CAJAL BLUE BRAIN PROJECT

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BLUE BRAIN

Restructuring of the Cajal Blue Brain Project

Cajal Blue Brain Project



The origins of this project span back to 2005, when L'École Polytechnique Fédérale de Lausanne (Switzerland) and IBM jointly announced their ambitious project to create a functional model of the brain using IBM's supercomputer, Blue Gene. By the end of 2006, the Blue Brain project had created a model of the neocortical column, the basic functional unit of the brain. However, the objectives defined for the project, within the 10 year period established, meant it had to become an international initiative. This is the context in which the Cajal Blue Brain Project (CBBP), the Spanish contribution to the global project as a whole came into being, led by the Universidad Politécnica de Madrid and the

Consejo Superior de Investigaciones Científicas.

The project is markedly interdisciplinary in nature, requiring the collaboration of scientists from different fields. The long-term objectives of the Cajal Blue Brain can be summarized as follows:

Key Objectives

- To decode the synaptome or detailed map of the synaptic connections of the cortical column and, as a result, reconstruct all its components.
- To give a strong boost to research on the cortical column, exploring in depth current hypotheses about its normal function and dysfunctions (especially Alzheimer's disease).
- To devise new methods to process and analyze the experimental data obtained in the aforementioned research studies.
- To develop computer technology to study neuronal functions using graphics tools and visualization methods.

Other Objectives

- To understand the implication of glial cells and blood vessels in the organization of the cortical column.
- To study the modulation of the functional organization of the cerebral cortex by cortical and subcortical afferent connections.
- To decipher the functional organization of cortical circuits in vitro.
- To simulate *in silico* the activity of the cortical column by means of a supercomputer.

Special points of interest:

• New structure of the CBBP

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Restructuring the Cajal Blue Brain Project

New Structure of the Project

From 2012 the project will be organized as follows:

- Project Director
- Project Manager
- Scientific Blocks:
 - Neuroscience (NS):
 - Module NS1: Neuroscience
 - Neurocomputing (NC): Module NC1: Data Mining Module NC2: Image Processing Module NC3: Visualization Module NC4: Informatics Tools

Governing Bodies

STRATEGIC MANAGEMENT COMMITTEE (SMC):

PROJECT DIRECTOR									
BLOCK	NEUROSCIENCE	NEUROCOMPUTING							
MODULES	Neuroscience	Data Mining	Image Proces- sing	Visualization	Informatics Tools				
REPRESENTA- TIVES	Module coordinator	Module coordinator	Module coordinator	Module coordinator	Module coordinator				

SCIENTIFIC COMMITTEE (SC):

PROJECT DIRECTOR									
		NEUROSCIENCE	NEUROCOMPUTING						
	MODULES	Neuroscience	Data Mining	Image Proces- sing	Visualization	Informatics Tools			
	REPRESENTATI- VES	Representatives NS	Representatives NC1	Representatives NC2	Representati- ves NC3	Representati- ves NC4			
	EXTERNAL REPRESENTATI- VES	Representative 1	Representative 2	Others					

Organigram of the Project





HBP-PS Closure: *The Human Brain Project-Preparatory Study' finished on April.*



The Human Brain Project-Preparatory Study has already finished. Last April the HBP Report was delivered to the EC as committed.

In this report, we argue that the convergence between ICT and biology has reached a point at which it can turn this dream into reality. It was this realization that motivated the authors to launch the Human Brain Project – Preparatory Study (HBP-PS) – a one year EU-funded Coordinating Action in which nearly three hundred experts in neuroscience, medicine and computing came together to develop a new "ICT-accelerated" vision for brain research and its applications. In this report the conclusions of this work are presented.

A new foundation for brain research

The Human Brain Project should pursue four goals, each building on existing work, and acting as a catalyst for new research.

1. **Data**: generate strategically selected data essential to seed brain atlases, build brain models and catalyse contributions from other groups.

2. **Theory**: identify mathematical principles underlying the relationships between different levels of brain organisation and their role in the brain's ability to acquire, represent and store information.

3. **ICT platforms**: provide an integrated system of ICT platforms providing services to neuroscientists, clinical researchers and technology developers that accelerate the pace of their research.

4. **Applications**: develop first draft models and prototype technologies demonstrating how the platforms can be used to produce results with immediate value for basic neuroscience, medicine and computing technology.



HBP NEXT STEPS

HBP Next Steps

HBP-PS Closure













The Cajal Blue Brain Project is hosted by the Universidad Politécnica de Madrid (UPM) in the Scientific and Technological Park of Montegancedo Campus. Computational needs and sup-

port infrastructure required by CajalBBP are provided by two of the Research Centers of the Park, the Centro de Tecnología Biomédica (CTB) and the Centro de Supercomputación y Visualización de Madrid, CeSViMa, which is focused on the massive storage of information, high-performance computing and advanced interactive visualization.

More information: www.ctb.upm.es







