



EBRAINS

EBRAINS and the innovation ecosystem

HBP & EBRAINS Bootcamp for Start-ups and Investors

30 May 2023



Co-funded by
the European Union

Three ways in which EBRAINS supports innovation

- By making its data and modelling tools more directly relevant to applied science
- By building alliances – EBRAINS brings different actors together through its membership structure and pro-active approach to creating consortia
- By shaping the ecosystem to make it more innovation-friendly: advocacy and platform-building

Innovation: shifting the possibilities frontier

- Most institutions and companies operate within the possibilities frontier: a function of technology and means of organisation. **The frontier can be pushed out either by new technology or by new means of organisation.** Organisational innovation is just as powerful as the early adoption of new technologies.
- **To move from one possibilities frontier to another possibilities frontier requires radical innovation.** Radical innovation changes ‘the rules of the game’.

Towards outcome-based healthcare

- Current healthcare is largely based on the "fee for service" model with few **incentives to achieve better outcomes**
- Hospitals produce 50 petabytes of data per year (according to WEF). Much of this treasure trove stays in inaccessible reports
- **Well-structured data** is key to delivery of outcomes via insights coming from complex health data
- Efficient data management means **quality can be measured and providers can be rewarded** for achieving good outcomes
- Resulting **transparency** will allow governments to reimburse best treatments in an evidence-based way

EU funding and innovation: two-fold focus

1) Benefiting from horizontal actions with an impact orientation

- Support for frontier research on the basis of excellence
- New knowledge and skills for researchers through mobility and training
- High-quality health care, new tools and technologies as well as innovative health industry (Destinations 4-6 of Horizon Europe Cluster Health)
- Focus on transforming results of excellent research into technologies / products

2) Developing domain-specific actions focused on brain health

Fostering patient engagement in research

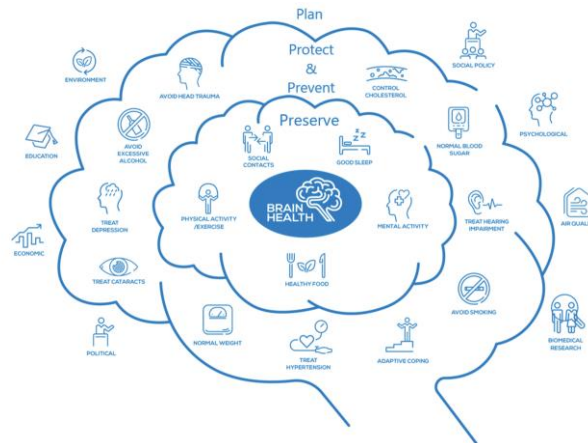
- Patient involvement explicitly encouraged in projects
- Digitalisation empowering patients
- Training patients and patient advocates: IMI-funded projects EUPATI and PARADIGM



Innovation trajectories (1): pivot towards prevention and life-course approach

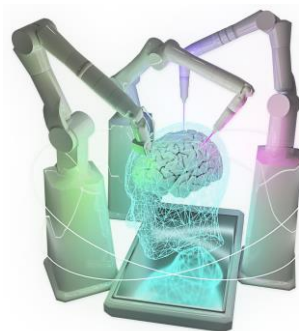
Shift in brain health strategies: towards a "person-centred" approach focused on promotion, prevention, treatment, care and rehabilitation (EAN)

- Earlier and more precise diagnosis
- More clinically effective interventions and monitoring
- Better patient adherence, and reduced hospitalisation



Innovation trajectories (2): AI tools for diagnostics and therapeutics

- Trustworthy AI tools for assessing and predicting the risk of developing a disease and/or the risk of disease progression, taking into account the individuals' (or groups) genotypes, phenotypes, life-style, occupational/environmental stressors and/or socio-economic and behavioural characteristics, as necessary.
- Clinical validation of AI solutions for treatment and care, comparing their benefits versus standard-of-care treatments in non-communicable diseases.
- **TEF-Health project** being launched to offer state-of-the-art facilities for **testing and validation** (making data available, offering clinical expertise, or helping with ethics approval)



Innovation trajectories (3): extracting value from data

- IoT infrastructure for better measurement and prediction of clinical outcomes
- RADAR: open-source platform developed within an IMI project dedicated to several brain disorders (epilepsy, multiple sclerosis, depression and later dementia). Dedicated to the collection and management of IoT data, especially ones collected through wearable devices and smart phones.



Wearable devices to help measure/ predict clinical outcomes in depression, MS & epilepsy (IMI2-RIA, 2016-22, EU: €11 M)

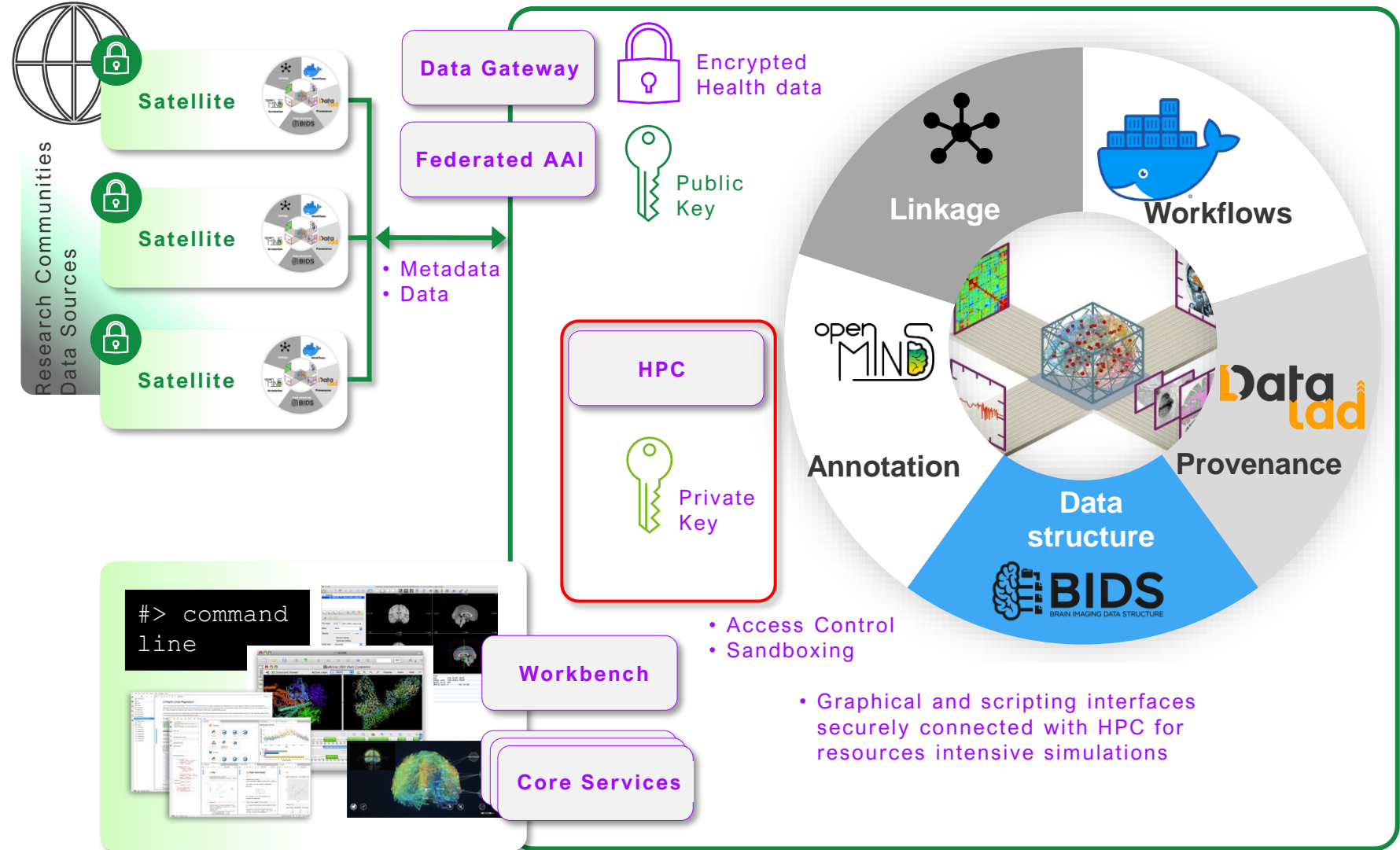
- Innovative tools for Electronic Health Records and patients registries: five projects selected for funding, including RES-Q, in the area of stroke.

Greater accessibility of data: European Health Data Space

- ✓ Projects need to promote better exchange of and access to different types of health data and data generated by DHT and other medical health technologies
- ✓ EHDS will build a common European approach for the use and re-use of health data that complements and builds on the GDPR
- ✓ 15 mandatory categories of data to be defined
- ✓ Data access bodies to be set up to provide access in a secure environment
- ✓ One request to be sufficient for all required data sets in the different countries
- ✓ **Pilot project ongoing** to prepare and test infrastructural support



Interoperable data

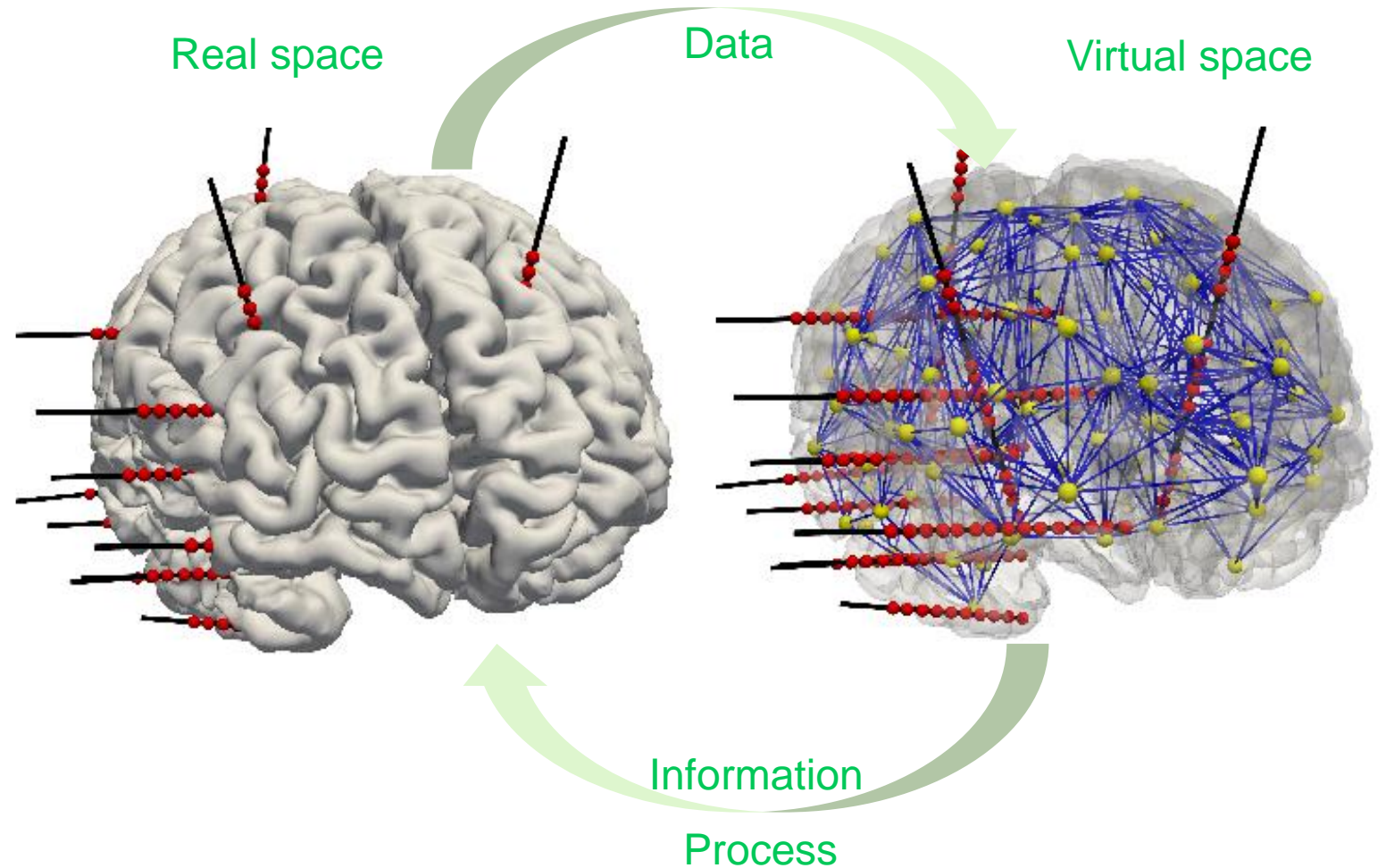


Innovation trajectories (4): digital twins for healthcare

- Development of **digital twins in healthcare** (DTH) has progressed substantially, profiting from advances in science and technology.
- DTH approaches can lead to better prevention, faster and more accurate diagnoses, personalised treatments and care.
- A consolidated European ecosystem around digital twins for healthcare is now emerging that brings together, streamlines, bundles and fosters their use across stakeholders in a coordinated manner, thereby empowering patients and enabling health professionals, pharmaceutical and medical devices industries, SMEs, software developers, academia and regulatory agencies.
- Roll-out of DTH can now be expected towards a comprehensive digital twin of the entire human body, with application also in psychiatry

Integrating neuroscience knowledge for better understanding and translation to brain medicine and technology

Virtual models designed to adequately represent an object or process that **is constrained by data** from its physical counterpart, and that **provides simulation data to guide choices and anticipate their consequences**. Validation tools can then support **knowledge inference**.



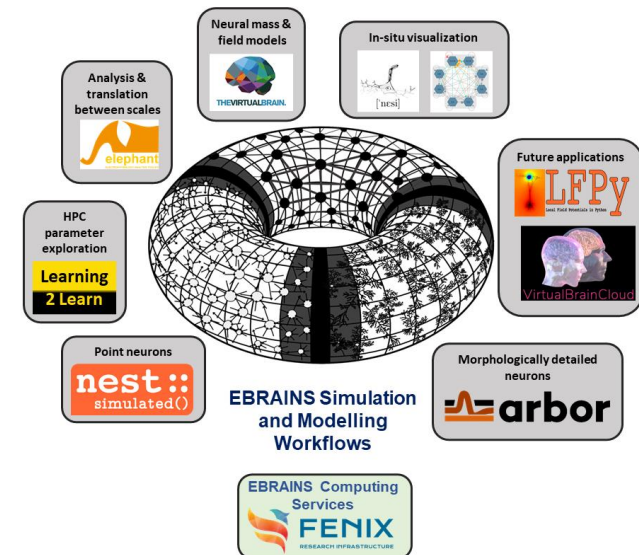
Innovation trajectories (5): personalised management of brain disorders

- Focus on digital health technologies (DHTs) with a demonstrated added value for better management and care and improved experience of patients with brain / mental disorders
- Outcomes to include a reusable digital platform to be used across numerous conditions and scenarios to collect, analyse and integrate diverse multimodal clinical and patient data
- Digital engagement tools for patients, caregivers and other relevant actors such as healthcare professionals, or social workers
- Analytical tools and methods to provide (near) real time feedback on the DHTs



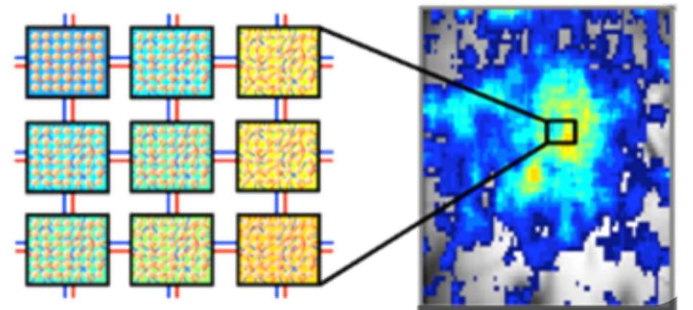
Innovation trajectories (6): precision medicine, including precision psychiatry

- Diagnostic systems based on deeper understanding of the biological basis of disorders
- Scientific work from molecular factors to social determinants to understand behaviour, based on understanding of mechanisms
- RDoC matrix: domains reflecting brain systems in which functioning is impaired and units of analysis



Innovation trajectories (7): neurotechnology medicine

- Significant advances in the management of certain brain diseases have come from neuro-engineering approaches, including through refinement of deep brain stimulation
- Towards European Neurotechnology Medicine Platform with a modular approach where new developments, be it in high channel-count reading and writing, device powering, wireless communication can be configured in various combinations, tailored for different diseases



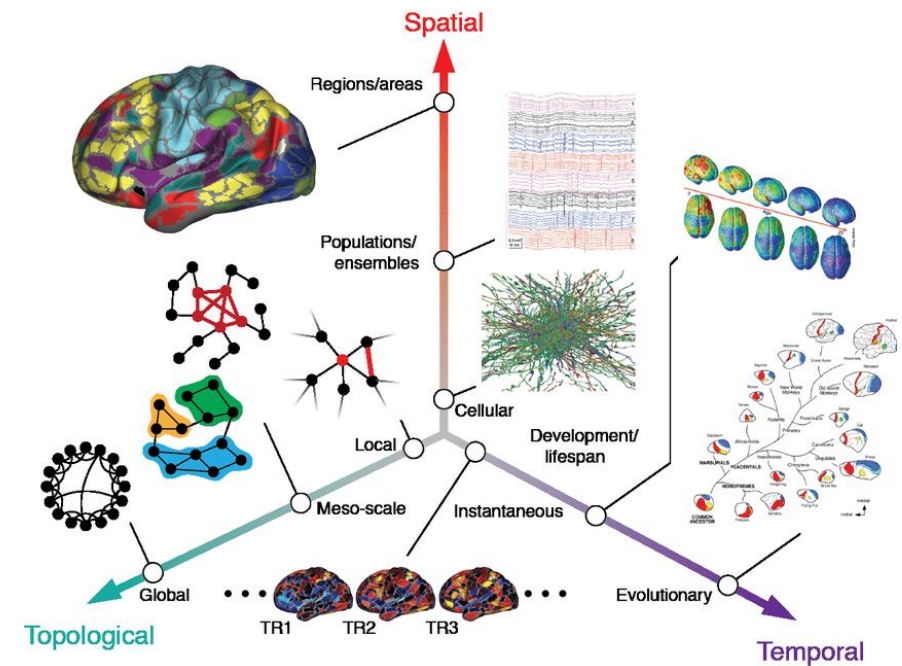
Supporting infrastructure

- ✓ Launch of the European Alliance of Medical Research Infrastructures to offer a one-stop-shop for industry and academia that supports their needs
- ✓ Filling important gaps, including by launching clinical trial networks
- ✓ EBRAINS as a domain-specific Research Infrastructure for brain science

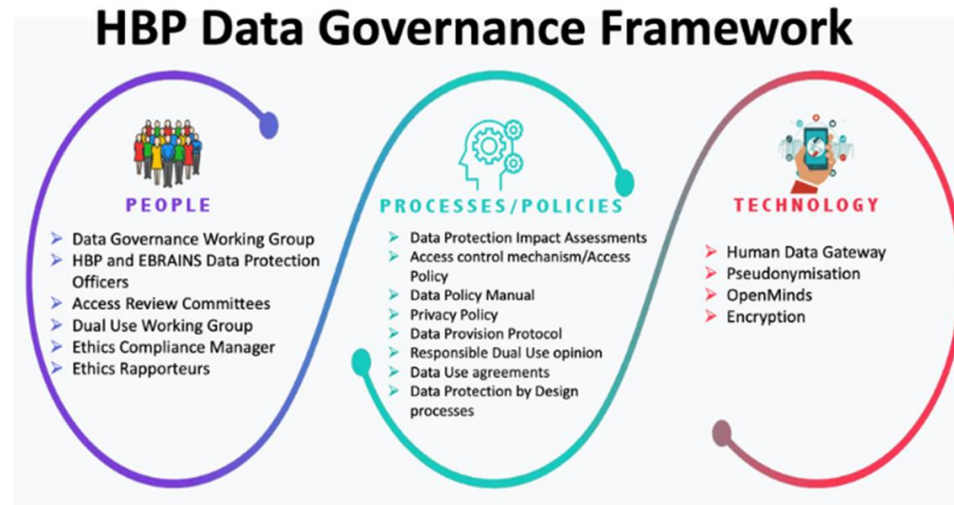


Digital brain research: decoding multiscale organization of the brain

- ✓ Unique richness and complexity with enormous volumes and types of data
- ✓ Multi-level brain organization
- ✓ Challenging scale integration
- ✓ Need to capture brain dynamics
- ✓ Large networks and cohorts



Ethics and Data Governance

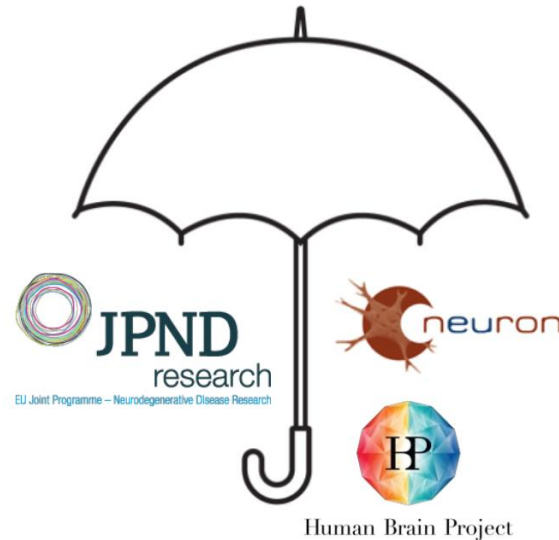


- Data Governance Working Group (DWGW): Supports the advancement of research in the Human Brain Project by developing responsible data governance and data sharing practices for approval, adoption, and implementation by decision-making bodies in the project
- Ethics Rapporteur Programme: Deepening the understanding of potential ethical and social implications of research and other work by the academics, scientist and engineers across the Human Brain Project

What next?

Towards European Partnership on Brain Health

- Bringing all brain research initiatives under one umbrella
- Expected in the 2nd strategic programme of Horizon Europe
- Member State-led initiative and a co-funded partnership
- Strategic Research and Innovation Agenda to be developed



Broader European Brain Ecosystem



Brain Knowledge Hub

Increased commitment to research, pulling of research findings, coordination of research agendas and avoidance of duplication.



Brain Health Partnership

Benefiting from greater predictive power of integrated brain models in personalised medicine
Brain Health Data System



Neurotechnology and Brain-inspired Technology


A network of neurotechnology platforms
Brain-inspired AI Laboratory




EBRAINS

Thank you

 @EBRAINS_EU

 Ebrains_eu

 EBRAINS

 @ebrains_eu

www.ebrains.eu

EBRAINS is an AISBL
(Association Internationale Sans
But Lucratif) under Belgian Law.

Head office
Chaussée de la Hulpe 166
B-1170 Brussels - Belgium

© EBRAINS 2022



Co-funded by
the European Union