

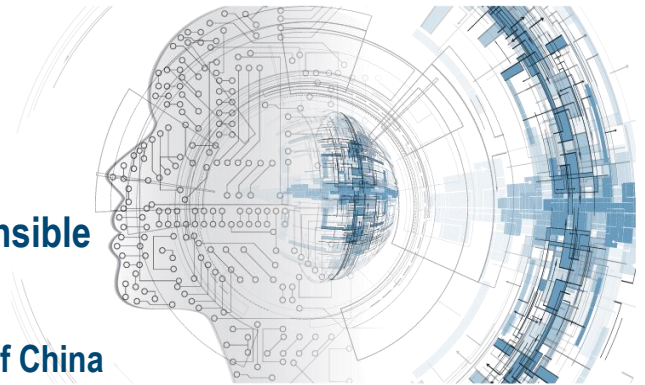
国际神经科技创新研讨会

推动负责任创新，增进全球健康福祉

OECD Workshop

“Minding Neurotechnology: delivering responsible innovation for health and well-being”

6-7 September 2018, Shanghai, People’s Republic of China



The Shanghai Workshop is focused on exploring some of the unique ethical, legal, and policy challenges raised by health-related applications of brain science and its integration into cutting edge neurotechnologies. One key aim of this workshop is to provide a forum for innovators to discuss strategies for delivering responsible innovation in neurotechnology for health and well-being applications.

This workshop is convened by the OECD Working Party on Biotechnology, Nanotechnology, and Converging Technologies (BNCT) and in collaboration with the China National Center for Biotechnology Development (CNCBD), Beijing, People’s Republic of China. The workshop is hosted by the Tongji University School of Medicine (TUSM), Shanghai, People’s Republic of China, and supported by The Kavli Foundation and the Korea Legislation Research Institute (KLRI).

The objectives of the Shanghai Workshop are:

1. Promote a deeper dialogue among business leaders, investors, policy makers, social scientists, and practitioner communities to enable desirable social outcomes and benefits of neurotechnology.
2. Enrich current discussions of the social implications of neurotechnology on both short and long-term time horizons by hearing from those engaged in bringing products to market.
3. Better understand how considerations of responsible innovation can improve the sustainability of business models in novel neurotechnology.

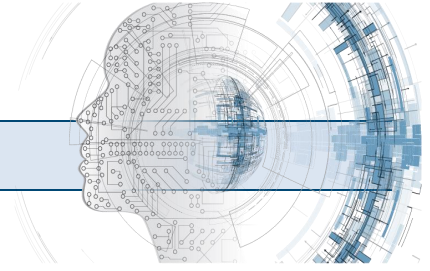
Context

The rapidly evolving field of neurotechnology is full of economic potential and is quickly becoming part of research laboratories and advanced therapeutic applications. As novel neurotechnologies redefine what is possible in research, therapy, and human capabilities, considerations regarding the potential ethical issues and social implications are needed.

Governments, academia, industry, and private foundations are increasingly making substantial investments in brain research and neurotechnology, and a host of national and international “brain projects” have sprung up across the public and private sector. These programmes are in response to calls at highest national and international policy levels to address challenges associated with mental illnesses and neurological disorders that cause great human suffering and loss of economic productivity.

Many of the large-scale international brain projects seek to accelerate our understanding of the brain through improved technology – whether it be through improved computational models, transformative research tools, or new simulations of human brain function. But these major “brain projects” are also part of the broader policy goals of fostering innovation and increasing productivity. Sales in neurotechnologies for neuroprosthetics, neuromodulation, neurorehabilitation, and neurosensing are expected to reach USD 12 billion in 2022. Beyond health, neurotechnologies have potential in the fields of education, and information and communication technology.

In addition to a focus on the role of public-private partnerships and the business sector, the workshop – in its panels and attention to invitees – will seek to engage two themes at the core of the BNCT Working Party: digitalisation, and technology convergence.



Day One (Thursday, 6 September 2018)

08:30-09:00 ► **Registration**

Conference Room: 2F Grand Ballroom, Renaissance Shanghai Putuo Hotel

09:00-09:30 ► **Welcome messages & introduction to workshop**

Workshop Moderator: Prof. Dr. Jialin Charles Zheng, Professor of Regenerative Medicine and Neuroscience, Dean, Tongji University School of Medicine, Shanghai, People's Republic of China

- Mr. Dominique Guellec, Head, Science and Technology Policy Division, Directorate for Science, Technology and Innovation, OECD, Paris, France
- Ministry of Science and Technology of the People's Republic of China (MOST)
- Dr. Xinmin Zhang, Director General, China National Center for Biotechnology Development (CNCBD), People's Republic of China
- Prof. Dr. Jie Chen, President of Tongji University, Shanghai, People's Republic of China
- Mr. Ik-hyeon Rhee, President Korea Legislation Research Institute (KLRI), Republic of Korea

09:30-09:55 ► **Keynote**

Ms. Tan Le, CEO, EMOTIV, San Francisco, USA

09:55-10:20 ► **Keynote**

Prof. Dr. Mu-ming Poo, Member of the Chinese Academy of Sciences, Director, Institute of Neuroscience, Chinese Academy of Sciences, Director, CAS Center for Excellence in Brain Science and Intelligence Technology, People's Republic of China

10:20-10:50 ► **Coffee break**

10:50-12:40 ► **Session 1**

Neurotechnology innovation from the bottom up: strategies for product development at major brain research initiatives

Chair: Prof. Dr. Linda Richards, Deputy Director (Research), Queensland Brain Institute, Australia

Panellists:

- Dr. A. Lyric Jorgenson, National Institutes of Health (NIH), Lyric A. Jorgenson, Deputy Director, Office of Science Policy, Office of the Director, USA
- Dr. Sung-Jin Jeong, Principal Researcher/Director, Neuronal Development and Disease Department, Brain Research Policy Center Korea Brain Research Institute, Republic of Korea
- Dr. Dekel Taliaz, CEO & Co-Founder, Taliáz Ltd, Co-founder, Vice President, Tech division of Israel Brain Technologies, Israel
- Prof. Dr. Shigeo Okabe, Brain/MINDS Program Supervisor, Graduate School of Medicine, The University of Tokyo, Japan
- Prof. Dr. Qingming Luo, Vice President, Huazhong University of Science and Technology, People's Republic of China

This first session focuses on the translation of knowledge emerging from major brain research initiatives into novel neurotechnologies for health and wellbeing. In order for those technologies to be integrated into society, they need to be developed for markets and broadly disseminated beyond the laboratory or company where they originated. Health innovation and technological development are expressed goals of some major public funding efforts and national brain initiatives, with company formation being imagined as one key to achieving those goals.

Discussion questions:

1. What are the current trends for neurotechnology innovation across the major 'brain initiatives'? What are the funding opportunities for the dissemination and translation of research?
2. For the 'brain initiatives' seeking to spur innovation: what are best practices for attracting investment, encouraging public-private sector collaboration, and translating research into marketable products?
3. What mechanisms are in place to ensure spin-outs and future products meet ethical, social standards?

12:40-13:40 ► **Lunch**

13:40-14:05 ► **Keynote**

Dr. Tom Insel, Co-Founder and President, Mindstrong Health, Palo Alto, CA, USA

14:05-14:20 ► **Session lead-in: "Neurotechnology ventures"**

Mr. Jordan P. Amadio, M.D., M.B.A., Neurosurgeon, Technology Innovator, Start-up Investor/ Strategist, Austin, Texas, USA

14:20-16:05 ► **Session 2**

Making innovation work: addressing the challenges of commercialisation in disruptive technology

Chair: Mr. Jordan P. Amadio, M.D., M.B.A., Neurosurgeon, Technology Innovator, Start-up Investor/ Strategist, Austin, Texas, USA

Panellists:

- Dr. Graeme Moffat, VP of Scientific & Regulatory Affairs, MUSE, Toronto, Canada
- Dr. David Benrimoh, CEO, Aifred Health, Montreal, Canada
- Dr. Moonkyo Chung, Korea Technology Finance Corporation (KOTEC), Deputy Director, Seocho Technology Appraisal Center, Republic of Korea
- Dr. Oh-hyoung Kwon, Partner, FuturePlay, Republic of Korea
- Ms. Yifei Fan, Business Development Manager, AXA Lab Asia, Shanghai, People's Republic of China
- Prof. Dr. Luming Li, Professor of Biomedical Engineering and Neuromodulation Technology, Tsinghua University, Beijing, People's Republic of China
- Dr. Yunting Liu, Commercial & Strategy Director, Tencent Medical, People's Republic of China
- Dr. Chris Thatcher, President and CEO, NeuroStar, USA

This session will focus on the formation and development of small and medium sized enterprises and their engagement with key partners: public research institutions and the private investment sector. Panellists will discuss the current state of play in their technologies, business models and challenges.

Discussion questions:

1. What are the unique challenges and opportunities for start-up companies and SMEs in neurotechnology innovation in terms of, e.g., market size, investment, ethics, and regulation?
2. What is the landscape of private investment in the arena of neurotechnology?
3. What is the role of academic entrepreneurs in the commercialisation of techno-creative innovations?

16:05-16:25 ► **Coffee break**

16:25-16:40 ► **Session lead-in**

Prof. Dr. Guoyu Wang, Professor of Philosophy, Fudan University, People's Republic of China

16:40-18:30 ► **Session 3**

Identifying gaps in neurotechnology governance: potential roles of the market and the public sector to ensure 'technology robustness'

Co-Chairs: Prof. Dr. Guoyu Wang, Professor of Philosophy, Fudan University, P.R. China; Mr. John Clarkson, Senior Vice President and Chief Operating Officer, Ontario Brain Institute, Toronto, Canada

Panellists:

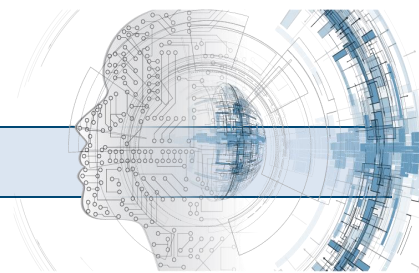
- Dr. Mariarosaria Taddeo, Research Fellow, Deputy Director, Digital Ethics Lab, Oxford Internet Institute, University of Oxford, Turing Fellow, Alan Turing Institute, London, Oxford, UK
- Mr. Junkil Been, Co-founder, Chief Executive Officer, Neurophet, Republic of Korea
- Dr. Marcello Lenca, Research Fellow, Health Ethics & Policy Lab, Department of Health Sciences and Technology, ETH Zürich, Switzerland
- Mr. Alex Ni, MBA, CPA, CMA, CTO, Avertus, Toronto, Canada
- Dr. Laura Y. Cabrera, Assistant Professor, Neuroethics, Michigan State University, Center for Ethics & Humanities in the Life Sciences, USA
- Dr. Andrea Bertolini, Assistant professor Private Law, Dirpolis Institute, Adjunct Professor, Private Law, University of Pisa, Italy

The third session will raise potential governance issues associated with emerging neurotechnologies that deserve shared consideration given their public attention as well as potential economic and social implications. Concerns about privacy and misuse of brain data have become more tangible in the wake of recent privacy breaches in the social networking community. Other governance issues are raised when products intended for clinical use are used in non-therapeutic settings. Given the limited experiences with some novel neurotechnologies: how can companies, investors, and insurers anticipate the potential unintended use, broader societal effects, misperception and backlash? How do they engage the goal of "appropriate use", data privacy, and integrity in neurotechnologies?

Discussion questions:

1. Understanding the grey areas in neurotechnology: what are the key gaps, risks and uncertainties within businesses, and at the intersection of the public and private sector?
2. Are governance tools such as consumer protection laws, liability rules, post-marketing surveillance, and current ethical frameworks sufficient to promote public trust and technology robustness?
3. What are the best practices to learn from "early adopters" that support technology validation?

19:00 ► **Dinner**



Day Two (Friday, 7 September 2018)

08:45-09:00 ▶ **Opening Day Two**

Workshop Moderator: Dr. Pingping Li, Associate Professor, Deputy Director, Division of Public Health, China National Center for Biotechnology Development (CNCBD), People's Republic of China

▶ **Comment**

Prof. Dr. Gang Pei, Member of the Chinese Academy of Sciences, Former President of Tongji University, Shanghai Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences, People's Republic of China

09:00-09:15 ▶ **Session lead-in: "Challenges in the governance of emerging technology"**

Prof. Dr. Gary E. Marchant, Faculty Director and Regents Professor, Center for Law Science & Innovation, Arizona State University, Tempe, USA

09:15-11:00 ▶ **Session 4**

Building responsible innovation: frameworks and best practices in the private sector

Chair: Prof. Dr. Judy Illes, Canada Research Chair in Neuroethics, Professor of Neurology, Department of Medicine, Director, Neuroethics Canada, The University of British Columbia, Vancouver, Canada

Panellists:

- Prof. Dr. Karen Rommelfanger, Assistant Professor, Department of Neurology, Assistant Professor, Department of Psychiatry and Behavioral Sciences, Emory University, Atlanta, USA
- Prof. Dr. Sebastian Pfotenhauer, Professor of Innovation Research - Innovation, Society & Public Policy Group, Munich Center for Technology in Society, Technical University of Munich, Germany
- Dr. Xiaodong Tao, Vice President, IFLYTEK CO., LTD., President of iFLY Health, People's Republic of China
- Prof. Dr. Yizheng Wang, Researcher, Huashan Hospital, Fudan University, People's Republic of China
- Dr. Tom Insel, Co-Founder and President, Mindstrong Health, Palo Alto, CA, USA
- Ms. Tan Le, Founder, Chief Executive Officer, Emotiv, San Francisco, USA
- Prof. Dr. Adrian Carter, Associate Professor, Head, Neuroscience and Society Group, Monash Institute of Cognitive and Clinical Neurosciences, Monash University, Australia
- Prof. Dr. Ricardo Andrés Chavarriaga Lozano, Ecole Polytechnique Fédérale de Lausanne, CNBI - Chair in Brain-Machine Interface, Geneva, Switzerland

In this session, panellists will focus on the modes through which ethics and social responsibility can make a positive impact on brain research and neurotechnology development. A mixed group of innovators, representatives from major 'brain initiatives', and other experts discuss how forms of upstream responsibility can contribute to downstream profitability and health impact. Some brain research initiatives and businesses within neurotechnology and related fields like AI have sought to integrate elements of social responsibility and ethics into their technology transfer, business practices, R&D, and corporate governance.

Discussion questions:

1. What are the strategic approaches and best practices to align disruptive neurotechnology with societal needs? How can responsibility frameworks complement regulation and support the robustness of products in markets?
2. What strategies are used by major brain initiatives and companies to help promote transparency, trust, and positive societal outcomes?
3. How can ethical, legal, and social considerations of neurotechnology innovation strengthen the ties between public research, investors, companies, and insurers?

11:00-11:20 ► **Coffee break**

11:20-12:30 ► **Session 5**

Exploring the potential role of policy makers in delivering responsible innovation for health and well-being

Chair: Dr. David Winickoff, Senior Policy Analyst, Secretary, Working Party on Bio-, Nano- and Converging Technologies (BNCT), Science and Technology Policy Division, OECD, Paris, France

Panellists:

- Dr. Françoise D. Roue, Chairperson of the Committee “Safety, Security and Risk”, French Ministry of Economy and Finance High Council of Economy, Paris, France
- Dr. Seunghye Wang, Research Fellow, Office of Global Legal Research, Korea Legislation Research Institute, Republic of Korea
- Prof. Dr. Xian-En Zhang, Principal Investigator, Institute of Biophysics, Chinese Academy of Sciences, Former Director of the Basic Research Department, Ministry of Science & Technology (MOST), People’s Republic of China
- Dr. Isabella Beretta, Scientific Advisor International Research Organisations, Federal Department of Economic Affairs, Education and Research EAER, State Secretariat for Education, Research and Innovation SERI, Berne, Switzerland
- Dr. A. Lyric Jorgenson, National Institutes of Health (NIH), Deputy Director, Office of Science Policy, Office of the Director, USA
- Mr. Hugh Whittall, Director at Nuffield Council on Bioethics, UK

Participants reflect on the potential role of policy makers and innovators in advancing responsible innovation in neurotechnology. The OECD is developing Principles for responsible development and use of novel neurotechnologies for health-related applications.

12:30-13:00 ► **Summary, conclusions, and outlook**

Dr. David Winickoff, Senior Policy Analyst, Secretary, Working Party on Bio-, Nano- and Converging Technologies (BNCT), Science and Technology Policy Division, OECD, Paris, France

13:00 ► **End of workshop**

Collaboration and support:

The Shanghai Workshop is co-organised by the China National Center for Biotechnology Development (CNCBD), Beijing, People's Republic of China. The CNCBD is an organization established in 1983 under the Ministry of Science and Technology with the approval of the State Council. The CNCBD offers first class management and coordination in the area of biotechnology research and industry, policy, project management, training, and international cooperation.



The Shanghai Workshop is supported by The Kavli Foundation. The Kavli Foundation, based in Los Angeles, California, USA, is dedicated to advancing science for the benefit of humanity, promoting public understanding of scientific research, and supporting scientists and their work. The Kavli Foundation is facilitating a series of meetings aimed at coordinating among the various international brain projects. In 2017, the Organisation for Economic Co-operation and Development (OECD), in collaboration with The Kavli Foundation, brought together leaders from across fields and around the globe to discuss responsible innovation in brain science and neurotechnology, with the goal of enhancing the communication and coordination of the ethical, legal, societal, regulatory and economic aspects surrounding neurotechnologies internationally.



The Shanghai Workshop is supported by the Korea Legislation Research Institute (KLRI), Seoul, Korea. The Korea Legislation Research Institute (KLRI) is a government-funded national policy research institute, established in July 1990, to systematically collect and manage legal information and conduct professional research on legislation, with the aim of providing advice and assistance in the formulation of national legislative policies and of improving legal services. KLRI has been partnering with OECD in order to explore the core scientific, legal, regulatory and societal challenges facing the responsible development and use of emerging technologies.



The Shanghai Workshop is hosted by Tongji University School of Medicine (TUSM), Shanghai, People's Republic of China. Tongji University, originated from medicine in 1907, is one of the leading universities in China under direct administration of Ministry of Education, listed on "Double First-Class", "Project 985" and "Project 211". TUSM constitutes 6 schools including the School of Basic Medicine, the School of Clinical Medicine, the School of Biomedical Engineering and Nanoscience, 4 research institutes including Brain and Spinal Center, Cancer Center, Stem Cell Center and Cardiology Center, 6 affiliated hospitals and 17 teaching hospitals.



The Tongji Hospital of Tongji University is one of the first Grade III comprehensive hospitals approved by the Ministry of Health in China. It has been rewarded as 'National Comprehensive Stroke Center', 'China Chest Pain Centers', and 'China Trauma Rescue and Treatment Center'. It drives discoveries and breakthroughs in basic and clinical research, known national-wide even worldwide for innovations, especially in the field of Orthopedics, Neuropsychiatry, Cardiology and Obstetrics and Gynecology. Research works have been published on high-impact journals, such as Nature, Science and Cell.

