The Human Brain Project in Brief

Understanding the human brain is one of the greatest challenges facing 21st century science. If we can rise to the challenge, we can develop new treatments for brain diseases, build revolutionary new computing technologies and gain profound insights into what makes us human. Using a unique simulation-based approach, HBP aims to provide researchers worldwide with a tool to understand how the brain really works.

Future Neuroscience
Neuroscience is generating exponentially growing volumes of data and knowledge on specific aspects of the healthy and diseased brain, in different species, at different ages. Yet despite these incredible advances, we still lack a unified understanding of the brain that can span its multiple levels of organisation, from genes to cognition and behaviour. This will require the development of radically new ICT: new supercomputing technologies to federate and manage the data, to integrate it in computer models and simulations of the brain, to identify patterns and organisational principles and to identify gaps to be filled by new experiments.

Future Medicine
Rising healthcare costs and the increasing number of European citizens who face the burden of caring for relatives with disorders of the brain, mean that a radically new approach is necessary. Today, the causes of most psychiatric and neurological diseases are still unknown or only partially understood. Diagnosis is often based on physical symptoms and is often only possible in the late stages of disease. The Human Brain Project will collect the masses of clinical data available, mining for biological patterns, leading to new ways of diagnosing and classifying brain diseases. This new approach opens up possibilities for new treatments, better identification of potential drug targets and could significantly speed up the process of clinical trials.

Future Computing
As modern computers exploit ever-higher numbers of parallel computing elements, they face a power wall: power consumption rises with the number of processors, potentially to unsustainable levels. By contrast, the brain manages billions of processing units connected via kilometres of fibres and trillions of synapses, while consuming no more power than a light bulb. Understanding how it does this – the way it computes reliably with unreliable elements, the way the different elements of the brain communicate – can provide the key not only to a completely new category of hardware (Neuromorphic Computing Systems) but to a paradigm shift for computing as a whole. The economic and industrial impact of such a shift is potentially enormous.

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Research Platforms for the Scientific Community
Based on previous pioneering work by the project partners, HBP's will build an integrated system of six ICT-based research platforms, providing scientists anywhere in the world with access to highly innovative tools and services that can radically accelerate the pace of their research. These will include:

- The Neuroinformatics Platform: bringing together data and knowledge from neuroscientists around the world and making it available to the scientific community;
- The Brain Simulation Platform: integrating this information in unifying computer models, making it possible to identify missing data, and allowing in silico experiments, impossible in the lab;
- The High Performance Computing Platform: providing the interactive supercomputing technology neuroscientists need for data-intensive modeling and simulations;
- The Medical Informatics Platform: federating clinical data from around the world, providing researchers with new mathematical tools to search for biological signatures of disease;
- The Neuromorphic Computing Platform: translating brain models into a new class of hardware devices testing their applications;
- The Neurorobotics Platform: allowing neuroscience and industry researchers to experiment with virtual robots controlled by brain models developed in the project.

The HBP platforms will drive a global, collaborative effort to address fundamental issues in future neuroscience, future medicine and future computing, with funding intended for groups outside the original HBP Consortium, working on themes of their own choosing.

A European Flagship
As one of 2 projects selected to receive a European Future and Emerging Technologies (FET) Flagship, HBP takes a truly collaborative approach, combining existing knowhow from across Europe and internationally. The project will profoundly impact the healthcare and computing industries, giving Europe a pioneering role in what are likely to become some of the most important segments of the 21st century world economy.

Links:

- **Press photos** to download: **https://www.i-med.ac.at/pr/presse/2013/04.html**
  Free to use - please respect copyright!

- **Press kit** http://bit.ly/HBPmediabox

- Further Informations: http://www.humanbrainproject.eu/index.html

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