Online documentation of Facility Hubs concept, offers and access (D6.1)

HBP Facility Hubs and Fenix

- Physical facilities

- Competence centres providing specialised software support going beyond the High-Level Support-Team (HLST)

- European Institute for Theoretical Neuroscience (EITN)
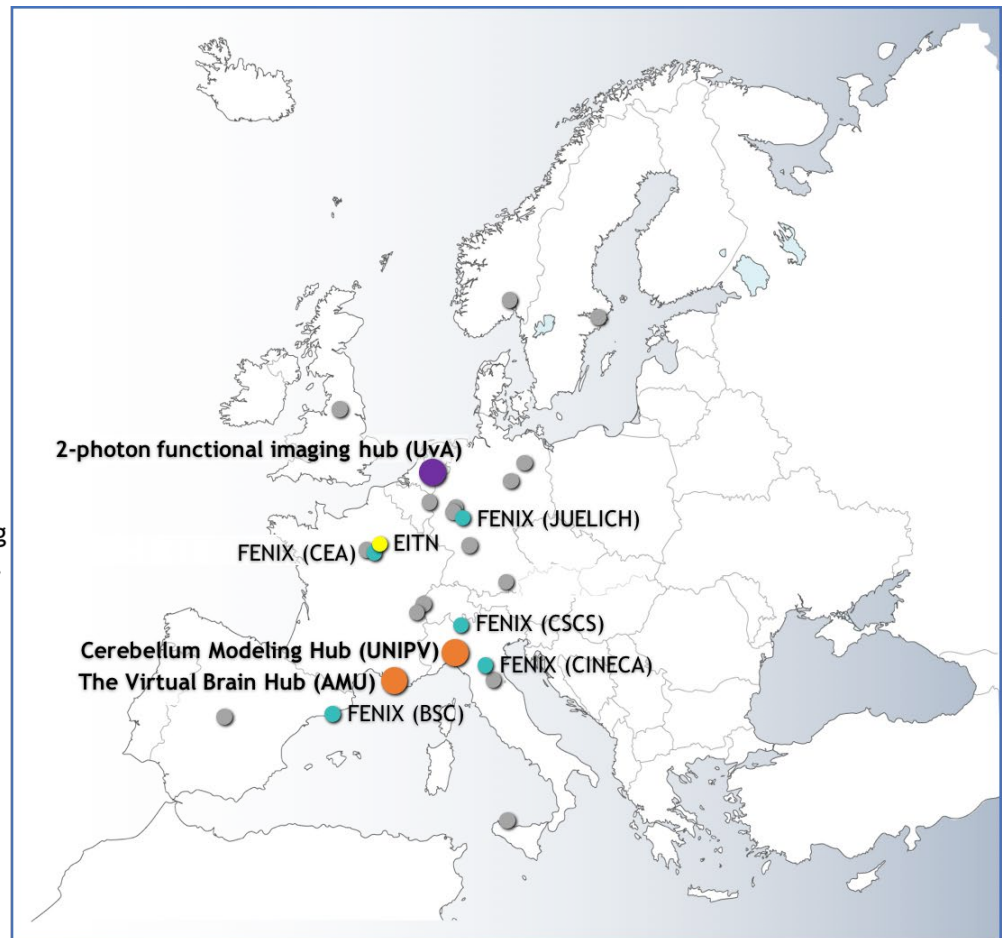
- Fenix partners

Figure 1: HBP Facility Hubs

The large coloured dots indicate the location of the three Facility Hubs. Accessible Facility Hubs can be found on https://www.humanbrainproject.eu/en/collaborate/facility-hubs/

Project Number:	945539	Project Title:	HBP SGA3

Document Title:	Online documentation of Facility Hubs concept, offers and access
Document Filename:	D6.1 (D57) SGA3 M14 ACCEPTED 220520.docx
Deliverable Number:	SGA3 D6.1 (D57)
Deliverable Type:	Websites, patents filing, etc.
Dissemination Level:	PU = Public
Planned Delivery Date:	SGA3 M14 / 31 May 2021
Actual Delivery Date:	SGA3 M14 / 31 May 2021; accepted 20 May 2022
Author(s):	Sabine Helene RULAND, JUELICH (P20)
Compiled by:	Sabine Helene RULAND, JUELICH (P20)
Contributor(s):	Cyriel PENNARTZ, UvA (P98), contributed to Section 5 Egidio D'ANGELO, UNIPV (P70), contributed to Section 5 Viktor JIRSA, AMU (P78), contributed to Section 5 Edith EUAN-DIAZ, EBRAINS (P1), comments to all sections
WP QC Review:	Anna LÜHRS, JUELICH (P20)
WP Leader / Deputy Leader Sign Off:	Thomas LIPPERT, JUELICH (P20)
T7.4 QC Review:	Martin TELEFONT, Annemieke MICHELS, EPFL (P134)
Description in GA:	Public online documentation of the Facility Hub concept, ways how to get access and information about first available pilots.
Abstract:	This Deliverables summarises the concept of the Facility Hubs, how to get access, the terms of usage and gives an overview on the first three Facility Hub pilots.
Keywords:	Facility Hubs, EBRAINS, access, modelling, cerebellum, TVB, functional imaging
Target Users/Readers:	Neuroscientific community, functional neuroimaging community, brain modelling and simulation community, engineers in neurotechnology, clinicians

Table of Contents

Table of Figures

1. Introduction

This document provides an overview of the concept of Facility Hubs, their access and use, as well as the offer by the first three Facility Hub pilots.

Facility Hubs complement the offers of the Research Infrastructure EBRAINS (https://ebrains.eu/), e.g. by giving access to local neuroscientific facilities, providing user support and user-specific development of software available on EBRAINS. They are an important component in building a user community around EBRAINS tools and services to establish EBRAINS as the Research Infrastructure for brain science, medicine and brain-inspired technology.

In May 2021, we have launched the first three Facility Hub pilots. Many more will follow in next two years to establish a world-wide unique network of facilities, competence centres and training opportunities which will support the scientific community and industry to use EBRAINS services, foster collaboration and bundle competences to achieve ground-breaking knowledge and develop cutting-edge technology with a high impact on economy and society.

2. Concept of Facility Hubs

Facility Hubs open up the perspective for users from academia and industry world-wide to use the most advanced, cutting-edge facilities and resources of HBP partners for their own research projects, to start collaborations in this field and to carry out beyond state-of-the-art science.

The HBP offers three types of Facility Hubs:

- Physical facilities (e.g. microscopes)
- Competence centres providing specialised software support going beyond the High-Level Support-Team (HLST)
- the European Institute for Theoretical Neuroscience (EITN)

HBP partners provide these resources as in-kind contributions to the Human Brain Project and EBRAINS and thereby provide academic users access to their facilities without charging costs for usage.

The Fenix infrastructure - which delivers the computational power behind EBRAINS - will support the Facility Hubs by providing access to computing and data resources for data storage, analysis, and simulation, through the five centres of the ICEI project: Barcelona Supercomputing Centre (BSC) in Spain, Commissariat à l'énergie atomique et aux énergies alternatives (CEA) in France, CINECA in Italy, Swiss National Supercomputing Centre (ETHZ-CSCS) in Switzerland, and Jülich Supercomputing Centre (JUELICH-JSC) in Germany.

The first three pilots (see Section 4) of the Facility Hubs are operational and accessible by users since end of May 2021. Many additional hubs are planned to follow in the HBP SGA3 phase.

Further information and available Facility Hubs can be found here: https://www.humanbrainproject.eu/en/collaborate/facility-hubs/

3. Access and Terms of Use

Users from academia and industry world-wide are eligible to apply for access to HBP Facility Hubs.

Getting access:

- Interested users of the Facility Hubs are asked to contact the respective Facility Hub contact for a first discussion on the potential project and support as well as the feasibility. Users must bring their own funding for the project which goes beyond the offer/support by the Facility Hub. Facility Hub support can also be included in applications to calls.

- Users are asked to submit a short project description to the Facility Hub contact using the template provided by the Facility Hub contact, which includes a project summary, complementarities and synergies with the Human Brain project, and the expected outputs. Since most of the Facility Hubs require extensive compute resources (e.g. for simulations or data storage), the Facility Hubs are aligned with the Fenix research infrastructure (https://fenix-ri.eu/). Facility Hubs have applied via ICEI (Interactive Computing E-Infrastructure for the Human Brain Project) for a certain amount of compute and data, resources which they can make available via "wide access" to users of the hub. If users would need more resources than supplied at the Hubs, they would have to submit a request via ICEI (https://fenix-ri.eu/access).

- The respective Facility Hub decides which projects are supported according to its rules and regulations. Criteria for the selection are scientific excellence, impact and contribution to the aims of the Human Brain Project, EBRAINS and the Facility Hub, as well as ethical compliance with the regulations of the Hub.

- Before the project starts, a Usage Agreement is signed. The usage needs to be in agreement with the EBRAINS General Terms of Use and the EBRAINS Access Policy (https://ebrains.eu/terms/ -general-terms-of-use) as well as with the Facility Hub-specific licence and rules. Results (e.g. datasets, software, models) need to be curated in EBRAINS and publications or other communications using results of the project need to acknowledge the Human Brain Project and EBRAINS (and the ICEI project, if any ICEI resources were used).

- Supported projects are offered to become a Partnering Project of the HBP and to enjoy the benefits of an associated HBP Partner (https://www.humanbrainproject.eu/en/about/project-structure/partnering-projects/).

Reporting:

- Users are asked to deliver a short project report by the end of the project according to the template which will be provided by the Facility Hub contact before the project start.

Monitoring:

- To monitor the interest and usage of the Facility Hubs by the community, user requests and outcomes of supported projects are documented and analysed on a yearly basis. This information is only for internal use. Collected data is GDPR compliant.

4.   Facility Hub pilots

The first three Facility Hub pilots are accessible for users: the two-photon functional imaging Hub (Facility Hub type physical facilities), the Cerebellar Modelling Hub, and The Virtual Brain Hub (Facility Hub type competence centres).

4.1   Two-photon functional imaging Hub at Universiteit van Amsterdam

The University of Amsterdam (UvA) harbours one of the largest groups for two-photon *in vivo* neuronal imaging and ensemble recordings in Europe, which is uniquely distinguished by its development of sophisticated behavioural paradigms testing multisensory perception, memory and consciousness, a high level of multidisciplinary integration and technical versatility.

The UvA Facility Hub and Competence Centre offers access to a Leica fast resonant two-photon scanner and high-density ensemble recording setups using Neuropixels and other silicon probe configurations. The core expertise in electrophysiological, optical and behavioural recordings is supplemented by opto- and chemogenetics, large-scale data analysis centred on population decoding and computational modelling. Two-photon imaging and ensemble recordings, both conducted in behaving, task-performing animal models, are illuminating our understanding of how cognitive,

perceptual and motor functions originate from the behaviour of large, cooperating populations of neurons.

The UvA can host medium (2-6 months) or longer (>6 months) term projects for PhD students, postdocs and research staff who need to acquire multiple technical skills and/or want to acquire data for a project. Shorter or remote visits are possible for researchers wanting to learn individual skills related to data analysis. Organising online and on-site courses and webinars for large groups is also possible.

Contact person: Paul MERTENS, p.e.c.mertens@uva.nl

Additional information: https://sils.uva.nl/content/research-groups/cognitive-and-systems-neuroscience/cognitive-and-systems-neuroscience.html

4.2   Cerebellar Modelling Hub at Università di Pavia

The University of Pavia harbours the Cerebellar Modelling Hub, which performs multiscale modelling spanning from neurons and microcircuits to large-scale networks and the whole brain. The Hub leverages on the unique concept of the Brain Scaffold Builder (BSB), a modelling workflow that allows multiscale modelling of neurons, microcircuits, large-scale networks and whole brains. Although initially designed for the cerebellum, BSB can be easily applied to any brain network through customised developments on demand. The BSB supports different modelling platforms and formats and can be applied to neuromorphic hardware, robotic control systems and virtual brain simulators. A special aspect of the Hub is to provide the infrastructure and expertise for multiscale experimental validation of the models in rodents. The Hub is relying on EBRAINS and shares with it a set of highly integrated APIs and several sophisticated model building tools.

The University of Pavia will allow users with different interests, background, and expertise to develop their own computational models and transform them into different kinds of applications. Dedicated community managers will help users through any issue they may have in exploiting the Hub, in arranging the specific development workflows and simulation of interest, or to help in getting the appropriate HPC allocation for the project. Dedicated tutorials and community managers will guide users through all the steps needed to reach their specific goals. The highest impact of this unique installation is expected on engineering and medicine, especially concerning brain-inspired technologies and the investigation and cure of brain diseases.

Contact person: Egidio D'ANGELO, dangelo@unipv.it

Technical assistance: Simona TRITTO (simona.tritto@unipv.it) and Stefano MASOLI (stefano.masoli@unipv.it)

Additional information: https://dangelo.unipv.it/

4.3   The Virtual Brain Hub at Aix-Marseille Université

The university of Marseille harbours the Virtual Brain Hub. The Virtual Brain (TVB) is a full brain network simulation engine, which significantly reduces the gap between computational models and human brain imaging data. The TVB Facility Hub and Competence Centre at Aix-Marseille University provides field-specific expert support for activities linked to the use of TVB (model building, simulation, analysis, validation and model inversion) for students, post docs and researchers in neuroscience, as well as engineers in neurotechnology and clinicians. Training is provided in TVB workshops and through internships. The TVB Facility Hub serves as the first point of contact for domain-specific questions and refers users to other HBP/EBRAINS groups for further assistance as appropriate.

Field-specific expert performance in various domains (high-performance computing, simulation science, brain imaging, neuroscience) is integrated into complex workflows, enabling interoperability of tools within the TVB and EBRAINS eco-system. TVB Facility Hub and Competence Centre provides the user with support in building up an integrated understanding of TVB and adapting the workflows to the user's own needs.

The Facility Hub aims to increase the capacity of neuroscientists to use ICT tools such as TVB and EBRAINS to advance science and enable more efficient translation into clinical applications.

Contact: Viktor JIRSA, viktor.jirsa@univ-amu.fr

Additional information: https://ins-amu.fr, https://www.thevirtualbrain.org

5.   Looking Forward

Following the first three pilots, additional Facility Hubs are planned to follow in the SGA3 phase of HBP. The vision is that a network of Facility Hubs, distributed across Europe, would complement the offers on EBRAINS (https://ebrains.eu/), foster collaboration and excellent, ground-breaking brain research and brain-inspired technology development.

The Facility Hubs are in-kind contributions from HBP Partners to EBRAINS. The resources of the Facility Hubs are part of the national contributions to the Research Infrastructure EBRAINS and an important pillar to ensure a long-term sustainability of EBRAINS beyond the HBP in 2023.