EBRAINS Germany

On EBRAINS

EBRAINS (European Brain Research Infrastructures) is a **digital research infrastructure** that combines neuroscience and medicine with brain-inspired AI and computer technology. The EBRAINS research infrastructure emerged from the European Human Brain Project (HBP).

EBRAINS was included in the roadmap of the European Strategy Forum for Research Infrastructures (ESFRI) in 2021 and is coordinated by the EBRAINS AISBL (Association International Sans But Lucratif), based in Brussels. In total, services are provided across Europe via 11 national 'nodes'. **EBRAINS Germany**, the German node with currently 9 partner institutions, was formally founded in December 2023 with the signing of a cooperation agreement. The partnership is coordinated by Forschungszentrum Jülich.

Partner institutions of EBRAINS Germany (as of July 2024):

JÜLICH Forschungszentrum

Universität Heidelberg Zukunft seit 1386

CHARITÉ Universitätsmedizin Berlin

HITS Heidelberg Institute for Theoretical Studies

zi Zentralinstitut für Seelische Gesundheit

Universität Hamburg Der Forschung | Der Lehre | Der Bildung

RWTH AACHEN UNIVERSITY

Technische Universität Chemnitz

Bernstein Network Computational Neuroscience

General overview:

- EBRAINS is a highly networked, digital research environment.
- EBRAINS enables co-design and cross-cutting approaches to complex, scientific questions of our time.
- EBRAINS addresses reproducibility in science by offering open and FAIR data research with collaboratively tested software solutions and methods as well as curated data and services.
- EBRAINS' modular structure enables customised applications, offers targeted extensions, high reproducibility and the flexibility to integrate new tools and services.

EBRAINS Germany

The scientific focus of EBRAINS Germany is in the areas of neuromedicine, brain atlases, neuromorphic computing, artificial intelligence, robotics, simulation technologies, high-performance computing and basic neuroscience research.

The freely accessible tools and services that the German partner institutions already offer via the EBRAINS research infrastructure include:

Atlases: 3D maps of the brain for navigating and analysing complex data, which are scalable, interoperable and big data-capable using the siibra toolsuite.

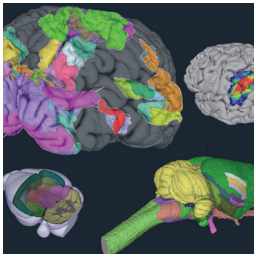
Medical analytics: Privacy-compliant searching, sharing and working with sensitive clinical data. The Health Data Cloud enables the processing of human digital twins.

Modelling and simulation: Creation of computer models of the brain, simulation of brain activity in healthy and diseased brains, investigation of behaviour and function. The service 'The Virtual Brain' enables the patient-specific simulation of so-called digital twins.

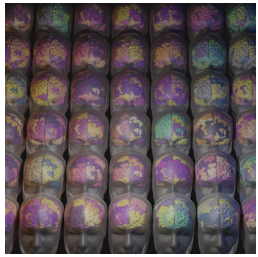
Computer infrastructure: Access to high-performance computing (HPC) systems (including access to and preparation of the user community for exascale computing) and the world's largest neuromorphic systems, BrainScaleS and SpiNNaker.

FAIR Data: Search and exchange of data, models & software.

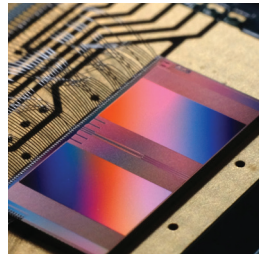
Collaborative digital platform: Design and development of services and tools through community contributions, ensuring operation and user support.



Brain atlases are 3D maps of the brain for navigating and analysing complex data.



'The Virtual Brain' enables the patient-specific simulation of so-called digital twins.



Access the world's largest neuromorphic systems, BrainScaleS and SpiNNaker.

User community

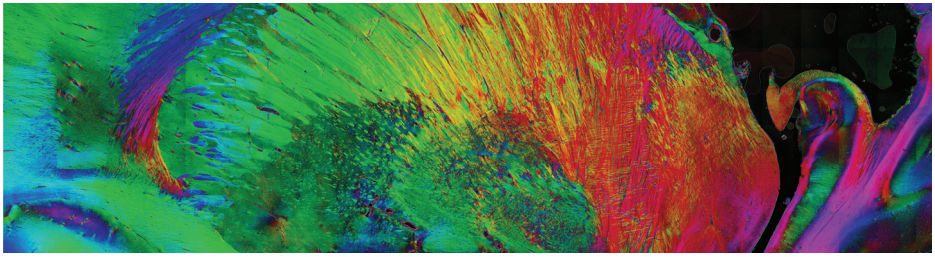
EBRAINS Germany plays a key role in establishing and maintaining a unique user community. This is done in close cooperation with the Bernstein Network Computational Neuroscience (https://bernstein-network.de/en/). Various working groups within EBRAINS Germany combine the expertise of institutions and researchers distributed across the country. The topic-specific working groups are open to all interested individuals, regardless of whether their institution is already a partner in the German node.

Transfer to industry and society

EBRAINS accelerates progress from basic research to medical and technical applications, e.g., in AI: application of foundation models to research data; transfer of neural mechanisms and cognitive functions such as perception and decision-making to AI and neuromorphic technologies.

Education and training

A key success factor is that EBRAINS Germany provides extensive training opportunities for both young and experienced researchers at universities, research institutions and in industry, enhancing their skills in the use of digital tools and data and providing access to computing infrastructures. With the new EduBrains training program, EBRAINS Germany is already making a significant contribution to training a new generation of researchers in future-oriented fields such as AI, robotics, data science and computing, who will also have a high level of expertise in neuroscience and medicine.



Detail of a human brain section showing the architecture of fibres, revealed by 3D polarised light imaging.

(Inter)national networking

EBRAINS Germany is actively shaping the future development of the EBRAINS services according to the specific needs of the German research communities. National and international interdisciplinary networking is strengthened, and new opportunities for collaboration within the EBRAINS Germany consortium arise through participation in various committees and working groups dedicated to specific scientific and technological topics as well as to the consolidation and further development of the research infrastructure.

Map of EBRAINS Germany

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