HBP Research Infrastructure Service Categories 2020 Summary

Human Brain Project

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1. Service categories of the HBP Research Infrastructure in the next funding period starting 2020

In the next funding period starting in 2020 the HBP Research Infrastructure, called EBRAINS, will comprise three pillars:

Data, Models and Computing Infrastructure. Each will be constructed around a **Work Package (WP)** and **six Service Categories** will be offered.

The Work Packages are:

- WP4: EBRAINS Data Services
- WP5: EBRAINS Modelling Services
- WP6: EBRAINS Computing Services

The Service Categories (SCs) are:

- SC1: Curated and shared data: EBRAINS FAIR data services - neuroscience data publishing
- SC2: Brain atlas services: navigate the brain in 3D - find, contribute and analyse brain data, based on location
- SC3: Brain modelling and simulation workflows: integrated tools to create and investigate models of the brain
- SC4: Closed loop AI and robotics workflows: design, test and implement robotic and AI solutions
- SC5: Medical brain activity data platform: human intracerebral EEG database and analysis service
- SC6: Interactive workflows on HPC or NMC: Europe-wide access to scalable and interactive compute services

1.1 SC1: Curated and shared data: EBRAINS FAIR data services neuroscience data publishing

EBRAINS users will have access to comprehensive tools and services for shared data and computational models. The services provide long term data storage, citable DOIs for data, defined conditions and licenses for use of data, tags to make the data discoverable, and additional metadata and descriptions making the data interpretable and re-usable. EBRAINS users can share their data through the FAIR data service and thereby obtain greater exposure of their research, or access the shared data assets and boost their productivity.

1.2 SC2: Brain atlas services: navigate the brain in 3D - find, contribute, and analyse brain data, based on location

EBRAINS brain atlas services will enable users to work with neuroscientific data according to well-defined 3D locations and regions of the brain, comparable to the way Geographical Information Systems (GIS) organize data in 2D maps of the Earth's surface. The services establish detailed 3D reference atlases of the human, non-human primate, and rodent brains that will be continuously enriched by a growing collection of multi-modal and multi-scale experimental data that are spatially linked in the reference atlases.

1.3 SC3: Brain modelling and simulation workflows: integrated tools to create and investigate models of the brain

EBRAINS integrated workflows at multiple scales allow users to perform complex computational experiments, including estimation of model parameters, model validation and large-scale simulations including analysis and visualization. Workflows addressing the needs of scientists across disciplines and levels of expertise will be accessible through pre-configured web applications or flexible digital notebooks.

1.4 SC4: Closed loop AI and robotics workflows: design, test and implement robotic and AI solutions

The EBRAINS Closed-Loop Neuroscience service allows users to connect neural models (brains) with physical agents (bodies), to address tasks in a physically realistic environment. This allows neuroscientists to investigate model structure and function simultaneously. It affords robotics a direct connection to neuroscience, allowing exploring the use of functional (including spiking) neural models, supported by HPC resources and two different Neuromorphic Computing (NMC) platforms, to address problems in robotics and AI.

1.5 SC5: Medical brain activity data platform: Human intracerebral EEG database and analysis service

The Human Intracerebral EEG data Platform (HIP) is a unique EBRAINS infrastructure that will provide the scientific community access to the largest and most advanced solution worldwide for storing, curating, sharing, and analysing multiscale neurophysiological data directly recorded from the Human brain. By leveraging the capacity to generate new research projects based on human intracerebral EEG (iEEG) data through its large consortium of iEEG expert centres, HIP also provides a key deliverable for future researchers and the EU society.

1.6 SC6: Web-based, interactive workflows on HPC: Europe-wide access to scalable and interactive compute services

High-performance computing (HPC) has become an important aspect in neuroscience research, to process and analyse high-resolution data sets, or for simulating large and complex neuronal network models and analysing the simulation and/or experimentation results. Neuromorphic Computing within HBP complements the HPC-based interactive workflows by providing access to different kinds of specialized hardware systems, targeting aspects of the emulation of spiking network models difficult to approach by standard simulation methods.