

Deliverable 5.1

# Brain research infrastructure landscape and integration report

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EBRAINS



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## Table of Abbreviations

<b>Abbreviation</b>	<b>Full name</b>
AI	Artificial Intelligence
ATMP	Advanced Therapy Medicinal Products
BBMRI	Biobanking and Biomolecular Resources Research Infrastructure
CSA	Coordination and Support Action
EATRIS	European Infrastructure for Translational Medicine
EBRAINS	European Brain Research Infrastructure
ECRIN	European Clinical Research Infrastructure Network
EHDS	European Health Data Space
ELIXIR	European Life Sciences Infrastructure for Biological Information
ELSI	Ethical Legal and Social Implications
EOSC	European Open Science Cloud
EPBH	European Partnership for Brain Health
ERIC	European Research Infrastructure Consortium
ESFRI	European Strategy Forum for Research Infrastructures
EU	European Union
EuroHPC	European High-Performance Computing Joint Undertaking
FAIR	Findable, Accessible, Interoperable, and Reusable
GDPR	General Data Protection Regulation
HADEA	European Health and Digital Executive Agency
HBP	Human Brain Project
INCF	International Neuroinformatics Coordinating Facility
ISO	International Organization for Standardization
OECD	Organisation for Economic Co-operation and Development
OPENSREEN	European Infrastructure of Open Screening Platforms for Chemical Biology
RI	Research Infrastructure

## 1. Objectives and Definitions

As exemplified by the ESFRI landscape analysis<sup>1</sup>, the description and analysis provided in this document are intended to give an overview of the Research Infrastructures (RIs), which may serve Brain Health research and related activities in Europe and beyond. As a starting point, we need to clearly define what a research infrastructure is. We use here the ESFRI definition:

*Research infrastructures are facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields. These include major equipment or sets of instruments, knowledge-related facilities such as collections, archives or scientific data infrastructures.*

Two essential principles extend this definition for our analysis. First, these infrastructures must deliver transnational services and tools, extending beyond local facility access. Second, they must serve the broader neuroscience health and research community.

Thus, this report identifies the main RIs providing transnational access for brain research in Europe and beyond, offering an overview of the global landscape relevant to brain health research. The goal here is to develop a comprehensive approach for optimal utilisation, further development, and cooperation among RIs in the field of brain science. It also serves as a tool to pinpoint potential critical gaps in the current framework.

This report also paves the way for D5.3, which is to develop solutions to facilitate the broad sharing of brain health data in the upcoming European Health Data Space (EHDS).

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<sup>1</sup> ESFRI. (2024). ESFRI Landscape Analysis 2024. European Strategy Forum on Research Infrastructures. Retrieved from <https://landscape2024.esfri.eu/>

## 2. Description of the Major International RI Landscape

### 2.1 Europe and the European Strategy Forum for Research Infrastructures (ESFRI)

In Europe, the RI landscape has just been the subject of an extensive review as part of ESFRI Landscape Analysis 2024. This document paves the way for a more specific analysis of the various research areas concerned, such as brain health and neuroscience. We, therefore, reproduce here the main analyses, conclusions and suggestions of this well-documented and precise report, supplementing them with aspects that are more specific to our field of research and action and extending it to infrastructures outside of Europe.

As far as European RIs are concerned, it should be reminded that the European infrastructure ecosystem has been substantially reorganised around two key developments: the creation of a sustainable, advanced European computing infrastructure through the EuroHPC initiative and the launch of the European Open Science Cloud (EOSC), aimed at establishing a European Data Space for science, research, and innovation, supported by multiple data providers and pan-European infrastructure, with a strong digital component (e-infrastructures).

### 2.2 Major European RIs of Importance for Brain Sciences

The description of the activities of the European RIs is essentially taken from the ESFRI Roadmap 2024.

- a. **EBRAINS** aims to develop a digital platform for brain research and neuroscience as an outcome of the Human Brain Project (HBP), a flagship research initiative focused on studying the human brain and developing new technologies and approaches for brain research. EBRAINS seeks to create a collaborative and integrated platform connecting researchers, data, and computational tools to advance our understanding of the brain and its functions. The platform is designed to facilitate data sharing, analysis, and modelling across different disciplines and research areas related to neuroscience, with FAIR data, Atlases, Modelling and Simulation, Computing infrastructure, Medical analytics, and Collaborative platform.
- b. **ELIXIR** enables researchers to access and analyse life science data (including brain research data). It aims to improve the value and impact of life science research on public health, the environment, and the economy. It develops ways for researchers across Europe to access, store, transfer and analyse large amounts of life science data. It identifies key data resources across Europe and supports the linkages between data and literature, e.g., by making it easier to move from a scientific paper to the dataset on which the paper was based, and provides ways for researchers to find the best software to analyse their data. It

establishes Europe-wide standards that can be used to describe life science data. This makes different data sets easier to compare and analyse. It helps develop communities, standards, databases and tools in selected life science domains.

- c. OPENSREEN** provides access to high-capacity screening platforms needed to develop novel molecular tool compounds and early therapeutic candidate molecules. This RI also provides access to high-throughput screening platforms and medicinal chemistry services. EU-OPENSREEN ERIC can contribute collections of drug-like small molecules for the identification of initial 'hit' compounds against a defined target. The identified compounds can then be chemically optimised regarding selectivity and potency into lead compounds through medicinal chemical services.
- d. Euro-Biolmaging** provides access to imaging technologies in biological and biomedical sciences to perform research on single cells and biomedical imaging technologies for studies in animals, plants, and human subjects. This is achieved through access to cutting-edge instrumentation at various levels of resolution. These include light microscopy, multimodal correlative microscopy, super-resolution microscopy, cryo-electron microscopy, and tomography, as well as imaging performed on ex vivo materials, plants, animals, and humans.
- e. EATRIS** gives access to state-of-the-art technologies and approaches for therapeutic preclinical validation, especially in the innovative field of Advanced Therapy Medicinal Products (ATMP), including gene therapy, cell therapy, and tissue engineering. This RI offers platforms capable of tackling several aspects of translational medicine, among which can be listed: the validation and development of biomarkers for the prevention, diagnosis and prognostic assessment of disease as well as for the prediction of therapy response; cutting-edge translational imaging facilities with a full range of high-end multimodal imaging techniques and advanced image analysis; a Small Molecules platform for the pre-clinical and clinical development of drug candidates; and lastly a Vaccines, Inflammation and Immune Monitoring platform which covers the entire vaccine development and production pipeline.
- f. INFRAFRONTIER** gives access to animal facilities and phenotyping services to properly characterise models of diseases. This RI offers the generation of customised mammalian models (mice and rats) using a variety of technologies, as well as access to first-line systemic phenotypic analysis covering a wide range of physiological functions. All provided services and activities are carried out in an internationally standardised way and follow strict quality control standards to ensure data reliability and the reproducibility of results. The phenotyping data are deeply annotated and cross-linked to corresponding data sets from

other model organisms and human patients. Specialised phenotyping services in specific disease areas, such as modules for in-depth metabolic phenotyping, behavioural phenotyping, or immuno-phenotyping, are also available through this RI. Finally, through the nodes of the European Mouse Mutant Archive, mouse mutants relevant to biomedical research are made available to the scientific community.

- g. ECRIN** provides the services and tools for the preparation, funding application, implementation, and management of multinational, high-quality, transparent clinical trials in all medical domains for academics and SMEs. The offered services include clinical operations, data centre certification, and infrastructure development projects. ECRIN ERIC tools allow researchers to facilitate the identification of clinical trial objects and objectives, data sharing and access to regulatory and methodological designs. ECRIN ERIC tools include the Adaptive Platform Trial Toolbox, the Paediatric Tools, and the Rare Diseases Clinical Trials Toolbox. Regulatory and ethical issues are also addressed and supported. The services and tools provided by ECRIN ERIC overcome the lack of infrastructures to support investigator-initiated clinical trials at affordable costs and the fragmentation and poor interoperability of the national clinical research approaches, thus contributing to creating a common approach at the European level. This is critical to promoting investigators' initial clinical trials that respond to healthcare problems that could not be of interest to companies.
- h. BBMRI** gives access to quality-defined biobanks and biomolecular resources in an ethical and GDPR-compliant way, which aims to facilitate biomedical research and improve public health through the responsible and sustainable use of biobanking and biomolecular resources. Its service portfolio includes findability and discovery of data and biospecimens, as well as related services of biobanks and biomolecular resources. The search for and access to biological samples and biomolecular resources is supported by effective IT common services. The BBMRI-ERIC services also contribute to the standardisation of biobank operations and the development of international ISO standards. Additionally, BBMRI-ERIC has played a pivotal role in originating FAIR-Health principles, combining FAIR principles with quality reproducibility and privacy aspects. The provision of the Ethical Legal and Social Implication Services (ELSI) is strategic for medical-oriented research. The ELSI support the community with guidance on hard and soft law (e.g., GDPR, Oviedo Convention) and provide a platform for knowledge exchange on citizen engagement, vulnerability of research participants, data protection, or incidental findings to address the particularities of research on or with humans. These types of services are implemented mainly within the BBMRI-ERIC activities.

## 2.3 Large International Initiatives to Support Brain Health and Research

Outside Europe, there are also a number of initiatives aimed at pooling services and tools for the development of neuroscience, with the aim of achieving sufficient critical mass in terms of technological resources and human skills. There is also a clear shift towards the digitalisation of science and medicine. These initiatives can be divided into several groups, considering that no structures outside Europe are truly equivalent to the RIs. We don't pretend to be exhaustive here, but being representative of the overall trend worldwide. Short descriptions and links to the corresponding websites are provided in the tables added as "Annex A: International Brain Research Initiatives and Organisations".

### 2.3.1 Large Brain Research Initiatives Organised at a National Level with International Dimension

Such initiatives have, overall, the same goal, namely to develop a national research strategy for brain and mental health research by unifying researchers and physicians from the academic and private sectors, research funding agencies, patient organisations, and stakeholders under a single umbrella, and also to leverage specific funds to tackle the challenge of human brain health. They include:

- Brain Initiative (USA)
- China Brain Project
- Brain/Mind Beyond (Japan)
- Korean Brain Initiative
- Canadian Brain Research Strategy

### 2.3.2 Platforms and Organizations Providing Resources for Neuroscience and Brain Health

- International Neuroinformatics Coordinating Facility (INCF) (European)
- Deep South (Australia)
- Allen Institute for Brain Science (USA)
- UK biobank
- Human Connectome (USA)

### 2.3.3 Large Neuroscience Institutes

Many countries worldwide have large structures dedicated to brain health research, including clinical research. Examples are the Neurocenter Finland, the Brain Institute in Paris, the Neuroscience Institute in Cape Town, and the Brain Intelligence Centre in China, to cite only a few. Most of these centres also develop facilities that are accessible to a wide range of scientists and used for large neuroscience or brain health projects.

## 3. Analysis of Complementarities and Gaps in European RIs

To delineate service complementarities, overlaps and gaps, we have thoroughly analysed the services, tools, roles and offerings of the European RIs, based on their presentation in the ESFRI roadmap document, complemented by searches in the respective websites.

### 3.1. Complementarities and Synergies

The complementarities and synergies between the European RIs are presented here first and grouped under three main topics:

- **Data:** Synergies exist between **EBRAINS, Euro-Bioimaging, BBMRI and ELIXIR** since ELIXIR's data standards and interoperability protocols could enhance EBRAINS' neuroscience data-sharing capabilities, enabling better integration across life sciences and cross-disciplinary research. Euro-BioImaging's imaging capabilities can be used to generate high-quality brain imaging data for EBRAINS, which can then integrate this data into its modelling and analytics tools, advancing brain mapping and neuroimaging studies. BBMRI's biobank data could be integrated into ELIXIR and EBRAINS's data management systems, leveraging their standards for broader accessibility and interoperability. This can help create comprehensive datasets that combine genetic, clinical, and biomolecular information.
- **Preclinical studies and Models:** There are synergies between **Euro-BioImaging, EBRAINS and INFRAFRONTIER** since INFRAFRONTIER's animal models can benefit from Euro-BioImaging's advanced imaging platforms and brain-specific modelling tools at EBRAINS, enhancing the phenotypic analysis of disease models. Together, they enable in-depth investigations at molecular, cellular, and systemic levels.
- **Clinical and therapeutic research:** Complementary specialisations of RI such as **OPENSREEN, EATRIS, EBRAINS, ECRIN, and INFRAFRONTIER** are beneficial for the development of biomarkers and new treatments. OPENSREEN can contribute initial "hit" compounds, which EATRIS can further develop, validate, and take through preclinical and early clinical stages, creating a seamless pipeline from discovery to validation. In addition, EATRIS can utilise INFRAFRONTIER's animal models to validate biomarkers or drug candidates in vivo before clinical trials, creating a pipeline from preclinical validation through to early clinical development. BBMRI's biobanks can supply well-characterized biospecimens for ECRIN-supported clinical trials, while ECRIN's infrastructure enables these biospecimens to be tested across multiple countries in standardised and ethical ways. EBRAINS can provide neuroscience-specific tools and data that can be used in ECRIN-supported clinical trials focused on

neurological conditions, enhancing the quality and depth of clinical research in the brain sciences.

In a nutshell, the comprehensive and wise use of the European RIs should provide integrated paths to good practice in brain research:

- **Data Sharing and Interoperability:** Multiple RIs (e.g., ELIXIR, EBRAINS, BBMRI, Euro-Biolmaging) focus on FAIR data and standards, allowing for easier data integration across disciplines. Nevertheless, data integration, storage, and handling remain the major challenges for the future of RIs, and this statement goes far beyond brain research.
- **Translational Research Pipeline:** RIs like OPENSREEN, EATRIS, ECRIN and INFRAFRONTIER could form a complementary pipeline from clinical data to compound discovery to preclinical and clinical validation, supporting an integrated development cycle for therapies at large.
- **Ethics and Compliance:** BBMRI's expertise in ethical and legal aspects complements ECRIN's clinical trial infrastructure, ensuring compliance across research stages involving human biospecimens or participants. Infrastructures such as EBRAINS should benefit from this expertise.

These complementarities underscore the strength of these RIs as a cohesive European ecosystem, allowing for interdisciplinary collaboration and comprehensive research support across the life sciences.

## 3.2. Gap Analysis

Here's an outline for a gap analysis for brain health research based on the provided descriptions of the European Research Infrastructures (RIs):

**a. EBRAINS:** Potential challenges in scaling data-sharing and interoperability beyond neuroscience.

**b. ELIXIR:** Limited access to clinical trials or translational research resources and potential overlap with other RIs in data standards could cause integration challenges.

**c. OPENSREEN ERIC:** Limited support for post-discovery stages such as clinical trials and regulatory compliance. It does not cover non-molecular biology areas, restricting the scope for certain biomedical applications.

**d. Euro-Biolmaging ERIC:** Limited integration with data analysis and computational modelling tools.

**e. EATRIS ERIC:** Limited focus on basic research, which might hinder foundational discoveries and challenges in harmonising standards for emerging therapies across countries.

**f. INFRAFRONTIER:** Limited direct support for human-focused clinical trials, lack of coverage for non-animal model systems and limited cross-RI integration for translational steps.

**g. ECRIN ERIC:** Focus on clinical trials might limit collaboration with preclinical research. The RI could benefit from enhanced integration with biobanking or imaging infrastructures for comprehensive clinical trial design.

**h. BBMRI-ERIC:** Limited integration with computational and data analysis tools. It also lacks direct support for advanced therapeutic development stages, which could enhance its translational impact.

#### Cross-Infrastructure Gaps

- **Interoperability:** Each RI has developed unique standards and tools, which may lead to challenges in integration and data interoperability.
- **Data Sharing:** While most RIs support data sharing, unified data-sharing policies and platforms across RIs would enhance collaboration.
- **Translational Gaps:** Several RIs are focused on either basic research or clinical stages, and there are fewer resources for bridging the translational research gap.
- **Ethical and Legal Compliance:** Each RI addresses these aspects independently, but a unified framework across RIs could simplify compliance.

## 4. Recommendations

Based on the above analysis and policy documents (e.g., OECD - "Optimising the Operation and Use of National Research Infrastructures"<sup>2</sup>), we tentatively provide here a series of recommendations for optimising the use, integration, and effectiveness of the European (RIs) within the upcoming partnership framework.

### 1. Enhance Data Interoperability and Standards Alignment Across RIs

Establishing a central coordinating body or working group involving representatives from each RI to define shared data standards, ontologies, and APIs will greatly facilitate interoperability. Indeed, many RIs, such as EBRAINS, ELIXIR, and BBMRI, focus on data sharing and FAIR principles, yet each has unique standards. Harmonising these will enhance cross-RI data usage, allowing seamless integration and comprehensive multi-domain analysis. Developing a common data-sharing protocol that builds on existing FAIR principles will be a nice asset to reach faster the "European Health Data Space" that will support cross-referencing datasets and improve accessibility.

### 2. Develop a Centralised Platform for Resource Discovery and Access

Many RIs have valuable resources and tools, but researchers may not be aware of all the available options. A centralised portal allowing researchers to search for resources, tools, and data across multiple RIs would increase accessibility and foster cross-RI collaboration.

### 3. Improve Cross-RI Training Programs for Fostering Multi-Disciplinary Skills

Multi-disciplinary skills, including the capacity to use digital tools, are increasingly critical in life sciences. It would be extremely useful to develop joint training programs across RIs to enhance researcher proficiency in multiple disciplines, especially where skills are complementary (e.g., data standards, computational tools, clinical trial methodologies). A well-rounded researcher base can maximise the infrastructure by understanding how to leverage resources across RIs.

This could be done by creating joint training modules covering data standards (ELIXIR and EBRAINS), imaging techniques (Euro-BioImaging and INFRAFRONTIER), and clinical trial design (ECRIN and EATRIS). Additionally, fellowships or exchange programs could be established for researchers to gain experience in multiple RIs. Annual conferences or workshop series to showcase successful cross-RI collaborations and share knowledge can also be proposed.

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<sup>2</sup> OECD. (2020). Optimising the Operation and Use of National Research Infrastructures. OECD Science, Technology and Industry Policy Papers, No. 91, OECD Publishing, Paris. <https://doi.org/10.1787/7cc876f7-en>

#### 4. Integrate Ethical and Regulatory Support Across Clinical and Preclinical Research

In this respect, BBMRI's ethical, legal, and social implications (ELSI) services should be extended to other RIs like ECRIN, EATRIS, and INFRAFRONTIER to support a unified framework for ethical compliance. Indeed, most RIs manage ethical issues independently, leading to potential inconsistencies and challenges when projects span multiple infrastructures. BBMRI's expertise in ethical compliance, particularly regarding GDPR, biobanking, and data protection, would benefit these other RIs in creating a cohesive ethical landscape. It could be useful to create an ELSI working group to continuously review ethical guidelines in response to new challenges, such as advanced therapies and AI-driven research.

#### 5. Establish Pilot Projects to Test and Refine Integrated Workflows

A good way of convincing users of the added value of RIs would be to launch a series of pilot projects that span multiple RIs to identify and resolve any practical challenges in cross-infrastructure workflows. Testing the integration recommendations in real-world research projects will provide insights into logistical and operational challenges, allowing for workflow refinement. For this, it would be necessary to identify high-impact, cross-disciplinary research projects as pilot candidates, such as a project on neurodegenerative disease that could benefit from EBRAINS, EATRIS, and Euro-BioImaging.

#### 6. Foster RI development and collaboration through specific funding mechanisms

Funding limitations often restrict researchers to one RI. Dedicated funding for cross-RI projects would incentivise collaboration and support more ambitious, multidisciplinary studies. The EPBH will work with European funding agencies to develop grants specifically for projects involving collaboration across multiple RIs.

#### 7. Develop Long-Term Strategies for Emerging Technology Integration

It would be very useful to create a joint strategic plan across RIs to assess and incorporate emerging technologies like AI, machine learning, and advanced bioinformatics. Indeed, emerging technologies can enhance the capabilities of each RI, especially for data analysis, clinical trials, and modeling. A coordinated approach ensures that new technology is adopted uniformly and effectively. This will probably require the existence of a technology foresight committee to regularly assess advancements and recommend potential applications within each RI.

#### 8. Enhance Access to Imaging and Computational Resources for Cross-Disciplinary Research

In a more specific fashion, it will be useful to foster closer integration between Euro-BioImaging, EBRAINS, and INFRAFRONTIER to enable cross-disciplinary use of imaging, modelling, and computational tools. Indeed, each of these RIs brings unique imaging and computational analysis tools that could be more widely leveraged. For example, Euro-BioImaging's imaging platforms could complement EBRAINS' brain data analysis, and INFRAFRONTIER's phenotyping could benefit from imaging capabilities.

These recommendations are designed to help European RIs maximise their potential through integration, shared resources, and cross-disciplinary support in neuroscience. By implementing these steps, these infrastructures can foster a more collaborative and comprehensive research ecosystem that drives innovation in brain health research in Europe.

## Annex A: International Brain Research Initiatives and Organisations

### Large National Brain Research Initiatives

Initiative	Country/ Region	Description	Website
Brain Initiative	USA	The BRAIN (Brain Research Through Advancing Innovative Neurotechnologies) Initiative is a U.S. National Institutes of Health program that aims to revolutionize our understanding of the human brain through the development and application of innovative technologies. Its primary goal is to improve how we treat, prevent, and cure brain disorders. The initiative coordinates research across 10 NIH institutes and centers, focusing on diverse areas including cell mapping, neural circuits, monitoring brain activity, and developing interventional tools. With a total investment of approximately 4 billion dollars from 2014 to 2024. <sup>3</sup>	<a href="https://braininitiative.nih.gov">https://braininitiative.nih.gov</a>
China Brain Project	China	The China Brain Project is a national research initiative focused on neuroscience research and applications. The project structure combines basic research on neural circuits with two applied areas: brain disorder treatments and artificial intelligence development. Launched as part of China's 13th Five-Year Plan, the project received 3.1 billion yuan in funding as of 2021. Research activities include studies using non-human primate models and clinical research involving brain disorders. <sup>4</sup>	No website
Brain/MINDS Beyond	Japan	Brain/MINDS Beyond is a Japanese international research program launched in 2018. The initiative aims to study brain circuits, psychiatric and neurological disorders, and develop AI-based technologies through	<a href="https://brainminds-beyond.jp/">https://brainminds-beyond.jp/</a>

<sup>3</sup> BRAIN Initiative Scientific Advancements: [https://braininitiative.nih.gov/sites/default/files/documents/brain\\_initiative\\_scientific\\_advancements\\_508c.pdf](https://braininitiative.nih.gov/sites/default/files/documents/brain_initiative_scientific_advancements_508c.pdf)

<sup>4</sup> Yuan, K., Zhao, H., Zhang, Y., Gong, Y., Liu, X., & Lu, L. (2022). Progress of the China brain project. *Med. Rev.* 2(3): 213-215.

		international collaboration. The program works alongside other Japanese brain research projects (SRPBS and Brain/MINDS) and coordinates with international brain research initiatives. The research focuses on comparative studies between human and non-human primates, brain imaging analysis, and development of AI technologies for brain science.	
Korean Brain Initiative	South Korea	The Korea Brain Initiative, launched in 2016, marks South Korea's strategic entry into advanced neuroscience research. This comprehensive program combines innovative brain mapping with practical medical applications to advance our understanding of neural function and treat neurological disorders. Through collaboration between research institutions, universities, and industry partners, the initiative develops breakthrough treatments while building a robust neuroscience ecosystem. The program exemplifies Korea's commitment to scientific leadership, bridging laboratory discoveries with clinical applications to address pressing challenges in brain health. <sup>5</sup>	<a href="https://www.kbri.re.kr/new/pages_eng/main/">https://www.kbri.re.kr/new/pages_eng/main/</a>
Canadian Brain Research Strategy	Canada	The Canadian Brain Research Strategy represents a nationwide initiative to advance brain and mental health research through coordinated efforts across the country. Launched to address the growing impact of brain conditions affecting one in five Canadians, this comprehensive strategy aims to unite Canada's neuroscience expertise while establishing a Canadian Brain Research Initiative. The program emphasizes the critical need for coordinated research spanning the entire lifespan, leveraging Canada's strengths in both neuroscience and artificial intelligence. Through partnerships between research institutions, health charities, funding agencies, industry, patients, and Indigenous partners, CBRS seeks to position Canada competitively among other G7 nations that have already made substantial investments in brain research. <sup>6</sup>	<a href="https://canadianbrain.ca/">https://canadianbrain.ca/</a>

<sup>5</sup> [https://www.kbri.re.kr/new/pages\\_eng/sub/page.html?mc=3186](https://www.kbri.re.kr/new/pages_eng/sub/page.html?mc=3186)

<sup>6</sup> [https://canadianbrain.ca/wp-content/uploads/2024/03/CBRS\\_2024\\_WhatIsTheCBRS.pdf](https://canadianbrain.ca/wp-content/uploads/2024/03/CBRS_2024_WhatIsTheCBRS.pdf)

### Research Resource Platforms

Platform	Country/ Region	Description	Website
INCF	Europe/Global	The International Neuroinformatics Coordinating Facility (INCF) is a global organization that promotes FAIR (Findable, Accessible, Interoperable, Reusable) data management practices in neuroscience. Its mission focuses on developing standards and best practices to support open and FAIR neuroscience, while working to advance neuroinformatics as a scientific discipline. The organization coordinates global neuroscience infrastructure and provides training opportunities through an international network of scientists, institutions, organizations, and companies active in neuroinformatics, neuroscience, data science, technology, and science policy. In 2022, INCF operated with a total income of approximately 727,000 USD, derived from various sources including membership fees, events, and external projects. <sup>7</sup>	<a href="https://www.incf.org/">https://www.incf.org/</a>
Allen Institute for Brain Science	USA	The Allen Institute for Brain Science is a Seattle-based nonprofit research organization dedicated to unlocking the brain's mysteries. Their scientists work to map and catalogue the various types of brain cells, studying their characteristics and connections with unprecedented detail. Using advanced technologies like RNA sequencing and innovative imaging, their teams are building a comprehensive understanding of how our brains are organized and function. They embrace an open science approach, sharing their discoveries and tools with researchers worldwide to accelerate breakthroughs in neuroscience.	<a href="https://alleninstitute.org/division/brain-science/">https://alleninstitute.org/division/brain-science/</a>
UK Biobank		The UK Biobank is a groundbreaking medical research initiative that maintains a vast database of health and genetic information from half a million UK participants. Since 2006, they've been collecting biological samples and lifestyle data from volunteers aged 40-69, linking this information to their	<a href="https://www.ukbiobank.ac.uk/">https://www.ukbiobank.ac.uk/</a>

<sup>7</sup> INCF 2022 Annual report: [https://www.incf.org/sites/default/files/files/INCF\\_AR2022.pdf](https://www.incf.org/sites/default/files/files/INCF_AR2022.pdf)

		<p>health records. Funded by organizations like the Wellcome Trust and Medical Research Council, and supported by over 200 staff members, they make this invaluable resource available to approved researchers worldwide who are working to advance medical knowledge and improve human health<sup>8</sup>.</p> <p>In 2023, they operated with a total income of £34.5 million against an expenditure of £32.1 million, employing 228 staff members across multiple UK locations.<sup>9</sup></p>	
Human Connectome Project		<p>The Connectome Coordination Facility (CCF) is a research organization established after NIH's 2011 Human Connectome Project to coordinate and harmonize brain connectivity research worldwide. Operating as a central hub for connectome research, the CCF provides key services including data acquisition support through their helpdesk, data harmonization and standardization, data processing, and data distribution through NIH Data Archive. They manage various research initiatives across three main areas: healthy young adult brain studies, brain development and aging studies (ages 0-100), and disease-related studies. The CCF works with multiple research institutions to ensure data quality and compatibility across all connectome studies, though specific budget and operational details are not publicly available.<sup>10</sup></p>	<p><a href="https://www.humanconnectome.org/">https://www.humanconnectome.org/</a></p>

### Large neuroscience institutes

Platform	Country/Region	Description	Website
Neurocenter Finland	Finland	Neurocenter Finland is an organisation dedicated to supporting brain health research in Finland. It works to advance Finnish neuroscience research and development, which is already internationally renowned, by fostering	<a href="https://neurocenterfinland.fi/en/">https://neurocenterfinland.fi/en/</a>

<sup>8</sup> <https://www.ukbiobank.ac.uk/learn-more-about-uk-biobank/about-us>

<sup>9</sup> UK Biobank 2024 Annual report: <https://www.ukbiobank.ac.uk/media/3lmk5qh5/2023-uk-biobank-ltd-accounts-signed-21june24.pdf>

<sup>10</sup> <https://www.humanconnectome.org/ccf-services>

		collaboration among researchers and maintaining focus on brain health initiatives.	
Paris Brain Institute	France	The Paris Brain Institute, established in 2010, is a collaborative, interdisciplinary research center focused on understanding the brain and developing treatments for neurological and psychiatric disorders. Through its unique partnership between public research organisations (CNRS, Inserm and Sorbonne University) and private stakeholders, working with the AP-HP hospital network, the Institute brings together patients, researchers, clinicians, engineers, technicians, business leaders and students working side by side. Annual budget: ~€86.4M (2023) <sup>11</sup>	<a href="https://parisbraininstitute.org/">https://parisbraininstitute.org/</a>
Neuroscience Institute	South Africa	The Neuroscience Institute (NI) is an interdisciplinary research institute at the University of Cape Town, established in 2015. With a vision focused on helping African people achieve their full potential through brain health, the institute works to advance research, training, and advocacy through a network of scientists and clinicians. Located at the Groote Schuur Hospital campus and supported by university, government, and philanthropic funding, it serves as a hub for brain health research and clinical work in Sub-Saharan Africa. The institute is equipped with state-of-the-art facilities including a research neuroimaging suite with 3T MRI and PET-CT capabilities, molecular diagnostics and genomics facilities, a brain bank with an adjacent biorepository, and neuroscience research laboratories. <sup>12</sup>	<a href="https://neuroscience.uct.ac.za/">https://neuroscience.uct.ac.za/</a>
Brain Intelligence Centre	China	The Brain Intelligence Centre (Institute of Neuroscience, ION), established in 1999 and restructured in 2014 as the CAS Center for Excellence in Brain Science and Intelligence Technology, is a Chinese research institution focused on neuroscience research. Operating 50 laboratories, it conducts research across molecular, cellular, developmental, and cognitive neuroscience. The Centre receives funding from the Chinese Academy of Sciences, Ministry of Science and Technology, and Natural Science Foundation of China. Its	<a href="http://english.cebsit.cas.cn/">http://english.cebsit.cas.cn/</a>

<sup>11</sup> Paris Brains Institute 2023 Annual report: <https://parisbraininstitute.org/official-publications>

<sup>12</sup> <https://neuroscience.uct.ac.za/about/neuroscience-africa>

		activities include research programs, graduate student training, and international collaborations through a guest investigator program. <sup>13</sup>	
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<sup>13</sup> <http://english.cebsit.cas.cn/aboution/Introduction/>