



Human Brain Project

Workshop EBRAINS – a platform for collaboration in digital neuroscience

Partnering projects in HBP and Open Calls in SGA3

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Human Brain Project

[Centro para el Desarrollo Tecnológico Industrial \(CDTI\) Calle del Cid, 4, 28001 Madrid Spain](#)

November 12, 2019, from 9:00 to 18:00

Co-funded by
the European Union



Why now?

Elon Musk's
brain-computer
interface
company raised
\$27 million and
is looking for
plenty more



Why now? Opportunity

Developments in
genomics and
gene therapy

Developments in
microelectronics
and
nanotechnology
for brain
interfacing

Developments in
robotics and
virtual reality

Developments in
Imaging
techniques

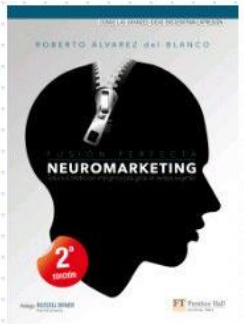
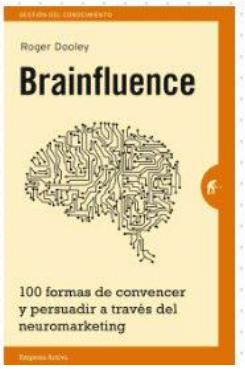
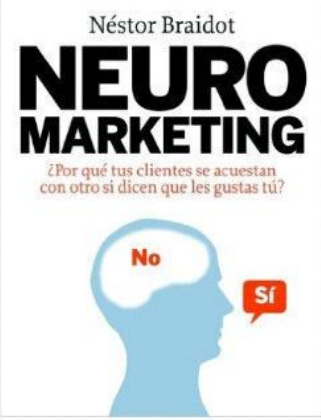
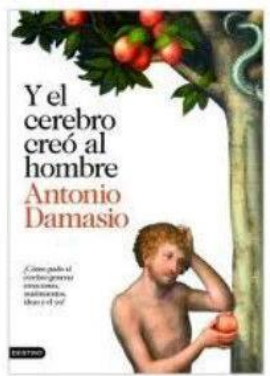
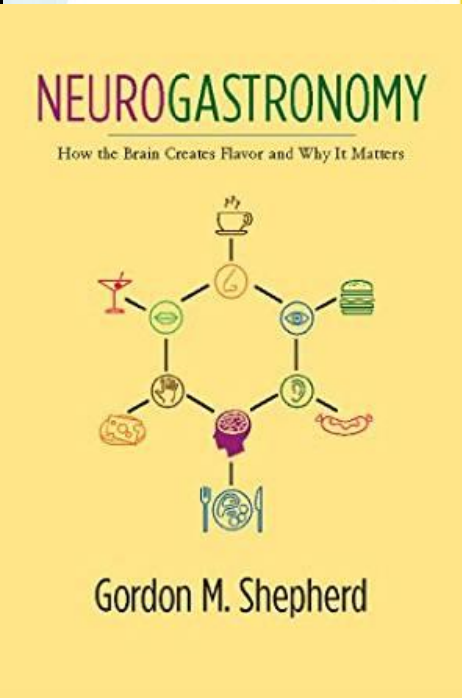
Developments of
new materials
(e.g. graphene)

Developments in
light-controlled
drugs,
optogenetics
and DREADDs

Developments
of
computational
capabilities and
AI

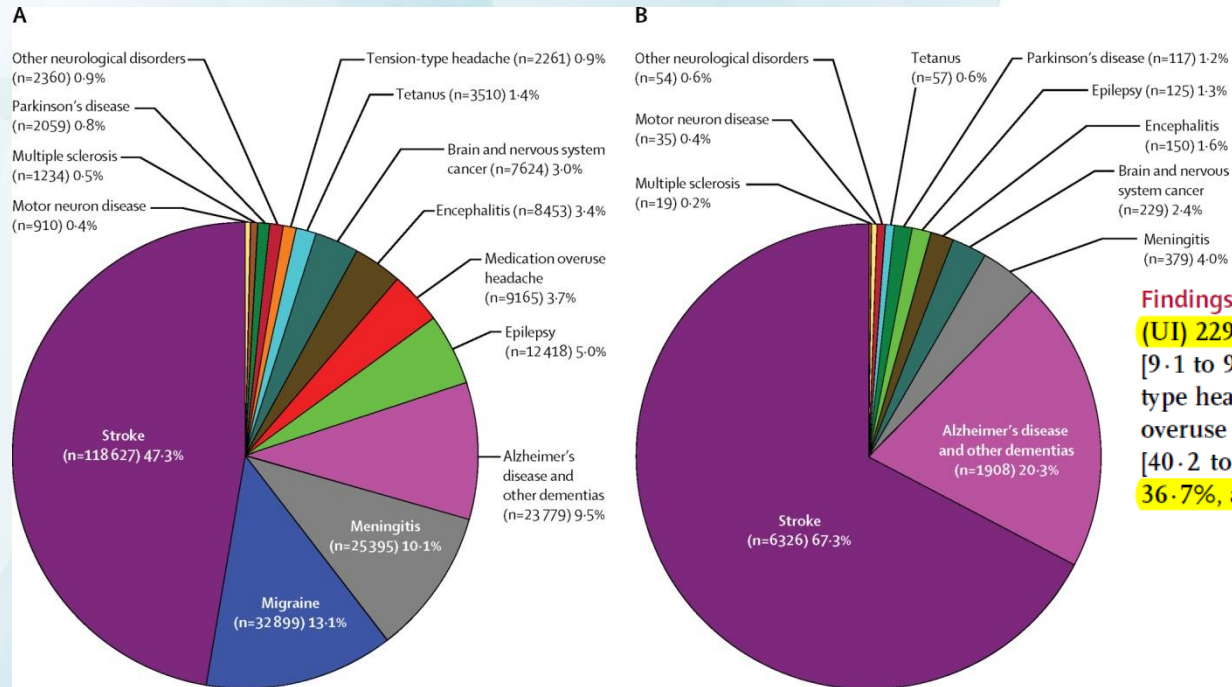


Society looks for brain science...



Neuroethics
Neurojustice...

Why now? Prevalence of neurological / neuropsychiatric diseases. Societal and economic costs.



Global, regional, and national burden of neurological disorders during 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015

GBD 2015 Neurological Disorders Collaborator Group*

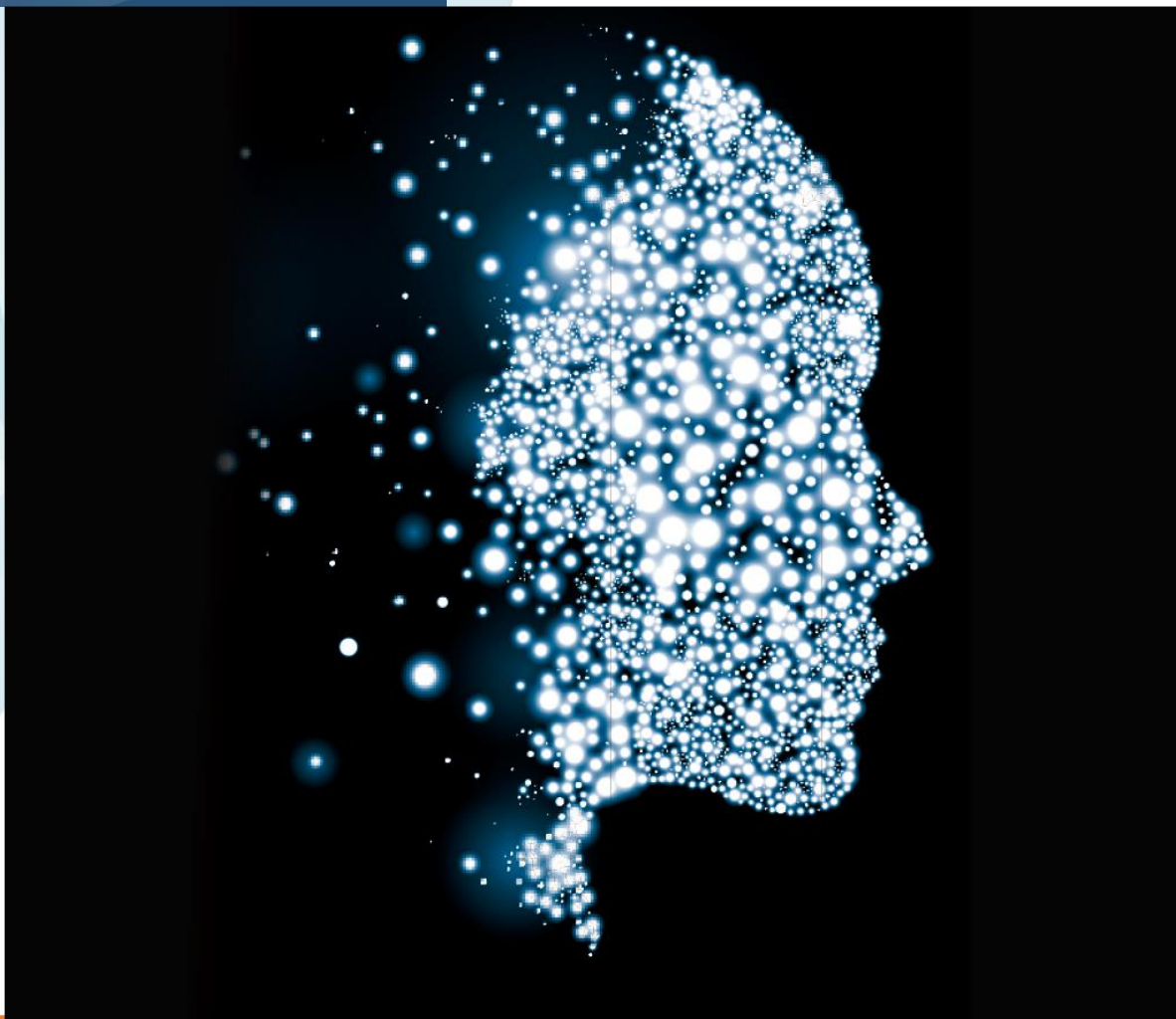
Findings Neurological disorders ranked as the leading cause group of DALYs in 2015 (250.7 [95% uncertainty interval (UI) 229.1 to 274.7] million, comprising 10.2% of global DALYs) and the second-leading cause group of deaths (9.4 [9.1 to 9.7] million), comprising 16.8% of global deaths). The most prevalent neurological disorders were tension-type headache (1505.9 [UI 1337.3 to 1681.6 million cases]), migraine (958.8 [872.1 to 1055.6] million), medication overuse headache (58.5 [50.8 to 67.4 million]), and Alzheimer's disease and other dementias (46.0 [40.2 to 52.7 million]). Between 1990 and 2015, the number of deaths from neurological disorders increased by 36.7%, and the number of DALYs by 7.4%. These increases occurred despite decreases in age-standardised rates of disability-adjusted life-years (DALYs)

Interpretation Neurological disorders are an important cause of disability and death worldwide. Globally, the burden of neurological disorders has increased substantially over the past 25 years because of expanding population numbers and ageing, despite substantial decreases in mortality rates from stroke and communicable neurological disorders.



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Why now?



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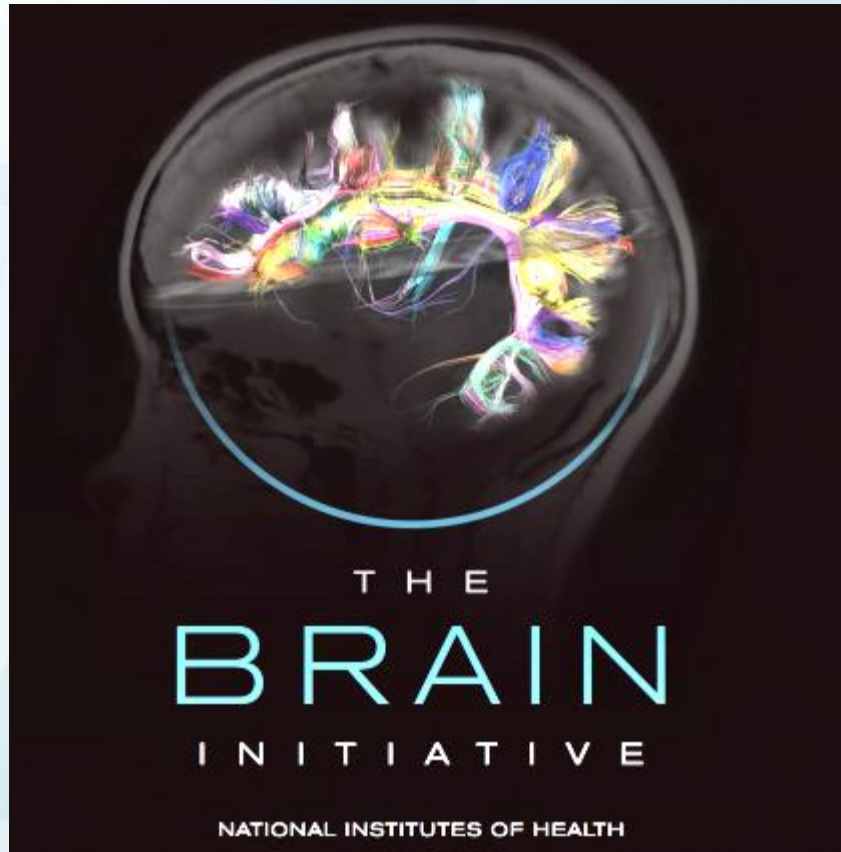
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Why now? Others are doing it



ALLEN INSTITUTE *for*
BRAIN SCIENCE



中国脑计划： 大幕即将拉开

随着人类能够更深刻地认识大脑，那些困扰人类许久的精神类疾病都将找到合适的治疗方法，在人类通向长寿和健康的道路上遇到的最新最大的挑战都将被攻克。
本报记者 刘洋

Necessary co-existence of small groups with large coordinated efforts, in a time when those are feasible
Scientific, Health, Innovation and Economic implications





Human Brain Project

Impact and openness to the community

What is the difference
between partner projects
and open calls?



Impact and openness to the community



Need to have a established frame and then open to others

- ABOUT ▾
- NEWS
- FLAG-ERA CALLS ▾
- FUNDED PROJECTS
- HUMAN BRAIN PROJECT ▾**
- GRAPHENE FLAGSHIP ▾
- FLAGSHIP PILOTS ▾

Human Brain Project



Understanding the human brain can gain profound insights into what makes us human, build revolutionary computing technologies and develop new treatments for brain disorders. ICT developments are bringing these goals within reach for the first time in history.

The [Human Brain Project \(HBP\)](#) is one of the two [FET Flagships](#) selected by the European Commission in 2013 and it aims to make the leap towards understanding the Human Brain. The project has a number of scientific [objectives](#) during its lifespan of 10 years.

The FLAG-ERA Consortium of European research and innovation funding agencies, research councils and ministries jointly works towards creating an environment that enables the coordination of national and regional funding for the [FET Flagships](#).

As such, FLAG-ERA was set up to contribute to the construction of the HBP Flagship, while a dedicated [Liaison Group](#) allows for a direct dialogue between HBP representatives on the one hand and the national research funding agencies gathered by FLAG-ERA on the other hand.

Furthermore, FLAG-ERA makes an inventory of national research projects that are in line with the scientific roadmap developed by HBP and that could play a role as complementary partnering projects.

Finally, FLAG-ERA supports research projects in synergy with HBP by financing competitive transnational partnering projects. Therefore, a dedicated joint transnational call will be launched during the lifespan of the FLAG-ERA project.

[Human Brain Project Website](#)

FLAG ERA Calls

- ▶ [FLAG-ERA Joint Transnational Call \(JTC\) 2015](#)
 - ▶ [JTC 2015 funded projects](#)
- ▶ [FLAG-ERA Joint Transnational Call \(JTC\) 2016](#)
 - ▶ [JTC 2016 funded projects](#)
- ▶ [FLAG-ERA Joint Transnational Call \(JTC\) 2017](#)
 - ▶ [JTC 2017 Funded Projects](#)
- ▶ [FLAG-ERA Joint Transnational Call \(JTC\) 2019](#)

Our funders



Research Council of Lithuania



Human Bra

JTC 2015

— Human Brain Project

Acronym and title	Coordinator	Countries in partnership
CANON : Investigating the canonical organization of neocortical circuits for sensory integration	Conrado A. BOSMAN	<i>NL, FR, HU</i>
CHAMPMouse: CHArting Multi-areal Visual Perception in the Mouse	J. Alexander HEIMEL	<i>NL, BE, ES</i>
FIIND: Ferret Interactive Integrated Neurodevelopment Atlas	Roberto TORO	<i>FR, NL, CA</i>
FUSIMICE: Ultrafast Functional Ultrasound (fUS) Imaging for Highly-Resolved Targeted Mapping of Functional Connectivity in the Awake Mouse Brain	Zsolt LENKEI	<i>FR, BE, HU</i>
MULTI-LATERAL: Multi-level Integrative Analysis of Brain Lateralization for Language	Clyde FRANCKS	<i>NL, ES, FR</i>
SloW-Dyn: Slow Wave Dynamics: from experiments, analysis and models to rhythm restoration	Maria Victoria SANCHEZ-VIVES	<i>ES, FR, IT, US</i>



— HBP (Basic and Applied Research)

Acronym and title	Coordinator	Countries in partnership*
Brainsynch-Hit: The influence of directional interactions in brain networks in predicting cognitive deficits post-stroke	Maurizio Corbetta	IT, FR, NL
CAUSALTOMICS: Causal connectomics subtending oscillatory spread and information flow in the human brain	Antoni Valero-Cabré	FR, ES, RO
CORTICITY: Comparative Investigation of the Cortical Circuits in Mouse, NHP and Human	Henry Kennedy	FR, DE, ES, US, RO
HIPPOPLAST: How rigid and plastic circuits contribute to hippocampal function	Rosa Cossart	FR, ES, HU
MAC-Brain: Developing a Multi-scale account of Attentional Control as the constraining interface between vision and action: A cross-species investigation of relevant neural circuits in the human and macaque Brain	Leonardo Chelazzi	IT, BE, FR
SCALES: Studying Cognitive Activity at two Levels with Simultaneous depth and surface recordings	Christian Bénar	FR, RO, CH





Human Brain Project

JTC 2019

— HBP (Basic and Applied Research)

Acronym and title	Coordinator	Countries in partnership*
DOMINO – Development of cortical multisensory integration mechanisms at micro- and macro- scales during normal and pathophysiological conditions	Umberto Olcese University of Amsterdam	NL, FR, GR, IT
HA-CTion – Hypothalamic histaminergic modulation of brain regions involved in fear memory	Beatrice Passani University of Florence	IT, FR, NL
MILEDI – Multiscale Modelling of Impaired LEarning in Alzheimer's Disease and Innovative Treatments	Ausra Saudargiene Lithuanian University of Health Sciences	LT, FR, IT
MoDeM – The “Motor-way” to Decision-Making: how the motor system drives cue-triggered decisions	Giuseppe de Pellegrino University of Bologna	IT, FR, NL
NeuronsReunited – Neurons reunited: data and software to reconstruct long-range projection neurons, place them in a digital reference brain with high precision, and model their interactions	Paul Tiesinga Radboud University	NL, DE, BE, ES, IT

PrimCorNet – Layer-specific characterization and modeling of fronto-parietal dynamics in primate cortical networks

Thomas Brochier
Institut de Neurosciences de la Timone

FR, DE, GR

SENSEI – Segmentation of Neurons using Standard and Super-Resolution Microscopy

Nicola Vanello
Research Center “E. Piaggio” – University of Pisa

IT, BE, FR

SMART BRAIN – Advanced Morphological Reconstruction of Human Brain Tissue by Multimodal Fusion of Multiscale Optical Imaging Technologies

Jonathan Mapelli
Università degli Studi di Modena e Reggio Emilia

IT, FR, NL

SoundSight – The sight of sound: how vision shapes the development of auditory inputs to the occipital cortex

Christian N Levelt
Netherlands Institute for Neuroscience / KNAW

NL, BE, ES





SloW Dyn:

From experiments, analysis and models to rhythm restoration



The SloW-Dyn Team:



Maria Victoria Sanchez-Vives



Alain Destexhe



Stefano Panzeri



Tommaso Fellin



Ruben Moreno Bote



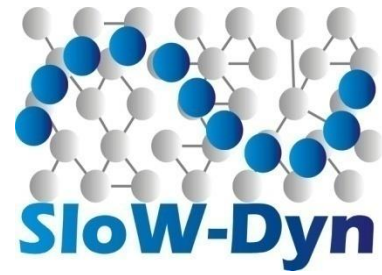
Nicolas Brunel



Mathieu Galtier



Aims of the project



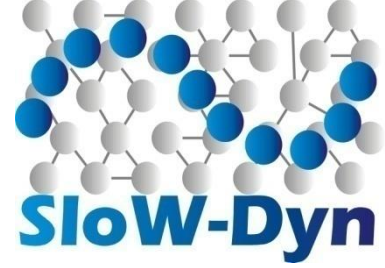
- Data-based model of **slow cortical oscillations and their evolution with age**.
- Multi-scale experimental data.
- Understanding cortical network mechanisms during slow waves associated to:
 - Natural ageing in humans.
 - Associated neurodegenerative diseases.
- Restoration of “young sleep”.
- Reaching general public and large data gathering through commercial partner.



Multi scale approach - Macro

Partner: DREEM/RYTHM

- Miniaturized electronics
- Embedded systems
- Customized dry electrodes
- Bone conduction device
- **Use of close-loop auditory stim for the enhancement of slow waves. “Rejuvenate sleep”**
- Currently 6 EEG channels
- 2 EOG
- 2 EMG
- 1 ECG
- Next: actimeter and oxypulse



OBJECTIVES IN SLOW DYN

- Generation of large sleep data base.
- EEG big data from slow wave sleep of (1000s) of individuals of different ages.
- Achieved through distribution of RYTHM EEG head band.
- Valuable information about the transformation of slow waves during human ageing.

dreem.com

We are on a journey to enhance the quality of life by unlocking the mysteries of the brain.



Open calls

Another Two CEols for HBP's Final Phase Opened

8. Data and models for studying the neural basis of cognition
9. Data and models for the understanding of consciousness

Two More CEol for HBP's Final Phase Opened

6. Visual scene understanding models for robotics use-cases
7. Integration of symbolic processing into cognitive architectures

Calls for which pre-proposal date has closed

Fifth CEol for HBP's Final Phase Opened

5. Cellular Models For Simulation

Four CEols for HBP's Final Phase Opened

1. Validation and Inference
2. Brain atlas and simulation engine adapter construction
3. Whole brain multi-parametric imaging using invasive and non-invasive recordings

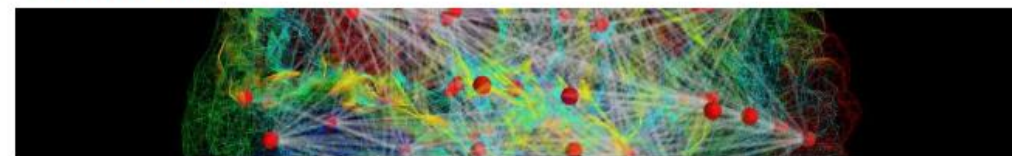
CEol 1: Validation and Inference



The goal of the specific CEol is to attract experts in model validation to independently validate the brain models against available experimental evidence. The budget is EUR 700,000 for 1 proposal. The pre-proposal submission deadline is 04.11.2019 16:00 UTC (17:00 CET). The proposal submission deadline is: 02.12.2019 16:00 UTC (17:00 CET).

All applicants must submit a pre-proposal and the full proposal by the given deadlines. Apply [here](#).

CEol 2: Brain atlas and simulation engine adapter construction



The goal of the specific CEol is to attract experts in computational services related to the informatics integration of Brain Atlas and The Virtual Brain. The budget is EUR 450,000 for 1 proposal. The pre-proposal submission deadline is 04.11.2019 16:00 UTC (17:00 CET). The proposal submission deadline is: 02.12.2019 16:00 UTC (17:00 CET).

All applicants must submit a pre-proposal and the full proposal by the given deadlines. Apply [here](#).

CEol 3: Whole brain multi-parametric imaging using invasive and non-invasive recordings



The goal of the specific CEol is to attract experts in the field of multimodal multiparametric brain imaging across scales. The budget is EUR 450,000 for 1 proposal. The pre-proposal submission deadline is 04.11.2019 16:00 UTC (17:00





Open calls

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Two More CEol for HBP's Final Phase Opened

6. Visual scene understanding models for robotics use-cases

7. Integration of symbolic processing into cognitive architectures

Calls for which pre-proposal date has closed

Fifth CEol for HBP's Final Phase Opened

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Four CEols for HBP's Final Phase Opened

1. Validation and Inference

2. Brain atlas and simulation engine adapter construction

3. Whole brain multi-parametric imaging using invasive and non-invasive recordings

Two Calls For Research Into Biological Learning Networks

CEol 6: Application of visual scene understanding models to robotics use-cases of industrial relevance



This CEol is for Organisations or groups of Organisations interested in applying techniques in visual scene understanding to robotics applications of industrial relevance. The budget is EUR 800,000 for 1 proposal. The pre-proposal submission deadline is 07.11.2019 16:00 UTC (17:00 CET). The proposal submission deadline is: 05.12.2019 16:00 UTC (17:00 CET).

All applicants must submit a pre-proposal and the full proposal by the given deadlines. Apply [here](#).

CEol 7: Integration of symbolic processing into the cognitive architectures



This CEol aims to integrate expertise of neural network modelling of high-level symbolic processing for integration in developed biologically inspired cognitive architectures. The budget is EUR 800,000 for 1 proposal. The pre-proposal submission deadline is 07.11.2019 16:00 UTC (17:00 CET). The proposal submission deadline is: 05.12.2019 16:00 UTC (17:00 CET).

[Centro para el Desarrollo T](#)
November 12, 2019, from





Open calls

Another Two CEols for HBP's Final Phase Opened

8. Data and models for studying the neural basis of cognition

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Two More CEol for HBP's Final Phase Opened

6. Visual scene understanding models for robotics use-cases

7. Integration of symbolic processing into cognitive architectures

Calls for which pre-proposal date has closed

Fifth CEol for HBP's Final Phase Opened

5. Cellular Models For Simulation

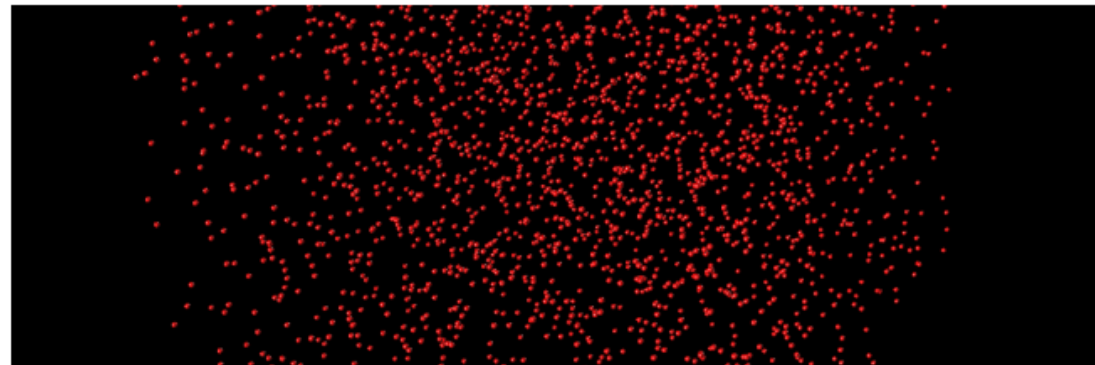
Four CEols for HBP's Final Phase Opened

1. Validation and Inference
2. Brain atlas and simulation engine adapter construction
3. Whole brain multi-parametric imaging using

Open Calls For Which The Pre-Proposal Date Has Now Passed

Fifth CEol for HBP's Final Phase Opened

CEol 5: Cellular Level Models For HPC Simulation Call



A Call for Expression of Interest (CEol) is now open for organisations interested in preparing cellular-level models for portable high-performance computing (HPC) simulation using Arbor. The budget is EUR 900,000 for 2 proposals. The pre-proposal submission deadline is 06.11.2019 16:00 UTC (17:00 CET). The proposal submission deadline is: 04.12.2019 16:00 UTC (17:00 CET).

Other CEols will open soon. Stay tuned!

All applicants must submit a pre-proposal and the full proposal by the given deadlines. Apply [here](#).

Four CEols for HBP's Final Phase Opened

4 Calls for Expression of Interest (CEols) are now open for new projects to directly contribute to the development of the research Infrastructure (EBRAINS) and increase the scope of its application in terms of innovation, neuroscience and clinical research.

The CEols are for external applicants outside the current HBP Consortium or not currently involved in the HBP.

All applicants must submit a pre-proposal and the full proposal by the given deadlines. Apply [here](#).



Thank you

www.humanbrainproject.eu

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