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

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The truth about many neuroimaging datasets

- They are **messy**
- Data organization/curation and processing is a **time-consuming** and **error-prone** process

How can we organize and process data in a consistent and reproducible manner, to avoid downstream headaches?

Introducing the **Nipoppy** framework

1. **Protocol** for best practices (FAIR principles) in organization/processing of neuroimaging-clinical datasets

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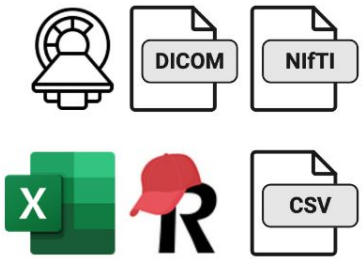
Capture

Take data **as they are**



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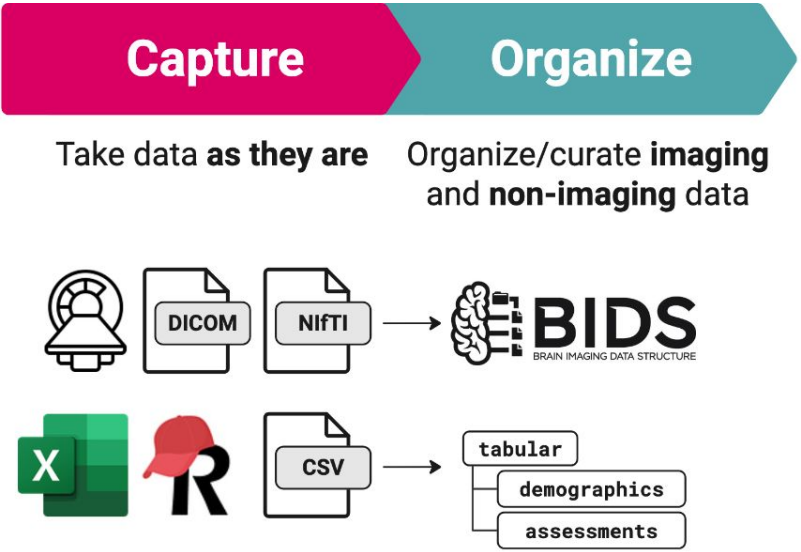

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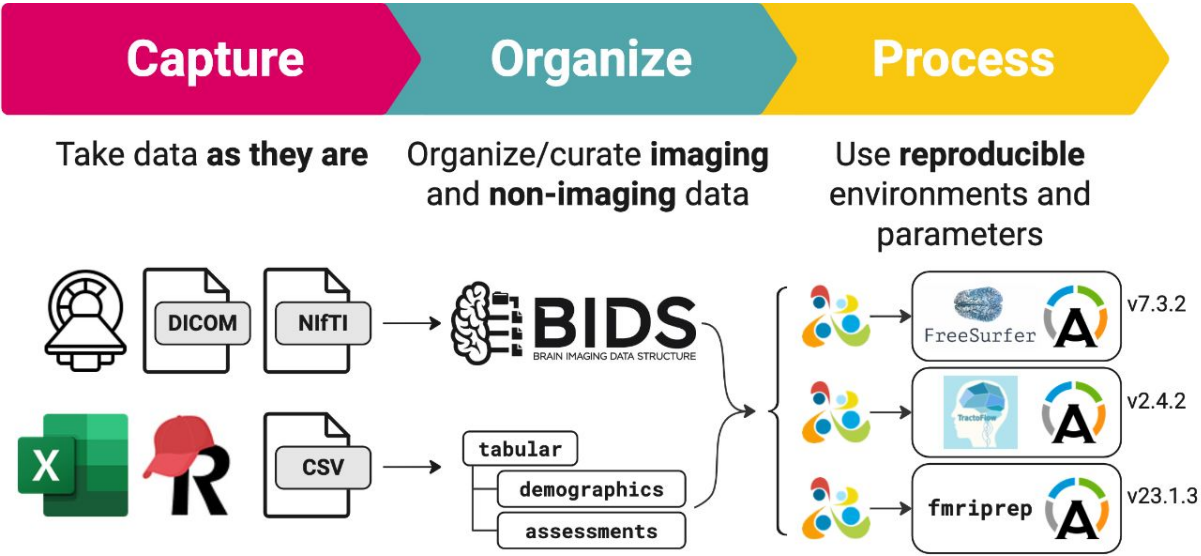

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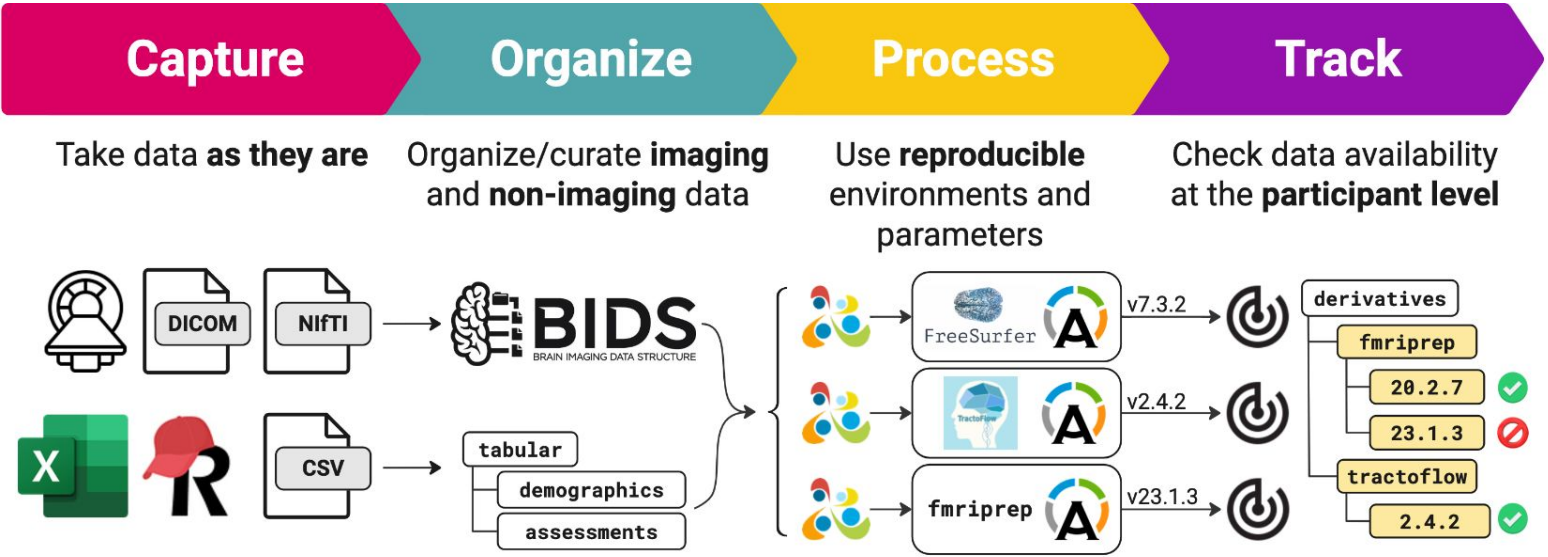

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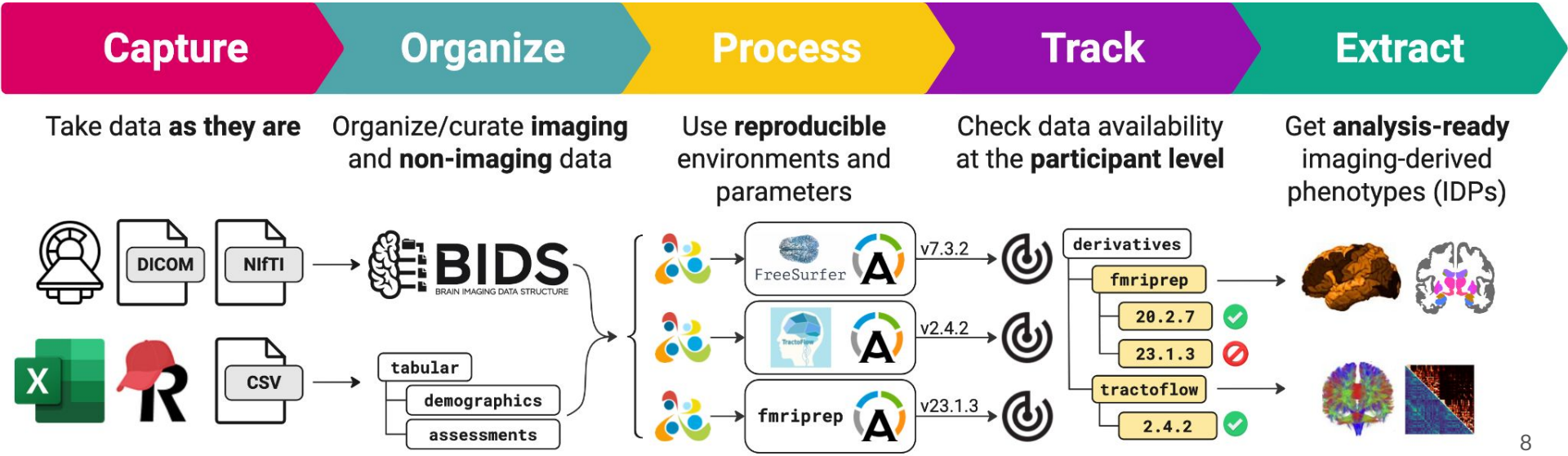

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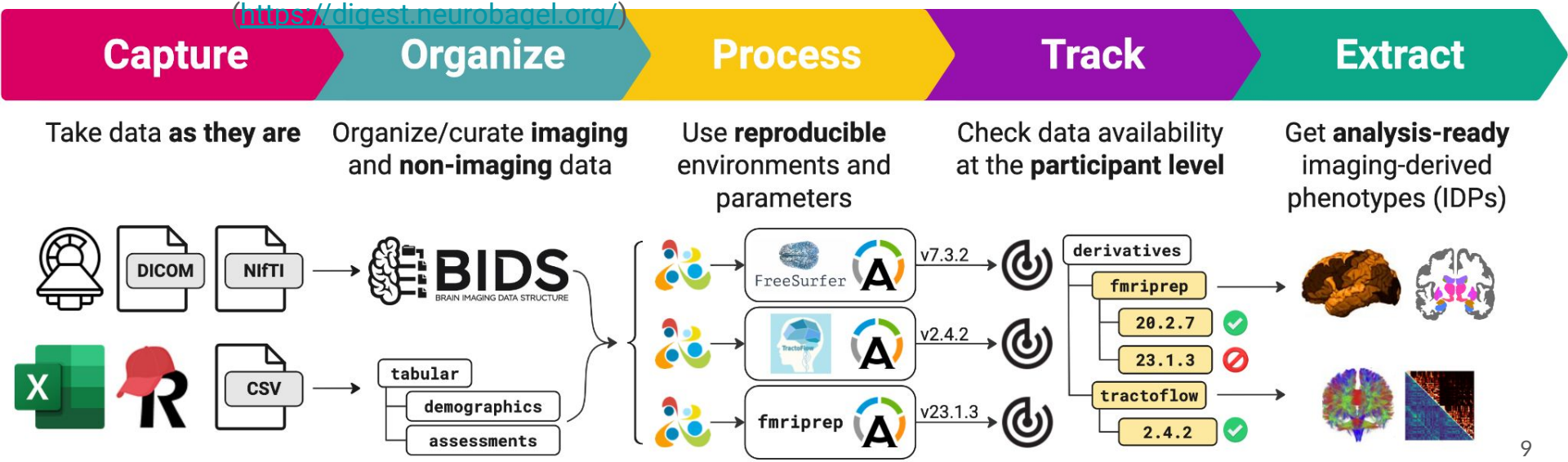
1. **Protocol** for best practices (FAIR principles) in organization/processing of neuroimaging-clinical datasets
   a. From raw scanner data to extracted imaging-derived phenotypes (IDPs)
   b. Visualizing tabular data/metadata on a dashboard (https://digest.neurobagel.org/)



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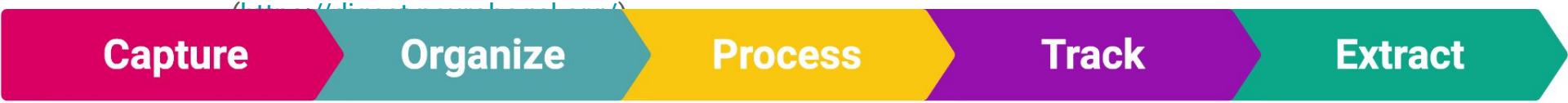

2. Data organization **specification**
   a. For imaging and non-imaging data
   b. At the whole study level

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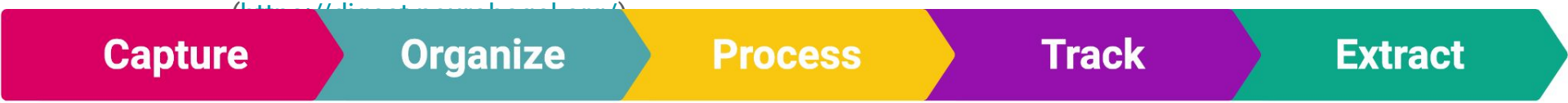

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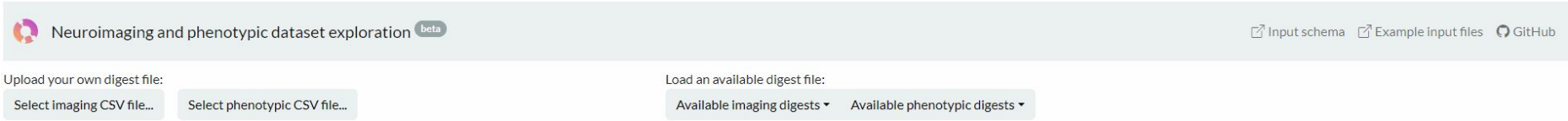
3. Software package with **tools** to help work with this framework

https://digest.neurobagel.org/



A typical **Nipoppy** workflow

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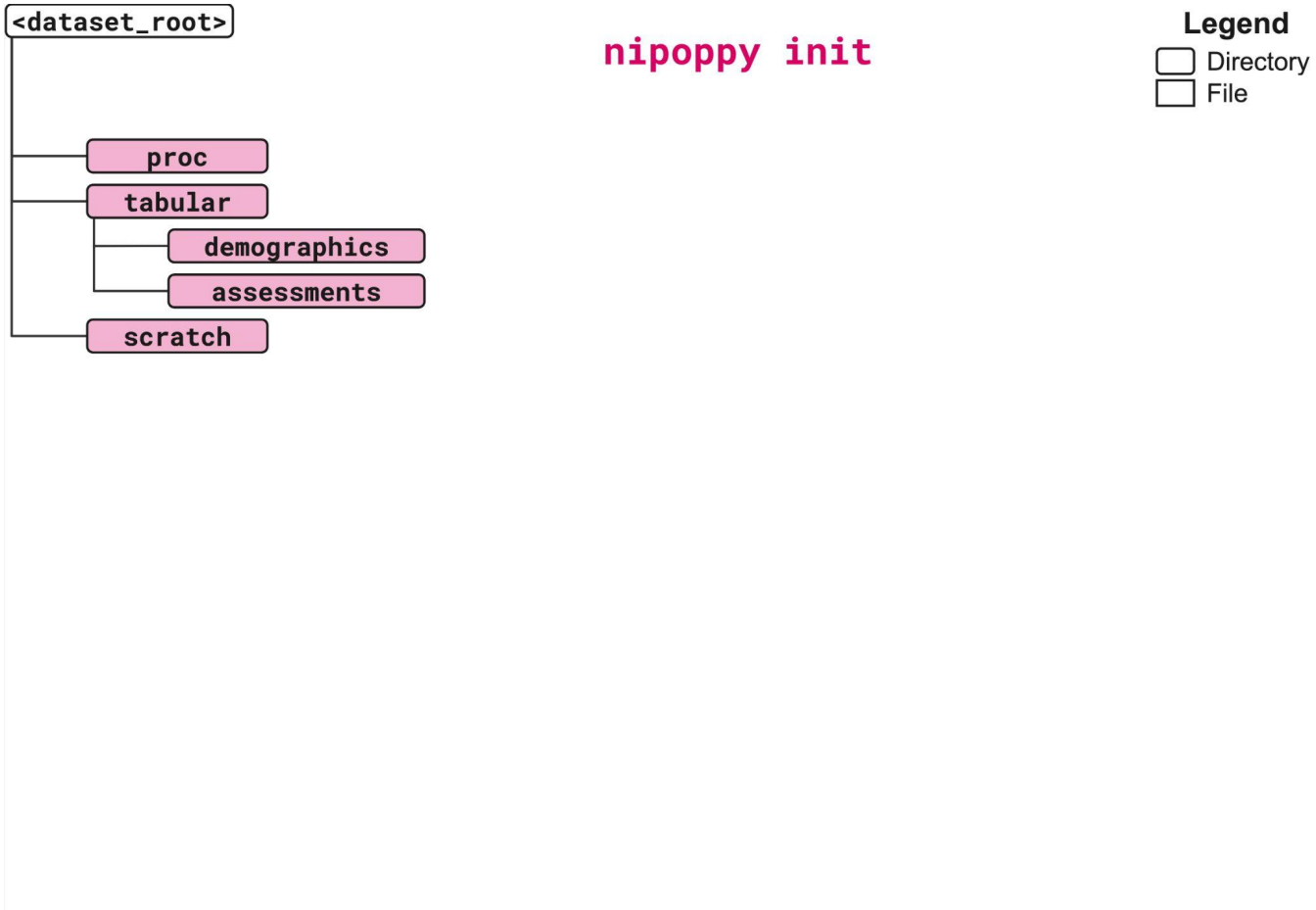

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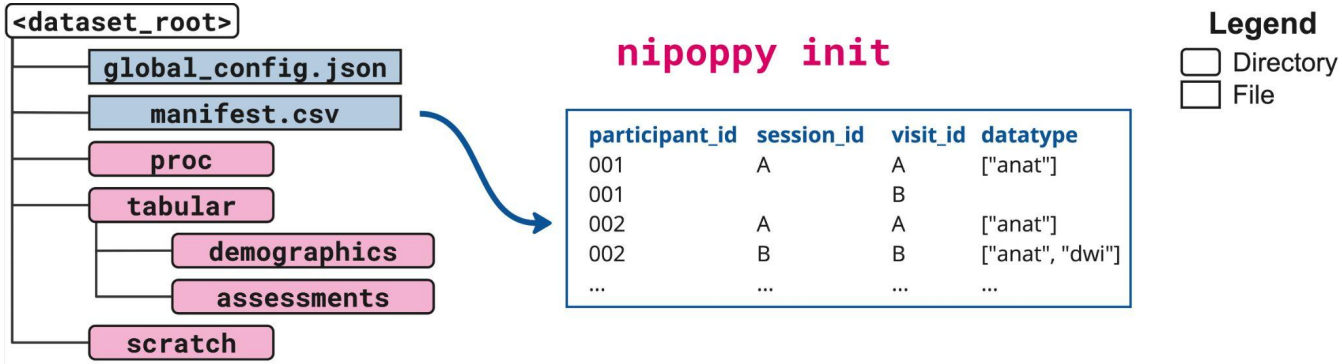

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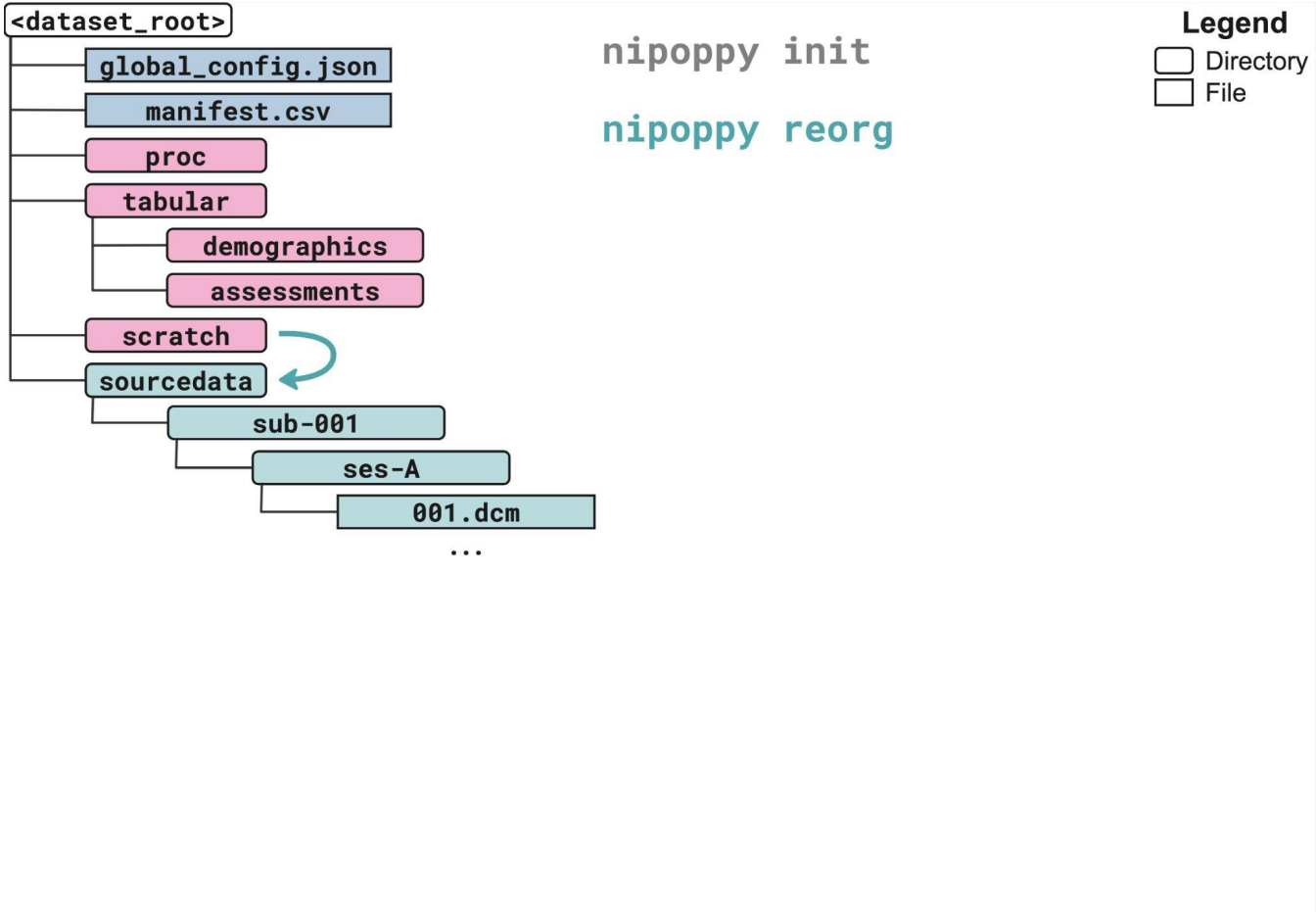

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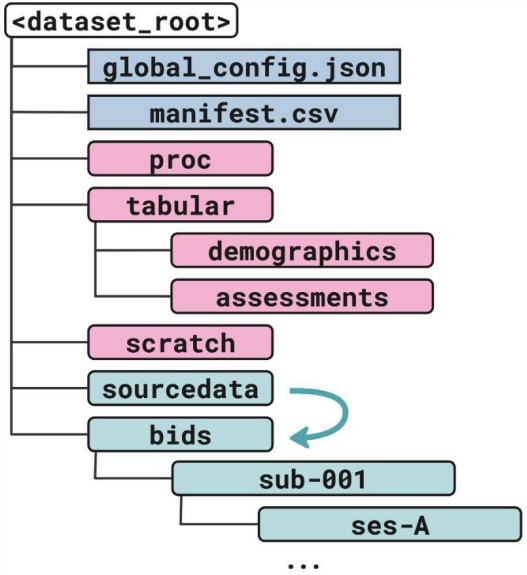


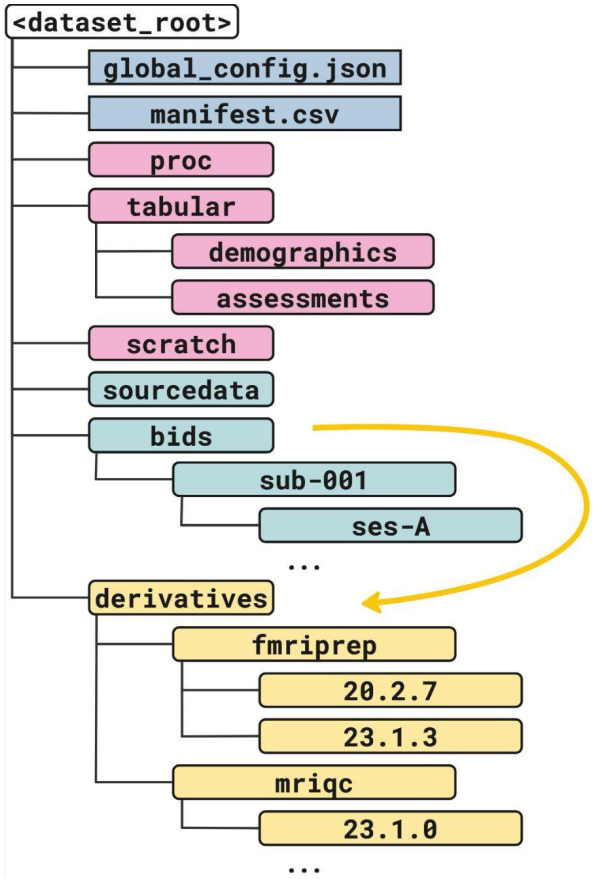

```
nipoppy init

nipoppy reorg

nipoppy bidsify
```

```
{
    "sourcefolder": "[[NIPOPPY_DPATH_SOURCEDATA]]",
    "bidsfolder": "[[NIPOPPY_DPATH_BIDS]]",
    "participant_label": [
        "[[NIPOPPY_PARTICIPANT_ID]]"
    ]
}
```

A typical Nipoppy workflow




```
nipoppy init

nipoppy reorg

nipoppy bidsify

nipoppy run
```

```
{
    "bids_dir": "[[NIPOPPY_DATASET_ROOT]]",
    "output_dir": "[[NIPOPPY_DPATH_PIPELINE_OUTPUT]]",
    "analysis_level": "participant",
    ...
}
```

Legend

- Directory
- File

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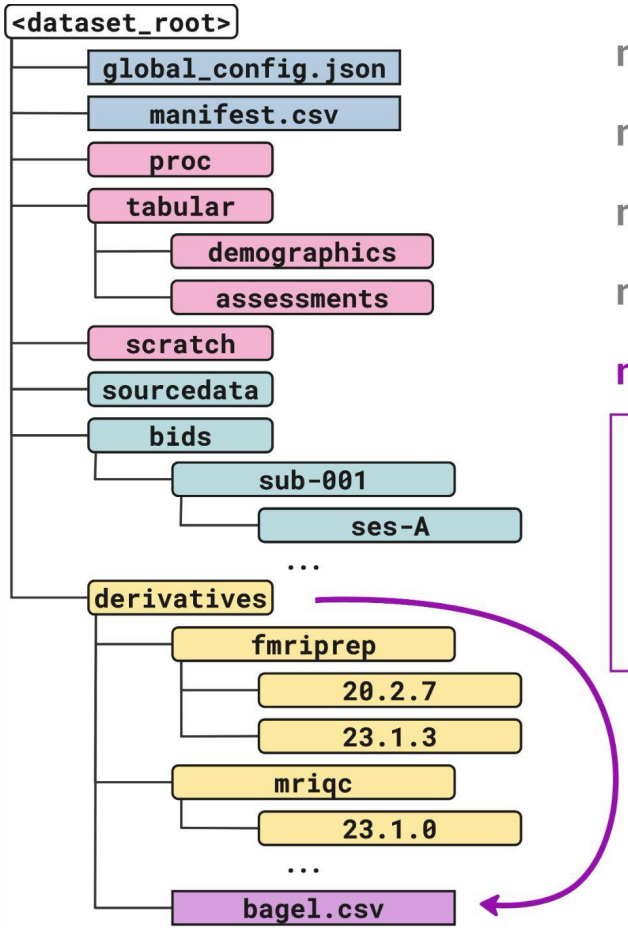


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nipoppy init

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nipoppy track

participant_id	session_id	pipeline	version	status
01	A	freesurfer	6.0.0	SUCCESS
01	A	freesurfer	7.4.1	SUCCESS
02	A	freesurfer	6.0.0	FAIL
02	A	freesurfer	7.4.1	FAIL
02	B	freesurfer	6.0.0	INCOMPLETE
02	B	freesurfer	7.4.1	INCOMPLETE
...	...	...	...	...

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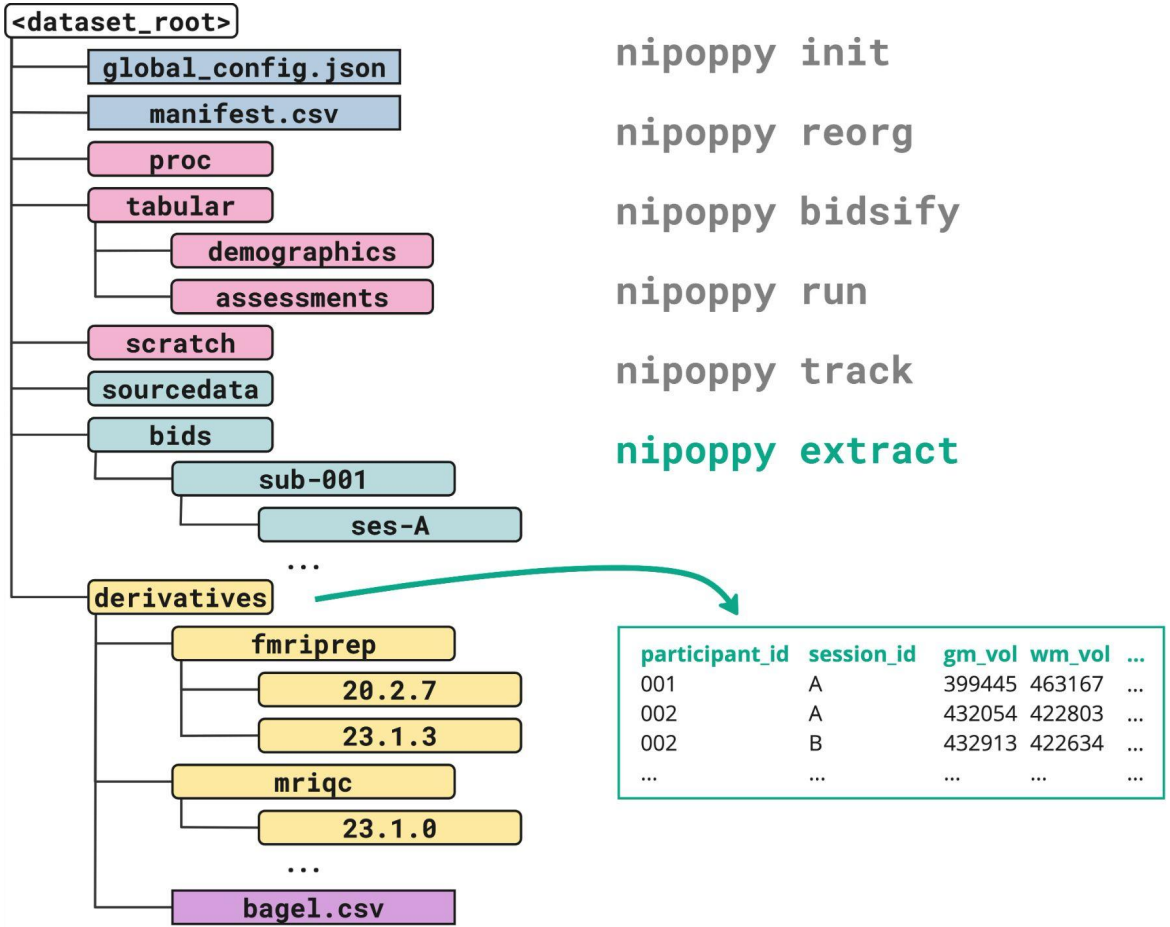

Nipoppy takeaways

Framework combining **existing tools**
Boutiques

- **Standardized organization** and workflow for both imaging and tabular data
- **Flexible** and **reproducible** processing pipelines
- Pipeline output **tracking** and imaging-derived phenotype (IDP) **extraction**
- Built-in support for **ongoing studies**
- Local, **decentralized** setup → facilitate multisite studies (see also: Neurobagel)

Thank you!

- Contact: michelle.wang6@mail.mcgill.ca
- Poster **#2256** (June 26-27, 13:45-15:45)
- Exhibitor booth **#103**
- https://github.com/neurodatascience/nipoppy
- https://nipoppy.readthedocs.io/en/latest/
- Related project: https://neurobagel.org/

Nikhil Bhagwat

Brent McPherson

Rémi Gau

Alyssa Dai

Sebastian Urchs

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
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