



The White House **Neuroscience** Initiative

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What are the **White House Neuroscience Initiative's** goals?

Develop a strategy towards **significant, transformative discoveries** in fundamental and translational neuroscience and cognitive science through coordinated Federal efforts and synergy with outside stakeholders.

OSTP: Incorporate and heighten the President's emphasis on neuroscience through Administration-wide initiatives and activities.

The White House **Neuroscience** Initiative

- National Plan to Address Alzheimer's Disease
- Interagency Working Group on Neuroscience
- Executive Order on Improving Access to Mental Health Services for Veterans, Service Members, and Military Families: National Research Action Plan
- The BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative
- Improving Mental Health Prevention and Treatment
- Neuroethics: Presidential Commission for the Study of Bioethical Issues
- Concussion: Healthy Kids and Sports

*Interagency **Working** **Group** on Neuroscience (IWGN)*

OSTP chartered the IWGN in June 2012 under the National Science and Technology Council's (NSTC) Committee on Science.

IWGN

Agency/Department Representation

Department of **Health and Human Services** (Co-chair)

(Including: **CDC, FDA, NIH**)

National Science Foundation (Co-chair)

Department of **Agriculture**

Department of **Commerce**

Department of **Defense**

Department of **Education**

Department of **Energy**

Department of **Homeland Security**

Department of **Justice**

Department of **Veterans Affairs**

Central Intelligence Agency

Environmental Protection Agency

National Aeronautics and Space Administration

Office of the Director of National Intelligence

Executive Office of the President, including:

Office of Science and Technology Policy (directs the activity),

Office of Management and Budget, and

Office of National Drug Control Policy



Interagency Working Group on Neuroscience (IWGN) Mission

Coordinate activities in neuroscience research across the Federal government with a focus on the fundamental understanding of learning, brain development, and plasticity, and applications to brain health and recovery.

Identify research areas where communication and/or coordination across Federal agencies can foster advances that address national needs and, where possible

Define concrete actions the Federal government can take to enable acceleration of progress in neuroscience research and development.

IWGN *Progress to Date*

Established a **forum for information exchange** across the Federal Government

Facilitating efforts across Federal agencies to improve **coordination and collaboration of R&D agendas** on neuroscience

In February 2014 publicly released a report, “**Priorities for Accelerating Neuroscience Research through Enhanced Communication, Coordination, and Collaboration,**” that addresses the need for a broad and comprehensive approach to basic and applied neuroscience research, calling on Federal agencies to work together to accelerate progress in this area.

Next steps will focus on implementation of key report recommendations.

(A link to the report is posted on the OSTP website under “Resource Library” ,
“Documents, Speeches, & Reports”, on Feb. 25, 2014:
<http://www.whitehouse.gov/administration/eop/ostp>)

IWGN *Focus Areas*

Understanding and applying **the brain's information processing capabilities**.

Understanding and treating **brain diseases, disorders, and traumas**.

Understanding and optimizing **interactions between the environment and the brain** across the lifespan.

Enhancing communication among federal agencies and with the public.

Translating research to practice.

IWGN *Future Activities*

Implement selected IWGN recommendations and working groups.

Coordinate interagency efforts on neuroscience with The BRAIN Initiative.

Support the development of methods for systematic description and quantification of behavioral, cognitive, and disease data.

Through workshops and other mechanisms, encourage neuroscientists, computer scientists, mathematicians, statisticians, and researchers from other disciplines to identify key opportunities for progress in the organization and analysis of large-scale datasets.

Study brain and cognitive changes across the lifespan and determine how they influence learning and are, in turn, influenced by learning.

Develop a publicly accessible Federal clearinghouse of neuroscience resources and information.

Explore potential areas for international engagement.



the WHITE HOUSE



PRESIDENT OBAMA IS CALLING ON THE SCIENCE COMMUNITY
TO JOIN HIM IN PURSUING A GRAND CHALLENGE

BRAIN INITIATIVE

BRAIN RESEARCH
THROUGH ADVANCING
INNOVATIVE
NEUROTECHNOLOGIES



President Obama & the BRAIN



The **BRAIN Initiative** is a Grand Challenge that was launched by President Obama in April 2013 to revolutionize understanding of the human brain.

DARPA, NIH, NSF, and FDA will support approximately **\$100 million** in research and related activities in FY 2014.

Private-sector commitments from the Allen Institute for Brain Science, the Kavli Foundation, and HHMI.

DARPA Defense Advanced Research Projects Agency

DARPA will be supporting **development of technologies to improve treatment of neuropsychological illness** for veterans and service members. This will include devices to measure and stimulate neurons, easing the symptoms of diseases such as PTSD and depression, in a project called **Systems-Based Neurotechnology for Emerging Therapies (SUBNETS)**.

DARPA has announced a new program on **how neural stimulation could enable recovery of memory** following brain injury as part of an effort called **Restoring Active Memory**.

DARPA will continue the development of **prosthetic limbs** that would restore sensation and control to amputees in a project called **Prosthetic Hand Proprioception and Touch Interfaces (HAPTIX)**.

NIH National Institutes of Health

An NIH working group composed of leading neuroscientists has identified a set of **priority research topics**.

In December 2013, NIH **released \$40 million in new solicitations** including funding to:

- generate an inventory of the different cell types in the brain;
- develop new “toolbox” of technologies to analyze the complex circuits responsible for cognition and behavior;
- develop new approaches for recording the activity of large numbers of neurons;
- understand large-scale neural circuits by integrating experimental, analytical, and theoretical approaches; and
- develop the next generation of non-invasive imaging technologies.

NIH embraces bold, 12-year scientific vision for The BRAIN Initiative

On June 5, 2014, a report by the NIH's ACD BRAIN Working Group called for \$4.5 billion in funding for brain research over the next 12 years.

High priority scientific goals include:

- Identify and provide experimental access to different brain cell types to determine their role in health and disease.
- Generate circuit diagrams that vary in resolution from synapses to the whole brain.
- Produce a dynamic picture of the functioning brain by developing and applying improved methods for large-scale monitoring of neural activity.
- Link brain activity to behavior with precise tools that change neural circuit dynamics.
- Produce conceptual foundations for understanding the biological basis of mental processes through development of new theoretical and data analysis tools.
- Develop innovative technologies to understand the human brain and treat its disorders; create and support integrated brain research networks.
- Integrate new technological and conceptual approaches to discover how dynamic patterns of neural activity are transformed into cognition, emotion, perception, and action in health and disease.

NSF National Science Foundation

To attain a fundamental scientific understanding of the full complexity of the brain, in context and in action, **NSF is focusing on generating an array of physical and conceptual tools** needed to determine how healthy brains function over the lifespan of an organism; and on deployment and utilization of these tools to produce a comprehensive understanding of how thoughts, memories and actions emerge from the dynamic activities of the brain.

The NSF will focus on three main areas:

- **Integrative and interdisciplinary fundamental research** using new collaborations among the science and engineering disciplines to improve our understanding of the brain.
- The development of **new theories, computational models and analytical tools** that will guide research questions and synthesize experimental data.
- Increased emphasis on the **development of innovative technologies and data infrastructure** required to handle the large scale data sets resulting from this research, and enable new experimental recording and neuro-control capabilities.

NSF **recently award \$25 million to the Center for Brains, Minds and Machines** based at MIT and Harvard University and partnering with many other institutions around the country.

The Center seeks to advance understanding of human intelligence and develop truly intelligent machines through interdisciplinary collaborations between researchers in cognitive science, computer science, math, psychology, statistics, robotics, and neuroscience.

FDA Food and Drug Administration

The FDA has recently announced that it will be supporting The BRAIN Initiative by working with medical device developers on **how to bring safe and effective technologies to market.**

**Key private sector partners
have made important
commitments to support
the BRAIN Initiative.
We encourage companies,
universities, and
philanthropists to get involved.**



OCULOMOTOR NEURONS



PRIVATE SECTOR PARTNERS

in The BRAIN Initiative

The BRAIN Initiative builds on leading edge brain research for over the past decade at the **Allen Institute for Brain Science**. More than \$60 million annually will be spent to support Allen Institute projects related to the initiative (alleninstitute.org).

The **Howard Hughes Medical Institute**, the Nation's largest nongovernmental funder of basic biomedical research, has a long history of supporting basic neuroscience research. It will spend at least \$30 million annually to support projects related to this initiative (hhmi.org).

The Kavli Foundation anticipates supporting activities that are related to this project with approximately \$4 million dollars per year over the next ten years. This figure includes a portion of the expected annual income from the endowments of existing Kavli Institutes and endowment gifts to establish new Kavli Institutes over the coming decade. This figure also includes the Foundation's continuing commitment to supporting project meetings and selected other activities (kavlifoundation.org).

The BRAIN Initiative: Going Forward

Federal investments are to increase to around **\$200 million** in the proposed FY 2015 budget.

White House event later this year to recognize “all hands on deck” commitments, such as:

- Research and shared facilities at universities and private research institutes.
- Efforts by patient advocacy organization to accelerate the development of diagnostics, treatments, and cures.
- IT infrastructure to store, share, visualize, and analyze the huge volumes of data that will be generated.
- Pre-competitive collaborations involving industry.
- Education and training programs.
- Regional “clusters” to accelerate economic growth, job creation, and innovation in commercial neurotechnology domains.
- Well-designed incentive prizes.



**MAINTAINING
OUR HIGHEST
ETHICAL
STANDARDS**

The Presidential Commission for the Study of Bioethical Issues (www.bioethics.gov) has been directed to explore the ethical, legal, and societal implications raised by this research initiative and other recent advances in neuroscience.

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Bioethics Commission Plays Early Role in BRAIN Initiative

Calling for the integration of ethics across the life of neuroscientific research endeavors, the Bioethics Commission released volume one of its two-part response related to The BRAIN Initiative:

Gray Matters: Integrative Approaches for Neuroscience, Ethics, and Society.

The report includes four recommendations for institutions and individuals engaged in neuroscience research.

Bioethics Commission

Recommendations

1. Integrate ethics early and explicitly throughout research.
2. Evaluate existing and innovative approaches to ethics integration.
3. Integrate ethics and science through education at all levels.
4. Explicitly include ethical perspectives on advisory and review bodies.

Next the Bioethics Commission will consider the ethical and societal implications of neuroscience research and its applications more broadly



The Human Genome Project demonstrates the potential impact that ambitious research programs like the BRAIN initiative can have. From 1988-2003, the Federal Government invested \$3.8 billion in the Human Genome Project, which has since generated an economic output of \$796 billion —a return of \$141 for every \$1 invested.

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All images from: cbs.fas.harvard.edu/science/connectome-project/brainbow



