



Open science: A journey from sharing research artefacts to collaborative research

Camille Maumet

► To cite this version:

Camille Maumet. Open science: A journey from sharing research artefacts to collaborative research. Rigor and Reproducibility Seminar Series - UF Interdisciplinary T32 in Movement Disorders and Neurorestoration, Jul 2022, Gainesville (Online), United States. hal-03716748

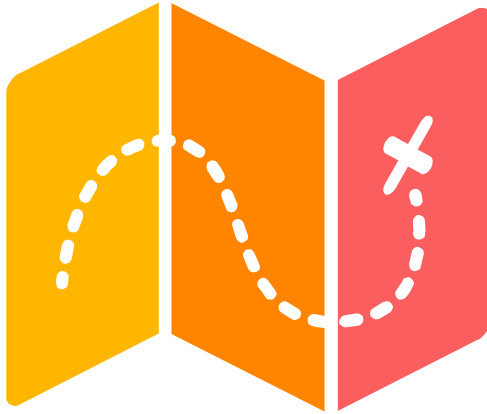
HAL Id: hal-03716748

<https://inria.hal.science/hal-03716748>

Submitted on 7 Jul 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Open science A journey from sharing research artefacts to collaborative research

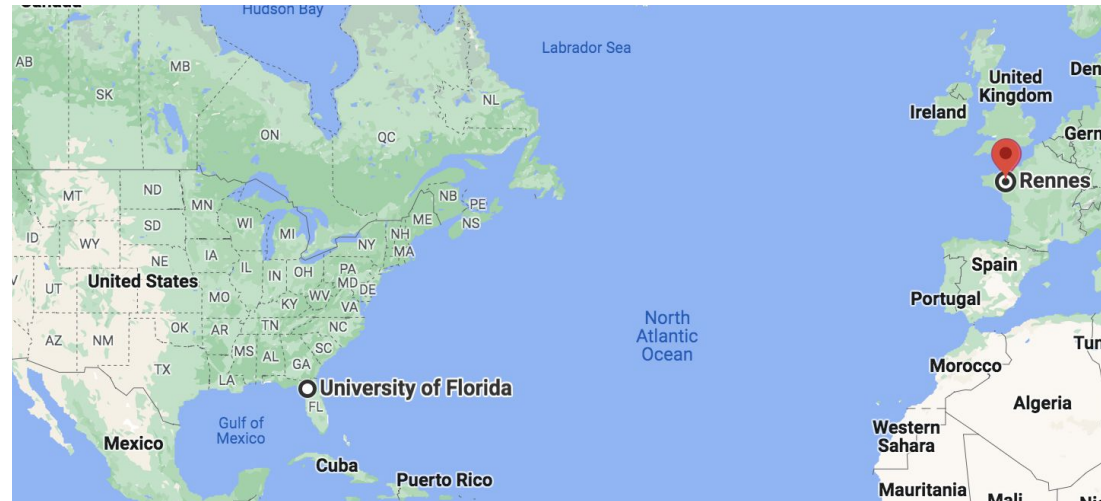
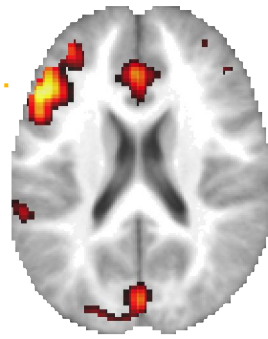
Camille Maumet

Inria, Univ Rennes, Inserm, CNRS, IRISA

Hi! I'm Camille



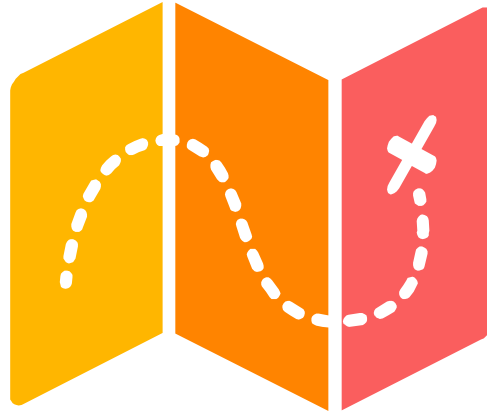
Research scientist in neuroinformatics
Rennes, France



PhD in brain imaging methods

PostDoc in neuroimaging data sharing → ✨ open science ✨

A journey into Open Science



Step 1

More
reproducible
research



SCIENCE

A Waste of 1,000 Research Papers

Decades of early research on the genetics of depression were built on nonexistent foundations. How did that happen?

ED YONG MAY 17, 2019



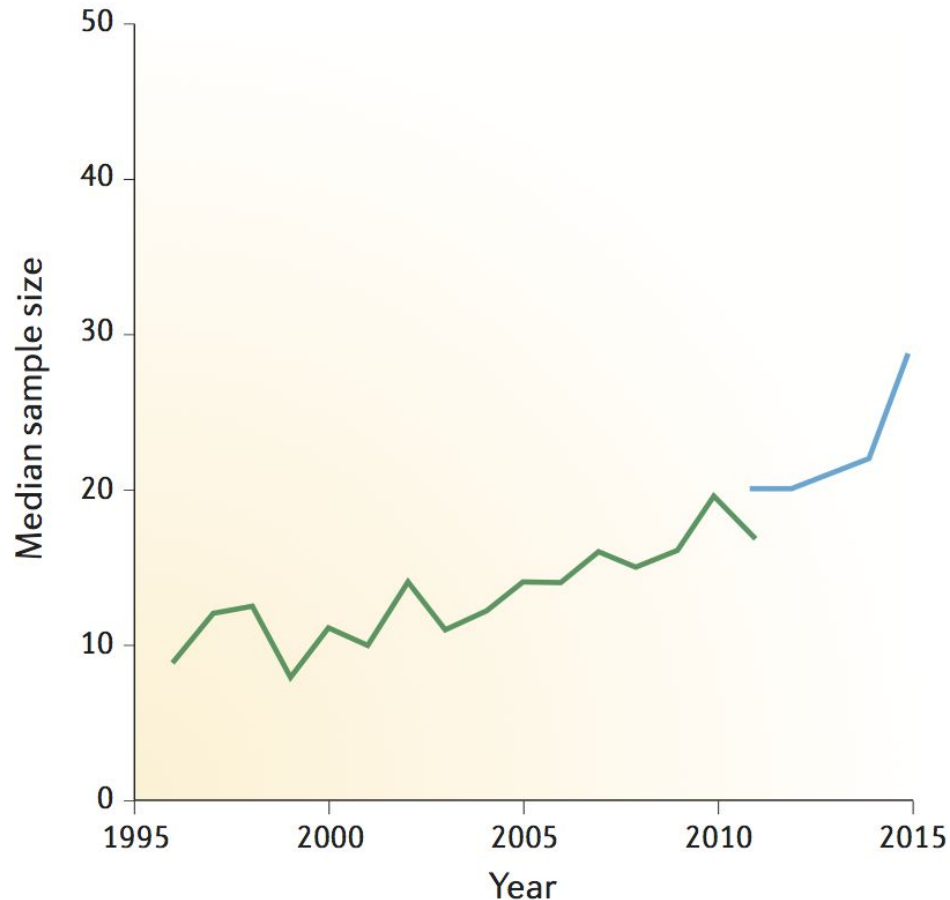
SEAN NEL / SHUTTERSTOCK

In 1996, a group of European researchers found that a certain gene, called *SLC6A4*, might influence a person's risk of depression.

It was a blockbuster discovery at the time. The team found that a less active version of the gene was more common among 454 people who had mood disorders than in 570 who did not. In theory, anyone who had this particular gene variant could be at higher risk for depression, and that finding, they said, might help in diagnosing such disorders, assessing suicidal behavior, or even

(Ir)-Reproducibility

Sample sizes in neuroimaging



2015 : 30 participants per study

[Poldrack et. al, Nature Neuroscience 2017]

Open data

Unique study
30 participants



OpenNEURO

studyforrest.org



NEUROVAULT

L I E L N L F T Q K T Q R V
S M Y C O N N E C T O M E Q
G S P K K W A R R G K E H R

NITRC

OSF

+ Images
+ Homogenous
- Datasets

Open data

Unique study
30 participants



OpenNEURO

studyforrest.org



NEUROVAULT

L I E L N L F T Q K T Q R V
S M Y C O N N E C T O M E C
G S P K K W A R R G K E H R

NITRC

OSF

Consortium
1000 participants



ABIDE
Autism Brain Imaging
Data Exchange



CORR
CONSORTIUM FOR
RELIABILITY AND
REPRODUCIBILITY



1000 Functional
Connectomes Project

+ Images
+ Homogenous
- Datasets



Open data

Unique study
30 participants



OpenNEURO

studyforreest.org



NEUROVAULT

L I E L N L F T Q K T Q R V
S M Y C O N N E C T O M E C
G S P K K W A R R G K E H R



Consortium
1000 participants



ABIDE
Autism Brain Imaging
Data Exchange



1000 Functional
Connectomes Project



Cohort
100 000 participants



HUMAN
Connectome
PROJECT



+ Images
+ Homogenous
- Datasets



Towards FAIR datasets



Towards FAIR datasets



Donders Repository



Towards FAIR datasets



Donders Repository



Findable we can search for open datasets in each repository

Towards FAIR datasets



Donders Repository



Findable we can search for open datasets in each repository

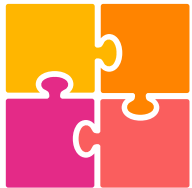


Accessible Direct download or with Data User Agreement

Towards FAIR datasets



Donders Repository



Interoperable?



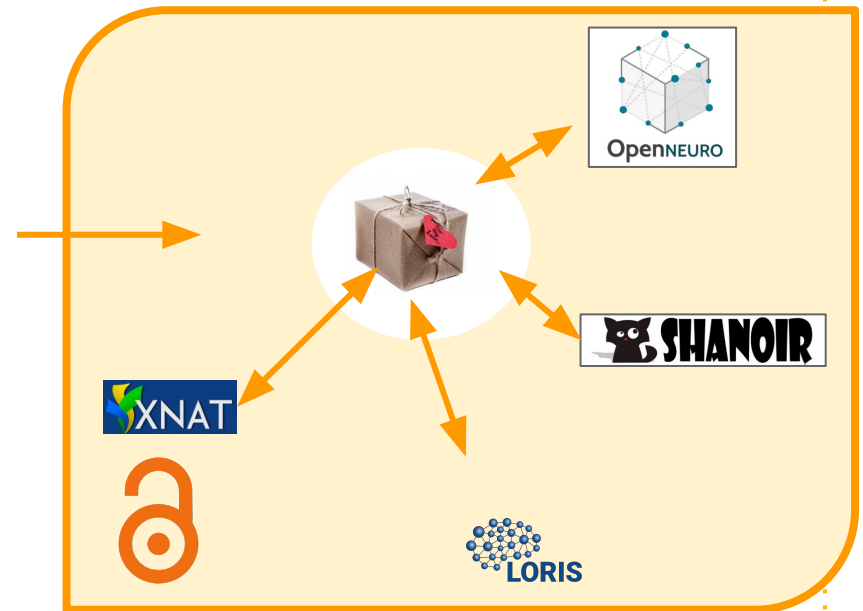
Findable we can search for open datasets in each repository



Accessible Direct download or with Data User Agreement

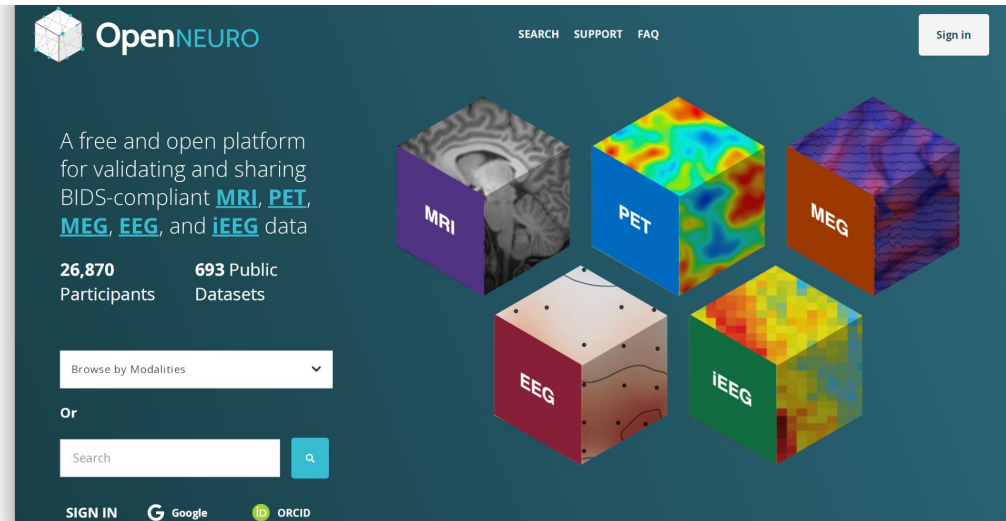
Standards for data sharing

- Data and **meta-data**
- A common “language”



Standards for data sharing - BIDS

```
my_dataset/  
├── participants.tsv  
├── sub-01/  
│   ├── anat/  
│   │   └── sub-01_T1w.nii.gz  
│   ├── func/  
│   │   ├── sub-01_task-rest_bold.nii.gz  
│   │   └── sub-01_task-rest_bold.json  
│   └── dwi/  
│       ├── sub-01_dwi.nii.gz  
│       ├── sub-01_dwi.json  
│       ├── sub-01_dwi.bval  
│       └── sub-01_dwi.bvec  
├── sub-02/  
├── sub-03/  
└── sub-04/
```



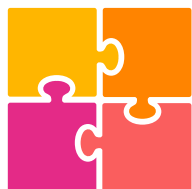
<https://openneuro.org/>

[Gorgolewski et. al, Scientific Data 2016]

Towards FAIR datasets



Donders Repository



Interoperable?



Findable we can search for open datasets in each repository

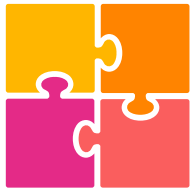


Accessible Direct download or with Data User Agreement

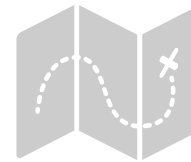
Towards FAIR datasets



Donders Repository



Interoperable A common languages across tools



Findable we can search for open datasets in each repository

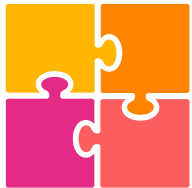


Accessible Direct download or with Data User Agreement

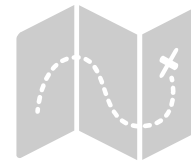
Towards FAIR datasets



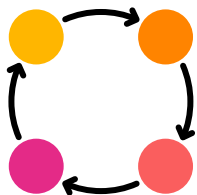
Donders Repository



Interoperable A common languages across tools



Findable we can search for open datasets in each repository



Reusable Metadata selected to enable reuse



Accessible Direct download or with Data User Agreement

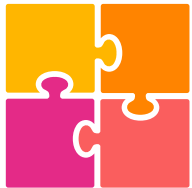
Towards FAIR datasets



Donders Repository



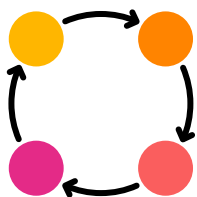
Findable **A**ccessible **I**nteroperable **R**eusable



Interoperable A common languages across tools



Findable we can search for open datasets in each repository

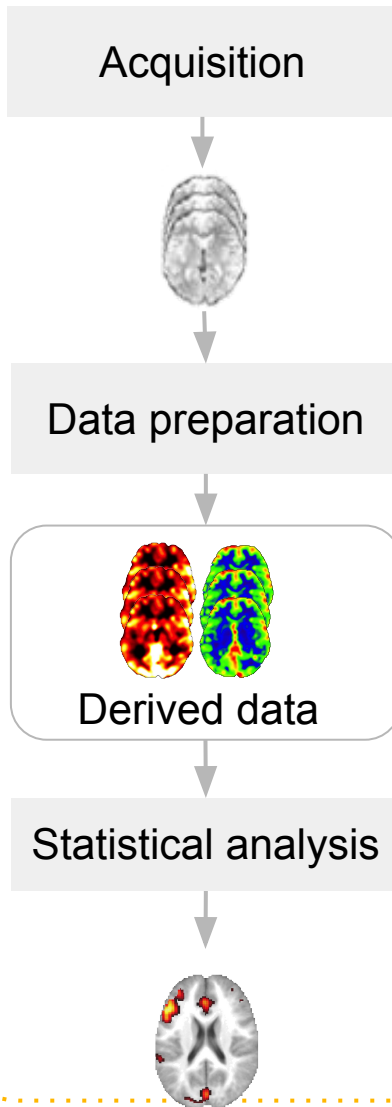


Reusable Metadata selected to enable reuse

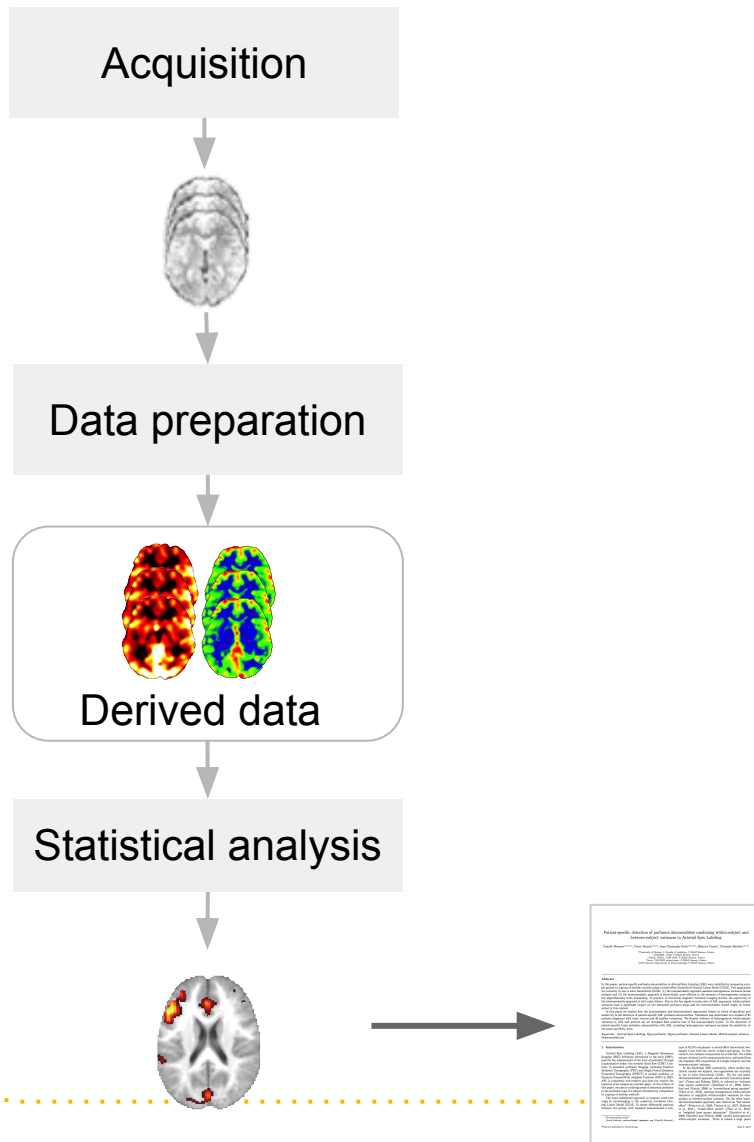


Accessible Direct download or with Data User Agreement

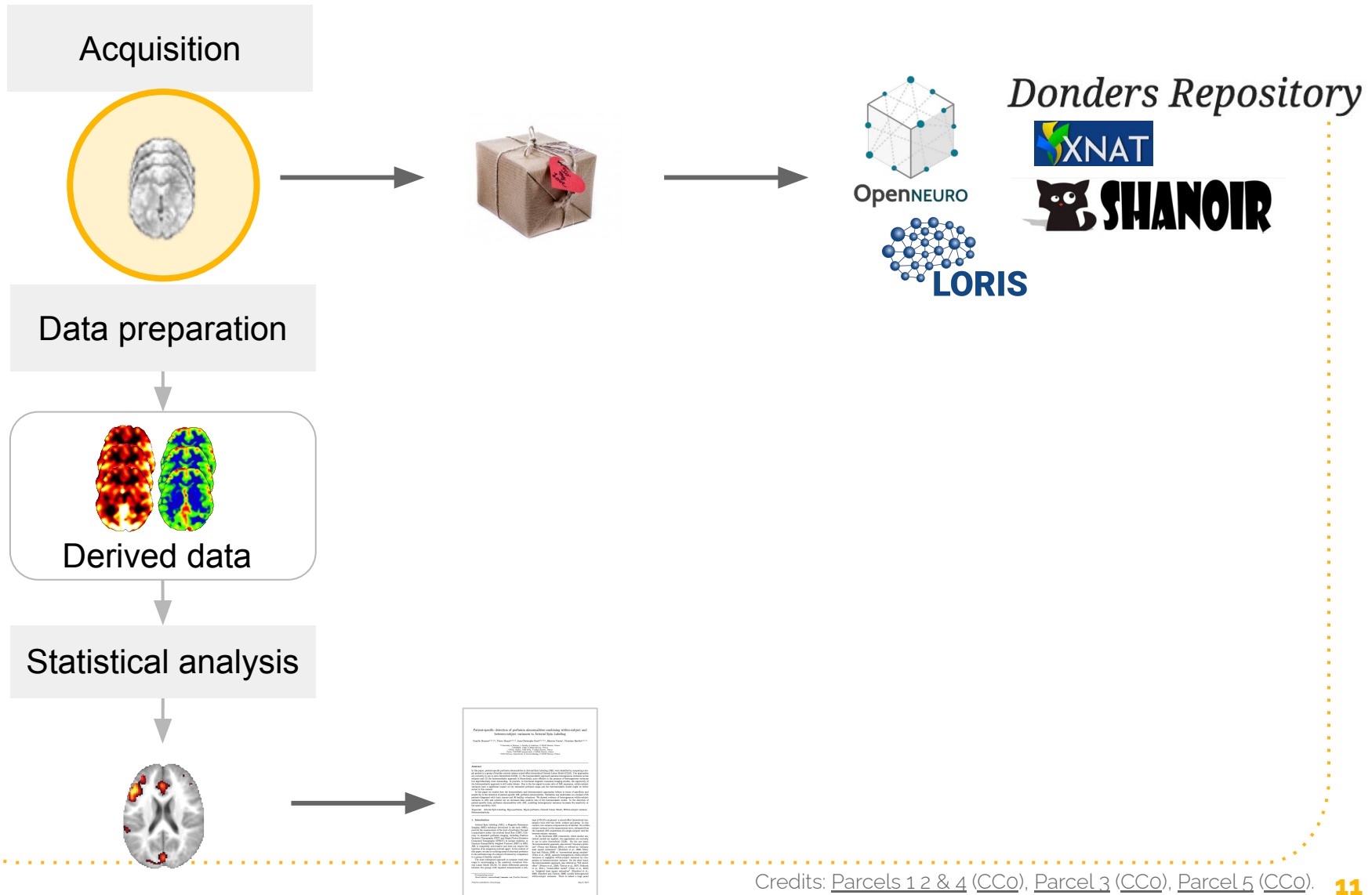
Sharing more research products



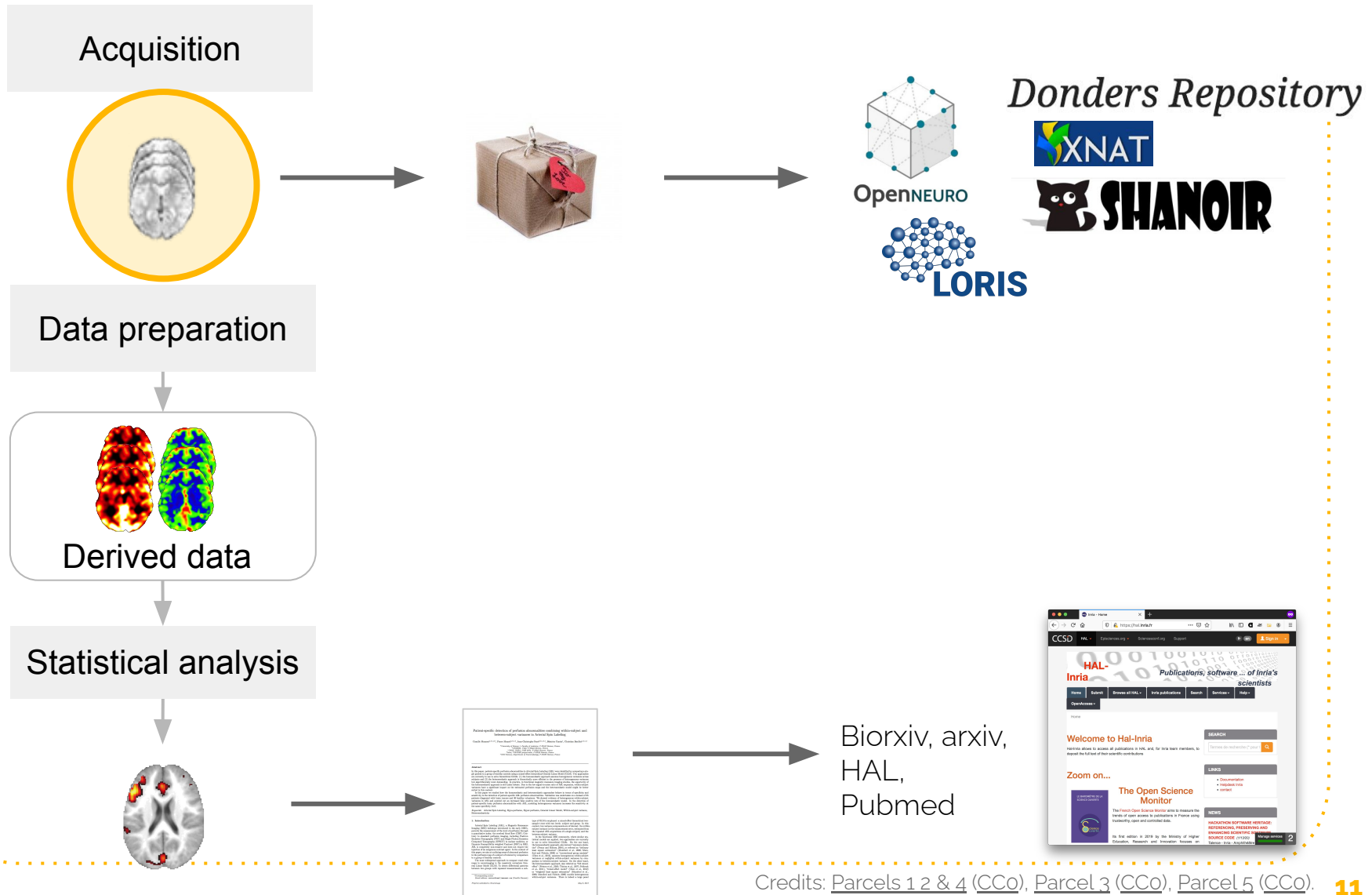
Sharing more research products



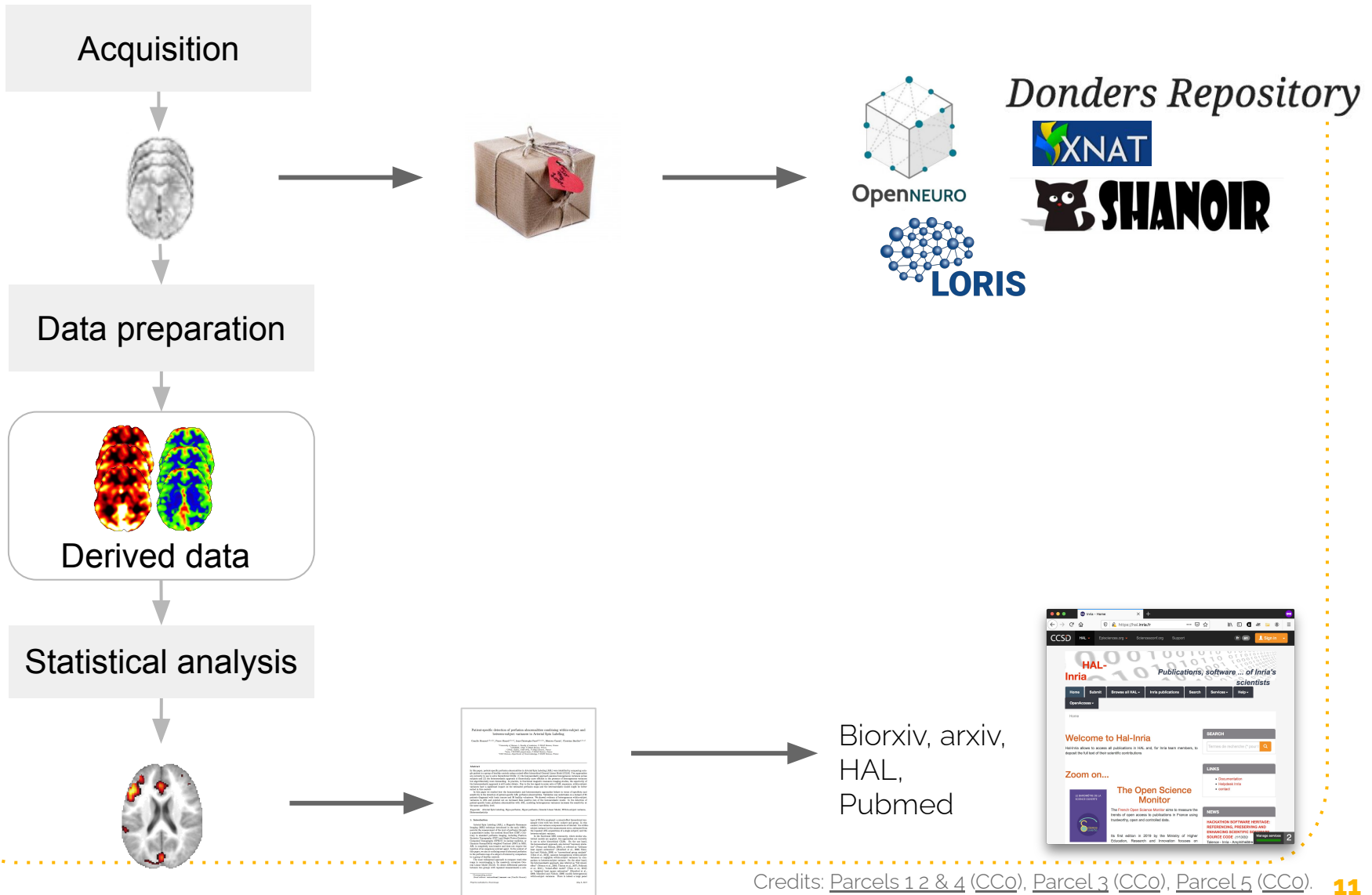
Sharing more research products



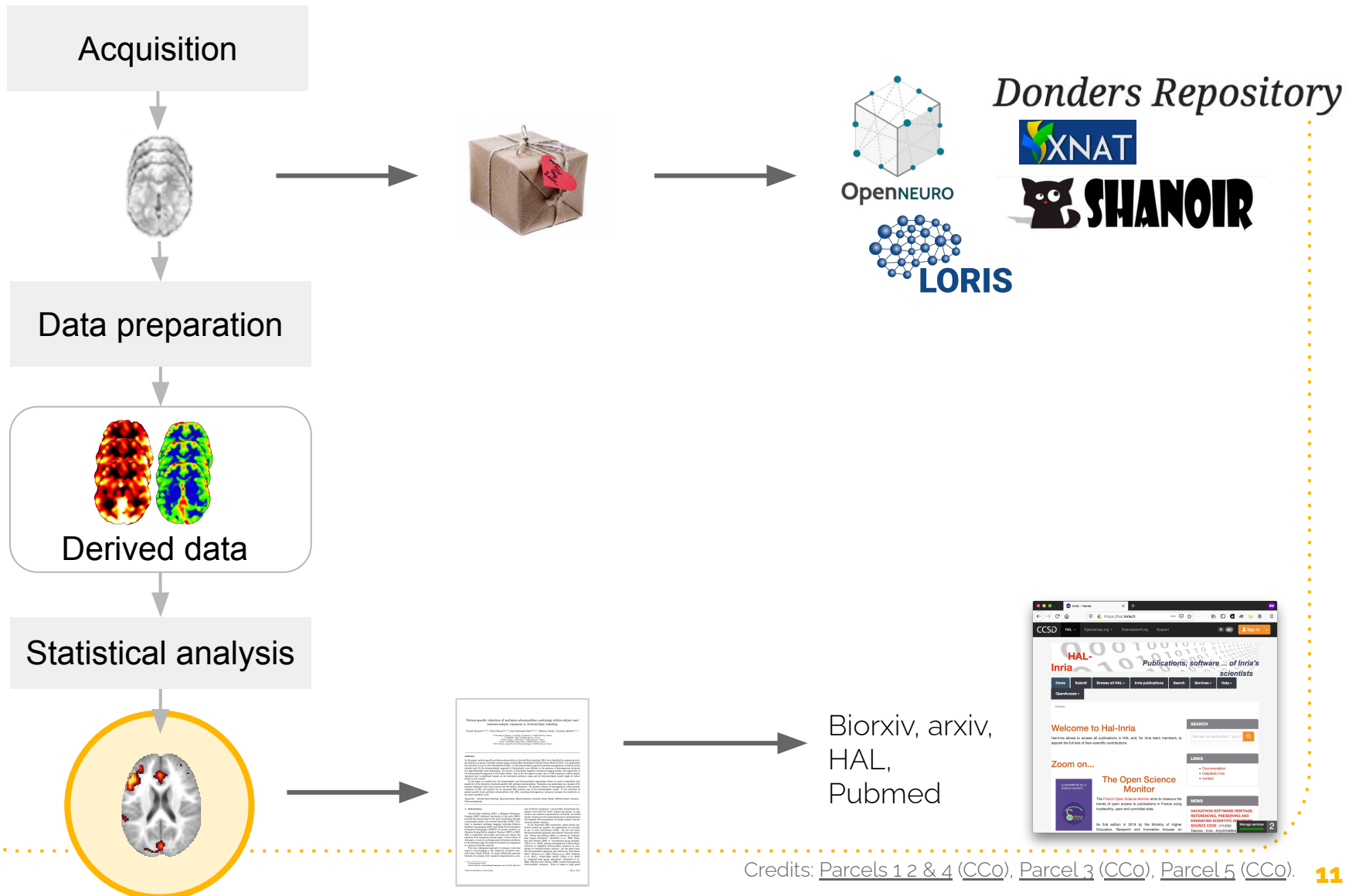
Sharing more research products



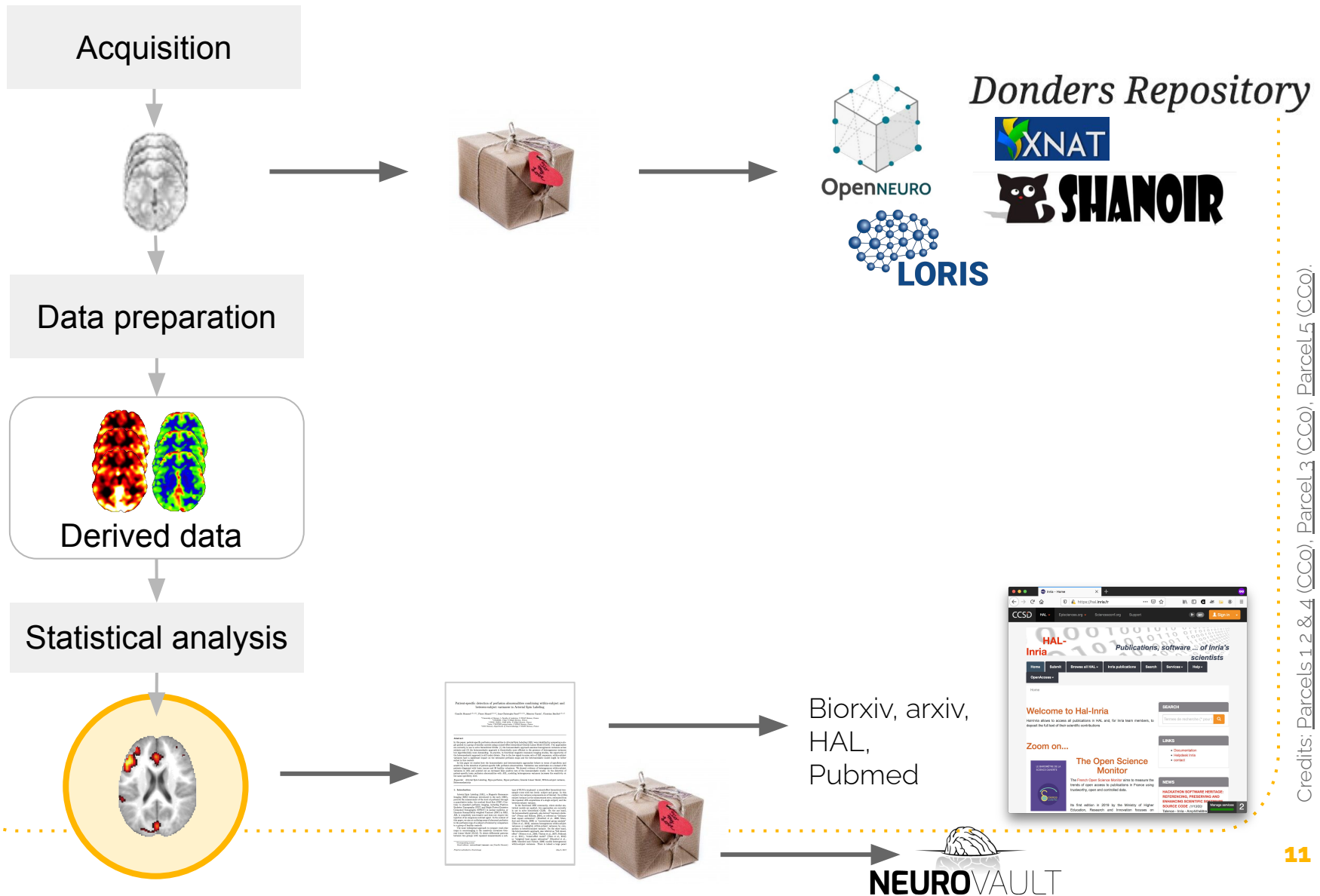
Sharing more research products



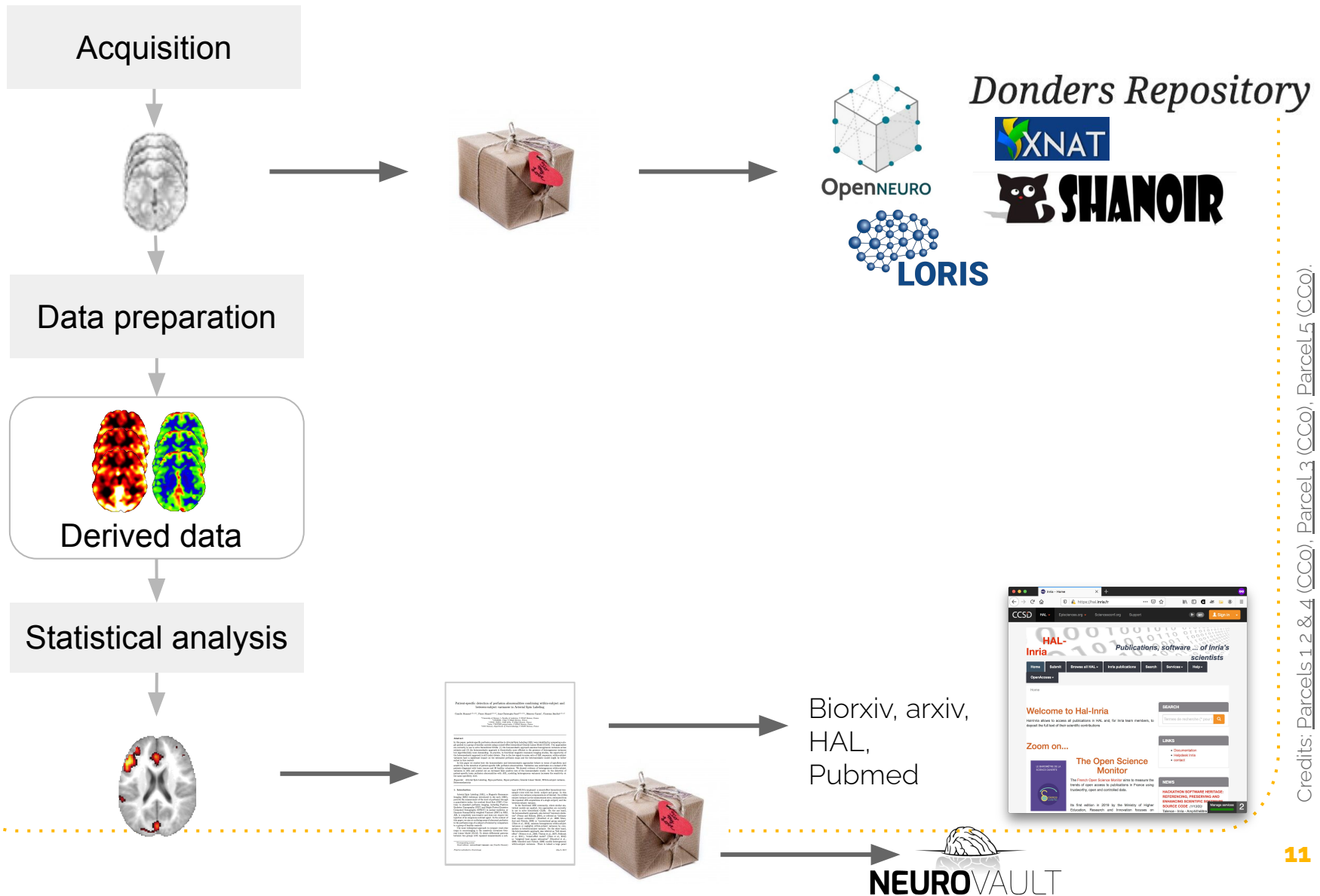
Sharing more research products



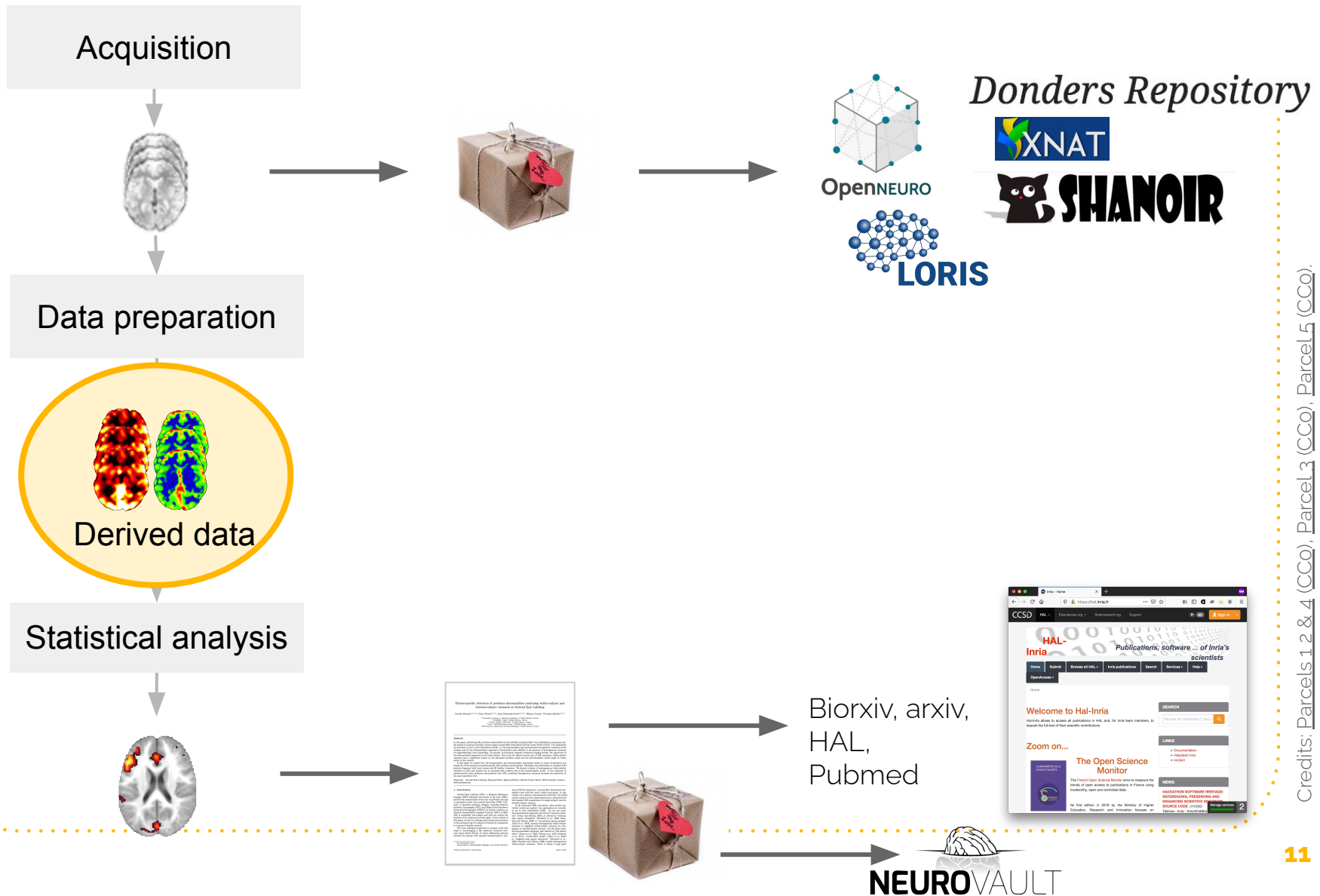
Sharing more research products



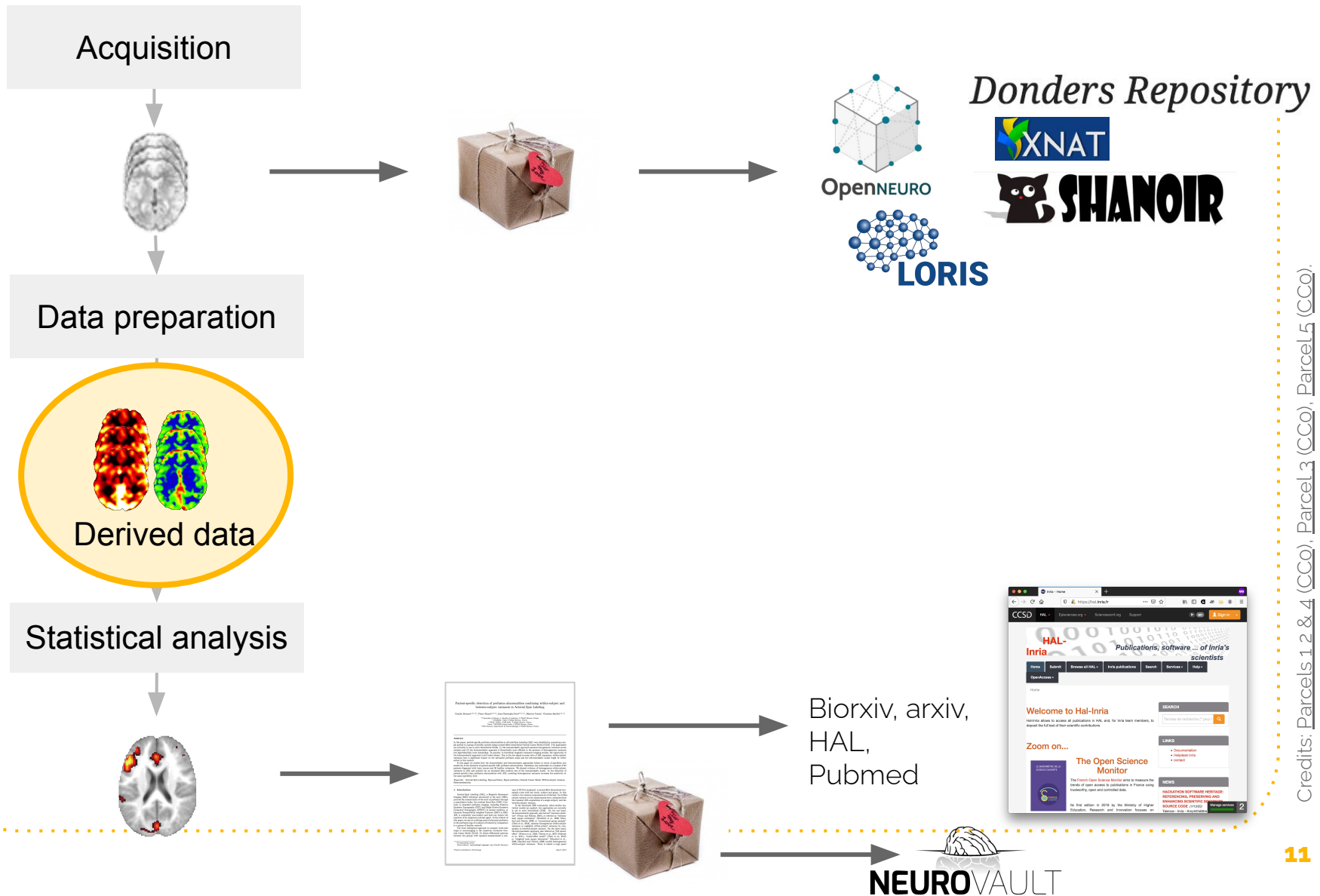
Sharing more research products



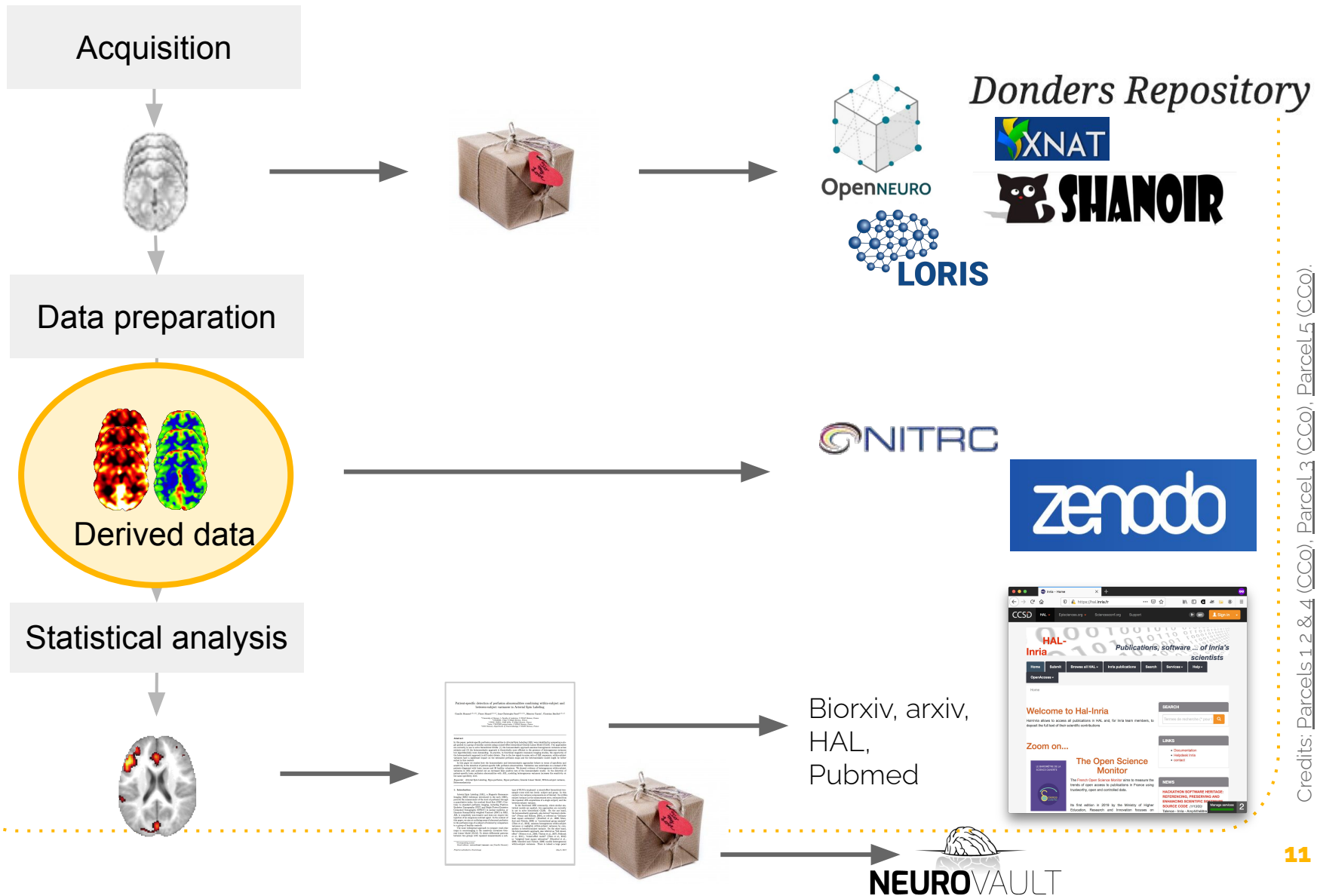
Sharing more research products



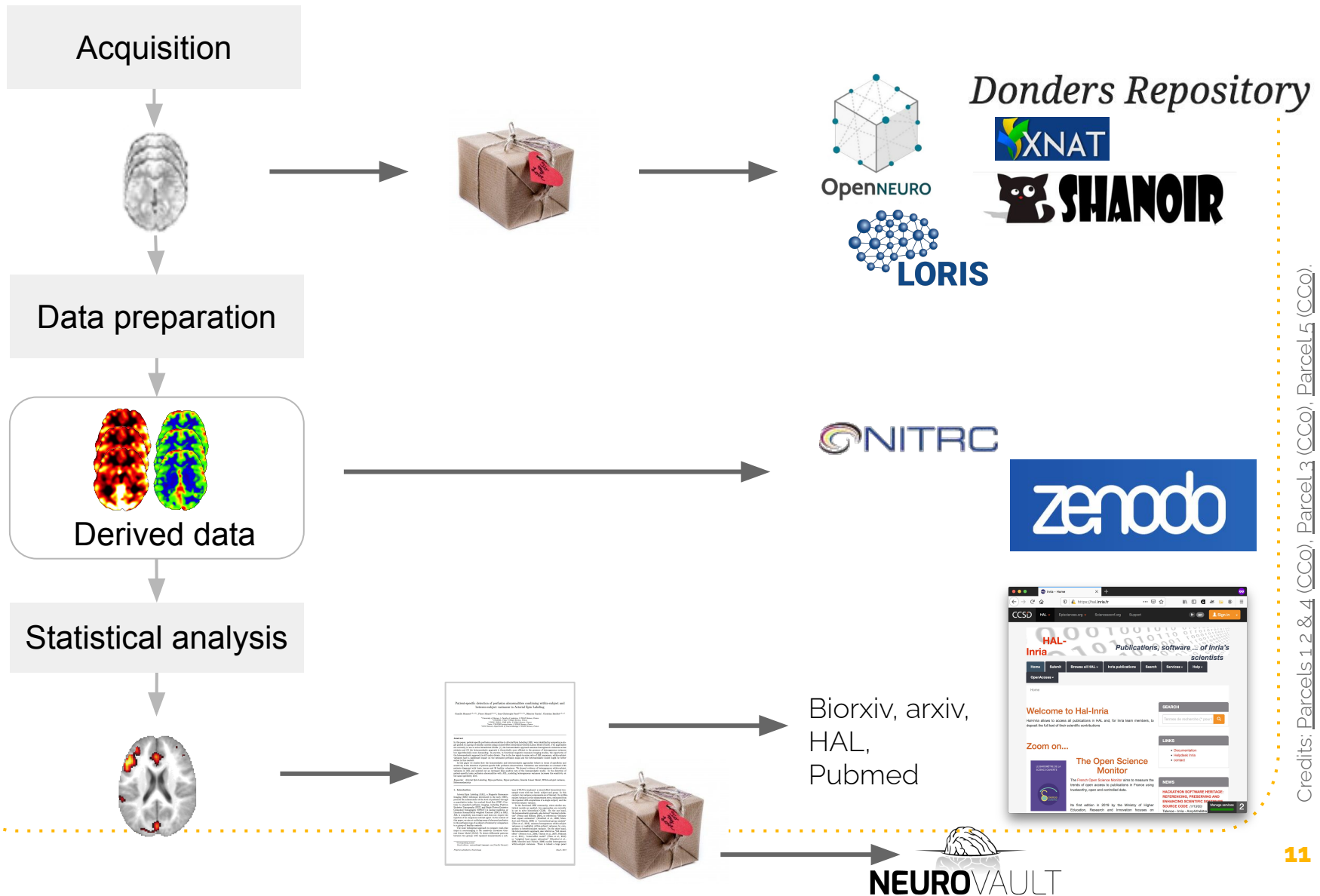
Sharing more research products



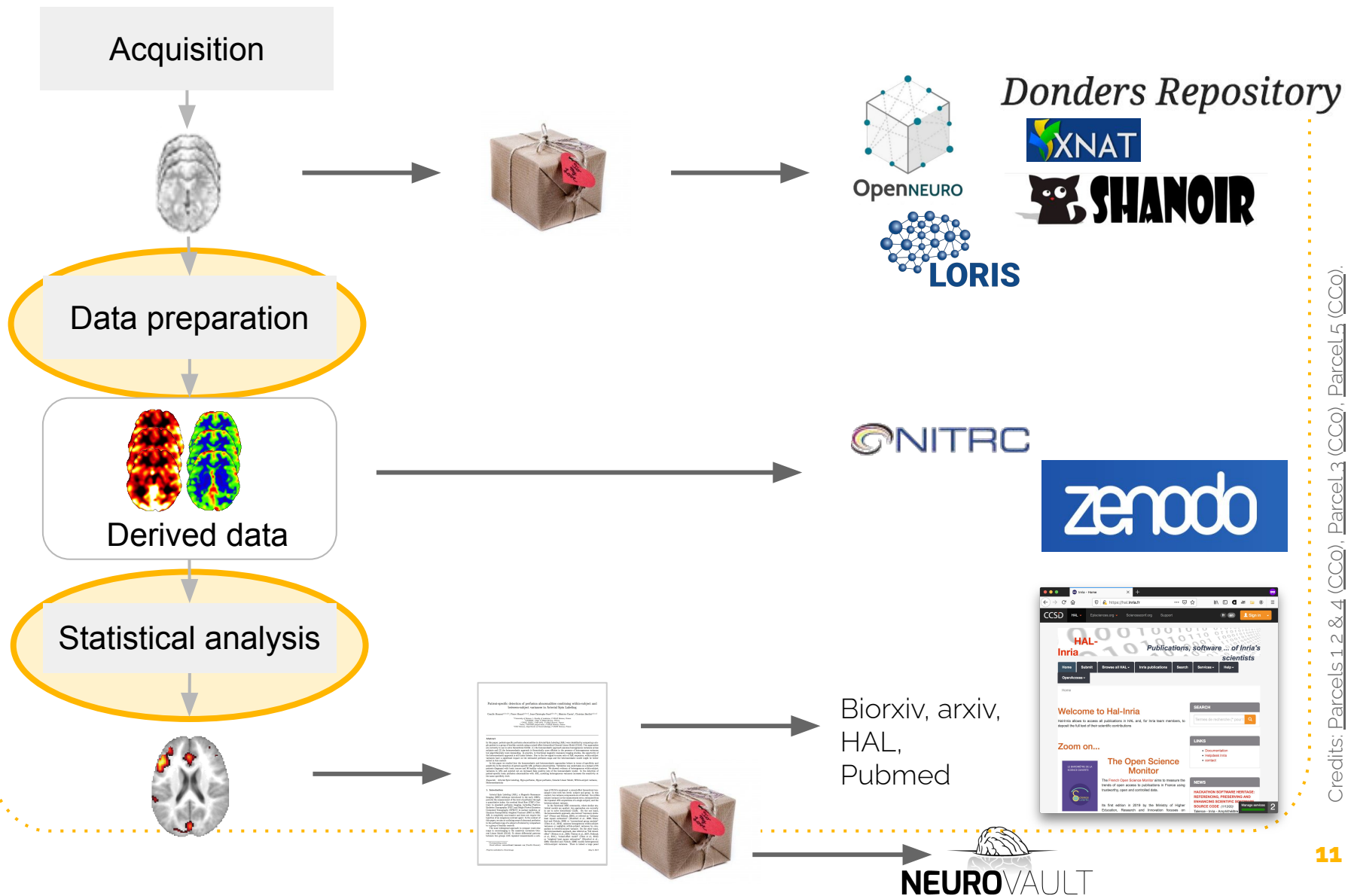
Sharing more research products



Sharing more research products



Sharing more research products



Sharing analysis code

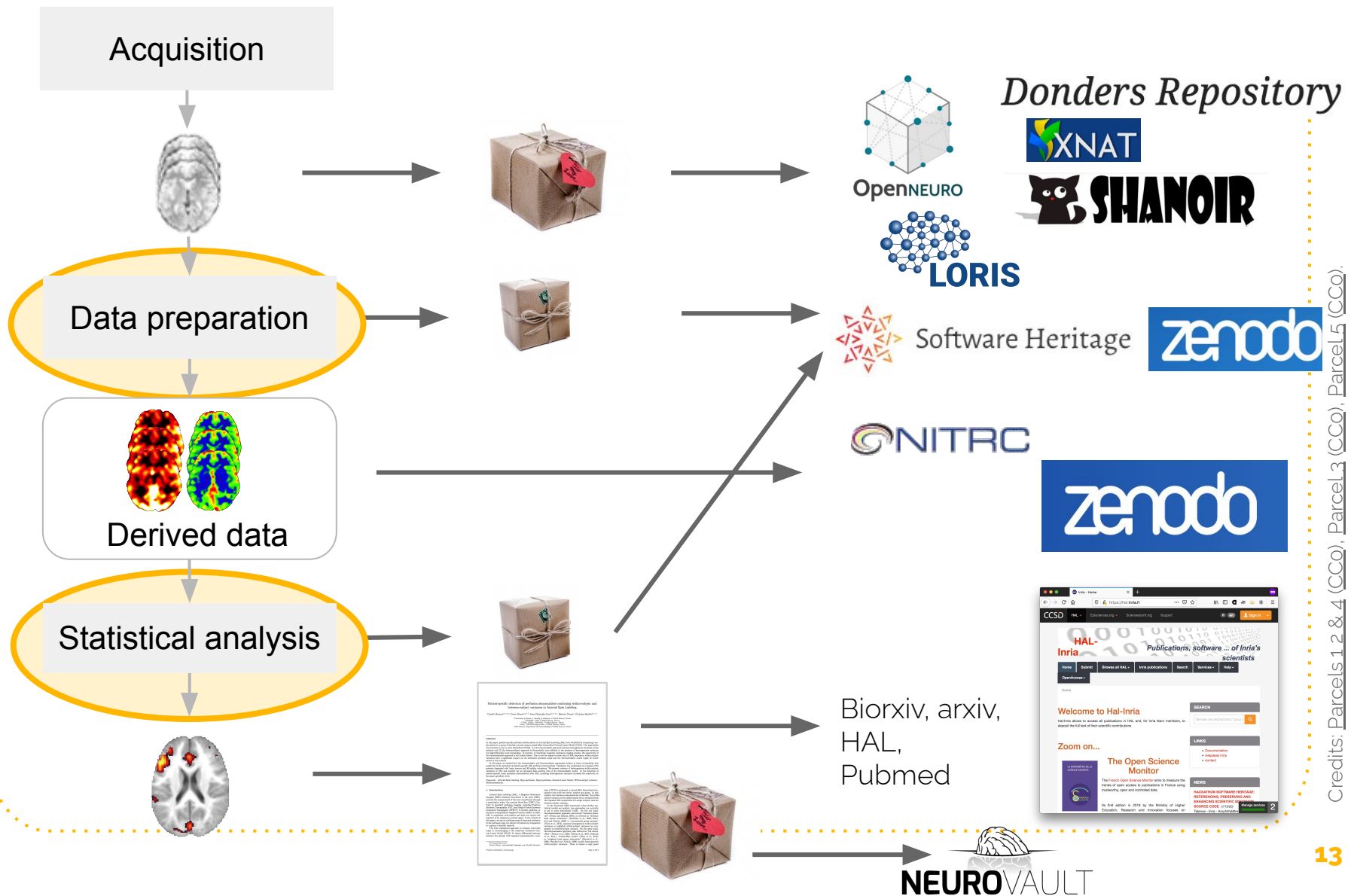


Different requirements for sharing code compared to datasets

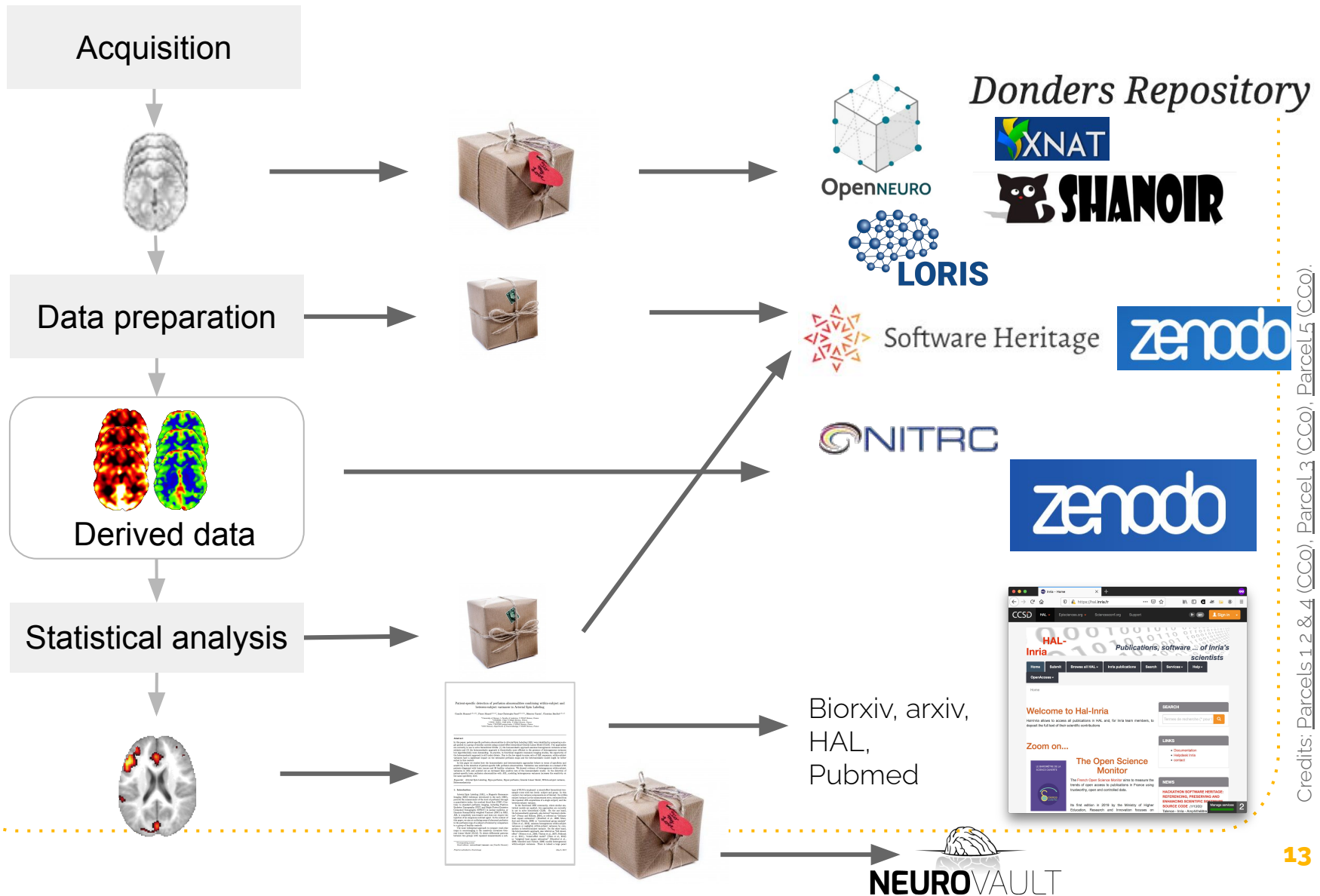
- Often stored in **online repositories** (e.g. Github, Gitlab)
- **Many** versions (commits)
- Long term preservation
- **Code structure**, README

```
.
|-- CITATION
|-- README
|-- LICENSE
|-- requirements.txt
|-- data
|   -- birds_count_table.csv
|-- doc
|   -- notebook.md
|   -- manuscript.md
|   -- changelog.txt
|-- results
|   -- summarized_results.csv
|-- src
|   -- sightings_analysis.py
|   -- runall.py
```

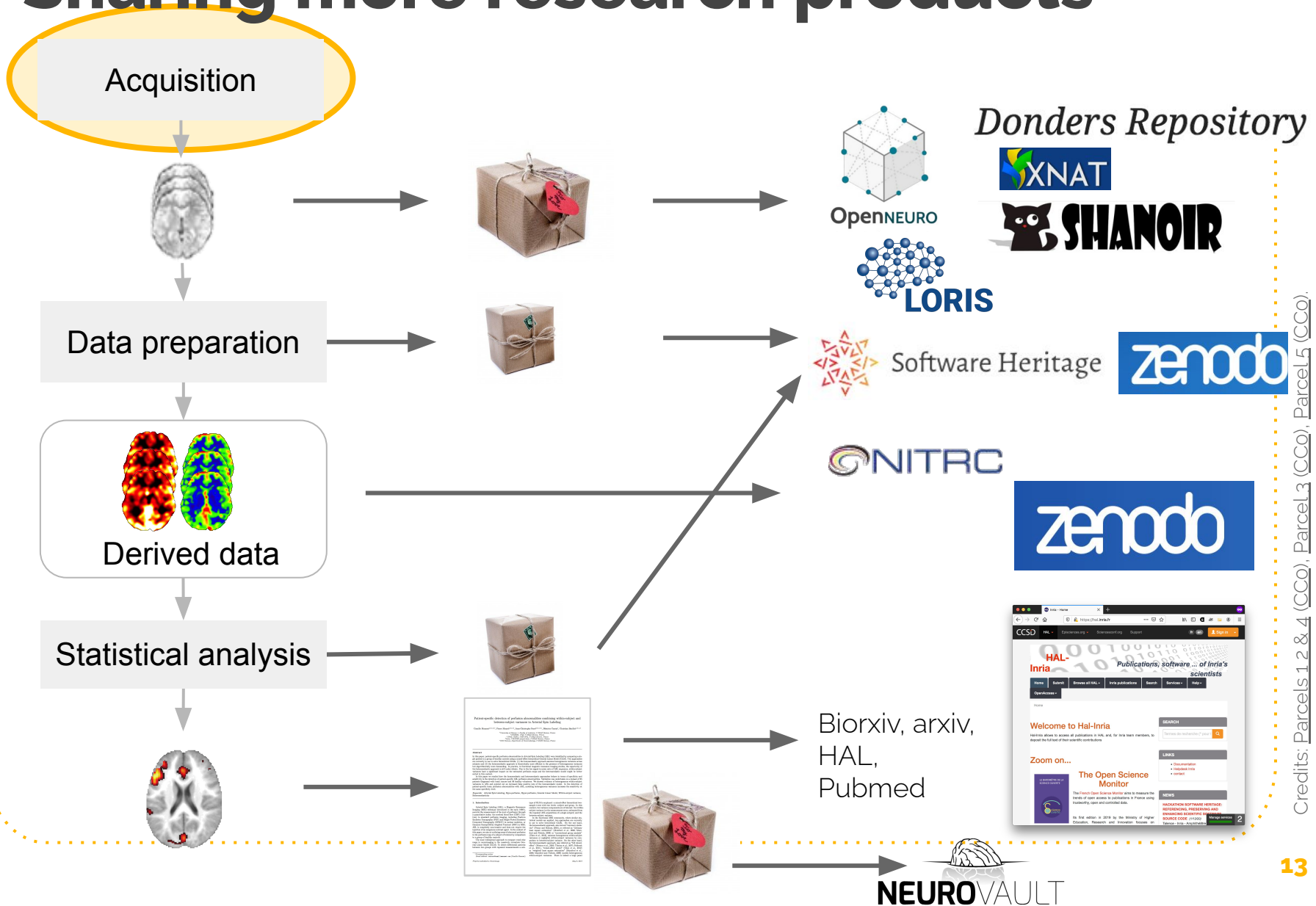
Sharing more research products



Sharing more research products



Sharing more research products



Let's get started...



- **Overwhelmed?** Lack of training in open science practices
- **Lack of incentives** How can we as individuals act towards more reproducible science?

Reproducible Science



Beyond technical solutions, a culture change

- Making resources **available to the scientific community**
- **Reusing** existing resources (datasets, tools) that were created by others

towards more collaborative research



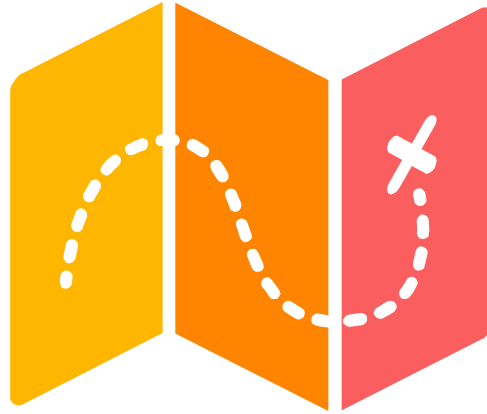
Chris Holdgraf
@choldgraf

Something I'm thinking about today: an important part of Open Science and Open Infrastructure is the idea that the end-product is not the only thing that matters. The **process to get there** is equally important. 1/

[Traduire le Tweet](#)

11:31 AM · 30 juin 2022 · Twitter Web App

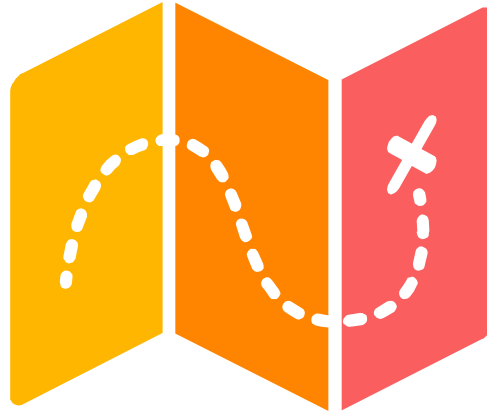
A journey into Open Science



Step 1

More
reproducible
research

A journey into Open Science



Step 1

More
reproducible
research

Step 2

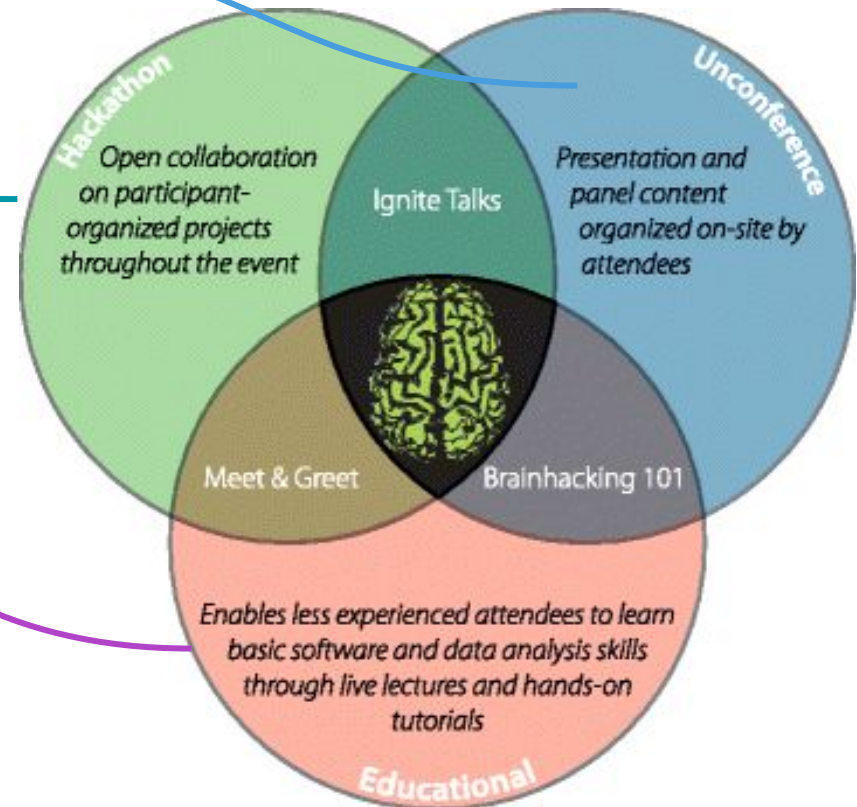
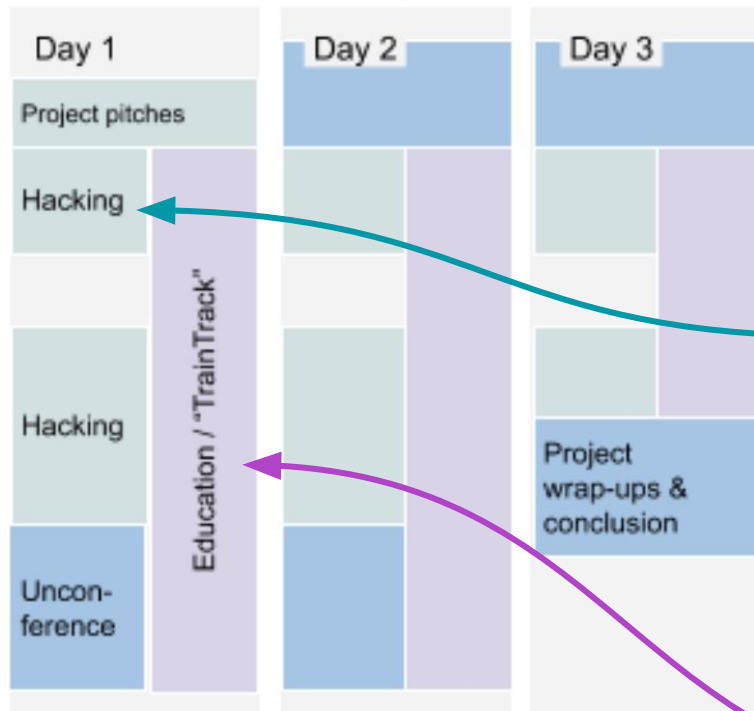
More
collaborative
research



Hackathons

"Hackathons based on collaboration, not competition"

B. Timeline of a Single Event



Hackathon: a space for learning

Traintrack

Courses covering many aspects of open science practices (e.g. version control, containers, etc.)



Unconferences

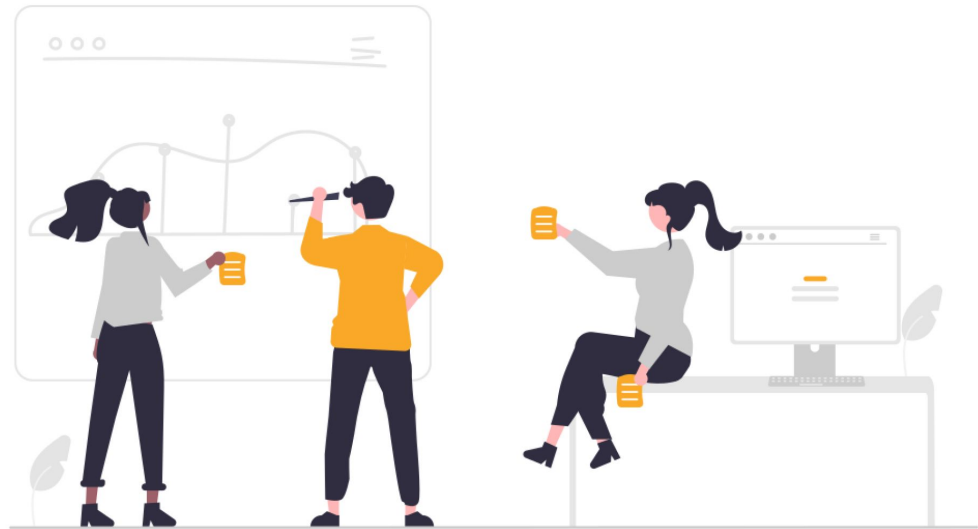
Spontaneous short sessions of a variety of topics

Community learning

Hearing about new projects, discussing with peers, etc.

Hackathon: a space for building

Hacktrack Finding critical mass and diverse opinions to work on projects that you care about



Data privacy & sharing

How to inform participants, collect consent for data sharing in compliance with European General Data Protection Regulation (GDPR)?



Open Brain Consent

[Open Brain Consent WG, HBM 2020]



Stephan
Heunis



Yarik
Halchenko



Cyril
Pernet

Open Brain Consent
stable

Search docs

- Sample consent forms
- Recommendations
- Ultimate consent form
- GDPR edition
- Anonymization tools
- Contribute
- Contact information
- Discussions

DigitalOcean Save time & money w/ the cloud platform loved by devs. Try for Free
Sponsored - Ads served ethically

Docs » Make open data sharing a no-brainer for ethics committees. [Edit on GitHub](#)

Make open data sharing a no-brainer for ethics committees.

[Zenodo badge](#)

Statement of the problem

The ideology of open and reproducible science makes its ways into various fields of science. Neuroimaging is a driving force today behind many fields of brain sciences. Despite possibly terabytes of neuroimaging data collected for research daily, just a small fraction becomes publicly available. Partially it is because management of neuroimaging data requires to confirm to established legal norms, i.e. addressing the aspect of research participants privacy. Those norms are usually established by institutional review boards (IRB, or otherwise called ethics committees), which are in turn "governed" by national, federal and supra-national regulations.

Flexibility in interpretation of original regulations established in the past century, decentralization of those committees, and lack of a "community" influence over them created the problem: for neuroimaging studies there was no commonly accepted version of a Consent form template which would allow for collected imaging data to be shared as openly as possible while providing adequate guarantees for research participants' privacy. In majority of the cases, used Consent forms simply did not include any provision for public sharing of the data to get a "speedy" IRB approval for a study. Situation is particularly tricky because major granting agencies (e.g. NIH, NSF, RCUK) nowadays require public data sharing, but do not provide explicit instructions on how.

Data privacy & sharing



Consent form

[Direct link](#)

To be approved and signed by participants

“[...] While the collection, use and storage of your data are done for the purpose of conducting the study to which you are currently participating, **these data might also be used for other future research projects in the field of medical and cognitive neuroscience.** [...]”

Data user agreement

[Direct link](#)

To be approved and signed by researchers reusing the data

“[...] 2. I **will not attempt to establish or retrieve the identity of the study participants.** I will not link these data to any other database in a way that could provide identifying information. [...]”

3. I **will not redistribute these data** or share access to these data with others, unless they have independently applied and been granted access to these data, i.e., signed this Data Use Agreement. This includes individuals in my institution.
[...]”

Translations

- Bosnian
- Czech
- German
- Greek
- Spanish
- Finnish
- French
- Italian
- Dutch
- Norwegian
- Turkish

French version



Anne
Hespel



Elise
Bannier

Hackathon: a space to meet with the community

Finding **people who care about the process** of how we do science



Finding **collaborators** for your next research project

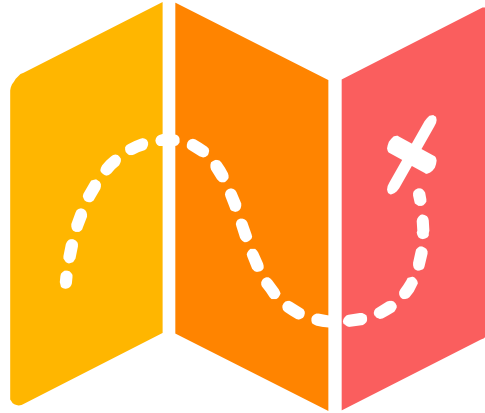
Greater sense of belonging into the **Community**

Let's continue the journey...



- We found a **community**
- But did everyone get **this opportunity?** Who is missing?

A journey into Open Science



Step 1

More
reproducible
research

Step 2

More
collaborative
research

Step 3

More
inclusive
research

The New York Times

Many Facial-Recognition Systems Are Biased, Says U.S. Study

Algorithms falsely identified African-American and Asian faces 10 to 100 times more than Caucasian faces, researchers for the National Institute of Standards and Technology found.



Morning at Grand Central Terminal. Technology for facial recognition is frequently biased, a new study confirmed. Timothy A. Clary/Agence France-Presse — Getty Images



Source: TED talk

[Joy Buolamwini, MIT 2017]

Algorithmic bias

Gender imbalance in medical imaging datasets produces biased classifiers for computer-aided diagnosis

Agostina J. Larrazabal, Nicolás Nieto, Victoria Peterson ,  +1, and Enzo Ferrante   [Authors Info & Affiliations](#)

Edited by David L. Donoho, Stanford University, Stanford, CA, and approved April 30, 2020 (received for review October 30, 2019)

May 26, 2020 | 117 (23) 12592-12594 | <https://doi.org/10.1073/pnas.1919012117>

↓ 1,936  80



Abstract

Artificial intelligence (AI) systems for computer-aided diagnosis and image-based screening are being adopted worldwide by medical institutions. In such a context,

[Larrazabal et al, PNAS 2020]

[Responsible AI Seminar](#)
(DTU Denmark, online)

Talk by Enzo Ferrante

X-ray: Lung opacity detection



The Diversity–Innovation Paradox in Science

Bas Hofstra , Vivek V. Kulkarni, Sebastian Munoz-Najar Galvez, , and Daniel A. McFarland  [Authors Info & Affiliations](#)

Edited by Peter S. Bearman, Columbia University, New York, NY, and approved March 16, 2020 (received for review September 5, 2019)

April 14, 2020 | 117 (17) 9284–9291 | <https://doi.org/10.1073/pnas.1915378117>

 5,276  199



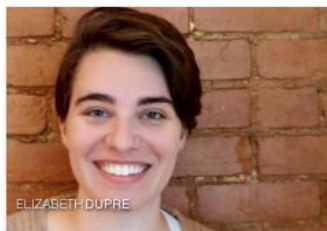
Significance

By analyzing data from nearly all US PhD recipients and their dissertations across three decades, this paper finds demographically underrepresented students innovate at higher rates than majority students, but their novel contributions are discounted and less likely to earn them academic positions. The discounting of minorities' innovations may partly explain their underrepresentation in influential positions of academia.

[Hofstra et al, PNAS 2020]

Designing online conferences **for inclusivity**

OHBM Open Science SIG 2020



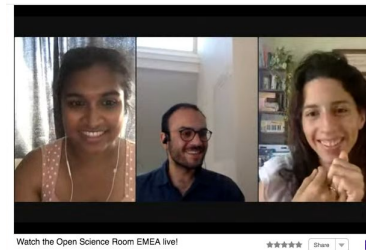
OHBM Open Science Room



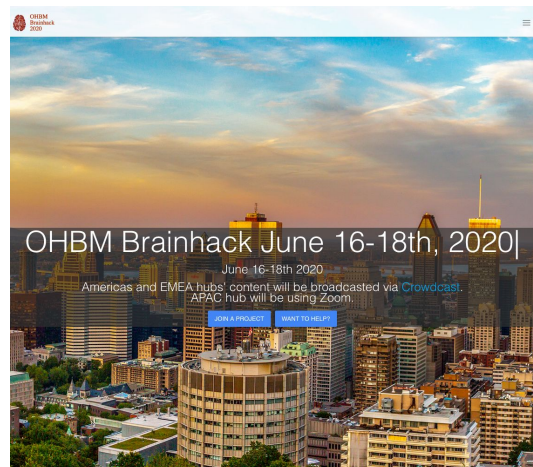
Cass
Gould van Praag



Stephan
Heunis



OHBM Brainhack 2020



Rémi Gau



Liza Levitis

Designing online conferences for inclusivity



Unlocking access



Schedule purposefully

3 time zone hubs and flexible personal schedule



Build an accessible space

Geographical restrictions and accessibility



Use appropriate fee system

Support hidden costs



Adapt content locally

Translations, language groups

Available for all at a reasonable time

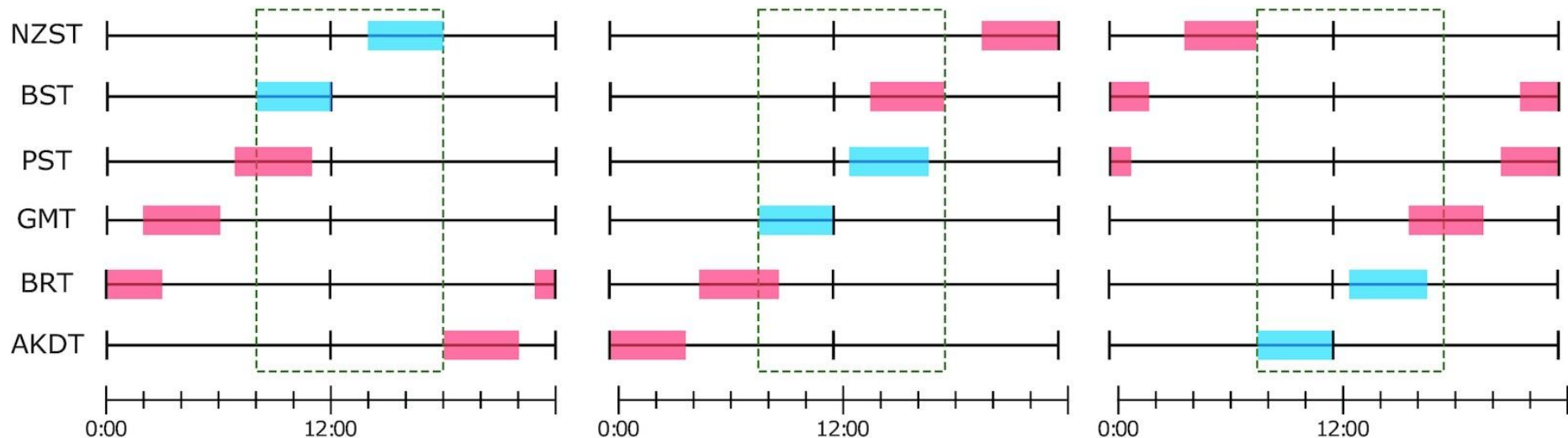
Hub 1: Asia, Pacific



Hub 2: Africa, Europe, Middle East



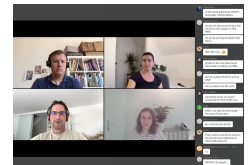
Hub 3: Americas



Multi-road Open Science Room

OHBM
registrants

Zero-cost
registrants



Virtual OHBM platform

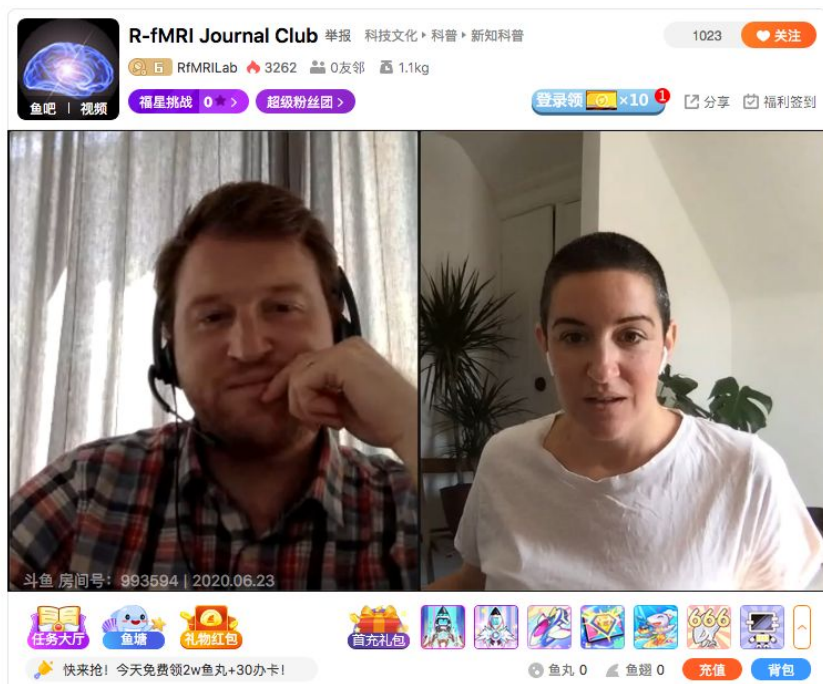
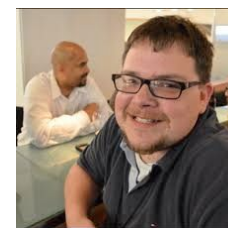
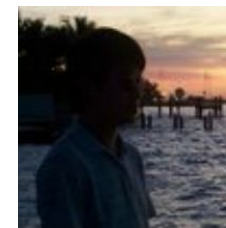


Virtual OSR



 CROWDCAST

Hackathon & OSR from China



OHBM骇客松活动公告

Original: OHBM OS-SIG OHBM国际人脑图谱学会 5/16

这里是OHBM开放科学特别兴趣小组 (OS-SIG)，很高兴能与您分享以下信息：

2020年OHBM 大脑骇客活动 (OHBM Brainhack, 由OS-SIG组织的骇客松/编程马拉松活动) 现已开始注册, 活动将于6月16日至18日在线上举行。快来注册吧! (<http://www.humanbrainmapping.org/HackathonReg>)

我们将提供50个价值100美元的微型基金, 以帮助骇客松的参加者们设置在线会议。通过上文链接提交申请。

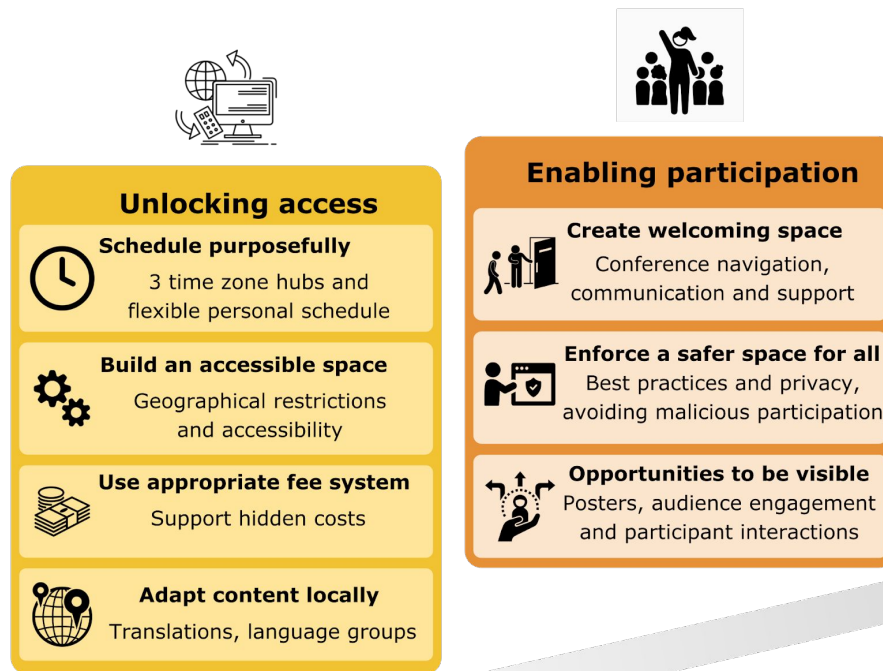
何为OHBM 大脑骇客活动?

观看短片了解更多信息!

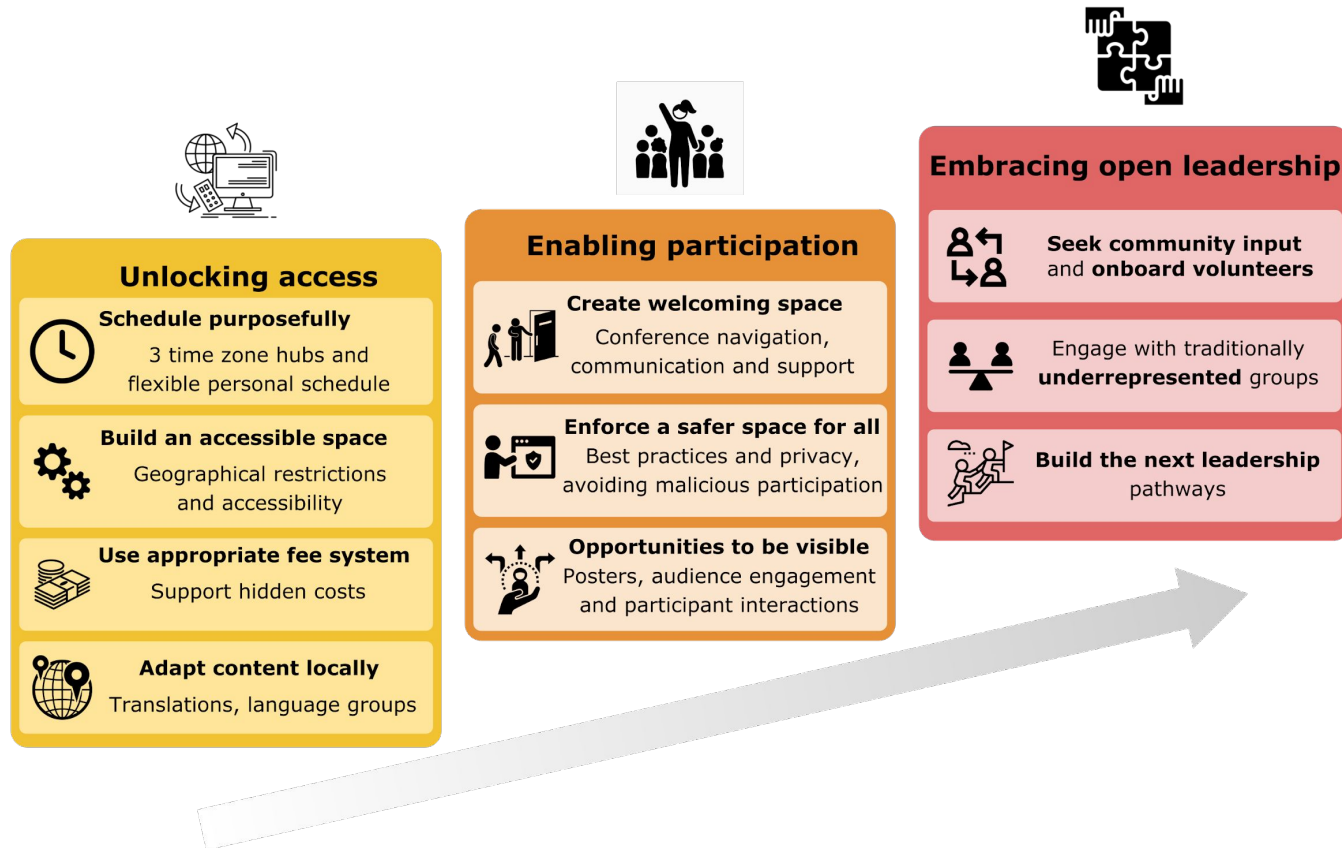


Scan to Follow

Designing online conferences for inclusivity



Designing online conferences for inclusivity



100 volunteers! Thank you



Alexandra Lautarescu
Centre for the Developing Brain, King's College London



Amanda Robinson
The University of Sydney, Australia



Frantisek Vasa
King's College London



Irene Dupong
University of Paris



Manoj Kumar
Princeton University



Marta Topor
University of Surrey



Sin Kim
Korea Advanced Institute of Science and Technology, Daejeon, Korea



Soroosh Afyouni
University of Oxford, Oxfordshire, United Kingdom



Angela Tam
National University of Singapore



Ayan Sengupta
University of Cambridge, University of London



Jakub Vohryzek
University of Oxford, Oxford, UK



Jess Steventon
CUBRIC, Cardiff University, UK



Matteo Frigo
Iria Sophia Antipolis - Mediterranean, Nice, France



Morgan McIntyre
Queensland Brain Institute



Tibor Auer
School of Psychology, University of Surrey, Guildford, Surrey, England



Tjii Grootswagers
Western Sydney University, Sydney, Australia



Ben Fulcher
The University of Sydney, Australia



Cooper Smout
Institute for Globally Distributed Open Research and Education



Johanna Bayer
The University of Melbourne



Jon Hailz Legarreta Gorroño
Universidad de Siles, Siles, Spain



Rohit Goswami
Faculty of Physical Sciences, University of Iceland



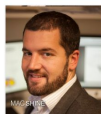
Rotem Botvinik-Nezer
Dartmouth College, Hanover, NH, USA



Tom Johnstone
Swinscombe University of Technology, Melbourne, Australia



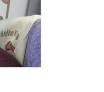
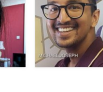
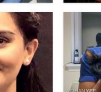
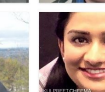
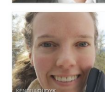
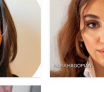
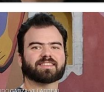
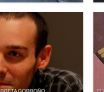
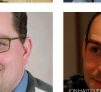
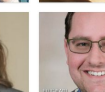
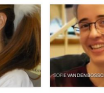
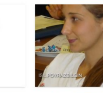
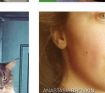
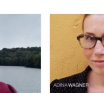
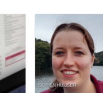
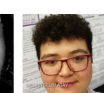
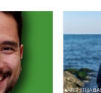
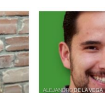
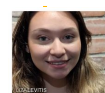
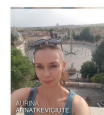
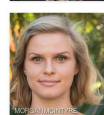
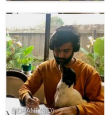
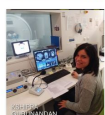
Tom Kirk
Institute of Biomedical Engineering, University of Oxford



Tulika Nandi
University of Oxford, Oxford, UK



Vittorio Iacovella
CIMAC - Center for Mind & Brain Sciences, The University of Trieste (Italy)



Brainhack

The purpose of Brainhack is to bridge the data science and neuroscience research communities to advance the progress of brain science research. Brainhack is a unique conference that convenes researchers from across the globe and myriad disciplines to work together on innovative projects related to neuroscience. Year after year, global Brainhack events have brought together researchers to participate in open collaboration and regional Brainhack events keep the momentum going throughout the year.



ANIBAL SOLARI



NAVEED



NAVEED



NAVEED



NAVEED



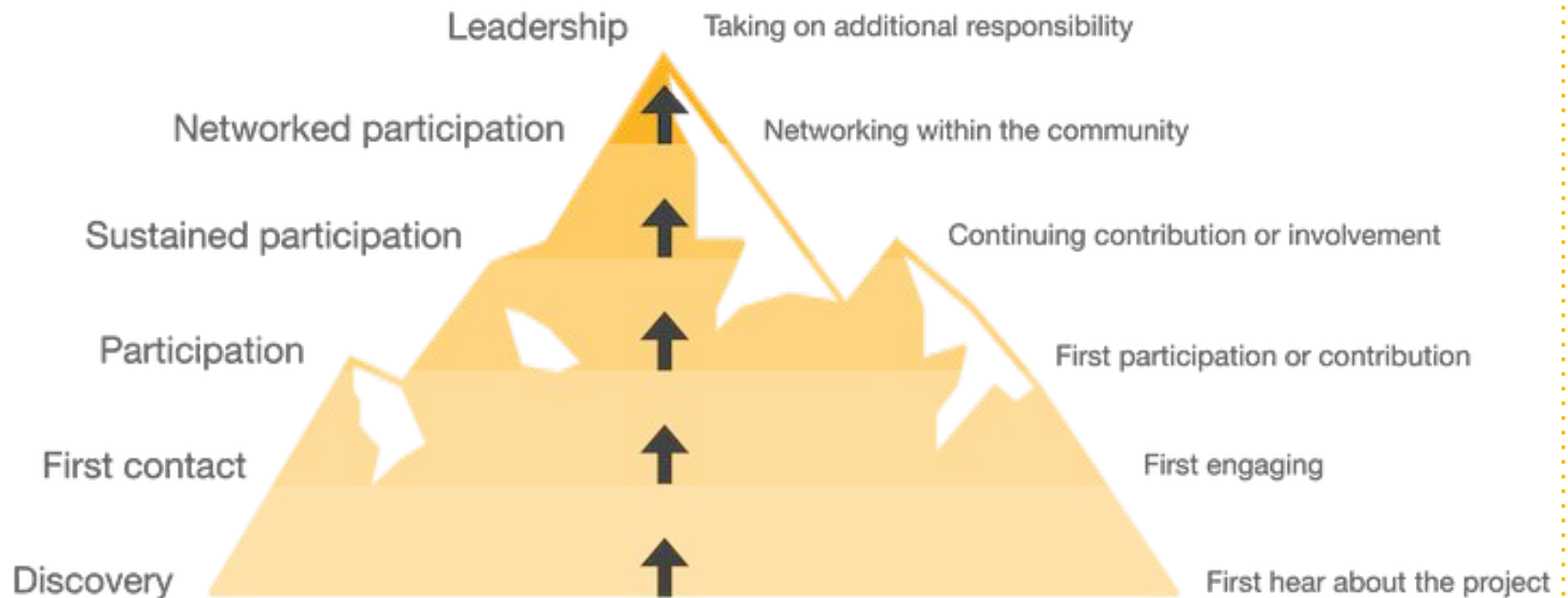
NAVEED



NAVEED

Going further!

Mountain of engagement



[By WIN Open Research](#)

Continuing on our journey...

Online training & communities

Open Life Science



Open Life Science

Sharing - Connecting - Empowering



A mentoring & training program for Open Science ambassadors

The **Open Life Science (OLS)** program is for people interested in **applying open principles** in their work and **becoming Open Science ambassadors** in their communities.

<https://openlifesci.org/>

Repronim



Repronim: A Center for Reproducible Neuroimaging Computation

<https://www.repronim.org/>

The Turing Way

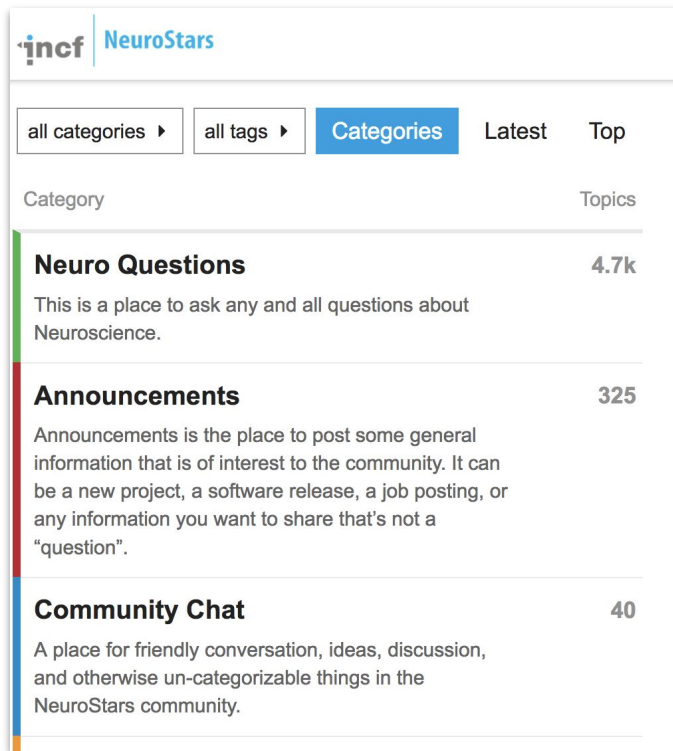


<https://the-turing-way.netlify.app>

Continuing on our journey...

Online discussions

INCF Neurostars



The screenshot shows the INCF NeuroStars website interface. At the top, there's a header with the 'incf' logo and 'NeuroStars' text. Below this, there are three buttons: 'all categories' (with a dropdown arrow), 'all tags' (with a dropdown arrow), and 'Categories' (highlighted in blue). To the right of these buttons are two more buttons: 'Latest' and 'Top'. Below the buttons, there's a table with two columns: 'Category' and 'Topics'. The table lists three categories: 'Neuro Questions' with 4.7k topics, 'Announcements' with 325 topics, and 'Community Chat' with 40 topics. Each category has a brief description below it.

Category	Topics
Neuro Questions This is a place to ask any and all questions about Neuroscience.	4.7k
Announcements Announcements is the place to post some general information that is of interest to the community. It can be a new project, a software release, a job posting, or any information you want to share that's not a "question".	325
Community Chat A place for friendly conversation, ideas, discussion, and otherwise un-categorizable things in the NeuroStars community.	40

<https://neurostars.org/>

Brainhack mattermost

Text-based discussions

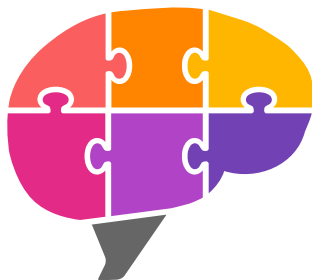


<https://brainhack.org/>

Open science A journey from sharing research artefacts to collaborative research

Camille Maumet

Thank you!



We are hiring

<https://team.inria.fr/empenn/job-offers/>