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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



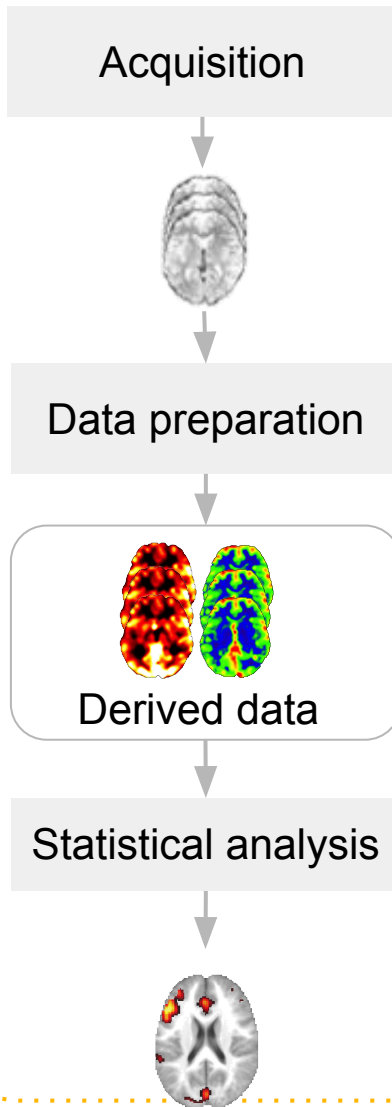
 Université  
de Rennes

 UMR **IRISA**

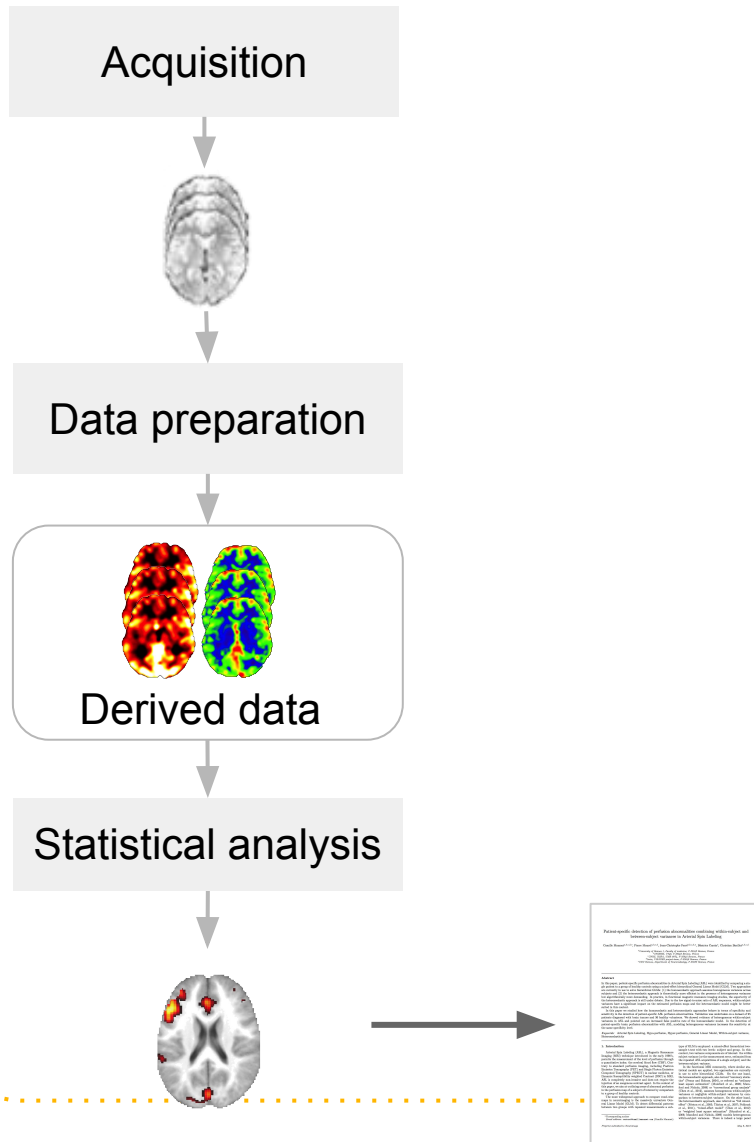
# Keeping inventions alive...



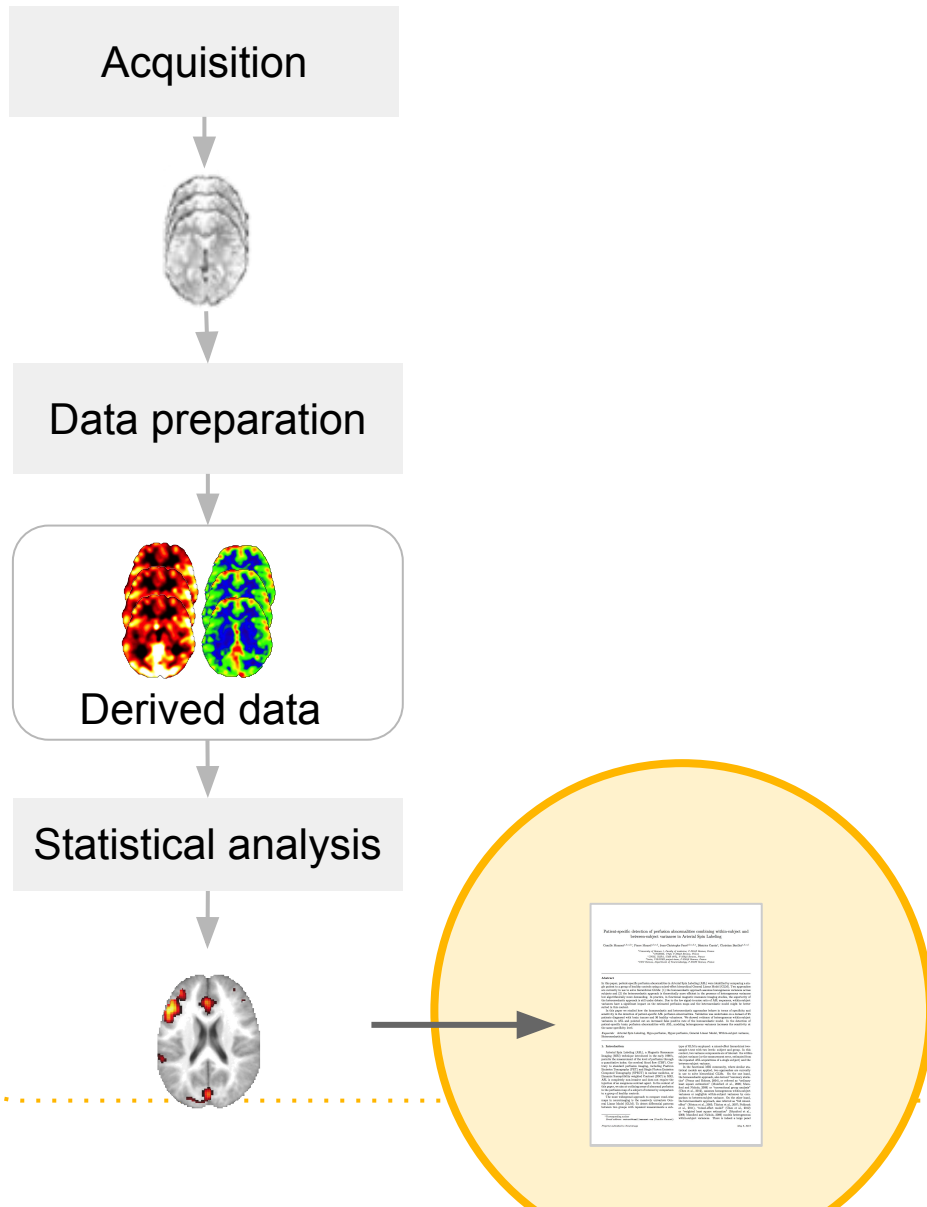
# Keeping inventions alive...



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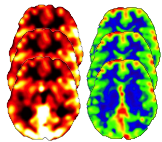


# Keeping inventions alive...

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...

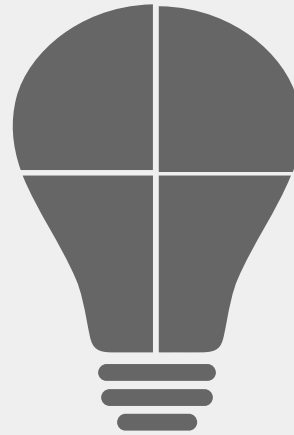
Did I understand the method correctly?

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

... a different computing platform?

... something else!?

# Keeping inventions alive...



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

Which release of SPM was used?

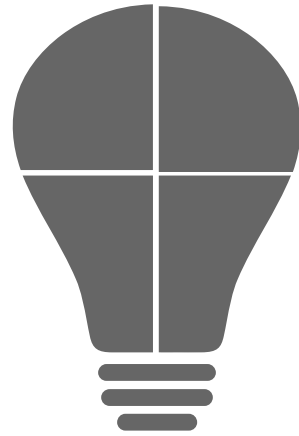
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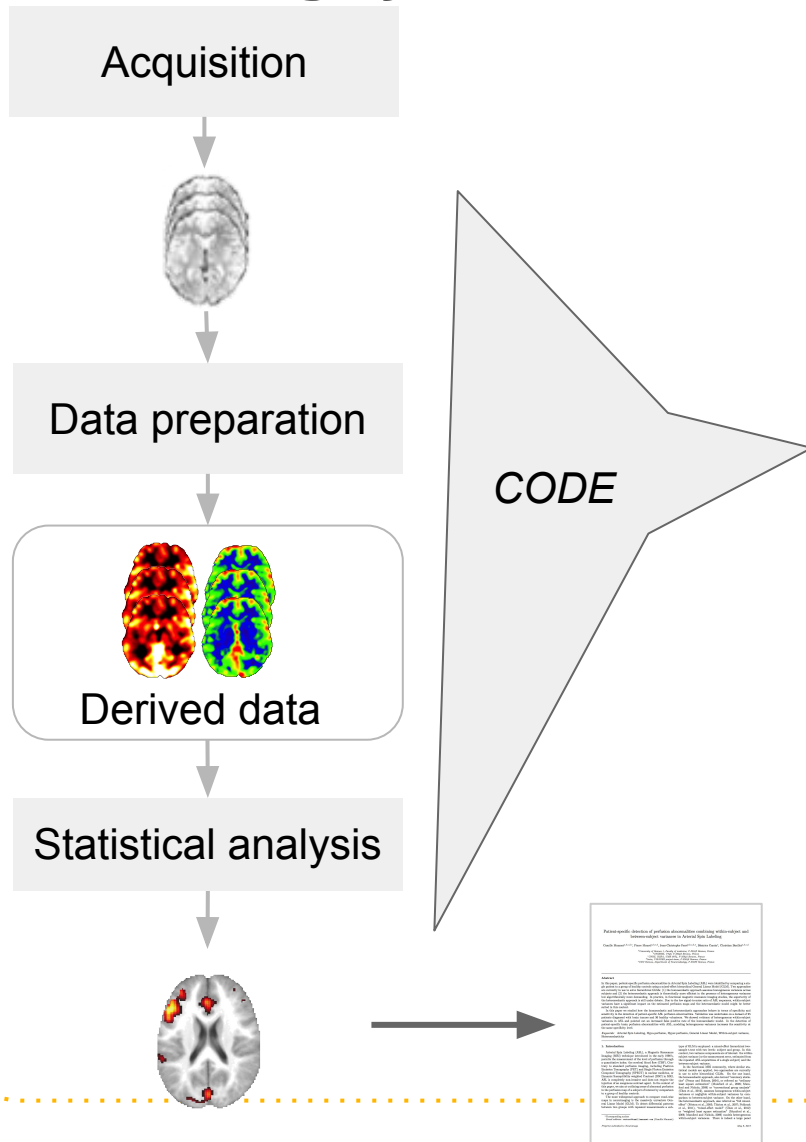
... something else!?



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



# Good Practices for reproducibility

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[Wilson et. al, PlosCompBio 2017]

- Use **version control**
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- **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*

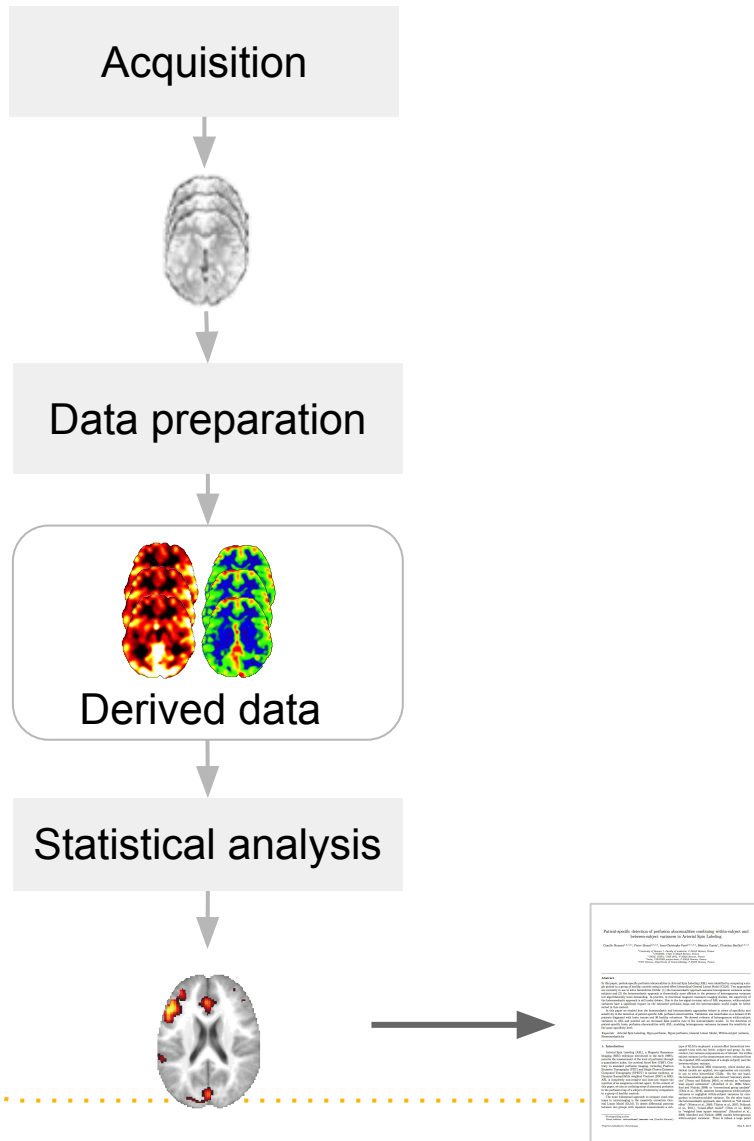
**10 years computational  
reproducibility** is an open question!

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

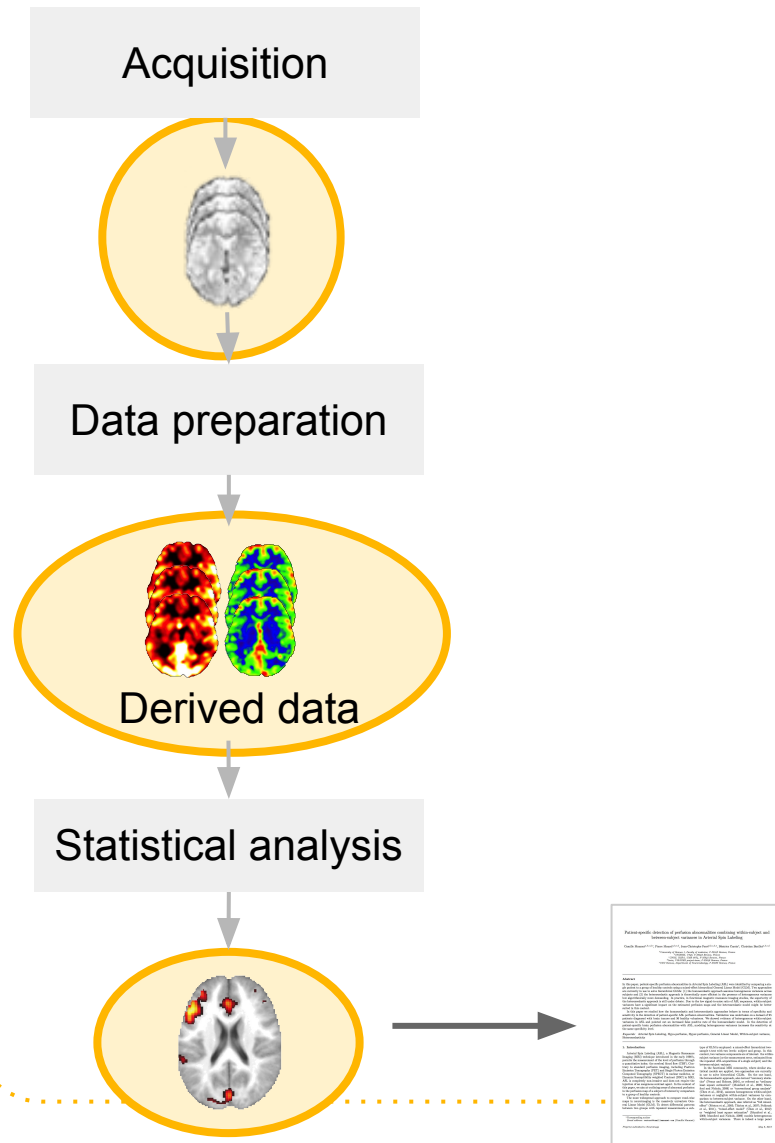
Make your project  
**OPEN**



# Making your project **open**



# Making your project **open**



# Good practices: **FAIR principles**



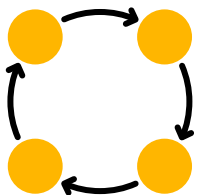
# Good practices: **FAIR** principles



**Interoperable** Using a common standard/format across tools



**Findable** we can search for open datasets in each repository

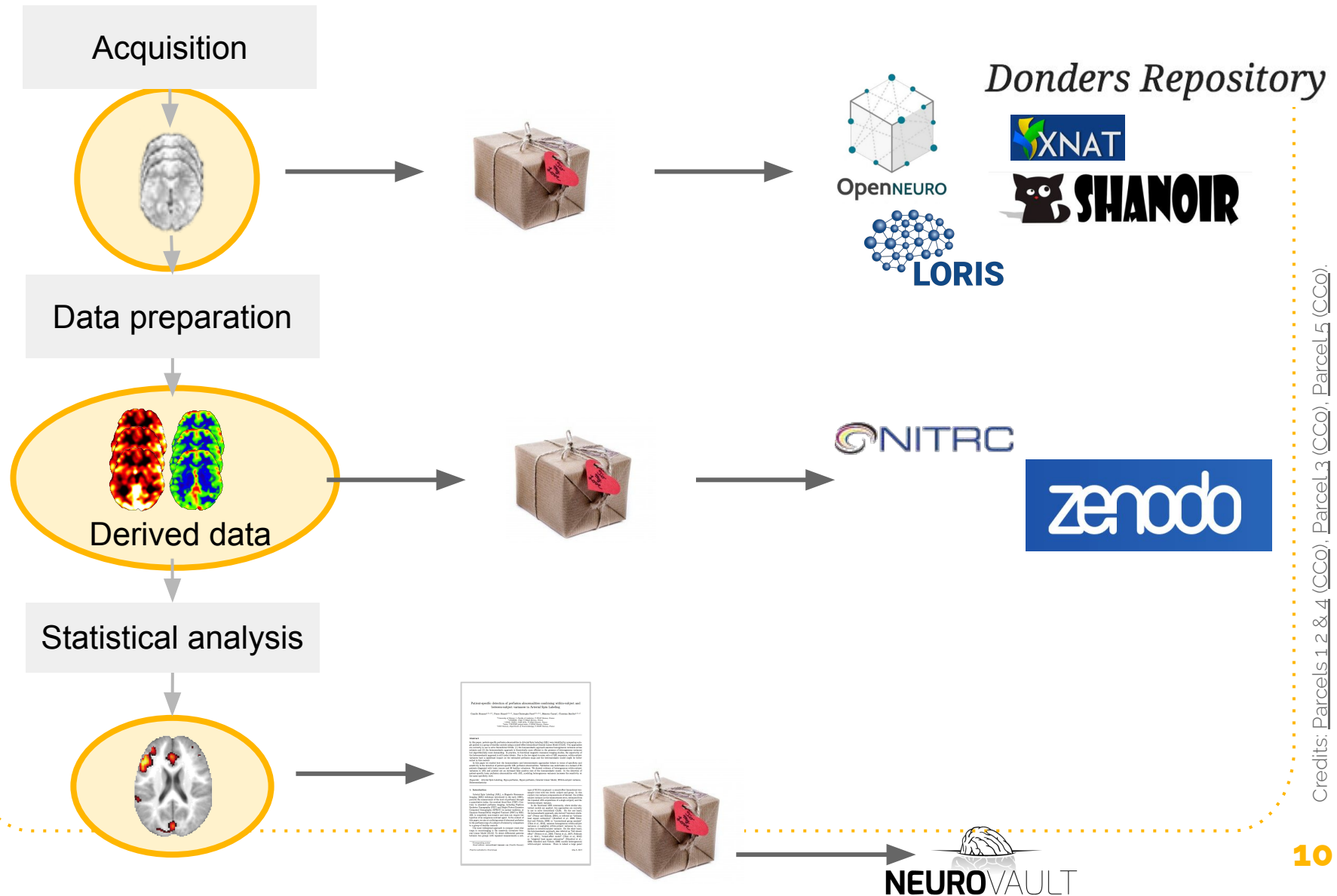


**Reusable** Including enough metadata to enable reuse. *e.g. onsets of the task for task-based fMRI.*



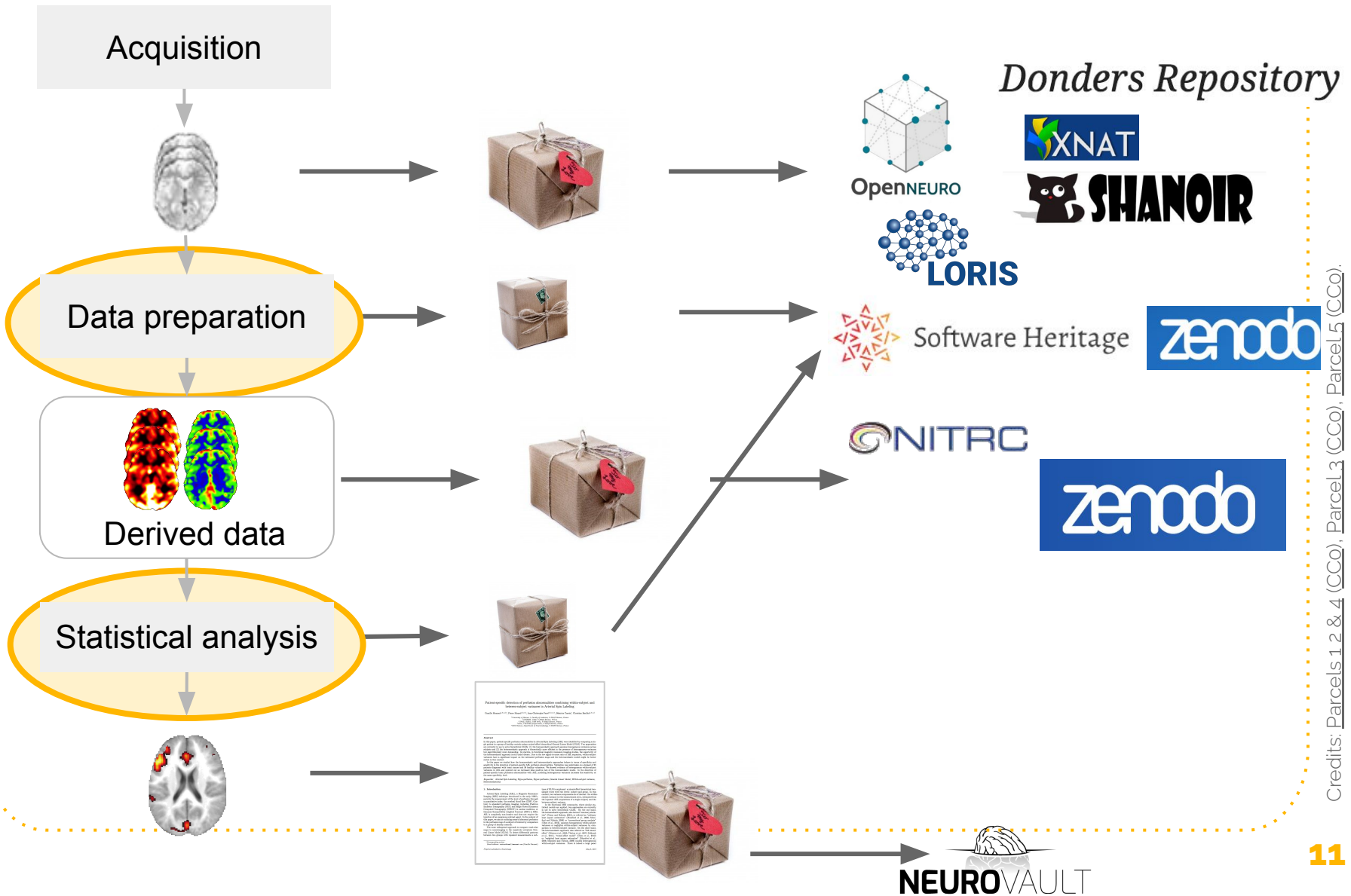
**Accessible** Direct download (*e.g. Openneuro*) or with Data User Agreement (*e.g. Donders*)

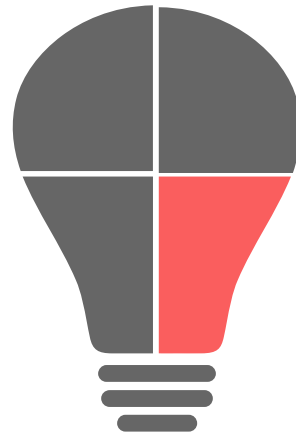
# Making your project **open**





# 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

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

Who can **see**  
**and use** the  
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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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## Open governance

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

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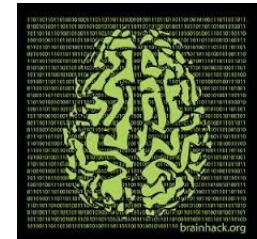
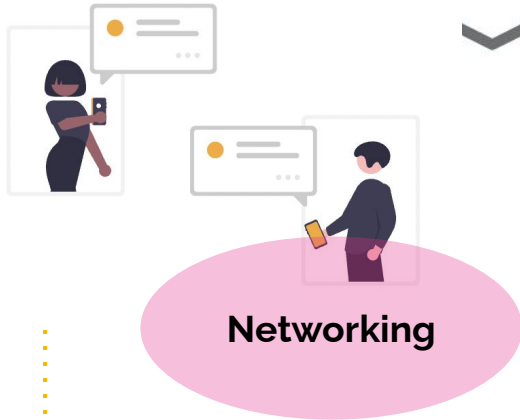
Increased  
collaboration



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>



**Credit:** Presentation template and icons by SlidesCarnival, adapted



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@cmaumet