Nipoppy: A framework for the **organization** and **decentralized processing** of neuroimaging-clinical studies

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ORIGAMI
Lab

How can we make neuroimaging datasets more FAIR?

- **FAIR**: findable, accessible, interoperable, reusable (Wilkinson *et al*., 2016)

Existing open standards/tools developed by the community

(Gorgolewski *et al.*, 2016)

(Kurtzer *et al.*, 2017)

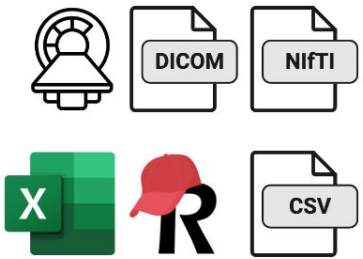
(Glatard *et al.*, 2018)

We leveraged existing open science tools to build a flexible framework for data organization and processing of neuroimaging-clinical data

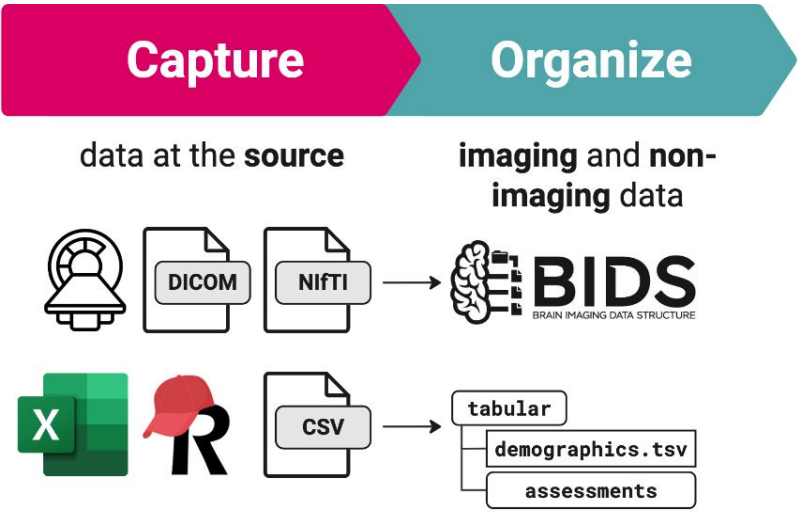
The **Nipoppy** protocol

Capture

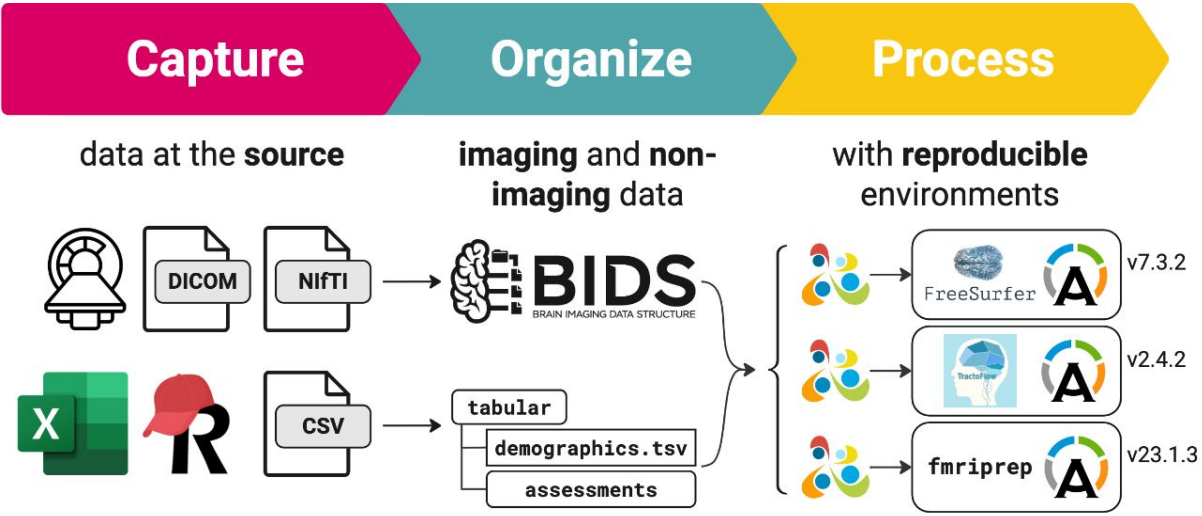
data at the **source**



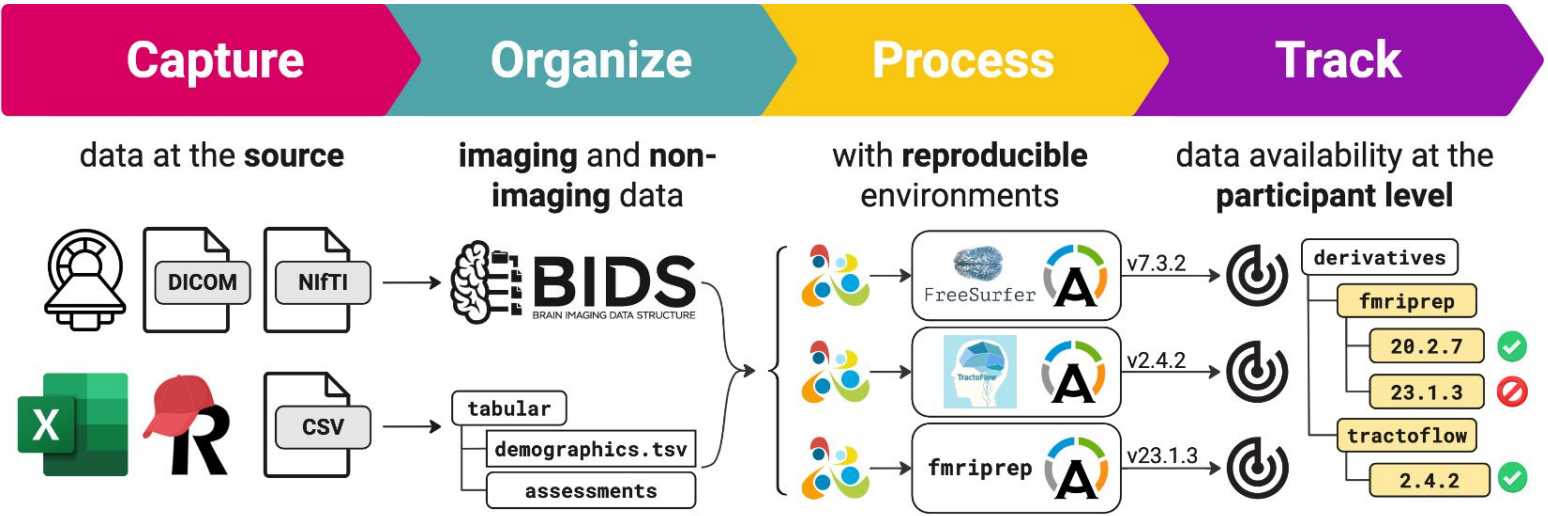
The **Nipoppy** protocol



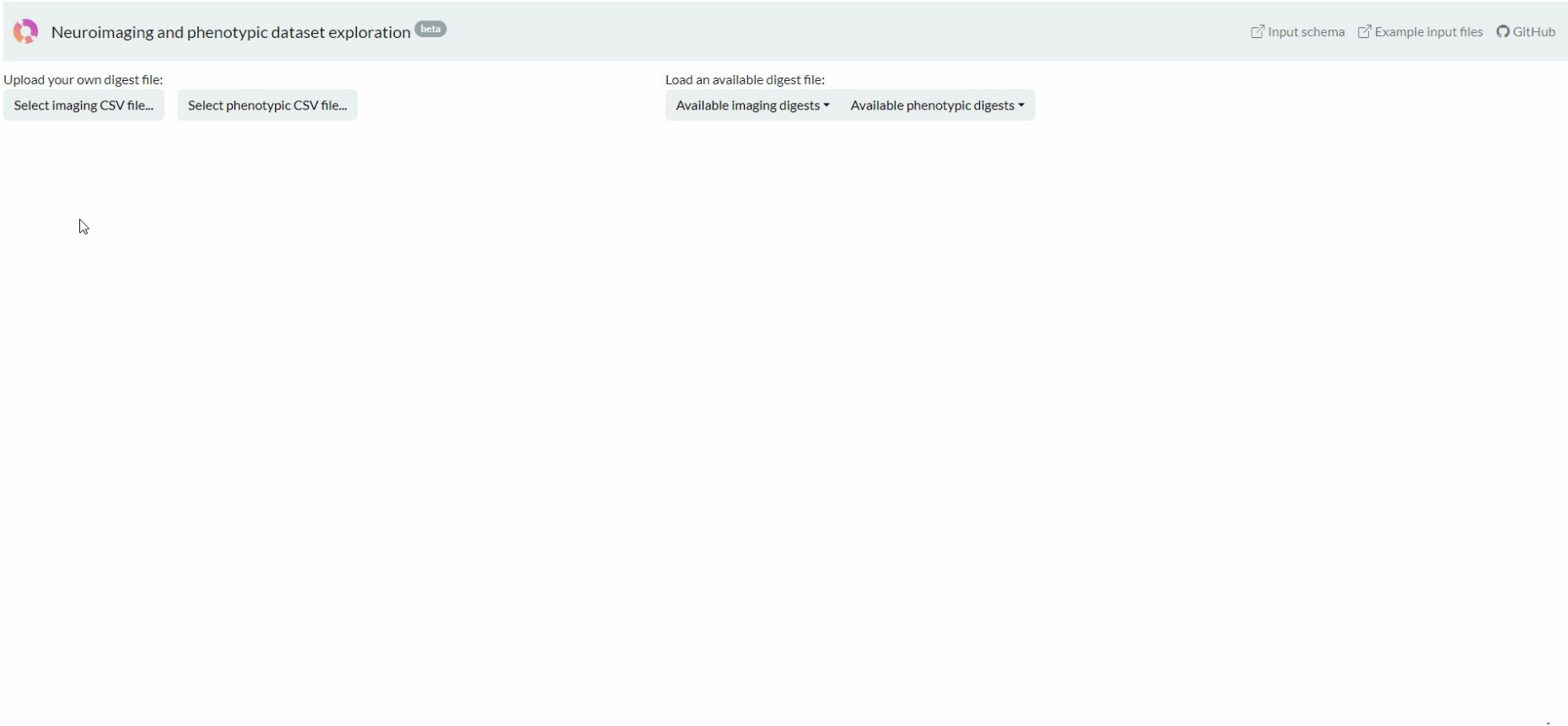
The **Nipoppy** protocol



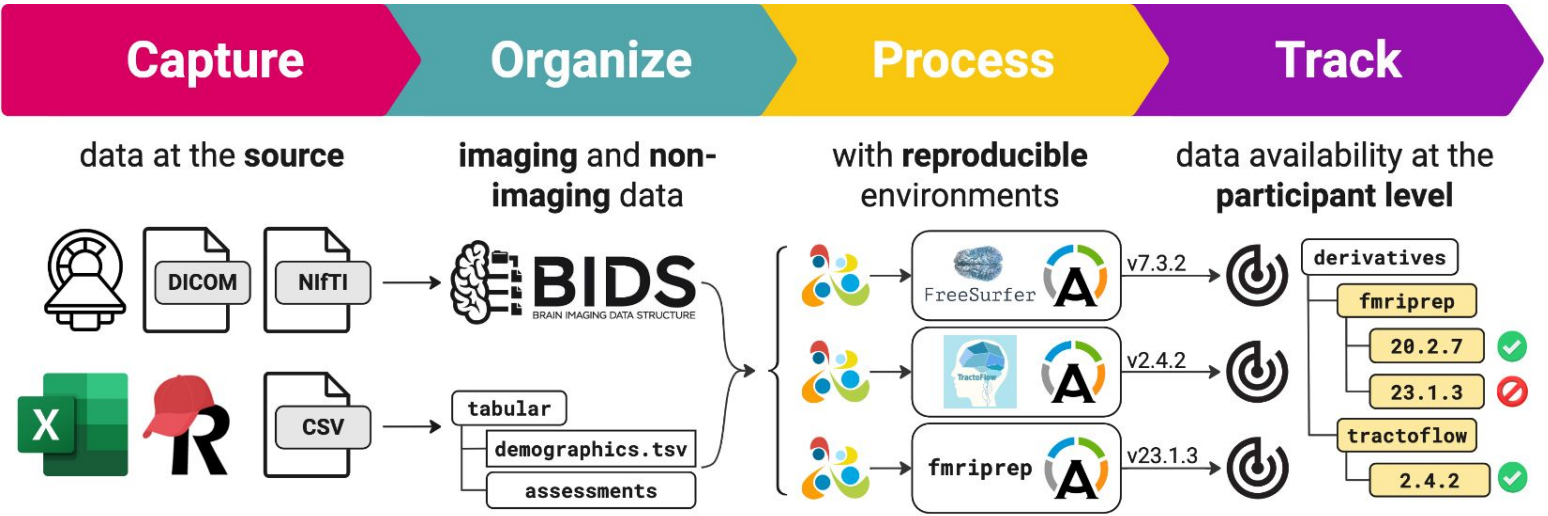
The **Nipoppy** protocol



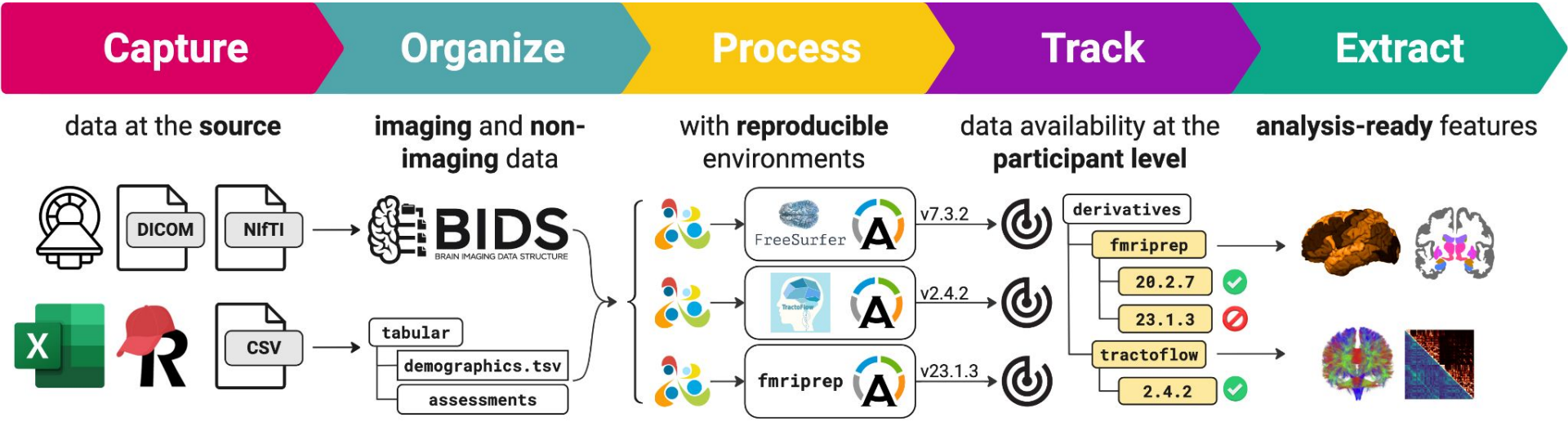
https://digest.neurobagel.org/



The **Nipoppy** protocol



The **Nipoppy** protocol



The **Nipoppy** protocol and software tools

https://nipoppy.readthedocs.io/ https://github.com/nipoppy/nipoppy

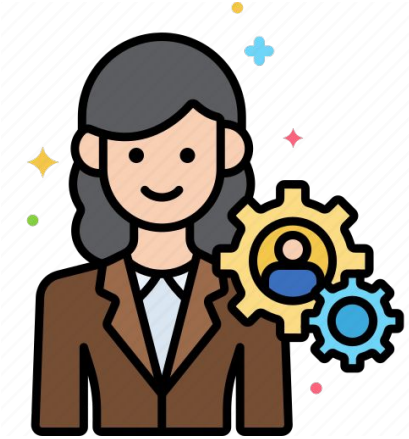

```
Usage: nipoppy [-h] [--version] {init,doughnut,reorg,bidsify,run,track,extract} ...

Organize and process neuroimaging-clinical datasets.

Options:
  -h, --help            Show this help message and exit.
  --version             Show version number and exit.

Subcommands:
  {init,doughnut,reorg,bidsify,run,track,extract}
    init                Initialize a new dataset.
    doughnut            Create/update a dataset's doughnut file.
    reorg               (Re)organize raw (DICOM) files, from the raw DICOM directory
                        (<DATASET_ROOT>/scratch/raw_imaging) to the organized
                        sourcedata directory (<DATASET_ROOT>/sourcedata).
    bidsify             Run a BIDS conversion pipeline.
    run                 Run a processing pipeline.
    track               Track the processing status of a pipeline.
    extract             Run an extraction pipeline.

Run 'nipoppy COMMAND --help' for more information on a subcommand.
```

Nipoppy takeaways

For trainees

Best/FAIR practices

For labs



Efficiency and consistency

For institutions

Data-sharing

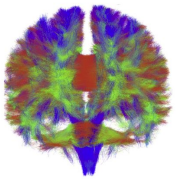
Metadata discovery with **Neurobagel**

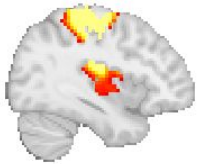
Nipoppy at The Neuro

QUEBEC PARKINSON NETWORK

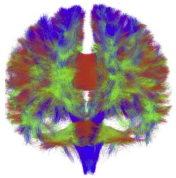
Parkinson's Progression Markers Initiative

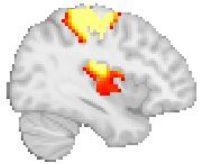

Anat. MRI


Diff. MRI


Func. MRI

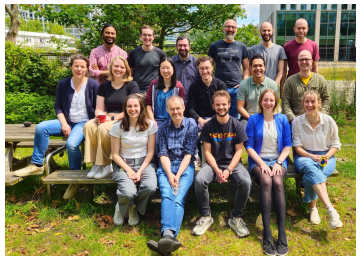

Anat. MRI


Diff. MRI
(in progress)


Func. MRI
(to come)

Nipoppy beyond The Neuro

ENIGMA-PD working group
(Ysbrand van der Werf)



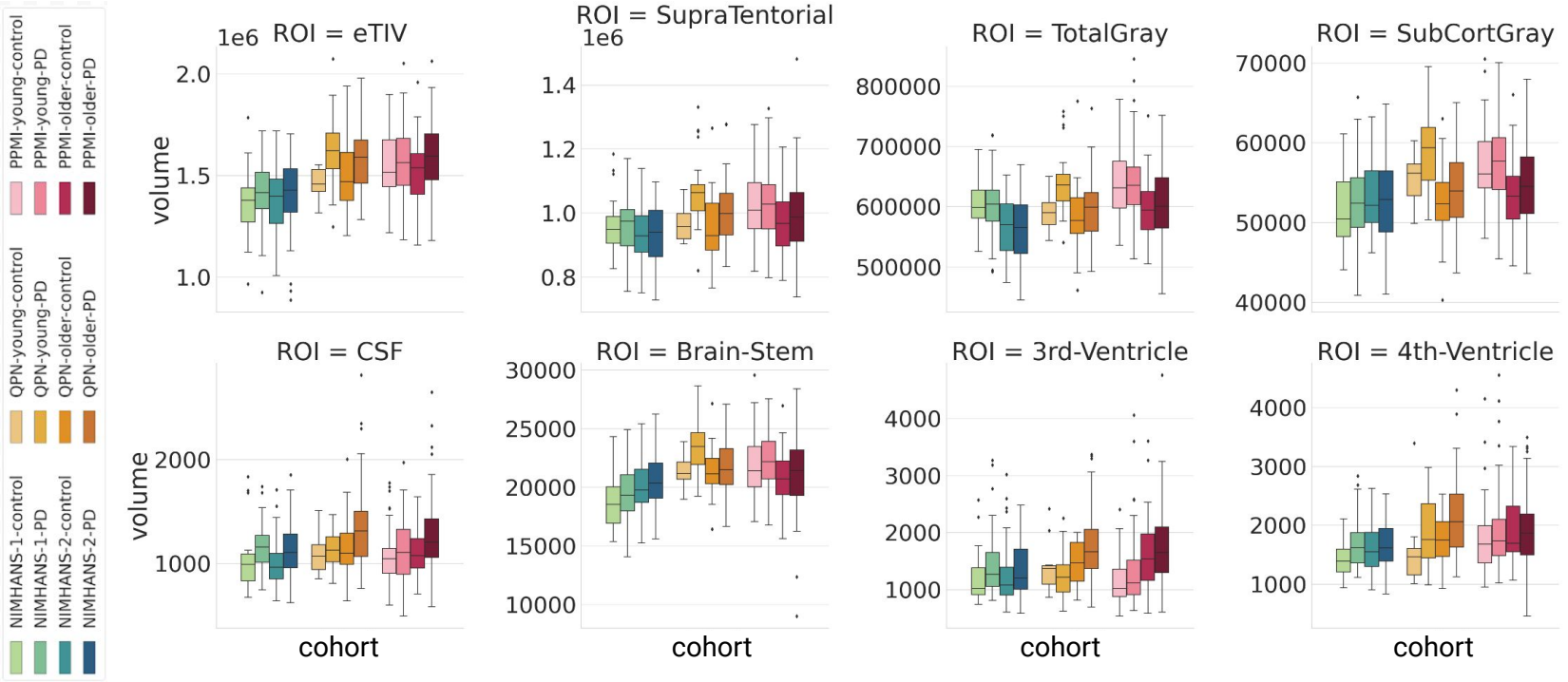
NIMHANS large ongoing PD study in Bangalore, India
(Shweta Prasad)

CRIUGM PD-MCI dataset
(Oury Monchi)

Douglas research centre
(Mallar Chakravarty)

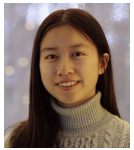
Example **Nipoppy** application

Decentralized data processing → imaging-derived pheno. **sharing** → joint analysis

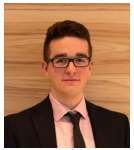


Thank you!

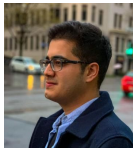

Nikhil Bhagwat


Alyssa Dai


Jacob Sanz-Robinson


Mathieu Dugré


Sebastian Urchs


Mohammad Torabi


Rémi Gau


Brent McPherson


Jean-Baptiste Poline

ORIGAMI Lab

neuro Montreal Neurological Institute-Hospital

CIHR IRSC Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

Québec
Fonds de recherche – Nature et technologies
Fonds de recherche – Santé
Fonds de recherche – Société et culture

PARKINSON QUÉBEC

UNIQUE CENTRE

NIH National Institutes of Health

THE MICHAEL J. FOX FOUNDATION FOR PARKINSON'S RESEARCH

McGill UNIVERSITY

Chan Zuckerberg Initiative

HBHL NEUROHUB

QUEBEC PARKINSON NETWORK

Fondation Brain Canada Foundation