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!

NeuroFedora: current metrics

- less than a year old[8],

[8] in its second iteration

[9] src.fedoraproject.org: Neuro-SIG

[10] Pagure.io: Neuro-SIG: issues

NeuroFedora: current metrics

- less than a year old[8],
- 20 volunteers
  - 15 package maintainers
  - 5 designers, newcomers
  - only 5 from a neuroscience background

[8] in its second iteration

[9] src.fedoraproject.org: Neuro-SIG

[10] Pagure.io: Neuro-SIG: issues

NeuroFedora: current metrics

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

[8] in its second iteration

[9] src.fedoraproject.org: Neuro-SIG

[10] Pagure.io: Neuro-SIG: issues

Search: “NeuroFedora”

Mailing list: neuro-sig@lists.fedoraproject.org

IRC: #fedora-neuro on Freenode

Telegram: t.me/NeuroFedora

Documentation neuro.fedoraproject.org

Blog: neuroblog.fedoraproject.org

Pagure.io (FOSS Git forge): neuro-sig/NeuroFedora

License

The LaTeX source code can be found here.