

hiVE

HYPER
INTERACTION
VIABILITY
EXPERIMENTS

Project Overview

EU FP7 FET Open #222079

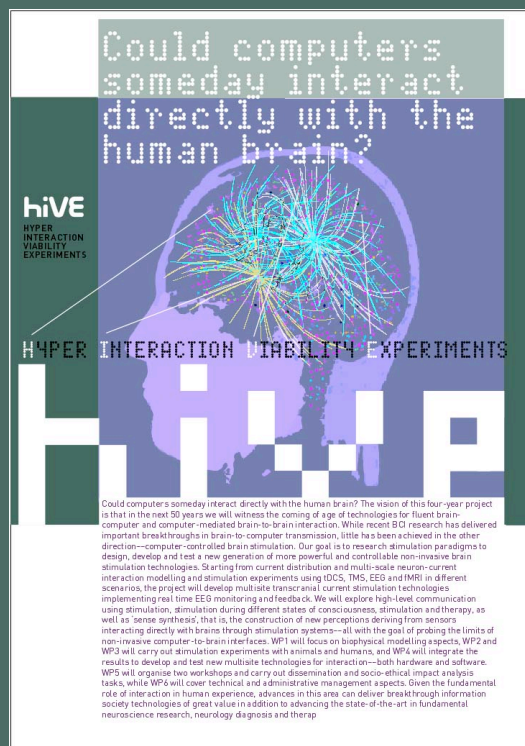
Hyper Interaction Viability Experiments

Fall 2008

Starlab[®]



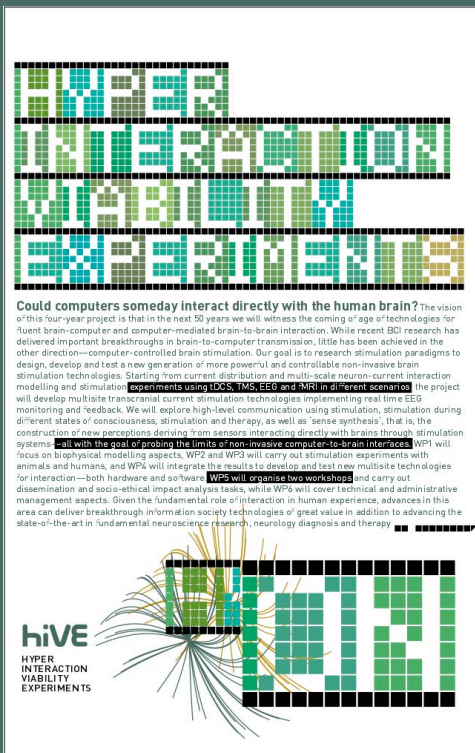
Vision and project focus



Grand Vision: in the next 50 years we will witness the coming of age of technologies for fluent brain-computer and computer-mediated brain-to-brain interaction—which we call *hyper-interaction*.

Our question: are non-invasive brain stimulation technologies a viable option for hyper-interaction?

Project Mission



The overall mission of this project is to probe the limits of non-invasive computer-to-brain interfaces by carrying out research using improved brain stimulation paradigms to explore fundamental neuroscience questions and applications, and by designing and testing more powerful, controllable and safe non-invasive brain stimulation technologies.

Challenges

- **Poor understanding of the effects of stimulation at the neuron and neuronal ensemble level:** we will investigate the biophysics of stimulation at the theoretical, computational and experimental level—both in humans and animals.
- **Unfocused, un-precise stimulation technologies:** we will develop new multisite electromagnetic non-invasive stimulation paradigms to implement more controllable and effective stimulation technologies and applications - a Multisite transcranial Current Stimulation and monitoring system (MtCS).
- **Limited animal and human stimulation experimental work:** the project will explore new stimulation paradigms to communicate and interact with neural ensembles and the human brain.

Applications

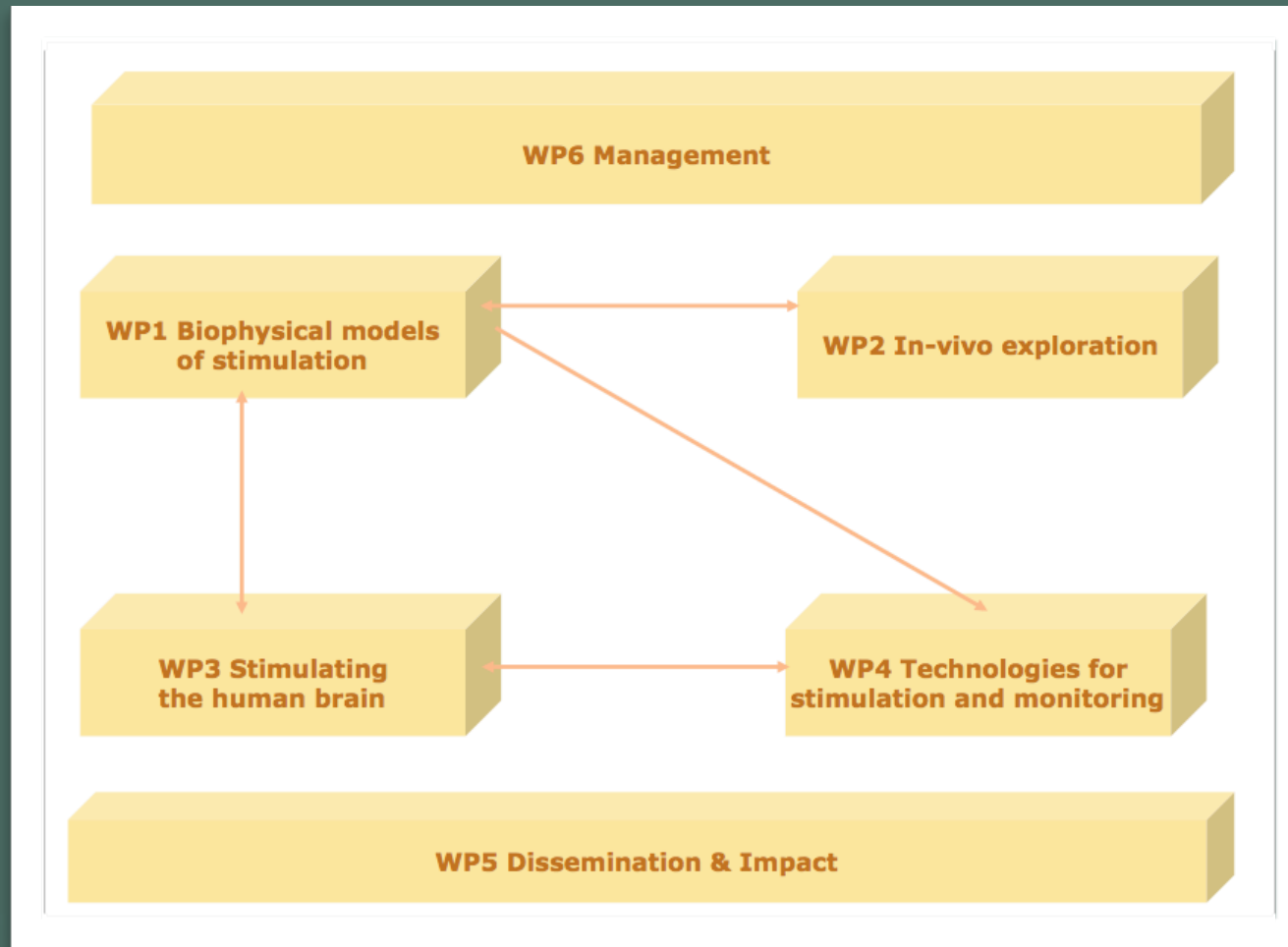
- **Research:** fundamental cognitive psychology/neuroscience. Plasticity of the human brain can also be measured now with repetitive TMS (and variants of the technique).
- **Diagnosis:** TMS is used currently clinically to measure activity and function of specific brain circuits in humans.
- **Therapy:** TMS and tDCS are treatment tools for various neurological conditions (e.g., migraine, stroke, Parkinson's Disease, dystonia, tinnitus) and psychiatric conditions (e.g., clinical depression, auditory hallucinations).
- **Brain-computer interfacing:** direct communication from machines to the brain; the devices should be small, with self-programmability and with closed loop to adapt to changing situations.
- **Sense-synthesis:** creation of new senses from coupling of data sources directly to the human brain. Data may come from artificial sensor systems (e.g., radioactivity, or radar imaging), or from the user's own body (temperature) or brain.

Project Team (beneficiaries)

A.1.3 List of beneficiaries

Beneficiary no.	Beneficiary name	Beneficiary short name	Country	Date enter project	Date exit project
1 (Coordinator)	Starlab Barcelona, SL	Starlab	Spain	1	48
2	Charité Universitätsmedizin Berlin	Charité	Germany	1	48
3	University of Wales Bangor	BU	United Kingdom	1	48
4	Kapodistrian University of Athens	NKUA	Greece	1	48
5	Fundação da Faculdade de Ciências da Universidade de Lisboa	FFCUL	Portugal	1	48
6	Institut National de la Santé et de la Recherche Médicale	INSERM	France	1	48
7	Universidad Pablo de Olavide	UPO	Spain	1	48

Work packages (pert)



Website and collaboration

The screenshot displays the hiVE website interface. At the top, a banner features the hiVE logo and the text "Could computers someday interact directly with the human brain?". Below the banner is a navigation menu with buttons for Home, The project, Consortium, Documents, Forums, News, Wiki, and Contact. The main content area features an article titled "Could computers someday interact directly with the human brain?". To the left of the article is a sidebar with a "Barcelona Kick Off Meeting" announcement. To the right is a sidebar with logos for Starlab, CHARITÉ, BANGOR UNIVERSITY, and the University of Athens. The article text discusses the future of brain-computer interaction and the goals of the hiVE project.

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Could computers
someday interact
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Home The project Consortium Documents Forums News Wiki Contact

Could computers someday interact directly with the human brain?

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Barcelona Kick Off Meeting

HIVE's Kick Off Meeting will be held in Barcelona (at Starlab premises, in the historic Fabra Observatori) September 17 to 19 inclusive, with a welcome dinner September 16th.

[Read more](#)

*In the next 50 years we will witness the coming of age of technologies for fluent brain-computer and computer-mediated brain-to-brain interaction. While recent research has delivered important breakthroughs in brain-to-computer transmission, little has been achieved in the other direction – **computer-controlled brain stimulation**.*

HIVE is a FET Open FP7 EU project (2008-2012). Our goal is to research stimulation paradigms to design, develop and test a new generation of more powerful and controllable non-invasive brain stimulation technologies. HIVE will develop improved electrical current distribution and multi-scale neuron-current interaction models and carry out stimulation

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UNIVERSITY OF ATHENS

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Project Impact

- **Project Workshops:** the two project Workshops will seek to attract both fellow scientists and technologists in the project problem area, as well as key users from industry and clinical practice.
- **Web site, forums, wikis:** An interactive and user-friendly web site will be designed and will serve as a major dissemination tool. The project web site will be established in the early phase of the project and will be continuously updated with the results of the project.
- A significant number of important **publications** is expected based on the concept, vision, design and evaluation results of the present project.

Ethical issues

- An internal and external ethics advisory board will be created to control experimental work.
- For the experimentally related ethical issues the procedures are straight forward and will be considered by the institutional ethics committees supervised by our external advisory ethics board.
- Animal tests will be kept to a minimum using lowest suitable mammalian species.
- Human tests rely on ample experience with TMS and DCS, plus new insights from the project's modeling and animal experimental work.
- All used assessment tools and protocols within the project experiments will be verified by the project's Ethics Advisory Boards, internal and external, regarding their impact. Advice will be sought from experts in the field during the project.
- Ethical guidelines and an analysis of the ethical implications of future applications of this research, both positive and potentially negative, will be analyzed in the project.

Thank you

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de la santé et de la recherche médicale

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