

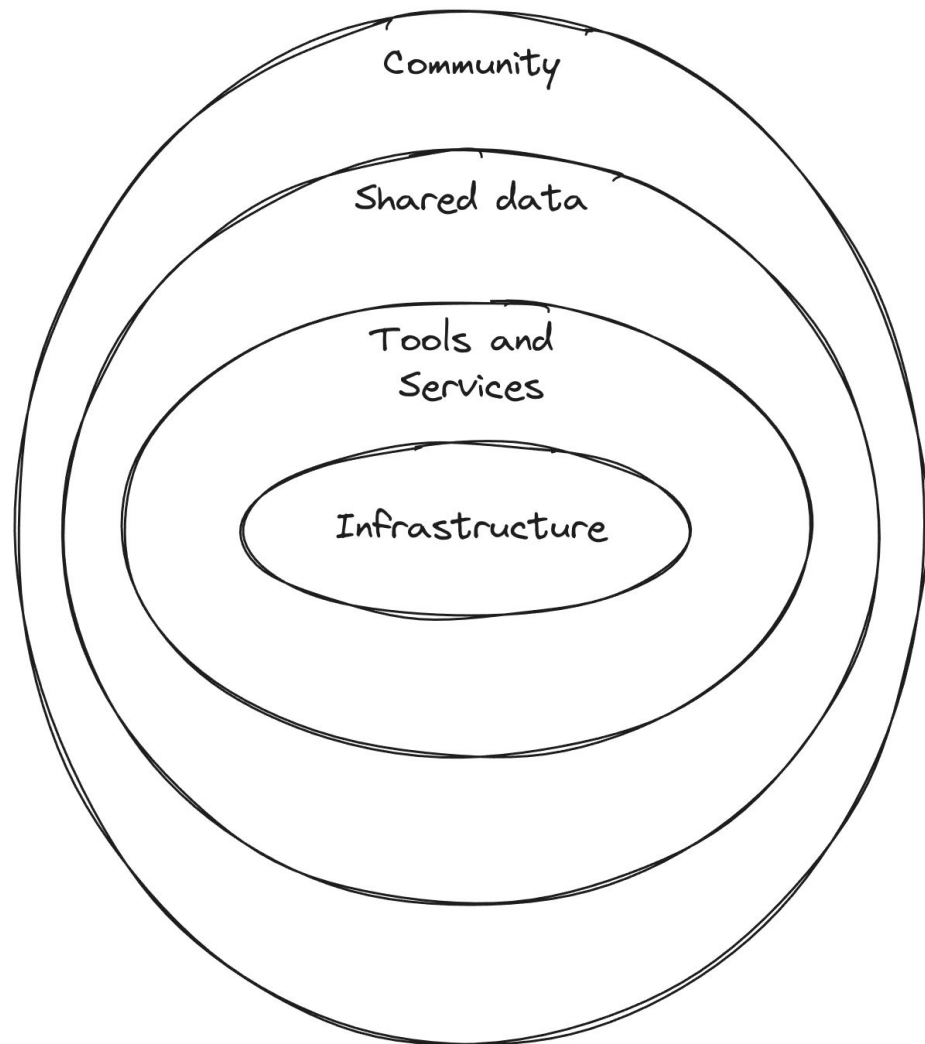
# EBRAINS

digital infrastructure  
for brain research

# EBRAINS

## Overview

- digital research infrastructure for neuroscience
- focus on collaborative open science
- integrated set of multiscale data, tools, IT resources, and collaborative environments



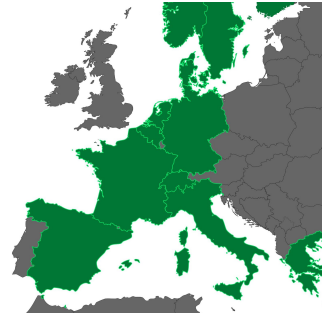
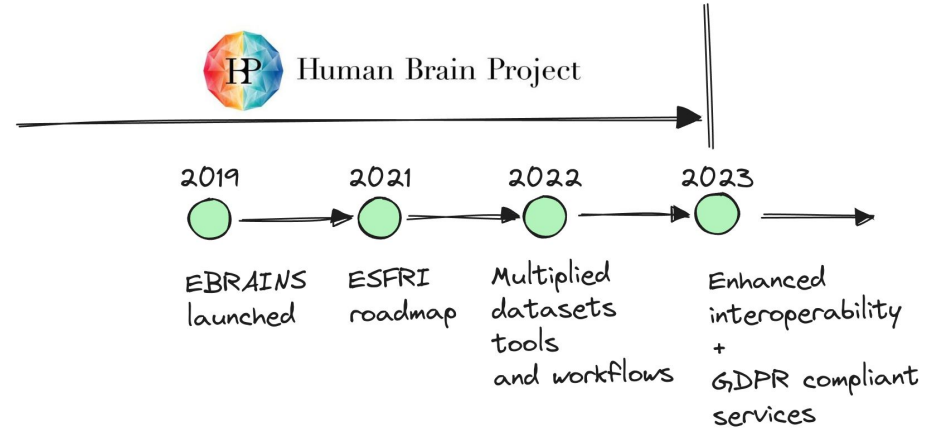
# EBRAINS

## Overview

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- focus on collaborative open science
- integrated set of multiscale data, tools, IT resources, and collaborative environments

## Origins

- developed within The Human Brain Project (10 years EU-Flagship)
- multidisciplinary effort centered around co-design principles



# EBRAINS RI services

## Data

- storage, sharing, and access to data, models, software and workflows

## Brain atlases

- navigate, characterize, and analyze brain data based on anatomical location

## Modeling, simulation and computing

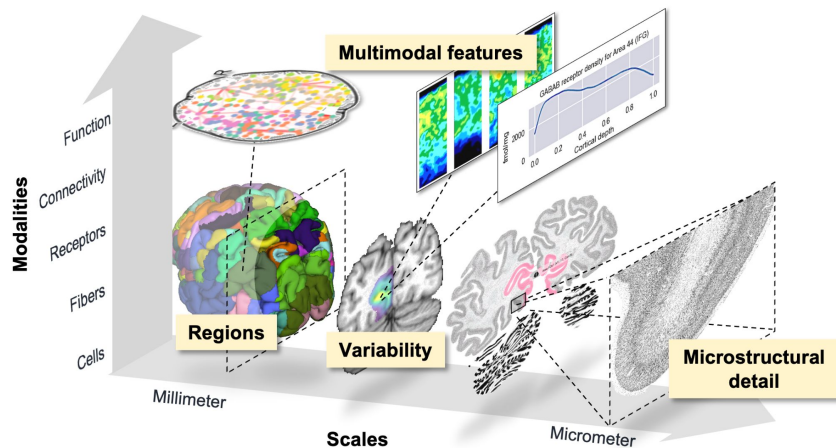
- enable simulation studies from cellular to whole-brain level

## Validation and inference

- analytic tools and model validation

## Health research platforms

- GDPR-compliant tools to access medical brain data



# Data sharing process in EBRAINS

1. **Submission**  
*initial description of data sharing intent*
2. **Review**  
*within 5 days*
3. **Acceptance**  
*assigns curator*
4. **Integration**  
*registering metadata in openMINDS format,  
data upload to long-term storage*
5. **Publication**  
*DOI assigned, entry in the Knowledge Graph*
6. **In-depth integration**  
*continuous post-publication metadata  
expansion*

Metadata description:



- openMINDS
  - open Metadata Initiative for Neuroscience Data Structures
  - (meta)data models
  - predefined metadata schemas (ontologies)
  - tooling (Python / MATLAB / BIDS)

**Request curation** 

**Findable** 

# Find data on EBRAINS

Knowledge Graph search: <https://search.kg.ebrains.eu/>

SEARCH

**CATEGORIES**

Project	125
<b>Dataset</b>	<b>1032</b>
Model	253
(Meta)Data Model	4
Software	224
Web service	18
Contributor	2152

**FILTERS** Reset

**ACCESSIBILITY**

<input type="checkbox"/> free access	898
<input type="checkbox"/> under embargo	93
<input type="checkbox"/> controlled access	38

Viewing 1-20 of 1032 results.

**Top trending**

### The Swedish National Facility for Magnetoencephalography Parkinson's Disease Dataset

**Released:** 2023-11-17

**Accessibility:** controlled access

**Custodians:** Lundqvist, D.

Parkinson's disease (PD) is characterised by a loss of dopamine and dopaminergic cells. The consequence is widespread network disturbances in brain function. It is still an ongoing topic of investigation how...

**Tags:** brain, electrocardiography, electromyography, electrooculography, magnetic resonance imaging, magnetoencephalography, motor behavior, Movements, Parkinson's disease

**Top trending**

### Julich-Brain Atlas, cytoarchitectonic maps

**Released:** 2023-07-13

**DATASET**

## Ventrolateral prefrontal cortex and posterior parietal cortex multielectrode array recordings during local-global no-report task (v1)

Bellet, M. E.; Gay, M.; Panagiotaropoulos, T.

**Overview**

**DOI:** 10.25493/CJ9N-6CZ

**Released:** 2024-02-13

**Accessibility:** free access

**License:** Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International

**Custodians:** Panagiotaropoulos, T.

This dataset features multiunit activity (MUA) recordings from two adult male macaque monkeys, captured via Utah arrays implanted in specific brain regions: the ventrolateral prefrontal cortex (vlPFC, area 45a) and the parietal cortex (PPC, areas 7a/7b). The recordings were made as the monkeys engaged in a visual task, where they were required to maintain their gaze on a central fixation point while a sequence of images was displayed. These images were presented within a 2x2 local-global design. The primary aim of collecting this data was to investigate how

**Studied brain region:**

- prefrontal cortex
- parietal cortex

**Behavioral protocols:** Local-global task (Bellet et al., 2023)

**Preparation:** in vivo

**Experimental approach:** electrophysiology

**Technique:**

- visual stimulation
- abstract image visual stimulation

**Keywords:**

- image sequence
- multi-unit activity

**Accessible** 🖱️



# Data access in EBRAINS

- placement in a **long-term repository requested** during the curation process
- can be **hosted by EBRAINS** (data-proxy)
- **standardized repositories** (ModelDB) can also be linked from the KG
- **external data hosting** suitable also for sensitive data



Free Access

All data and metadata freely accessible.



Under Embargo

Data (and some meta-data) will be made available later.



Controlled Access

Authorization is required to access the dataset.



Restricted Access

Data access controlled externally (e.g. medical data).

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DATASET

Human Connectome Project Young Adult fMRI time series, structural and functional connectomes (v1.0)

Schirner, M.; Ritter, P.



- The data is currently shared via the Virtual Research Environment at [Charité – Universitätsmedizin Berlin](#).
- Please contact [petra.ritter@bih-charite.de](mailto:petra.ritter@bih-charite.de) and [michael.schirner@bih-charite.de](mailto:michael.schirner@bih-charite.de) for access.
- Data Processing Agreement for HCP Young Adult Connectomes can be found [here](#)



Free Access

All data and metadata freely accessible.



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Controlled Access

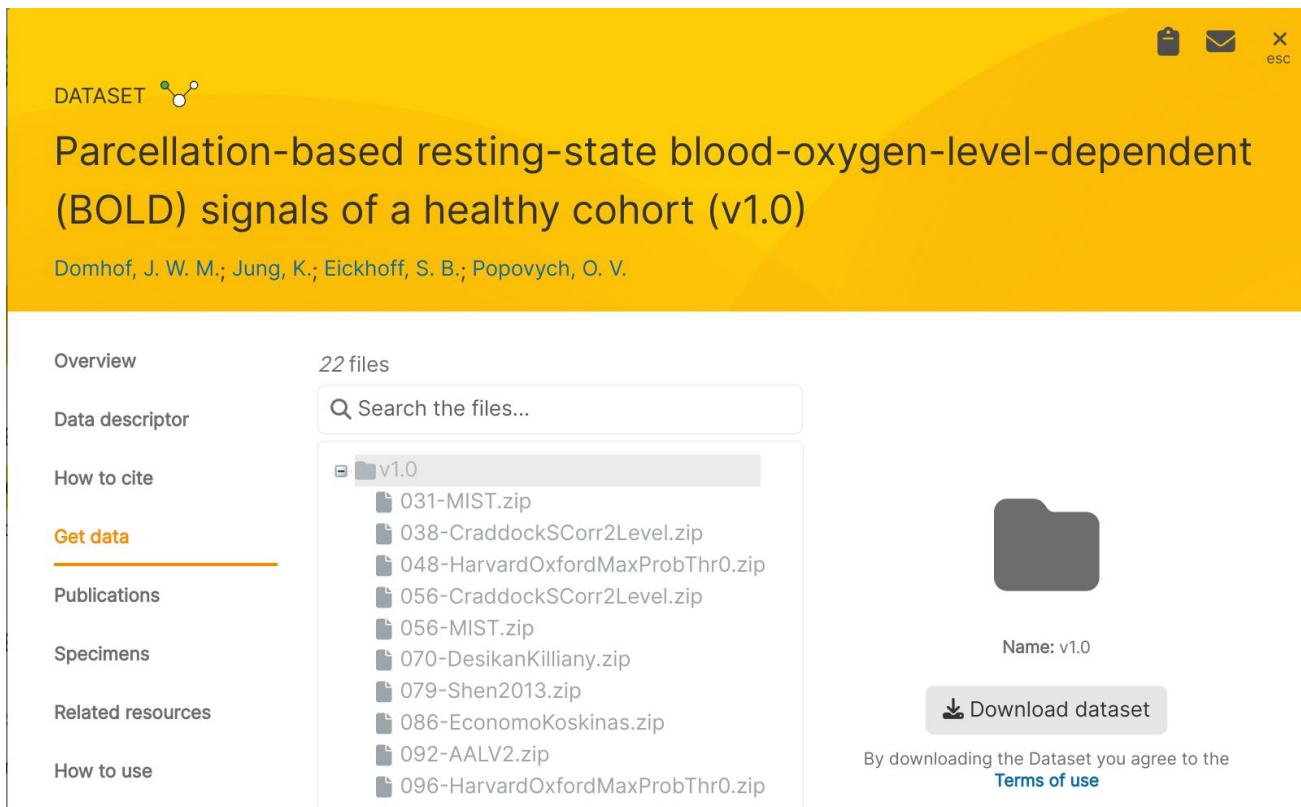
Authorization is required to access the dataset.



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Data access controlled externally (e.g. medical data).

# Data access in EBRAINS



The screenshot shows the EBRAINS dataset interface. At the top, there is a yellow header with the text "DATASET" and a small molecular icon. The main title is "Parcellation-based resting-state blood-oxygen-level-dependent (BOLD) signals of a healthy cohort (v1.0)". Below the title, the authors are listed: "Domhof, J. W. M.; Jung, K.; Eickhoff, S. B.; Popovych, O. V.". On the right side of the header, there are icons for a clipboard, an envelope, and a close button labeled "esc".

On the left side, there is a navigation menu with the following items: "Overview", "Data descriptor", "How to cite", "Get data" (highlighted with an orange underline), "Publications", "Specimens", "Related resources", and "How to use".

The main content area shows "22 files" and a search bar with the text "Search the files...". Below the search bar, there is a list of files under a folder icon labeled "v1.0". The files listed are:

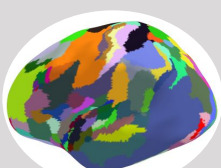
- 031-MIST.zip
- 038-CraddockSCorr2Level.zip
- 048-HarvardOxfordMaxProbThr0.zip
- 056-CraddockSCorr2Level.zip
- 056-MIST.zip
- 070-DesikanKilliany.zip
- 079-Shen2013.zip
- 086-EconomoSkinas.zip
- 092-AALV2.zip
- 096-HarvardOxfordMaxProbThr0.zip

On the right side of the main content area, there is a large folder icon with the text "Name: v1.0" below it. Below the folder icon is a button labeled "Download dataset" with a download icon. At the bottom right, there is a note: "By downloading the Dataset you agree to the [Terms of use](#)".

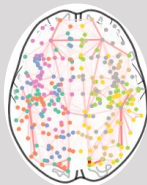
Interoperable 

# Showcase 1 - Workflow

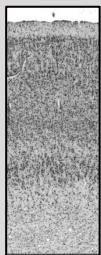
## Data collection



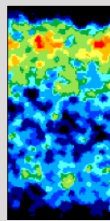
Cytoarchitectonic maps



Structural & functional connectivity



Cell densities



Receptor densities

## Human Data Gateway

Individual time-series and connectomes



Regional variance of multimodal features

**DATASET**  
**1000BRAINS study, connectivity data (v1.1)**  
Caspers, S.; Schreiber, J.

**Overview**  
Data descriptor  
How to cite  
Get data  
Publications  
Subjects

**DOI:** 10.25493/6640-3XH  
**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.  
**Custodians:** Caspers, Svenja

The human brain shows considerable interindividual variability, particularly during the course of aging, which is influenced by genetic and environmental factors. To characterize this variability across a wide range of subjects in the general phenotypic data are required. The 1000BRAINS study, which is based on the population-based Heinz Nixdorf Recall Study of the University of Duisburg-Essen (Germany), aims at studying this variability of brain structure, function and

**EBRAINS**

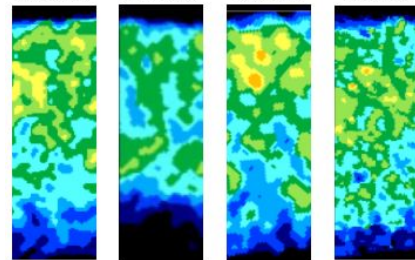
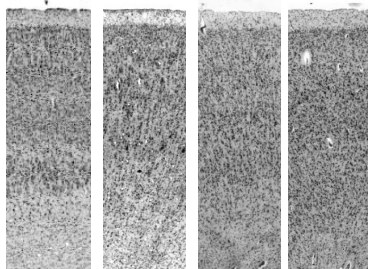
Services News Register Support About

**Multilevel Human Brain Atlas**

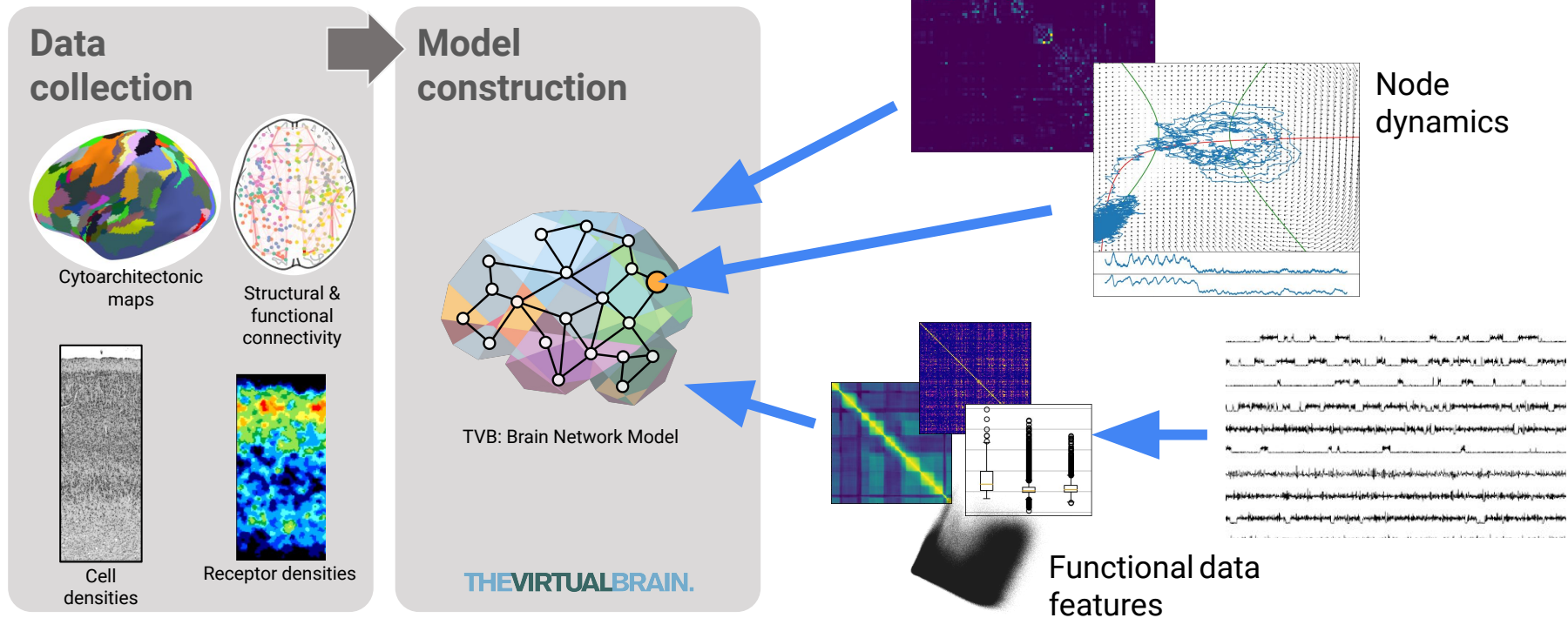
A three-dimensional atlas that integrates the different facets of human brain organization at the millimeter and micrometer level

Explore the different facets of human brain organization in an interactive viewer  
Connect your computing workflows to the atlas  
Our community

**Brain atlas:** Julich-Brain Atlas  
**Preparation:** In vivo  
**Methods:**  
diffusion-weighted magnetic resonance imaging (DWI)  
fiber tract reconstructions  
Spatial atlas registration  
**Keywords:**  
imaging

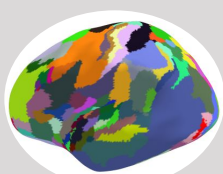


# Showcase 1 - Workflow



# Showcase 1 - Workflow

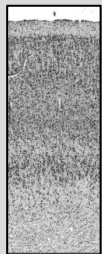
## Data collection



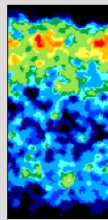
Cytoarchitectonic maps



Structural & functional connectivity

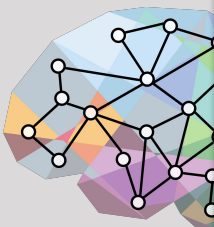


Cell densities



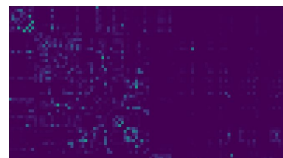
Receptor densities

## Model construction



TVB: Brain Network

THEVIRTUALBRAIN.



Build the network

< Previous



MODEL

## The Virtual Aging Brain (v1.0.0)

Lavanga, M.; Stumme, J.; Yalcinkaya, B. H.; Fousek, J.; Jockwitz, C.; Sheheitli, H.; Bittner, N.; Hashemi, M.; Petkoski, S.; Caspers, S.; Jirsa, V.

Overview

DOI: [10.25493/SVZE-Y7H](https://doi.org/10.25493/SVZE-Y7H)

Custodians: [Fousek, J.](#)

How to cite

License: [The MIT license](#)

Study targets:  
[Homo sapiens](#)

Get model

The Virtual Ageing Brain is a mechanistic model linking changes in structural connectivity and brain function to address the inter-individual variability in decline of cognitive abilities during healthy ageing. At the core of the VAB is a dynamical brain network model informed by individual brain imaging data (structural whole-brain connectivity), and a connectivity mask selecting interhemispheric connections is used to define the age-related changes to the structure. This model can be then

Model scope:  
[network: whole brain](#)

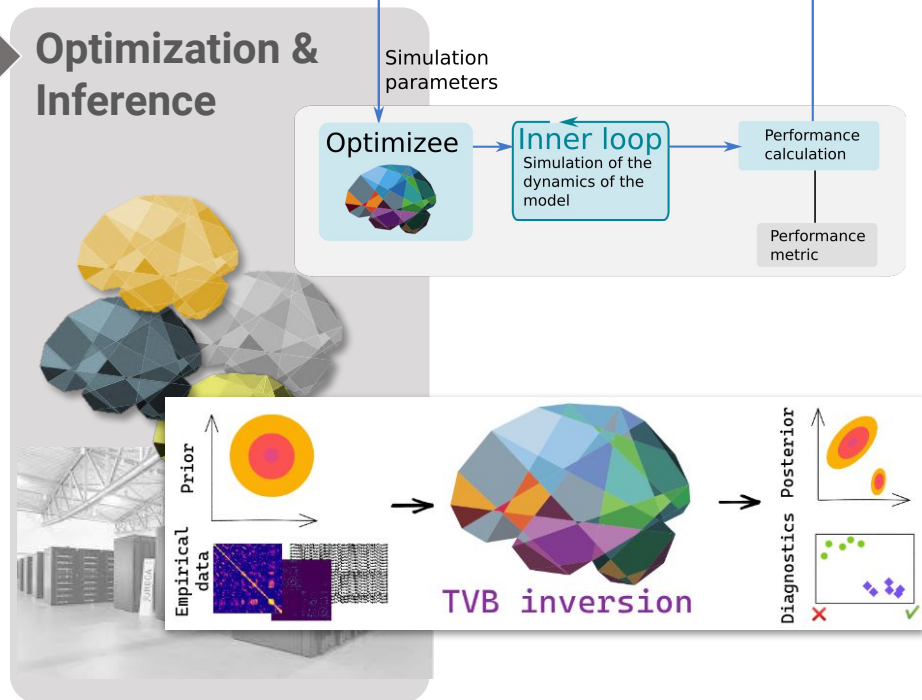
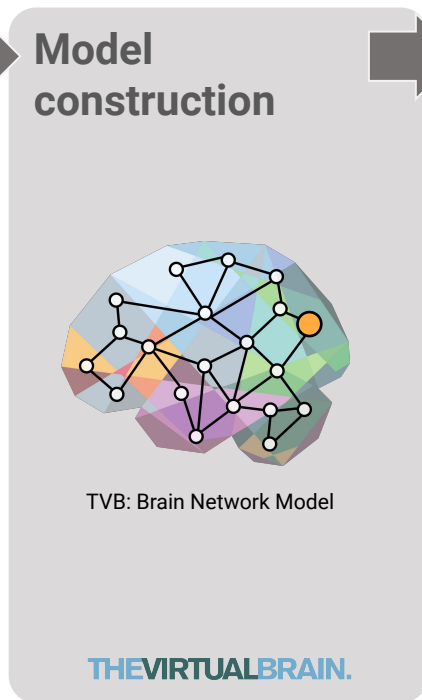
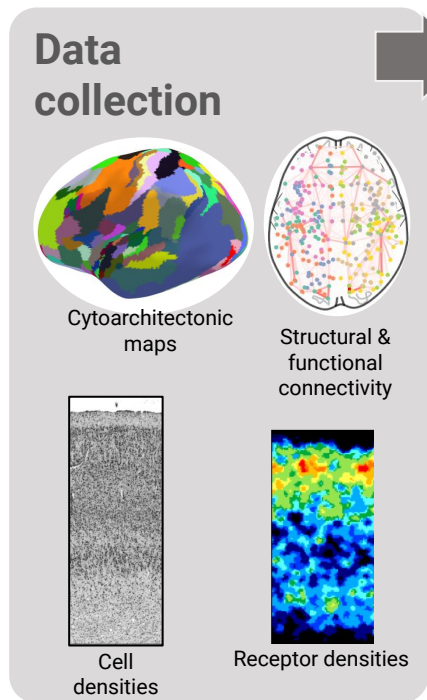
Publications

Abstraction level:  
[population modelling: neural mass](#)

Related resources

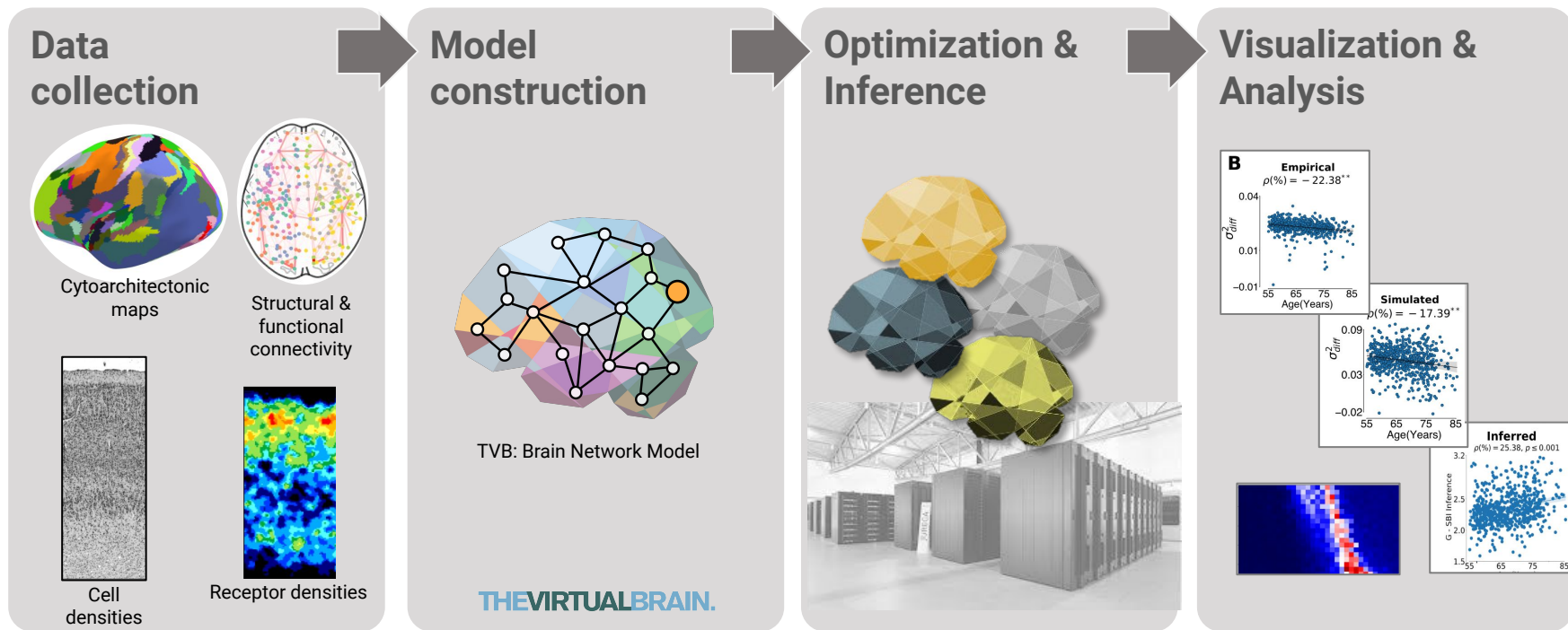
Functional data features

# Showcase 1 - Workflow

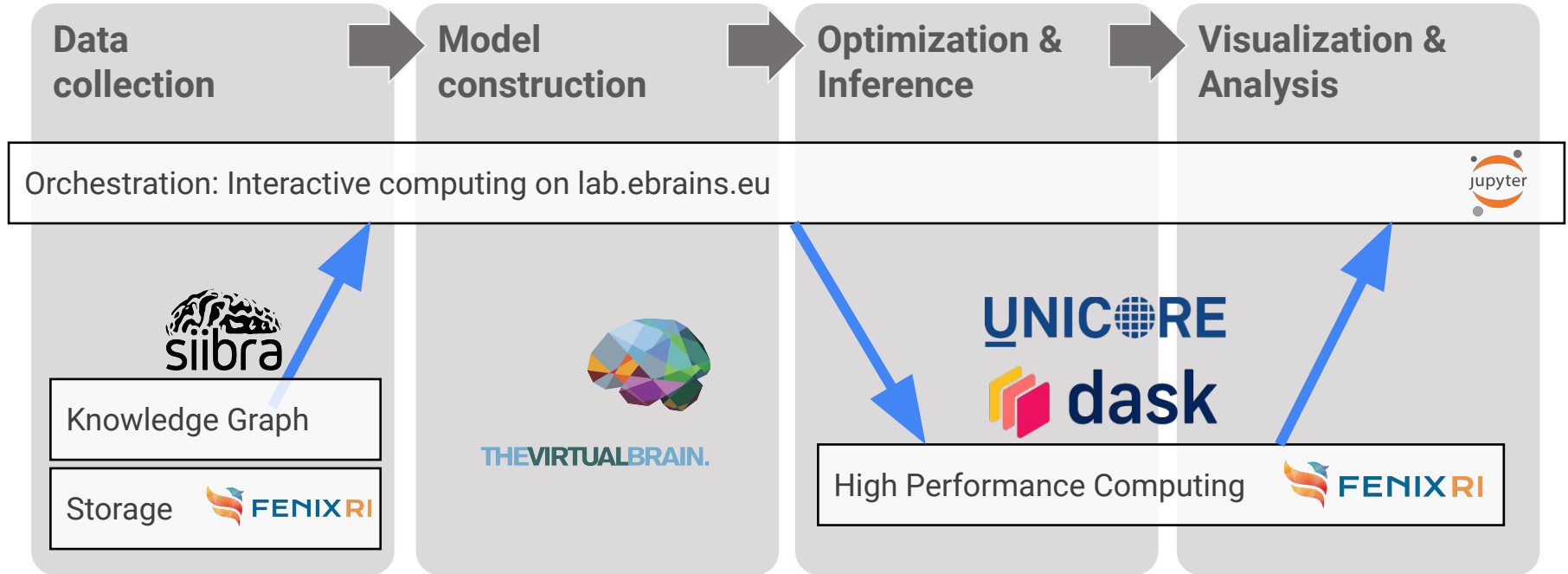




# Showcase 1 - Workflow



# Showcase 1: A scaffold for interactive computing with EBRAINS data & services



Show  
code

Data  
collec

Orchestr

Know

Storage



```
1_TV_B_First_steps.ipynb
```

Visualize our simulation

And finally, we can look at the results of our simulation in terms of time series.

```
[ ]: sim = simulator.Simulator(
    model=models.Generic2Doscillator(a=np.array([0.5])),
    connectivity=conn,
    coupling=coupling.Linear(a=np.array([0.0126])),
    integrator=integrators.HeunDeterministic(dt=0.5),
    monitors={
        monitors.TemporalAverage(period=1.0),
        monitors.Bold(period=500),
    },
    simulation_length=60e3, # 1 minute simulation
).configure()

(tavg_time, tavg_data), (hold_time, bold_data) = sim.run()
...
...
...

```

Raw Neuronal Activity

```
2_TV_B_Modelling_Epilepsy X
```

```
[48]: # Initialise the Simulator.
sim = simulator.Simulator(model=epi,
    connectivity=con,
    conduction_speed=np.float(con
    coupling=con_coupling,
    integrator=heunint,
    initial_conditions=init_cond,
    monitors=what_to_watch)

sim.configure()
...
...
[49]: ((tavg, tavg), (tseeg, seeg)) = sim.run(simulation_length
...
...
[51]: # Normalize the time series to have nice plots.
tavg /= (np.max(tavg,0) - np.min(tavg,0))
tavg -= np.mean(tavg, 0)
tseeg /= (np.max(tseeg,0) - np.min(tseeg, 0))
tseeg -= np.mean(tseeg, 0)
...
...

```

Epileptogenic Network time series

```
2_TV_B_Modelling_Epilepsy X
```

Output View

beta: 1.00  
gamma: 1.00  
V: 1.00  
W: 0.00  
X axis: V  
Y axis: W  
Mode: 0

Show trajectory

&



High Performance Computing

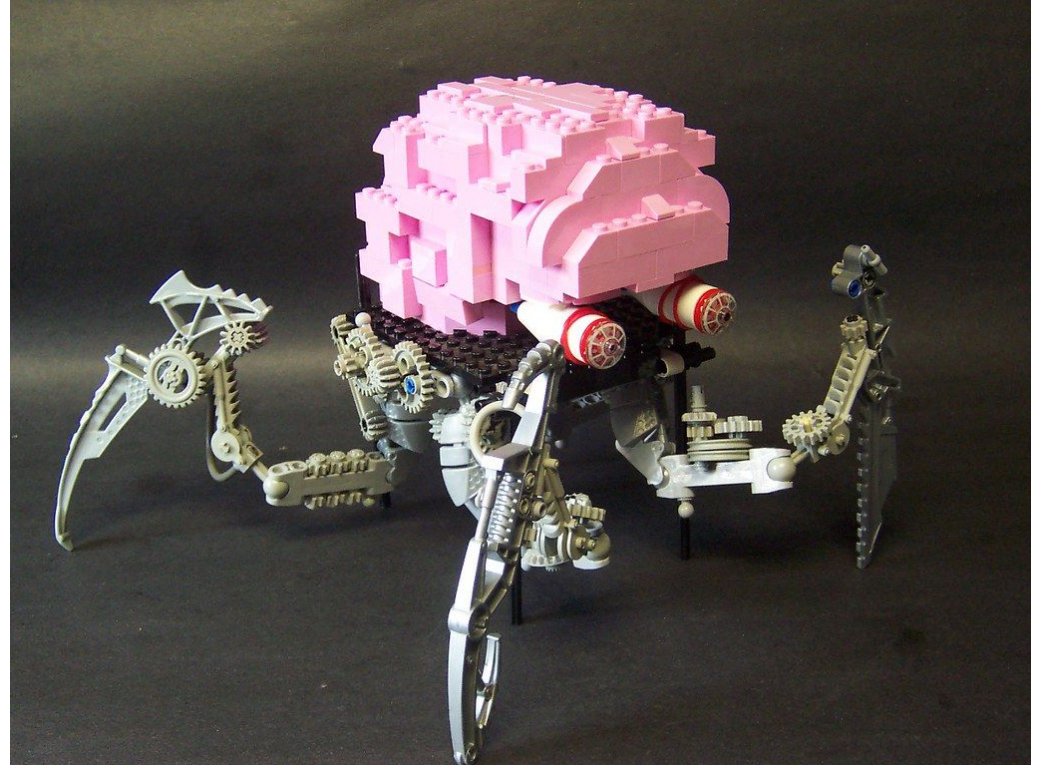


**Reusable** 

Reusable 



Reusable 





Thank you!