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Open science practices for keeping inventions alive after project ends

Camille Maumet

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ECR Session: Keep your Momentum

October 6, 2023

ESMRMB

European Society for Magnetic Resonance in Medicine and Biology



Open science practices for keeping inventions alive after project ends

Camille Maumet

Inria, Univ Rennes, Inserm, CNRS, IRISA

Inria

 **Inserm**
Institut national
de la santé et de la recherche médicale



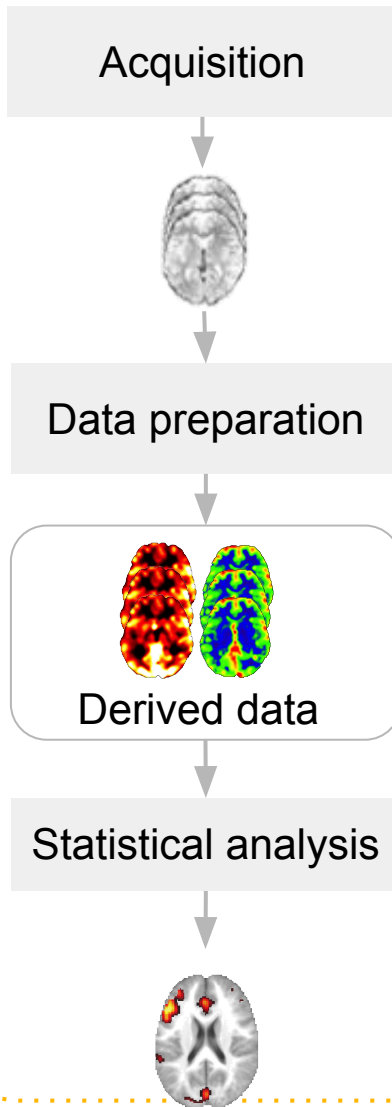
 **Université
de Rennes**

 **UMR IRISA**

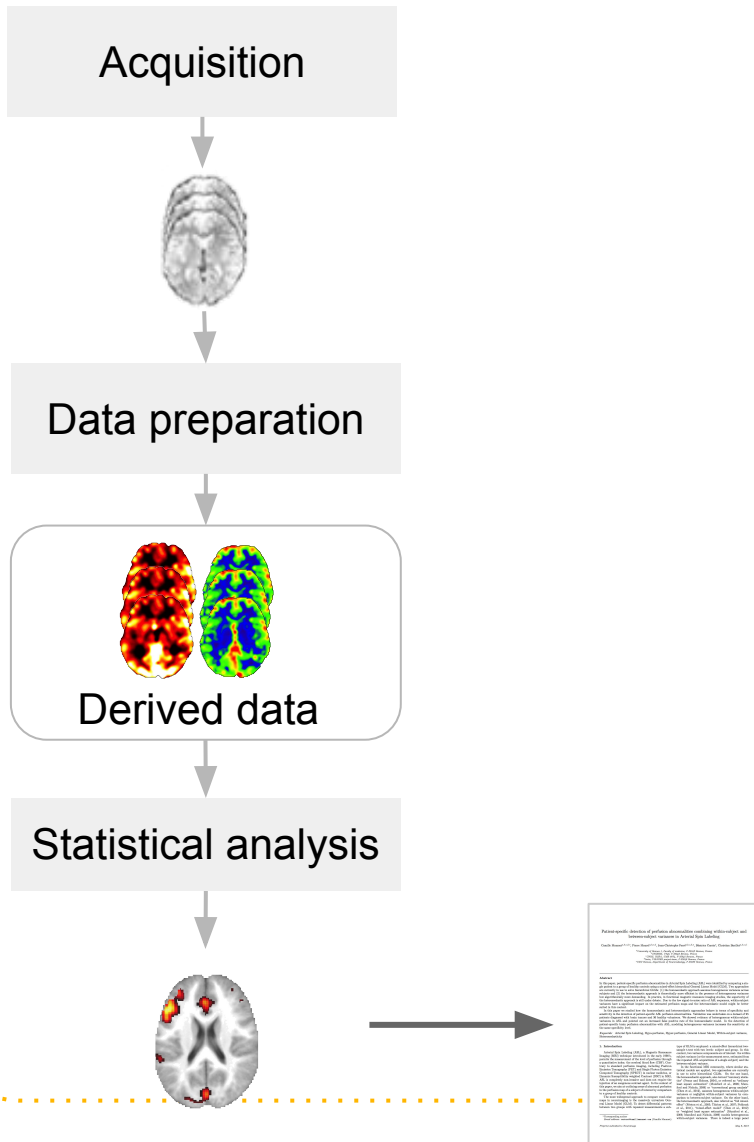
Keeping inventions alive...



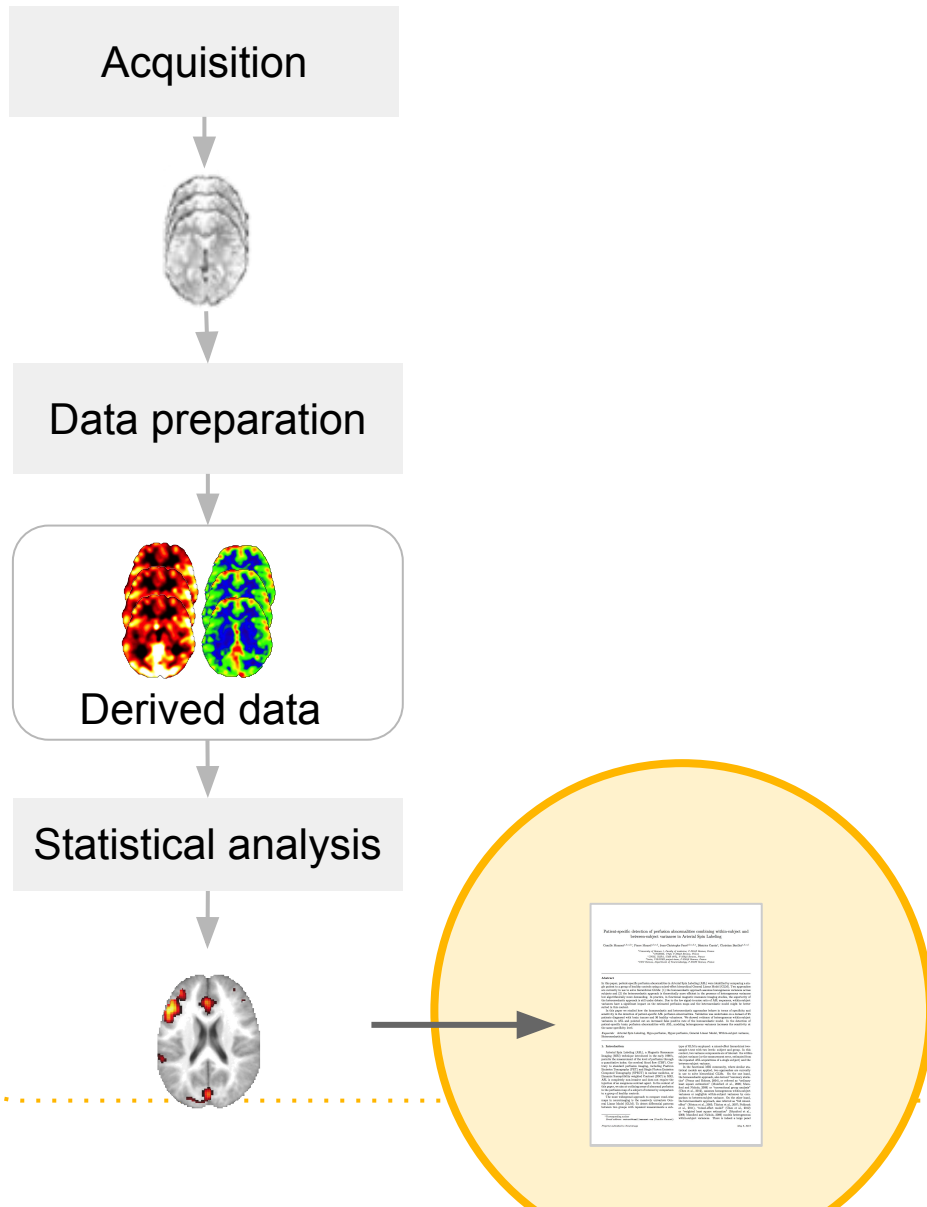
Keeping inventions alive...



Keeping inventions alive...



Keeping inventions alive...

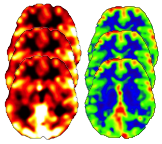


Keeping inventions alive...

Acquisition

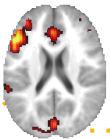


Data preparation



Derived data

Statistical analysis



Keeping inventions alive...

tion

aration

data

analysis



Keeping inventions alive...



Keeping inventions alive...



Keeping inventions alive...



Which release of SPM was used?

Which registration algorithm was selected?

How was the brain mask computed?

Hum... **I can't reproduce** the original results...

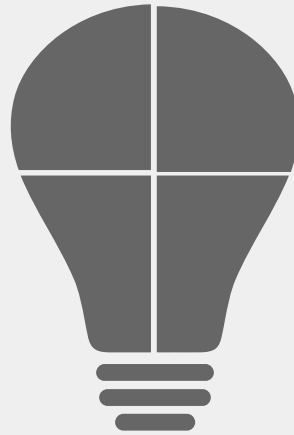
Did I understand the method correctly?

... or is this due to my use of a different dataset?

... a different computing platform?

... something else!?

Keeping inventions alive...



Which release of SPM was used?

Which registration algorithm was selected?

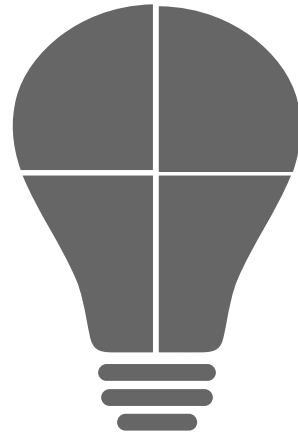
How was the brain mask computed?

... or is this due to
... use of a
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... different
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...
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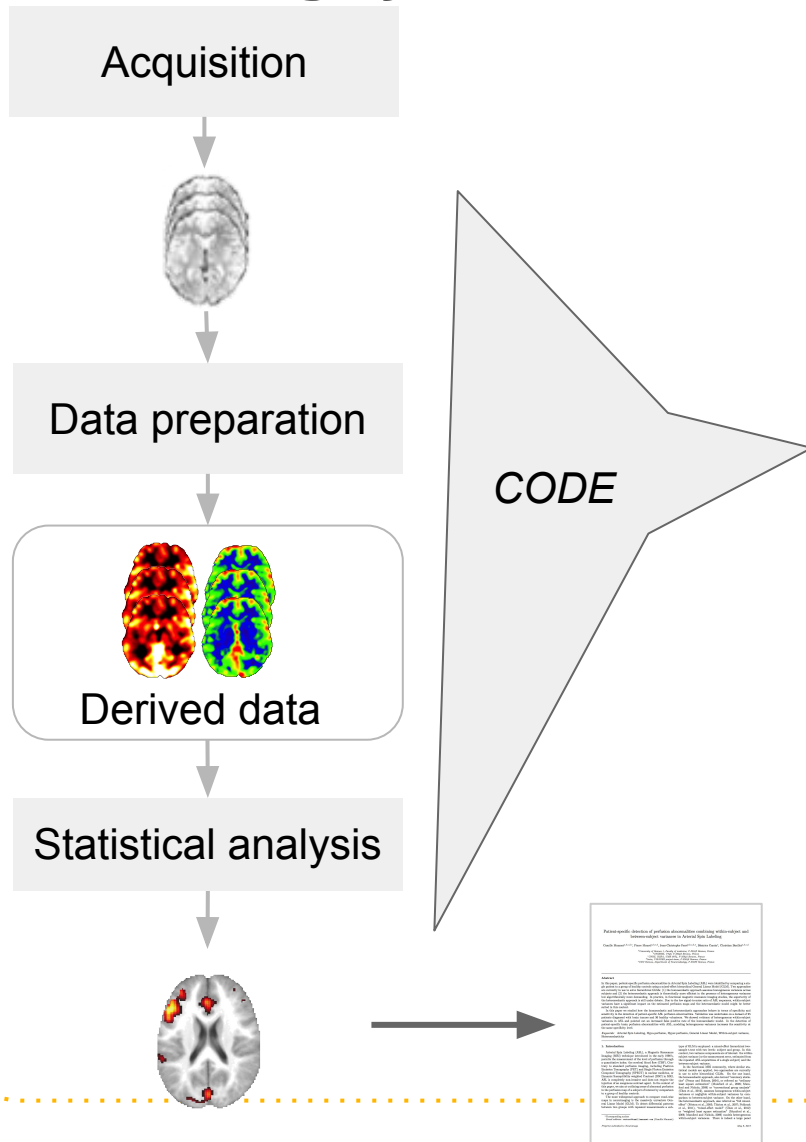
Hum... I can't
reproduce the original
results...



Make your project
REPRODUCIBLE



Making your project **reproducible**



Computational reproducibility

Ability to reproduce the exact same results using the **same data** and the **same methods**.

Good Practices **for reproducibility**

```
.
|-- 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
```

[Wilson et. al, PlosCompBio 2017]

- Use **version control**
- Create **1 repository** per manuscript

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[Wilson et. al, PlosCompBio 2017]

- Use **version control**
- Create **1 repository** per manuscript

- **Archive** your code for long term preservation



Software Heritage

zenodo

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[Wilson et. al, PlosCompBio 2017]

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Software Heritage

zenodo

But...

It's not only about the source code
but also the **environnement**
(versions, OS, etc.)
docker, guix

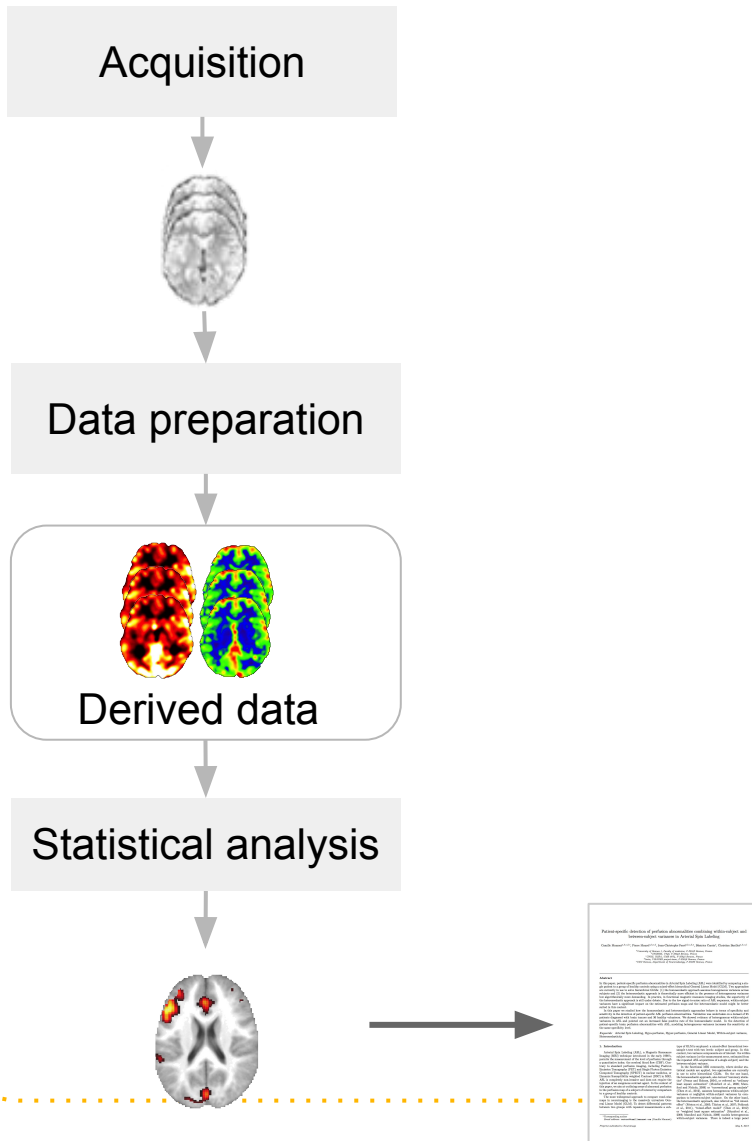
**10 years computational
reproducibility** is an open question!

Perkel, Jeffrey M. "Challenge to scientists: does your ten-year-old code still run?." *Nature* 584.7822 (2020): 656-659.

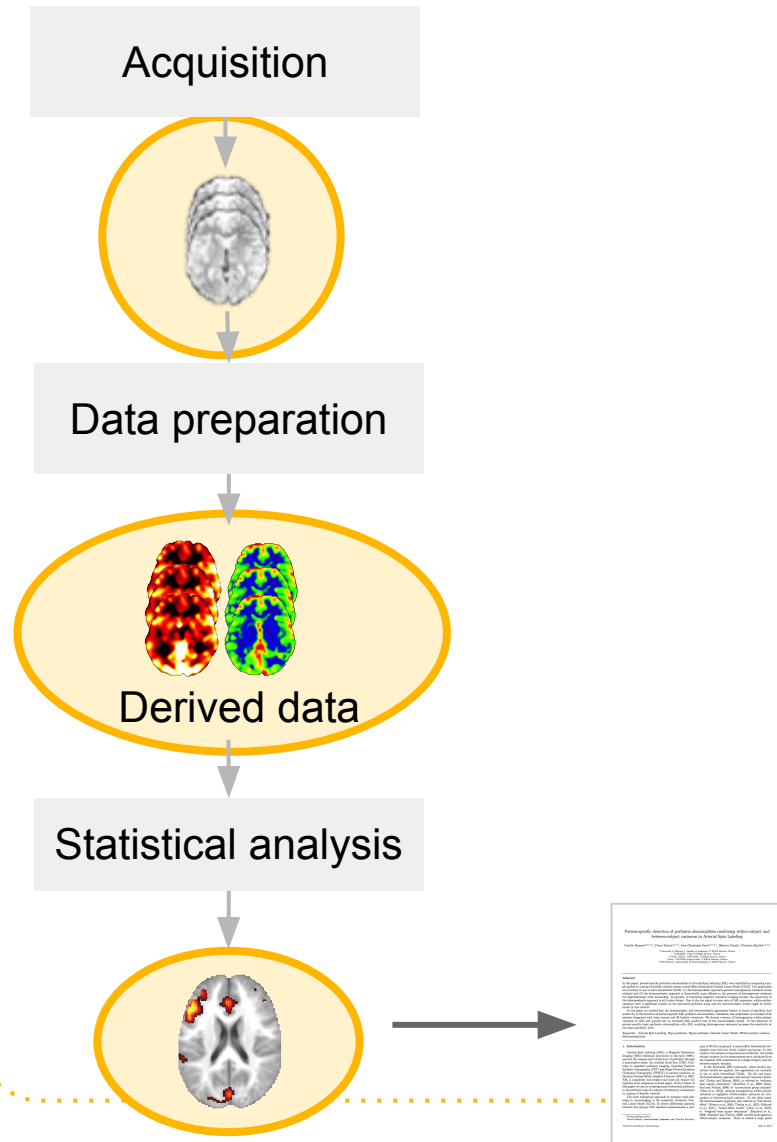
Make your project
OPEN



Making your project **open**



Making your project **open**



Good practices: **FAIR principles**



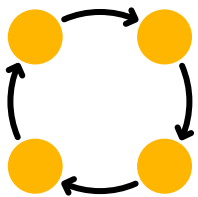
Good practices: **FAIR** principles



Interoperable Using a common standard/format across tools



Findable we can search for open datasets in each repository

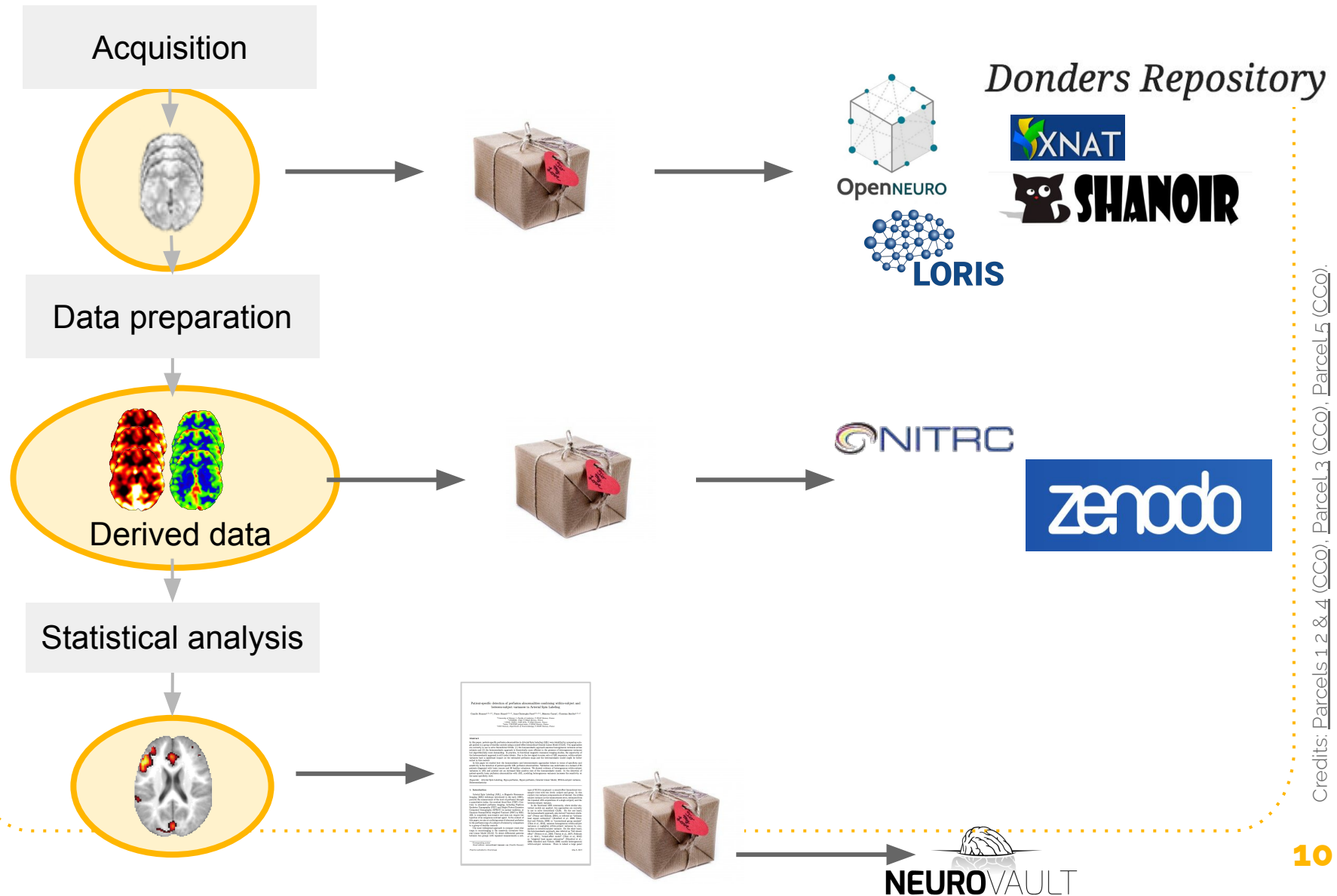


Reusable Including enough metadata to enable reuse. *e.g. onsets of the task for task-based fMRI.*

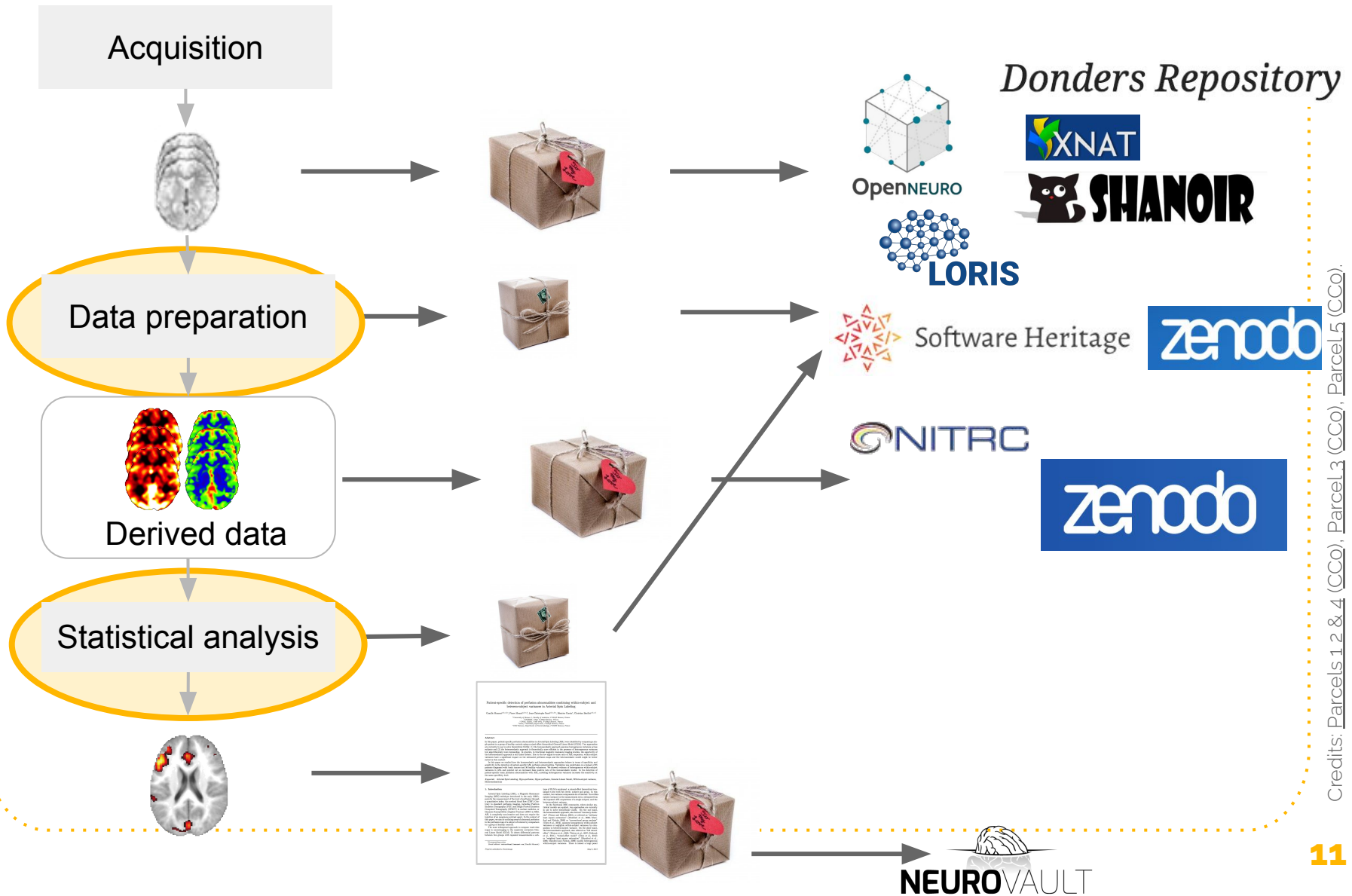


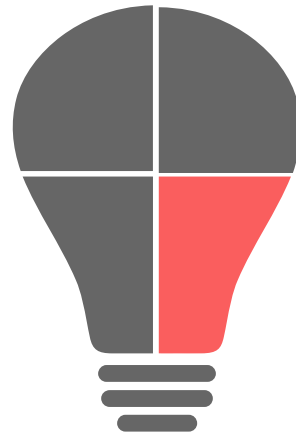
Accessible Direct download (*e.g. Openneuro*) or with Data User Agreement (*e.g. Donders*)

Making your project **open**



Making your project **open**





Make your project
COLLABORATIVE

Make your project **collaborative**

Beyond technical solutions, open science brings a culture change

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

towards more collaborative research



But what is **open code**...?



Open source

- Choose an open source **license**
- Make the code available for **download**
- Use an **archive** for long-term preservation

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Who can **see**
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Open development

- Accept external **contributions** (e.g. Github PR)
- Be transparent about **development choices** (e.g. issues, project board)

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Who can **decide**
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Open governance

- Be transparency about how **decisions** are made
- Open up pathways to **join the governance**

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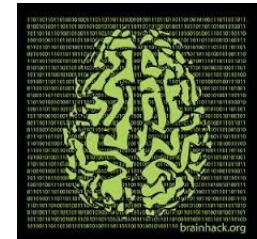
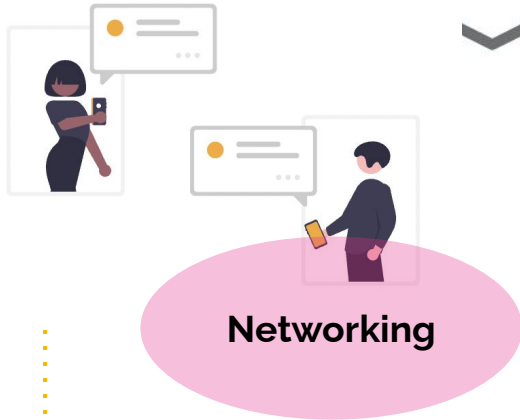
- Be transparency about how **decisions** are made
- Open up pathways to **join the governance**

Increased
collaboration

Engage
with existing
COMMUNITIES



MRI Together



Engage
with existing
COMMUNITIES



Make your project
REPRODUCIBLE

Make your project
OPEN



Engage
with existing
COMMUNITIES

Make your project
COLLABORATIVE

Open science Keeping inventions alive after project ends

Thank you!

Camille Maumet



We are hiring

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



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@cmaumet