



EBRAINS

EBRAINS Research Infrastructure: Leveraging the value of brain data

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HBP Infrastructure Development Director

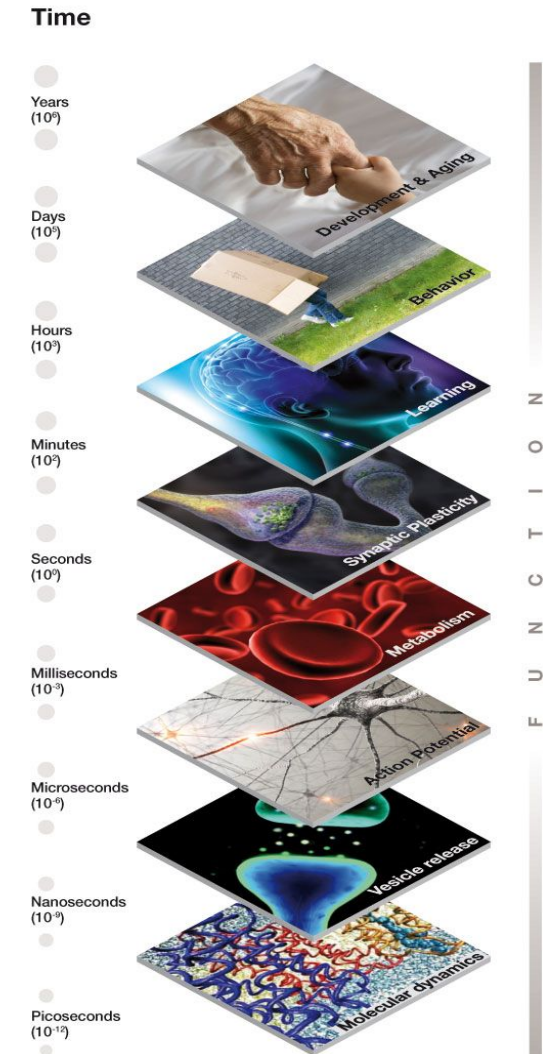
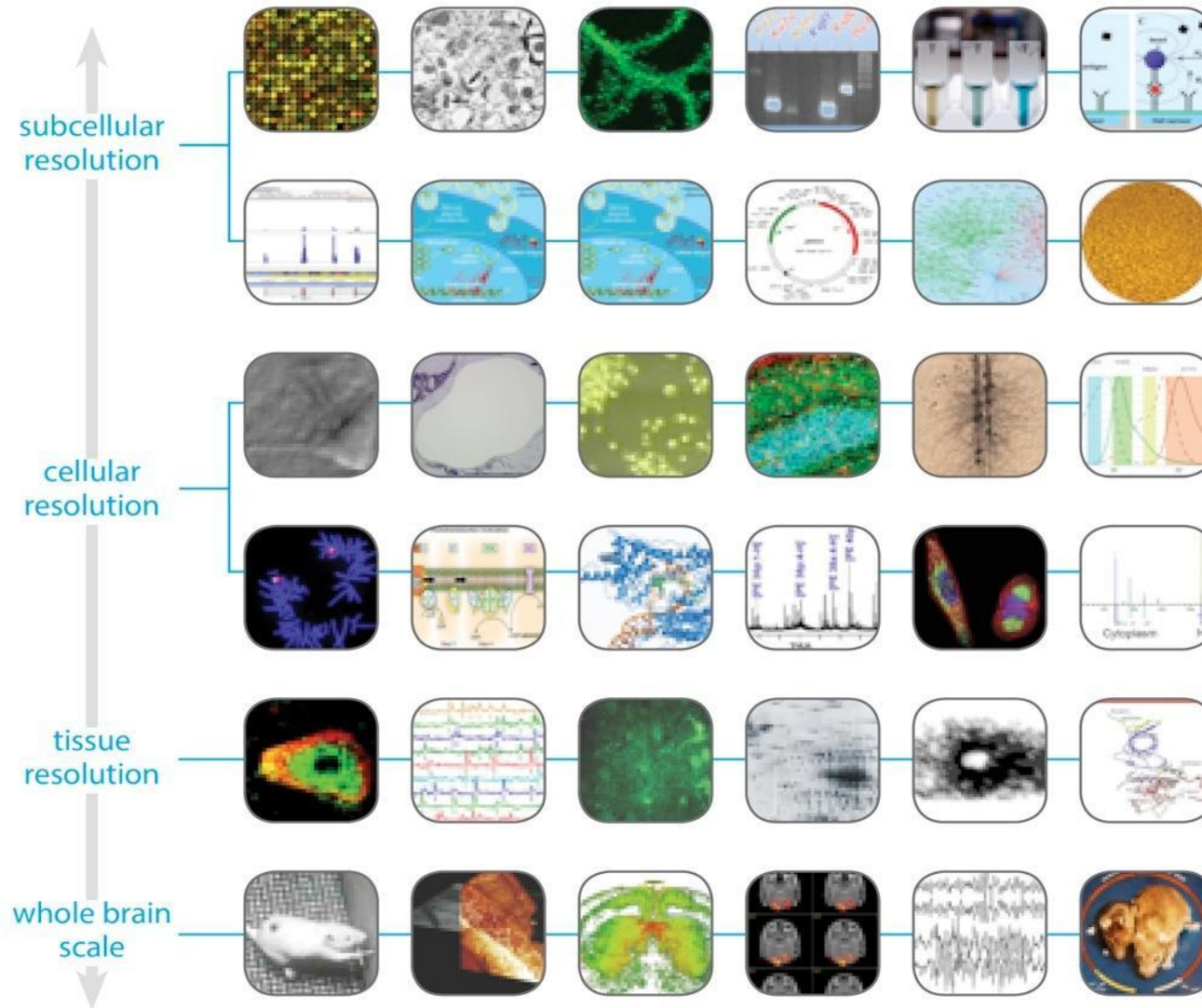
EBRAINS Data services leader

Head, Norwegian Neuroinformatics Node

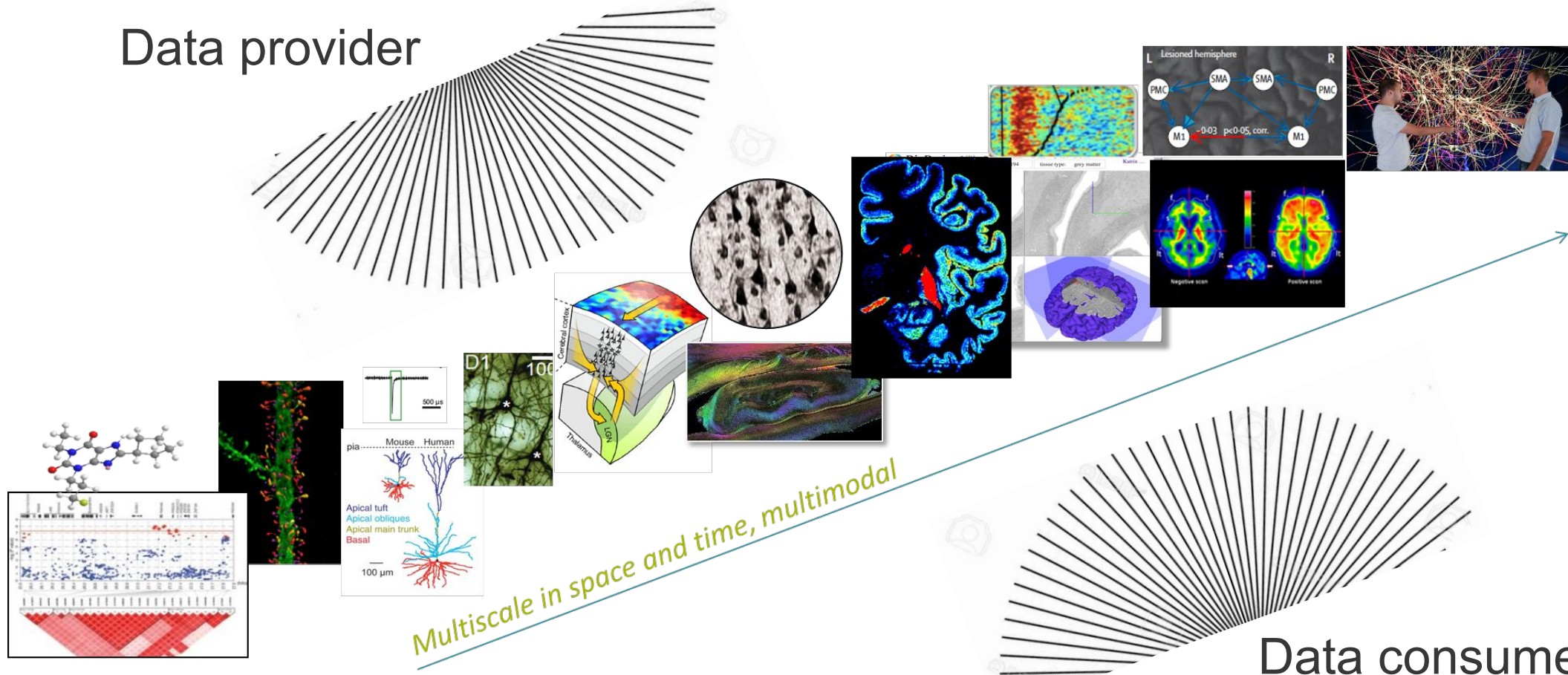
EOSC Symposium 2022

14 November 2022

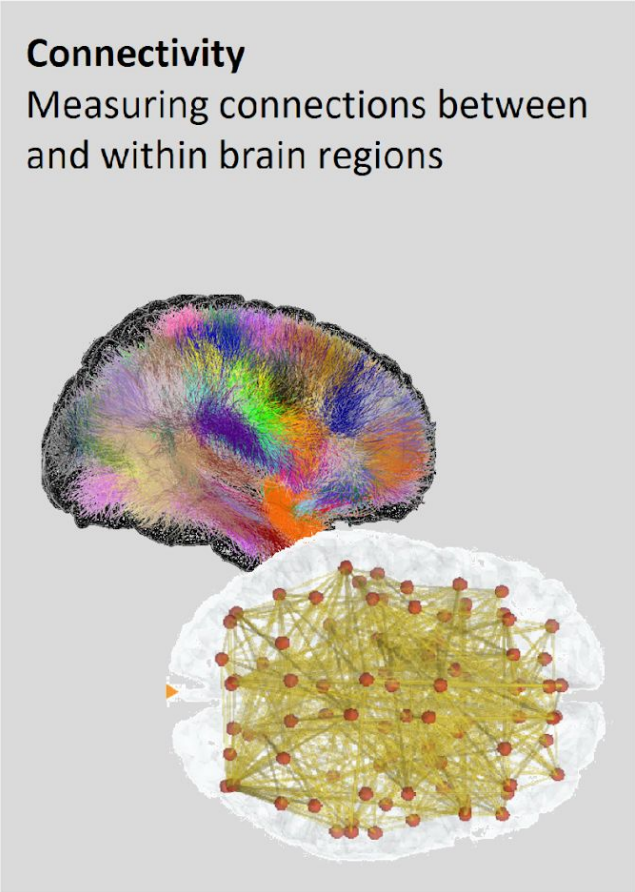
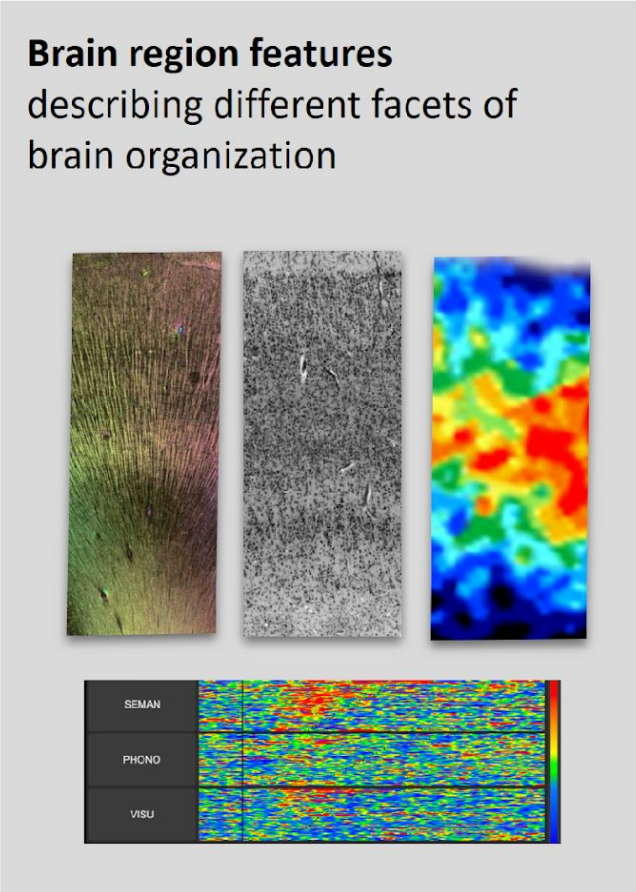
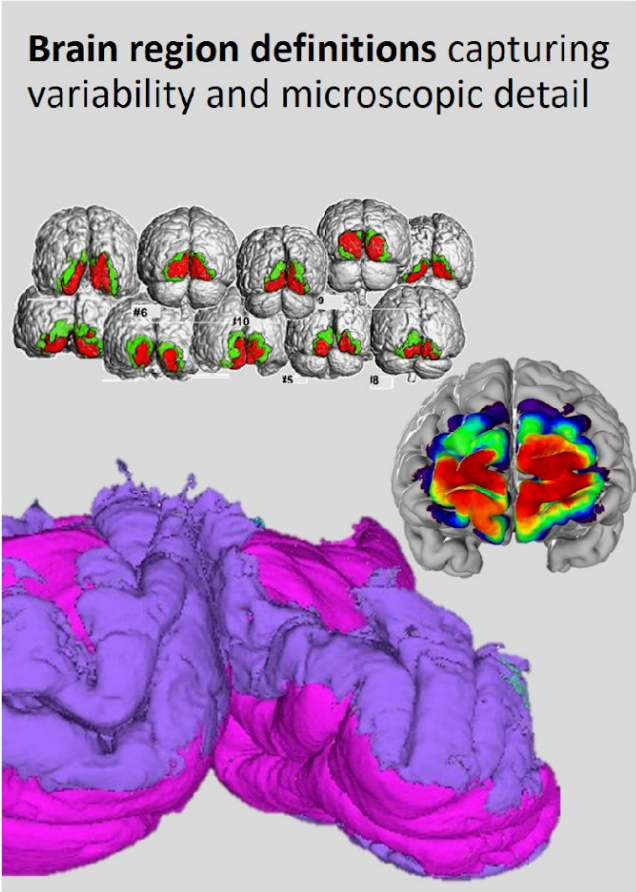
Multiscale and multiomic neuroscience data



Data consumer

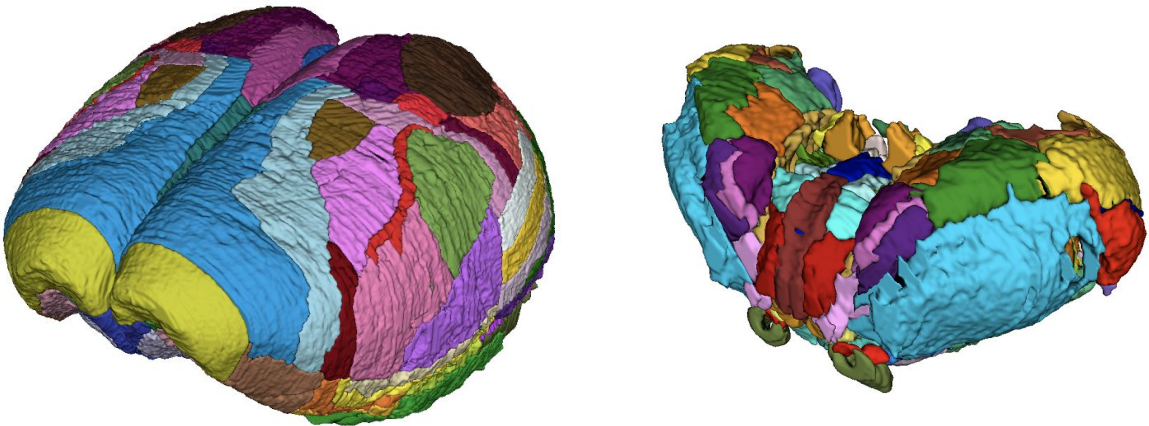
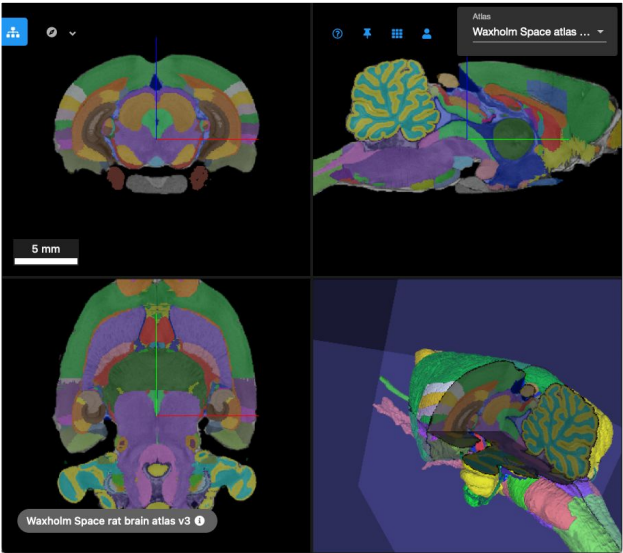


Complexity at each level

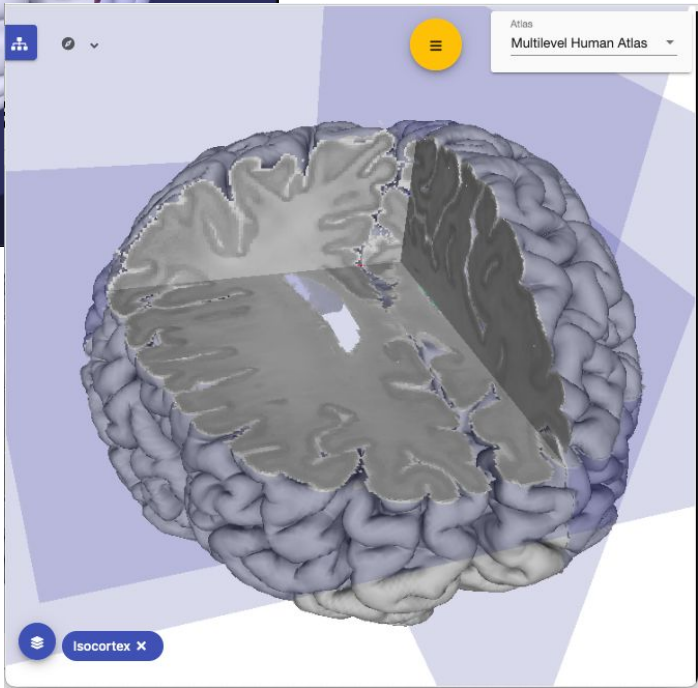
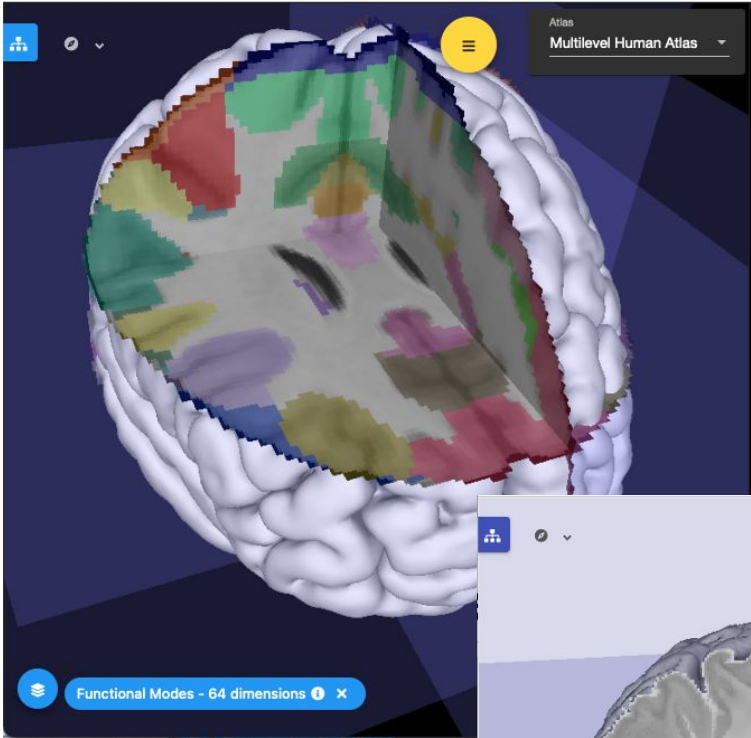


Dickscheid, Amunts and colleagues
Forschungszentrum Jülich

Brain atlases



Rat brain: Leergaard, Bjaalie, and colleagues
Univ Oslo



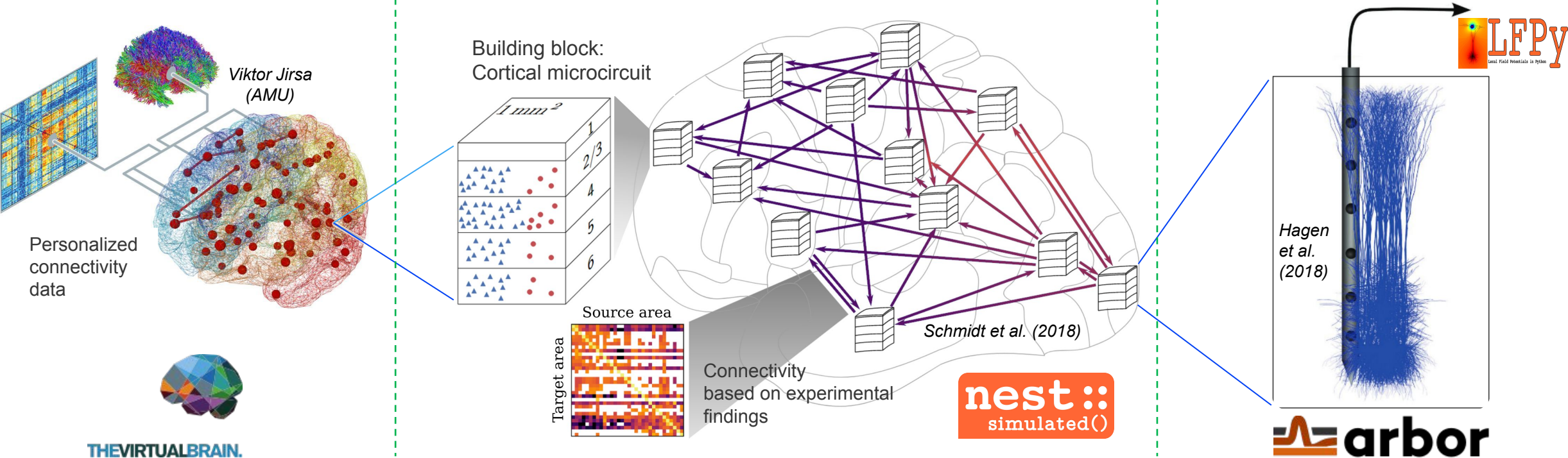
Human brain: Dickscheid, Amunts and colleagues
Forschungszentrum Jülich

Ecosystem for modeling and simulation

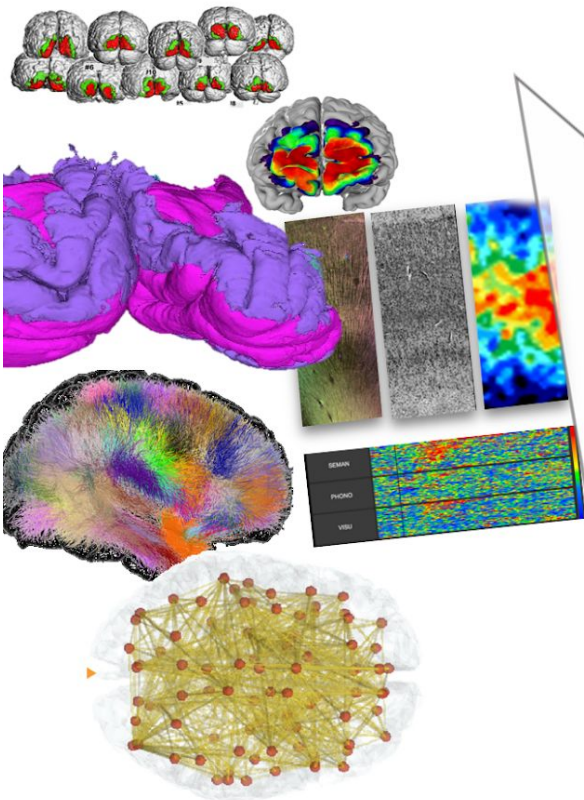
Whole brain and brain-region resolution

Single neuron resolution

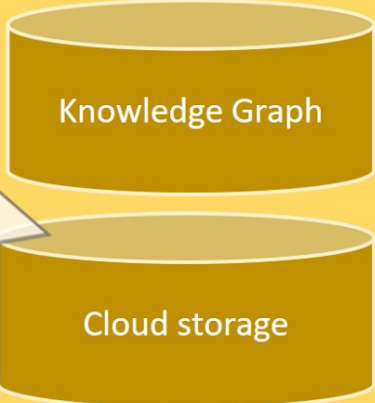
Cortical circuits with subcellular details



EBRAINS curation support



EBRAINS data services



search.kg.ebrains.eu

Federated High Performance Computing Infrastructure

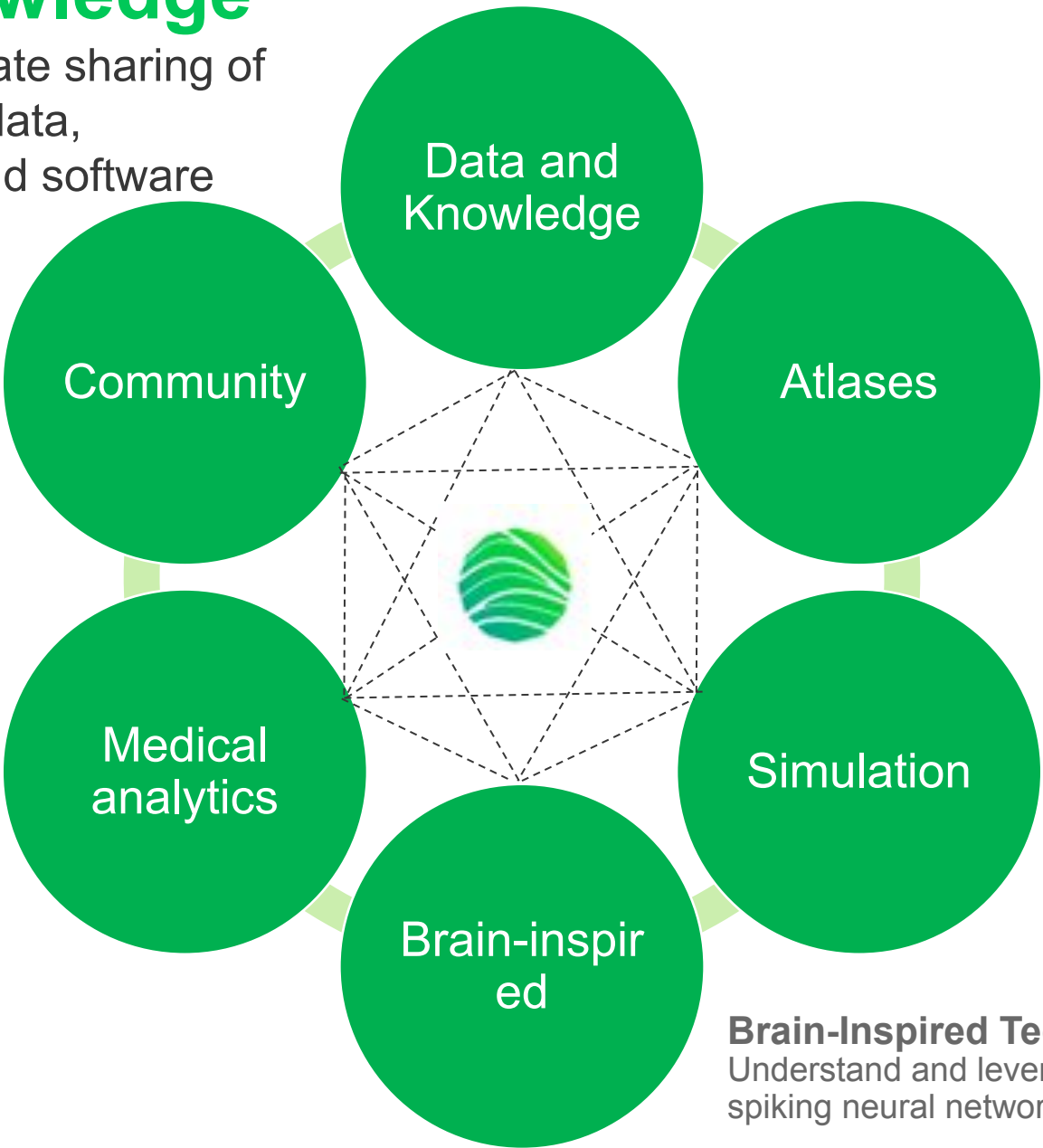
fenix-ri.eu

Data and Knowledge

Online solutions to facilitate sharing of and access to research data, computational models and software

Community
General services for the EBRAINS user community

Medical Data Analytics
Two unique EBRAINS platforms, covering key areas in clinical neuroscience research



Atlases
Navigate, characterise and analyse information on the basis of anatomical location

Simulation
Solutions for brain researchers to conduct sustainable simulation studies and share their results

Brain-Inspired Technologies
Understand and leverage the computational capabilities of spiking neural networks



EBRAINS Data and Knowledge services: Why?

- The digital transformation
- Replicability and Reproducibility - an ongoing methodological crisis in which it has been found that the results of many scientific studies are difficult or impossible to replicate or reproduce
- Open Science – initiatives aiming to remove the barriers for sharing any kind of output, resources, methods or tools, at any stage of the research process
- Data are drivers for science – the importance of being aware of and having access to high quality data and analytical tools

EBRAINS Data and Knowledge services: Why?

- 17th century: Scientific journals invented
- 20st century: Digital data stewardardship invented
- 21st century: Digital data stewardship implemented across all of science

EBRAINS Data and Knowledge services:

Why?

To deliver on FAIR, TRUST, CARE

Wilkinson et al., Sci Data 2016
Lin et al., Sci Data 2020
Carroll et al., Data Science Journal 2020

Data and metadata

F
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Data repositories

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Data governance

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EBRAINS Data and Knowledge services: What?

- Facilitating **sharing of and access** to research data, computational models and software
- Delivering **data consistency and quality**: combining metadata ingestion pipelines, human user input and multiple quality assurance processes, to help contributors (data providers) and users (data consumers)
- Providing **data governance**: clearly defined terms of use, responsible data compliance, and data protection provisions

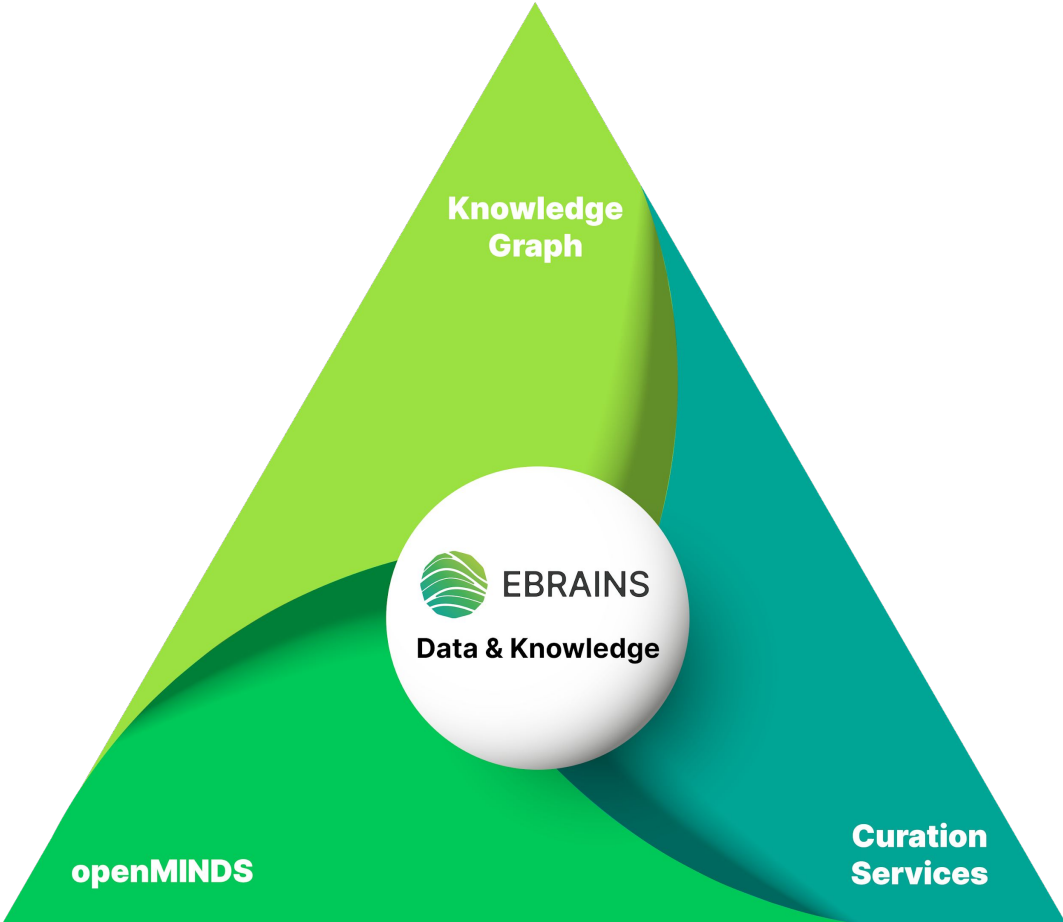


EBRAINS

Data and Knowledge

Online solutions to facilitate sharing of and access to research data, computational models and software

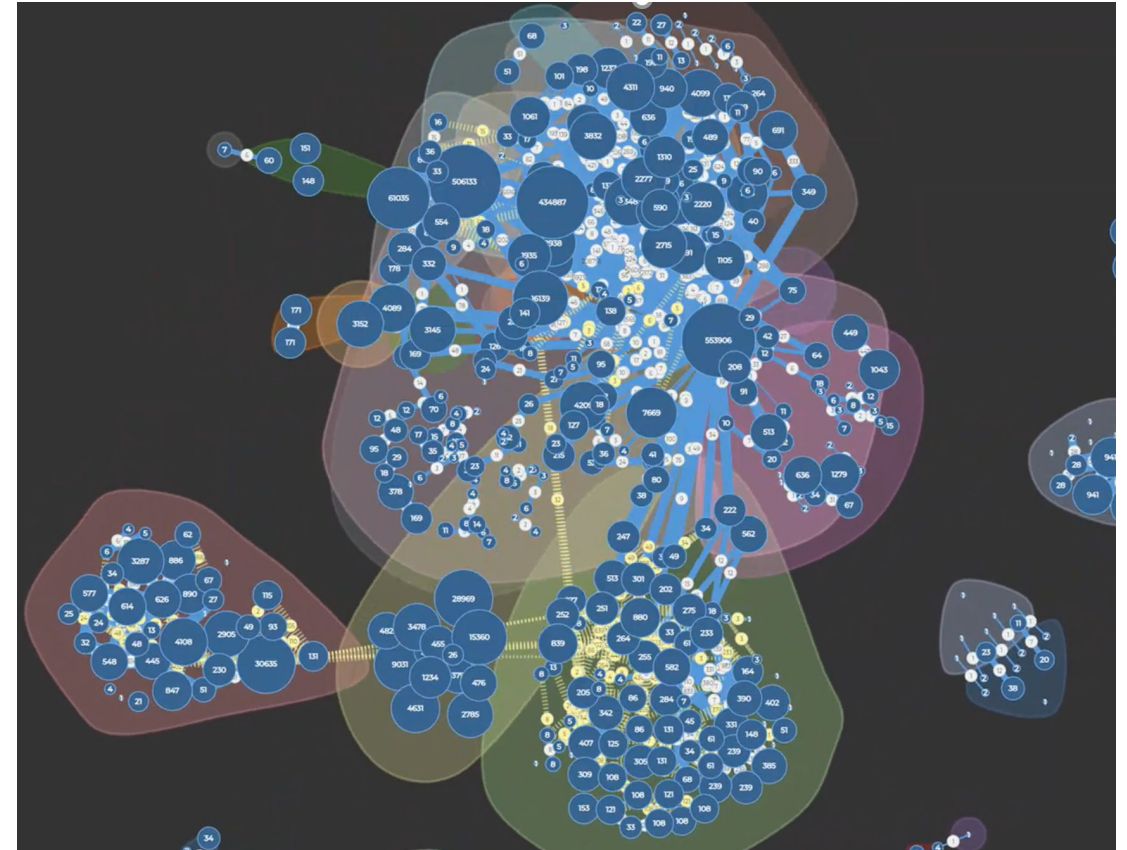
EBRAINS Data and Knowledge services: How?



EBRAINS Data and Knowledge services: How?

Knowledge Graph

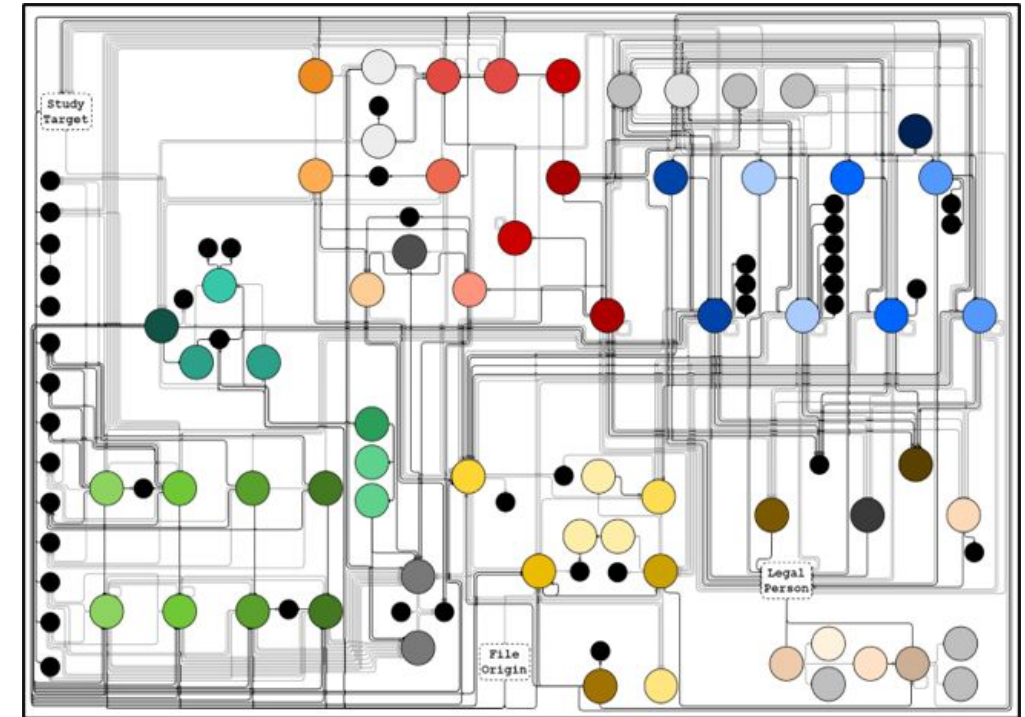
- Metadata management system
- Organized network of real-world entities
- Nodes – Links – Labels
- Dynamic and flexible navigation



EBRAINS Data and Knowledge services: How?

Metadata framework: openMINDS

- Neuroscience-specific metadata standards and conventions
- Human, animal or simulated studies, computational models, and software tools
- Easy to use and openly available on GitHub



open
MINDS

EBRAINS Data and Knowledge services: How?

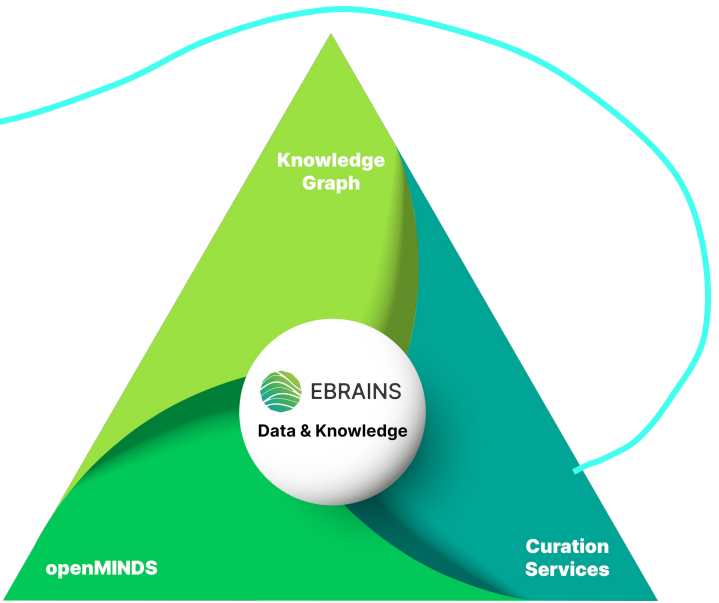
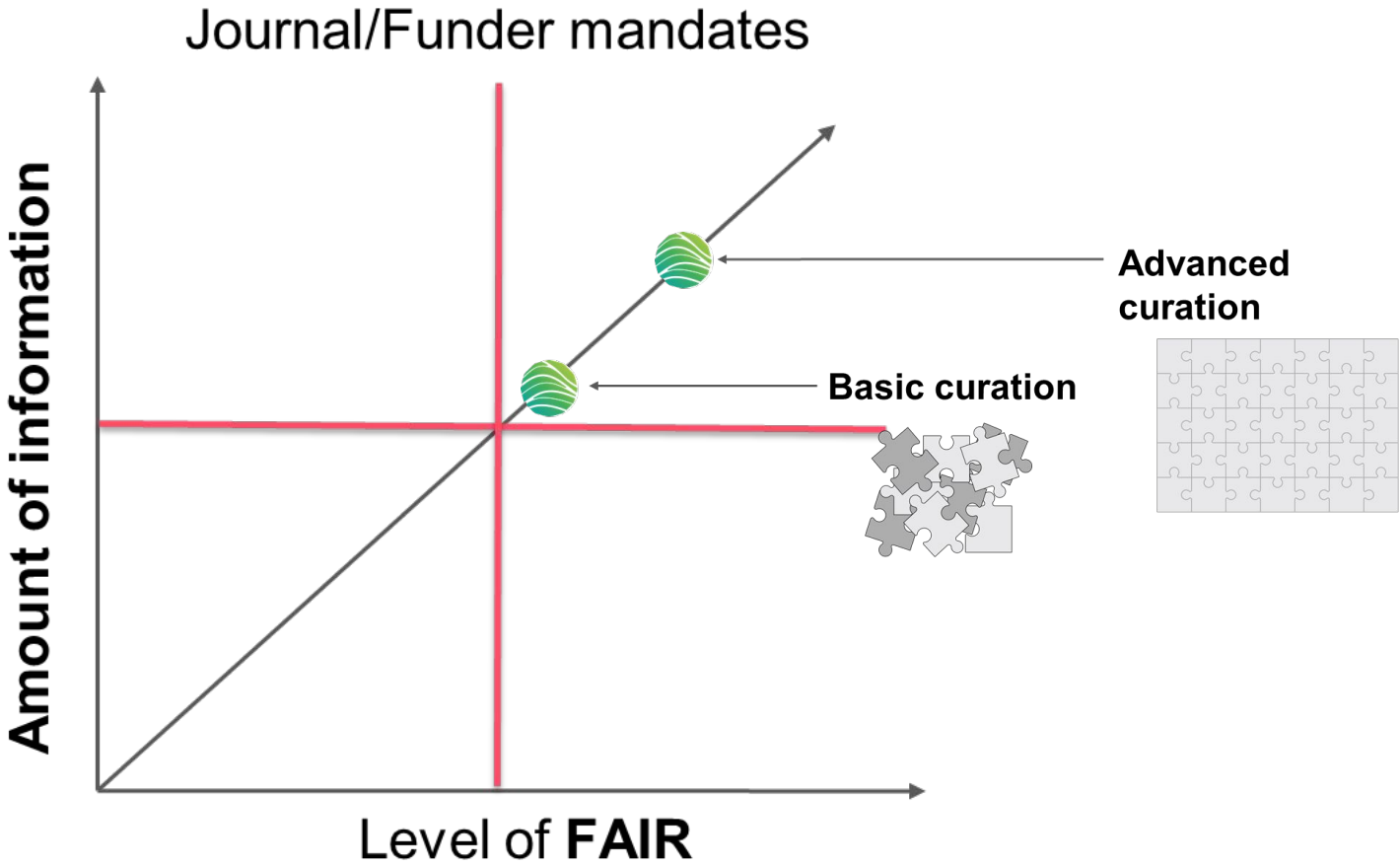
Curation workflow

- Quality assurance process
- Domain specific metadata enrichment
- FAIR compliant



SHARE
FIND
USE

SHARE data, models,
and software



SHARE
FIND
USE

FIND data, models,
and software



Share data About Login

Search (e.g. brain or neuroscience)

SEARCH

CATEGORIES

Project124

Dataset1216

Model100

Software156

Contributor1740

FILTERS

Reset

MODALITY

☐ microscopy

☐ neuroimaging

☐ histological approach

☐ anatomical approach

☐ anatomy

☐ neural connectivity

☐ histology

☐ electrophysiology

☐ expression characterization

Viewing 1-20 of 1216 results

Sort byRelevance

Human Intracranial EEG Database (HID) [cohort IV]

The Human Intracranial Database (HID) is a collection of stereotactic electroencephalography (sEEG) data in epileptic patients performing eight behavioral tasks. The behavioral tasks were used as functional localizers...

Keywords:

- analysis method
- behaviour assay
- electrophysiological recording

Methods:

- ☒ stereotactic electroencephalography (sEEG)
- sEEG-electrode implantation

DATASET

Human Intracranial EEG Database (HID) [cohort IV]

Lachaux, J.; Rheims, S.; Chatard, B.; Bertrand, O.

Overview

Data descriptor

Get data

Subjects

License:

The use of this dataset requires that the user cites the associated DOI and adheres to the conditions of use that are contained in the Data Use Agreement. You may not use the dataset for commercial purposes.

Project: Human Intracranial Database (HID)

Custodians: Lachaux, Jean-Philippe

The Human Intracranial Database (HID) is a collection of stereotactic electroencephalography (sEEG) data in epileptic patients performing eight behavioral tasks. The behavioral tasks were used as functional localizers: short and classic task paradigms designed to activate large-scale neural networks involved in

Preparation: In vivo

Methods:

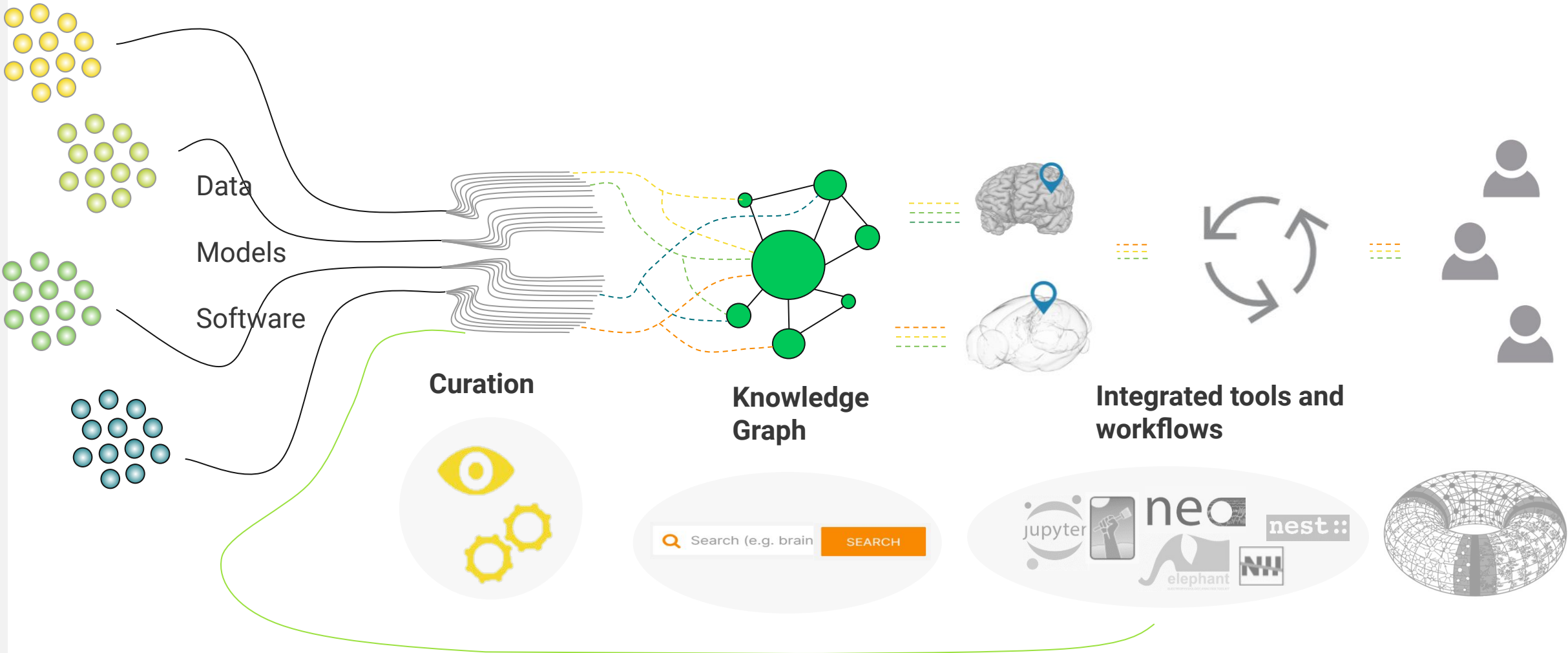
- ☒ stereotactic
- ☒ electroencephalography (sEEG)
- ☒ sEEG-electrode implantation
- ☒ magnetic resonance imaging (MRI)
- ☒ high frequency activity (HFA) average

Query builder and API

18

SHARE
FIND
USE

EBRAINS workflows: “Share – Find – Use”



How we communicate with Data providers

*I would like to make my data available together with a journal publication.
Can EBRAINS Data and Knowledge services deliver a solution?*

- Track for publishing research data alongside a journal article
- Special track for journals publishing Data descriptors, including Nature Scientific Data

SHARE DATA - GUIDELINES

Publishing a Dataset that Accompanies a Peer-Reviewed Journal Publication

How we communicate with Data providers

The data from my research is of a foundational nature. I want to easily find back to my own data and also make sure the data can be used in future research. Why should I use EBRAINS Data and Knowledge services?

I am looking for research data to complement my own research. Where should I look?

- Curation of metadata to increase discoverability and opportunities for re-use
- Specialized service for neuroscience, metadata standard for neuroscience data
- Advanced discoverability: Search interface and programmatic access

Use of EBRAINS Data and Knowledge services

- examples of external (non-HBP) projects that have used EBRAINS for data curation and sharing

Overview

Data descriptor

How to cite

Get data

Publications

Subjects

DOI: 10.25541/2021-0001

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Custodians: [View](#)

Currently, applications are defined by the learning and precise diagnosis appearance for accessible data.

Overview

Data descriptor

How to cite

Get data

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DATASET

The Digital Brain Tumour Atlas, an open histopathology resource

Roetzer-Pejrimovsky, T.; Moser, A. C.; Atli, B.; Vogel, C. C.; Mercea, P. A.; Prihoda, R.; Gelpi, E.; Haberler, C.; Höftberger, R.; Hainfellner, J. A.; Baumann, B.; Langs, G.; Woehrer, A.

DATASET

Intracranial electrophysiological recordings from the human brain during memory tasks with pupillometry

Cimbalnik, J.; Dolezal, J.; Topçu, Ç.; Lech, M.; Marks, V.; Joseph, B.; Dobias, M.; Van Gompel, J.; Worrell, G.; Kucewicz, M.

DATASET

Expression profile of the nucleoredoxin-like 2 gene in the mouse brain using a beta-galactosidase knock-in reporter strain (v1)

Access to data: levels and conditions

Open Access	Under embargo	Restricted Access	Controlled Access
Non-identifiable data		Strongly pseudonymised / de-identified data	Pseudonymous and raw data

More background and details about data publishing and EBRAINS Data and Knowledge services in Nature webcast

www.nature.com/webcasts/

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CUSTOM


Making small data big: Building a graph database from experimental brain research


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