

Future neuroscience and the Human Brain Project

Theory and data for advancing future neuroscience and the Human Brain Project (HBP)

The European Institute for Theoretical Neuroscience (EITN),
Expert seminar, May 21-22 2015

On May 21st and 22nd, 2015, the Danish Board of Technology Foundation (DBT) of the Human Brain Project's "Science and Society" sub-project 12, together with the HBP/CNRS-UNIC European Institute for Theoretical Neuroscience (EITN) hosted the expert seminar "*Theory and data for advancing future neuroscience and the Human Brain Project (HBP)*". The seminar welcomed HBP researchers and neuroscientists outside of the HBP.



Aim of the seminar

The Human Brain Project (HBP) is, in part, a response to the fragmentation of brain research and the data it produces. The HBP is an ambitious and highly interdisciplinary project, formulated as a very large integrated flagship research initiative. It is structured into thirteen subprojects (SPs): four Data and Theory subprojects (SP1 to SP4), six ICT platform subprojects (SP5 to SP10) and three cross-cutting subprojects for Applications, Ethics and Society and Management (SP11 to SP13).

In order to accelerate the pace of brain research, the HBP aims to **provide an integrated infrastructure** of six information and communications ICT platforms. The purpose of the platforms is to **enable collaboration** and **data sharing** between various disciplines within neuroscience, including clinical, translational and basic research.

The facilities and tools developed in the HBP will eventually be made **accessible for the entire neuroscience community**. Thus, the aim with the platforms is that it should be an infrastructure that is useful for the *entire neuroscientific community*. The entrance to the platforms will be the HBP Collaboratory – a web-based portal intended to provide



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access to collaborators participating in research activity in the HBP and to external scientists from around world.

This **seminar addresses two challenges** of the HBP:

- The building of a **user community** for use and co-design of the ICT platforms, and;
- The development of an on-going **dialogue with the international neuroscientific community** on the data and theory required for developing the platforms

For additional background information please see the [HBP mediation report](#) and the HBP 1st year [technical review](#). Both are key documents in the future development of the HBP.

Results of the seminar

At the seminar researchers from various sub-projects in the HBP gave the audience insight in the work with different aspects of building the ICT infrastructure and in the aim with building such facilities (please see program and list of participants at the end of this document).

In the course of the seminar a constructive conversation developed on the goals, approaches and future contribution of the HBP to neuroscience. Among the issues, the participants expressed a need for the HBP to communicate its diversity: for example by explaining and showcasing the sub-projects in greater detail. Participants were particularly critical and curious towards the HBPs approach to modelling and simulation (parts of) the brain. Particularly there was concern about how plasticity and neuromodulation would be taken into account in the models and important questions on the multi-level integration of the molecular with the cognitive level. Other questions addressed the mice/rat as a model organism.

Participants also commented extensively on the goal of the HBP. Many felt that such a huge project should work towards a contribution to better drug development or take one or more diseases as a starting point. Without doing so or without pursuing multiple objectives the project might be setting itself up for failure.

Finally, all advocated the need for the HBP to develop in collaboration with the neuroscience community. The project will need to identify and engage with (end) users and figure out how to bridge the gap between them and the project. Participants recognized the huge effort involved with network building across ICT and neuroscience communities. Successful network building could be seen as a success in itself.

The seminar will be **followed by a brief report**, which will be written with input from the speakers, commentators, session chairs and participants. Below we summarise the recommendations coming out of the seminar:



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Recommendations in brief:

Recommendations from the seminar:

- Communicate more about the research being done in the subprojects
- The project should still have several objectives, e.g.:
 - assist in understanding how brains fail
 - take a particular disease or drug design as a starting point
 - network building between internal and external researchers could be a success in itself
- Develop plans for how the ‘horizontal integration’ should take place. It will not just ‘happen’
- Find a point of connection between bottom-up and top-down approaches and create a bridge between the molecular and the cognitive level (multi-level integration)
- Prioritise building in plasticity and neuromodulation in the ICT brain models
- Set up a ‘brainstorming structure mechanism’ where crazy ideas can develop and be tested

Thank you:

The DBT would like to thank Alain Destexhe of the CNRS-UNIC, Albert Gjedde and Richard Walker of the advisory board, the session chairs Richard Morris and Piergiorgio Strata and commentator Marcel van Gerven, as well as the presenters from the HBP: Danilo Bzdok SP2, Richard Walker SP6, Omar Gutierrez Arenas SP6/SP12 and Florian Röhrbein SP10. Finally, we would like to thank all the participants and the wonderful staff at the EITN, for dedicated participation and assistance in making this event a success.

SP12 is the hub of responsible research and innovation (RRI) in the HBP. It undertakes foresight research on social, ethical, legal and cultural implications of HBP research, explores conceptual and philosophical issues and challenges raised by HBP research, builds awareness and capacity for social and ethical reflection among HBP researchers, engages HBP researchers with external stakeholders and the general public, and supports the robust management of ethical issues of the HBP as a whole. SP12 will collect and develop good practices in RRI. SP12 activities will help shape the direction of the HBP itself in ethically robust ways that serve the public interest.

The DBT leads the HBP SP12 engagement activities with stakeholders and the general public.

SP12 directors are:

Prof. Jean-Pierre Changeux, Institute Pasteur;

Prof. Kathinka Evers, Uppsala University

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Program for: Theory and data for advancing future neuroscience and the Human Brain Project
EXPERT SEMINAR, MAY 21ST AND 22ND 2015

ORGANIZERS:

THE DANISH BOARD OF TECHNOLOGY FOUNDATION (SP12)
THE EUROPEAN INSTITUTE FOR THEORETICAL NEUROSCIENCE (SP4)

ADVISORY BOARD:

ALBERT GJEDDE, UNIVERSITY OF COPENHAGEN
RICHARD WALKER, ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

EUROPEAN INSTITUTE FOR THEORETICAL NEUROSCIENCE
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12:00 – 12:45 Buffet Lunch at the EITN
12:45 – 13.00 Welcome: The role of SP12 in dialogue

13.00 – 16.00 First session (Thursday)

Topic: Introduction to HBP research, tools, theory and data

- Chair: Prof. Richard G. Morris, University of Edinburgh
- HBP Panel: Dr. Danilo Bzdok SP2, Dr. Richard Walker SP6, Dr. Omar Gutierrez Arenas SP6/SP12 and Prof. Florian Röhrbein SP10

13.00 – 14.30: Presentations by the HBP panel on current research and development in the HBP subprojects

14.30 – 16.00: Commentary by: Dr. Marcel van Gerven, Donders Institute, Radboud Universiteit. Plenum debate

16.00 – 16.30: Coffee Break

16.30 – 18.30: Second session

Topic: Theory and data for the HBP ICT platforms

- Chair: Prof. Albert Gjedde, University of Copenhagen

16.30 – 18.15 Opportunities for advancing knowledge on cognitive tasks
Joint working groups

18.15 – 18.30: Drawing lines to tomorrow's work

18.45 – 21.00: Working Dinner (by invitation)

09:30 – 10:45 Third session (Friday)

Topic: Feedback on Theory and data: What is desirable?

- Chair: Prof. Albert Gjedde, University of Copenhagen

9.30 – 10.00 Collecting points from yesterday's group work in plenum

10:00 – 10.45 Joint working groups

10.45 – 12.00 Closing reflections: What have we accomplished at the seminar? What is next?

- Chairs: Prof. Albert Gjedde and Prof. Piergiorgio Strata

12.00 – 13:00 Lunch at the EITN

14.00 – 17.00: Info-Day at the EITN for the Call for Expressions of Interest on "Systems and Cognitive Neuroscience"