Fact Sheet: Over $300 Million in Support of the President's BRAIN Initiative

September 30, 2014

> "Last year, I launched the BRAIN Initiative to help unlock the mysteries of the brain, to improve our treatment of conditions like Alzheimer's and autism and to deepen our understanding of how we think, learn and remember. I'm pleased to announce new steps that my Administration is taking to support this critical research, and I'm heartened to see so many private, philanthropic, and academic institutions joining this effort."
>
> - President Obama

In April 2013, the President announced the launch of the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative – a bold new Grand Challenge focused on revolutionizing our understanding of the human brain.

The BRAIN Initiative has the potential to do for neuroscience what the Human Genome Project did for genomics by supporting the development and application of innovative technologies that can create a dynamic understanding of brain function. It aims to help researchers uncover the mysteries of brain disorders, such as Alzheimer's and Parkinson's diseases, depression, and traumatic brain injury (TBI).

Today, the Administration is announcing:

- The BRAIN Initiative is growing to five participating federal agencies as the Food and Drug Administration (FDA) and Intelligence Advanced Research Projects Activity (IARPA) join the National Institutes of Health (NIH), National Science Foundation (NSF), and Defense Advanced Research Projects Agency (DARPA). NIH is announcing $46 million in new grant awards and all of the participating agencies are committing to engage in BRAIN Initiative-related work in Fiscal Year 2015 (FY15).

- Members of the National Photonics Initiative, along with other companies such as GE, Google, GlaxoSmithKline, and Inscopix are leveraging their core infrastructure, assets, and more than $30 million in research and development investments to support the BRAIN Initiative.

- Major foundations, patient advocacy organizations, and universities, including the Simons Foundation, University of Pittsburgh, and others, are aligning over $240 million of their research efforts with the BRAIN Initiative.

Today, the Administration is hosting the White House BRAIN Conference to highlight new commitments to the BRAIN Initiative and to explore how the Initiative can continue to advance neuroscience research and its application to the treatment of brain disorders. Attendees will include a range of partners from the research community, federal agencies, foundations, patient advocacy groups, private research institutes, companies, scientific societies, as well as individual scientists. As announced in the White House Factsheet on Executive Actions to Fulfill our Promises to Service Members, Veterans, and Their Families last month, the White House BRAIN Conference will include a focus on Post-Traumatic Stress Disorder (PTSD) and TBI.

Background

In the last decade alone, scientists have made a number of landmark discoveries that now create the opportunity to unlock the mysteries of the brain, including the sequencing of the human genome, the development of new tools for mapping neuronal connections, the increasing resolution of imaging technologies, the maturation of nanoscience, and the rise of biological engineering. These breakthroughs have paved the way for unprecedented collaboration and discovery across scientific fields. For instance, by combining advanced genetic and optical techniques, scientists can now use pulses of light to determine how specific cell activities in the brain affect behavior. Similarly, through the integration of neuroscience and physics, researchers can now use high-resolution imaging technologies to observe how the brain is structurally and functionally connected in living humans.

While these technological innovations have contributed substantially to our expanding knowledge of the brain, significant breakthroughs in how we treat neurological and psychiatric disease will require a new generation of tools to enable researchers to record signals from brain cells in much greater numbers and at even faster speeds. This cannot currently be achieved, but great promise for developing such technologies lies at the intersections of nanoscience, imaging, biological engineering, informatics, and other rapidly emerging fields of science and engineering.

The BRAIN Initiative will accelerate the development and application of new technologies that will enable researchers to produce dynamic pictures of the brain that show how individual brain cells and complex neural circuits interact at the speed of thought. These technologies will open new doors to explore how the brain records, processes, uses, stores, and retrieves vast quantities of information, and shed light on the complex links between brain function and behavior.

This initiative is one of the Administration's "Grand Challenges" – ambitious but achievable goals that require advances in science and technology. Since President Obama announced the BRAIN Initiative in April 2013, dozens of leading technology firms, academic institutions, scientists, and other key contributors to the field of neuroscience have answered his call and made significant commitments to advancing the initiative. Top neuroscientists also have developed a 12-year research strategy for NIH to achieve the goals of the BRAIN Initiative.

"The human brain is the most complicated biological structure in the known universe. We've only just scratched the surface in understanding how it works – or, unfortunately, doesn't quite work when disorders and disease occur," said NIH Director Francis S. Collins, M.D., Ph.D. "There's a big gap between what we want to do in brain research and the technologies available to take us there. These initial awards are focused on developing the tools and technologies needed to make the next leap in understanding the brain. This is just the beginning of a 12-year journey and we're excited to be starting the ride."

Today, the President's Science Advisor Dr. John Holdren highlighted several of these commitments, and called on companies, research universities, foundations, and philanthropists to join with him in continuing to identify and pursue the Grand Challenges of the 21st century.

Today's BRAIN Initiative announcements include:

- **Ongoing and new investments by the Administration:** Since the Initiative's launch, the Defense Advanced Research Projects Agency (DARPA), the National Institutes of Health (NIH), and the National Science Foundation (NSF) have already made significant BRAIN-related grant awards and issued solicitations. In addition, the President's FY15 Budget proposes to double the Federal investment in the BRAIN Initiative from these three agencies from about $100 million in Fiscal Year 2014 (FY14) to approximately $200 million in FY15. Moreover, two new Federal agencies have joined the BRAIN Initiative, with IARPA planning to sponsor several research programs to support the goals of the BRAIN Initiative and with FDA working to enhance the transparency of the regulatory landscape for neurological medical devices that will be developed as part of the BRAIN Initiative.

- **A broad response to the President's call to action:** In response to the President's call to action, a number of companies, foundations, patient advocacy organizations, universities, and private research institutions are making investments to advance the goals of the BRAIN Initiative. Building on a record of accomplishment from the commitments made in 2013, dozens of new partners announced commitments to align more than $270 million in research and development efforts with the goals of the BRAIN Initiative.

- **Maintaining our highest ethical standards:** In May 2014, at the President's request, the Presidential Commission for the Study of Bioethical Issues released the first of two reports exploring core ethical standards to guide the BRAIN Initiative and other recent advances in neuroscience. The Commission emphasized integrating ethics explicitly and systematically into neuroscience research from the start – a critical component for success that will prevent the need for later corrective interventions. The Commission is now examining the ethical and societal implications of neuroscience research and its applications more broadly and has been considering topics including capacity to consent, cognitive enhancement, and direct-to-consumer products, with its second report due out in the spring of 2015.

Key Activities by the Administration Being Highlighted Today

The BRAIN Initiative is growing to five participating federal agencies as FDA and IARPA join DARPA, NIH, and NSF. The NIH is announcing $46 million in new grant awards and all of the participating agencies are committing to engage in BRAIN Initiative-related work in FY15, including:

- *NIH is announcing $46 million in new BRAIN-related grant awards, focusing on new tools and techniques:* The National Institutes of Health announced today its first investment of approximately $46 million in FY2014 funds to support the goals of the President's BRAIN Initiative. Through this investment, more than 100 investigators will work to develop new tools and technologies to gain an understanding of circuit function in the brain and capture a dynamic view of the brain in action. In total, 58 awards were issued to institutions in more than 15 states and several countries. Funded projects focus

on classifying the myriad cell types in the brain, producing tools and technologies for analyzing brain cells and circuits, creating next-generation human brain imaging technology, developing methods for large-scale recordings of brain activity, and integrating experiments with theories and models to understand the functions of specific brain circuits. Planning for the NIH component of the BRAIN initiative is guided by the long-term scientific plan, "BRAIN 2025: A Scientific Vision" that details seven high-priority research areas and calls for a sustained federal commitment over 12 years. Potential new concepts for FY15 BRAIN Initiative funding announcements include human-centered neuroscience, training initiatives, and an initiative using the Small Business Innovation Research (SBIR) program in addition to the possible expansion of themes highlighted in FY14. For more details, see http://www.nih.gov/science/brain.

- *DARPA is supporting four current programs and is planning new investments in support of the BRAIN Initiative, with the ultimate goal of relieving and rehabilitating warfighters and civilians suffering from traumatic injury and neuro-psychiatric illness:* The Defense Advanced Research Projects Agency (DARPA) has launched a number of major efforts to develop breakthrough neurotechnologies that are deepening scientists' understanding of brain function and are supporting the development of novel therapeutic strategies. As part of this effort, DARPA is developing and assessing revolutionary electronic interfaces to the brain, as well as to the peripheral nervous system, that have the potential to provide high-resolution insights into neural circuits, lower the need for and impacts of invasive surgery, and improve neurocognitive and medical outcomes for patients with some of the most challenging disorders of the nervous system. Efforts currently underway at DARPA include the following programs:
    - Neuro-Function, Activity, Structure, and Technology (**Neuro-FAST**), which seeks to decode the behavior and neural activity of higher-order mammals to create a more complete understanding of neuronal activity and the structure and behavior of neural networks.
    - System-Based Neurotechnology for Emerging Therapy (**SUBNETS**), which aims to monitor, decode and alleviate symptoms in patients with otherwise intractable psychiatric and neurological diseases.
    - Restoring Active Memory (**RAM**), which is focused on restoring an individual's ability to form new memories following traumatic brain injury or neurologic disease.
    - Hand Proprioception and Touch Interfaces (**HAPTIX**), which aims to enable improved dexterity and fine motor control and restore the sensation of touch and spatial awareness for prosthetics users.

  DARPA will expand upon these efforts in FY15 with the new **ElectRx** program, which aims to develop new, minimally invasive neurotechnologies that, through targeted stimulation of the nervous system, can enhance the body and brain's ability to heal without surgery. These technologies hold promise to be helpful to service members, veterans, and others for the treatment of a wide range of medical conditions including inflammatory diseases and mental health disorders.

- *NSF continues its support of the BRAIN Initiative by accelerating fundamental research and the development of new technologies for neuroscience and neuroengineering:* Over

the past year, NSF has continued its significant investments in core activities focused on accelerating fundamental research and the development of new technologies for neuroscience and neuroengineering. In FY14, NSF funded 35 Early-concept Grants for Exploratory Research (EAGER) awards for innovative approaches and neurotechnologies to understand the brain. NSF also funded many more interdisciplinary neuroscience projects that span computing, engineering, and the mathematical, physical, life, social, and behavioral sciences, including support for the Science and Technology Center on Minds, Brains, and Machines at MIT. In the next year, NSF will invest in new interdisciplinary and transdisciplinary research and workforce development through a call for research on Integrative Strategies for Understanding Neural and Cognitive Systems and through Ideas Labs. In addition, NSF is announcing a new opportunity to facilitate partnerships among academia, industry, and government to advance the science and engineering of brain imaging and elucidate the relationship between structure and function. For more information, visit www.nsf.gov/brain.

- *FDA is joining the BRAIN Initiative, with the goal to enhance the transparency of the regulatory landscape for neurological medical devices:* In support of the FDA's work to enhance regulatory transparency, predictability, and assistance for developers and innovators of neurological medical devices, the agency will hold a public workshop in November of this year on Brain-Computer Interface (BCI) devices. These devices include neuroprostheses that interface with the central or peripheral nervous system to restore lost motor or sensory capabilities for patients with paralysis or amputations. As part of this workshop, the FDA is posting a discussion paper on its website, which contains information and questions on BCI devices to help facilitate and initiate discussion at the workshop. The FDA will use information and feedback from the workshop to develop an overall strategy that will promote advances in the technology while maintaining appropriate patient protections. This strategy will identify advances in regulatory science and the development of FDA guidance on premarket submissions for BCI technologies.

- *IARPA is joining the BRAIN Initiative and will use multidisciplinary approaches to advance understanding of cognition and computation in the brain:* The Intelligence Advanced Research Projects Activity (IARPA) is an organization within the Office of the Director of National Intelligence that invests in high-risk, high-payoff research to tackle some of the most difficult challenges in the Intelligence Community. As part of this mission, IARPA will sponsor several applied research programs that use multidisciplinary approaches to advance our understanding of cognition and computation in the brain. Programs to be executed in FY15 include: the Knowledge Representation in Neural Systems (KRNS) program, which seeks insights into the brain's representation of conceptual knowledge; the Strengthening Human Adaptive Reasoning and Problem-solving (SHARP) program, which will develop non-invasive neural interventions for optimizing reasoning and problem-solving; and the Machine Intelligence from Cortical Networks (MICrONS) program, which will reverse-engineer the algorithms of the brain to revolutionize machine learning.

Leading Companies are Committing to Support the Goals of the BRAIN Initiative

Leading companies are leveraging their core infrastructure, assets, and investments to support the BRAIN Initiative, including:

- *U.S. Photonics Industry Leaders are committing $30 million to tackle challenges of the BRAIN Initiative:* The National Photonics Initiative (NPI), an alliance of major scientific societies, industry and academic organizations, is convening a Photonics Industry Neuroscience Group to focus on developing new optics and photonics technologies in support of the BRAIN Initiative. This multidisciplinary industry group is comprised of influential U.S. industry leaders including Accumetra, LLC; Agilent, Applied Scientific Instrumentation; Coherent; Hamamatsu; Inscopix, Inc.; Spectra—Physics; and THORLABS. The Photonics Industry Neuroscience Group will work closely with the BRAIN Initiative leadership and with the neuroscience research community to advance optics and photonics research and technology development. The NPI industry group will invest at least $30 million in existing and future research and development spending over the next three years to advance optics and photonics technology challenges in neuroscience, such as:
    - Developing the imaging optics, laser sources, automated scanning technology, and high resolution cameras to provide a ten- to one-hundred-fold increase in the capability of imaging groups of thousands of active neurons;
    - Developing miniature, affordable, and portable/implantable microscopes compatible with high-throughput facilities for therapeutic screening based on neural activity signatures;
    - Using large-scale, high-throughput protein engineering technology, develop a new generation of fluorescent indicators of neural activity with ten-fold improvements in efficiency and temporal response; and
    - Developing automated software for detailed mapping of the human brain, architecture, neuronal wiring geometry, and dynamic activity from three-dimensional data sets generated by MRI, CT, and microscopic imaging.

- *GE has launched a new Brain Health Initiative linking numerous entities within the company such as GE Healthcare, GE Ventures & Healthymagination, and GE's Global Research Center:* The new Brain Health Initiative will build on and coordinate multiple efforts within the company, including corporate venture capital, open innovation, R&D, and health care lines of business. This includes previously announced efforts at GE, such as the work that the company has done to convene the traumatic brain injury community with a $60 million open innovation challenge, in partnership with the National Football League and Under Armour, to develop both next-generation imaging technology and algorithms and to provide better devices and gear for brain protection. GE also supports the TBI Endpoints Initiative (TED), a program that is bringing together multiple academic leaders in the traumatic brain injury field to better understand, diagnose and treat TBI and concussion, as well as other neuroscience-related research collaborations. GE is investing through venture capital in numerous start-up companies with novel neuro-based technologies. In further support of BRAIN-related efforts, GE is addressing critical public policy needs in neuroscience through its "Brain Trust" meetings of thought leaders.

- *Google engineers are building tools and developing infrastructure to analyze petabyte-scale datasets generated by the BRAIN Initiative:* Google is working closely with the Allen Institute for Brain Science to develop scalable computational solutions to advance scientific understanding of the brain. Google has also begun additional collaborations

with the Howard Hughes Medical Institute's Janelia Research Campus and several academic partners. Google is building the software tools and supporting infrastructure needed to analyze petabyte-scale datasets generated by the BRAIN Initiative and the neuroscience community to better understand the brain's computational circuitry and the neural basis for human cognition.

- *GlaxoSmithKline is announcing up to $5 million in new funding for the research community to develop innovative peripheral neurotechnologies:* In 2013, GlaxoSmithKline (GSK) announced its ambition to develop new treatments for disease through neuronal control of visceral organs systems, an area where GSK believes there is opportunity for translation of innovative neurotechnology to create precision treatments for chronic diseases such as asthma, hypertension, and arthritis. Since then, the GSK Bioelectronic Medicines program has furthered work in the research community in this area through multiple efforts, including exploratory funding for academic scientists, a $50 million venture capital fund, and a Bioelectronics Innovation Challenge to rapidly develop peripheral nerve research tools. Today GSK is announcing that within the Innovation Challenge, in addition to the previously announced $1 million award for the solver of the Challenge, GSK will provide up to $5 million of funding to seed and development funding for researchers to de-risk, design, develop, and test technologies. Launching today, the fund will rapidly engage, assess, and fund teams starting work in January 2015. In the spirit of open collaboration, the Challenge requires the funded parties to provide unrestricted, royalty-free access for research purposes to all technologies and tools developed through the program.

- *Inscopix is doubling the number of grants that it will award to advance the mechanistic understanding of the brain*: Inscopix is a provider of end-to-end solutions for imaging and interpreting large-scale neural activity during natural behavior. This past summer, in response to the BRAIN Initiative**,** Inscopix launched a $1 million scientific grant program, Deciphering Circuit Basis of Disease (DECODE), to catalyze the mechanistic understanding of the brain in health and disease. DECODE is an "in-kind" grant program designed to incentivize researchers to pursue transformative neural circuit research by coupling state-of-the-art technology access with comprehensive training. To better serve the response from the neuroscience research community to DECODE, Inscopix will double its commitment to $2 million and support up to ten laboratories for a period of two years.

Major Private Research Efforts are Announcing Plans to Align with and Support the BRAIN Initiative

Major foundations and universities are aligning over $240 million of their research efforts with the BRAIN Initiative, including:

- *University of Pittsburgh is announcing more than $65 million in funding for the University of Pittsburgh Brain Institute:* In January 2014, the University of Pittsburgh announced the creation of a Brain Institute focused on unlocking the mysteries of normal and abnormal brain function. The Brain Institute will support the efforts of more than 150 neuroscientists at the university and create seven new Centers, including the NeuroTech Center, which capitalizes on the University's advances in brain-computer

interfaces for paralyzed individuals, and the NeuroDiscovery Center, which will provide unique resources to enable innovative basic science research. The University has committed at least $45 million to support this effort and has received upwards of $20 million from public and private donors to fund its Brain Institute's endeavors.

- *The Simons Foundation is announcing alignment of $62 million Simons Collaboration on the Global Brain with the goals of the BRAIN Initiative:* In the spring of 2014, the Simons Foundation launched the Simons Collaboration on the Global Brain with a $60 million investment over the next five years. The goal of this collaboration, directed by David Tank, is to uncover patterns of the neural activity that produce cognition by combining analyses of internal mental states with studies of sensory and motor processing. Little is known about the internal states that represent motivation, decision bias, remembered events, and other cognitive functions; this work aims to define neural correlates of internal mental states by determining the principles of coding and dynamics within large populations of neurons recorded at single cell resolution in alert, behaving animals using advanced statistical analysis and modeling.

- *The Carnegie Mellon University is announcing a $40 million commitment to support the goals of the BRAIN Initiative:* The Carnegie Mellon University (CMU) BrainHub initiative spans across CMU's colleges and schools, involving nearly 50 faculty and over 150 scientists. A major facet of this initiative is increasing collaboration among faculty from disciplines such as computer science and engineering with those taking biological and behavioral approaches to neuroscience. Linking brain science to behavior via the application of machine learning, statistics, and computational modeling will be a hallmark of CMU's efforts, along with commercialization of the new technologies and applications. CMU plans to commit more than $40 million over the next five years to support several activities in the initiative, including 8 to 10 faculty positions, 10 endowed graduate fellowships, at least 6 new postdoctoral fellowships, $2 million in new seed funding, and support for an executive director position for this initiative. CMU is also partnering with institutions across the globe including the Indian Institute of Science, Sun Yat-sen University in China, and partners in Europe to create and analyze large data sets, and to train students and postdocs in computational approaches to brain science.

- *University of Texas System is announcing alignment of more than $20 million in equipment, faculty resources, and seed grants with the goals of the BRAIN Initiative:* In 2013, the University of Texas (UT) System organized a multi-campus Neuroscience Council in response to the BRAIN Initiative. The Council brings together top researchers from UT's 15 academic and health institutions to explore new convergent research that takes advantage of faculty expertise in disciplines such as engineering, computer science, mathematics, materials science, physics, and chemistry, along with cutting-edge resources such as the 10-petaflop supercomputer at UT Austin. The UT System has also created a Neuroscience and Neurotechnology Research Institute that will promote transdisciplinary, collaborative research projects focused on neurotechnology development and the creation of innovative tools and techniques that will transform the fields of imaging, neurocomputational techniques, molecular mapping, and the development of neuro-devices. In August 2014, The UT Board of Regents committed $20 million over two years for equipment, faculty recruitment, and seed money in the form of

peer-reviewed grants for multi-institutional, collaborative, and research projects to advance the BRAIN Initiative's goals.

- *University of California, Berkeley and Carl Zeiss Microscopy are announcing $12 million to create infrastructure for neurotechnology development:* The University of California, Berkeley (UC Berkeley) has invested in the Helen Wills Neuroscience Institute to create a program that will generate innovative devices and analytic tools in engineering, computation, chemistry, and molecular biology to enable transformative brain science from studies of human cognition to neural circuits in model organisms. The goal is to create new neurotechnologies that rapidly become accessible to the entire scientific community. The UC Berkeley BRAIN Initiative has invested $12 million to create infrastructure for neurotechnology development, including a public-private collaboration with Carl Zeiss Microscopy. This collaboration with Carl Zeiss Microscopy will support the Berkeley Brain Microscopy Innovation Center (BrainMIC), which will fast-track microscopy development for emerging neurotechnologies and will run an annual course to teach researchers how to use the new technologies.

- *University of Utah is committing $10 million to launch a Neuroscience Initiative to support the goals of the BRAIN Initiative:* The University of Utah Health Sciences has committed $10 million to launch a Neuroscience Initiative that will catalyze interdisciplinary approaches to neuroscience research. The goal is to deepen the understanding of the function and disorders of the nervous system and to improve patient care through innovation and integration of basic, translational, and clinical research efforts. This targeted investment by the university will lay the foundation for an expanded effort to enhance neuroscience research and advance the goals of the BRAIN Initiative. Initial funds will be used to create a "neuroscience hub," including space for collaborative research and neuroscience training. Funds will also be committed for priority investments, including recruiting new faculty in key areas to link basic, translational, and clinical neuroscience; seed funding to stimulate new projects and collaborations across departments and colleges; and programmatic efforts to educate the community and coordinate researchers in diverse disciplines across campus. The strategy will align neuroscience research in disease-focused pillars with a focus on those with high impact on Utah populations. The disease pillars will be linked by foundation elements, which represent critical areas of expertise or enabling technologies, in line with the priorities of the BRAIN Initiative.

- *Boston University is announcing alignment of new neuroscience centers with the goals of the BRAIN Initiative:* In 2014, Boston University announced a commitment of $140 million for the creation of the Center for Integrated Life Science and Engineering (CILSE), a new and unique facility for interdisciplinary research which will bring together outstanding scientists and engineers from across the University to work collaboratively in the areas of neuroscience and biological design. CILSE will comprise 170,000 square feet and support approximately 20 faculty and some 400 students and staff. Its core resources will include a shared equipment facility for Cognitive Neuroimaging. Three new research Centers will be launched including the Center for Systems Neuroscience and the Center for Sensory Communication and Neural Technology. The University has committed an additional $4 million over 5 years to the

launching of these Neuroscience Centers and they will focus on addressing the goals of the BRAIN Initiative.

- *The Brain & Behavior Research Foundation is committing to a $2 million increase in its annual support for young scientists working on the goals of the BRAIN Initiative:* The Brain & Behavior Research Foundation invests in cutting-edge research projects to understand, treat, and ultimately prevent and cure mental illness. In recognition of the critical role that basic research plays in understanding the brain, the Foundation is committing to a $2 million increase in its annual support for the most promising young scientists nationwide conducting neurobiological research to support the goals of the BRAIN Initiative through its Young Investigator Grants. The Foundation also continues to support the public television series "Healthy Minds," which this season will include episodes highlighting The BRAIN Initiative and the importance of research.

- *The Children's Neurobiological Solutions Foundation is committing to expanding their Pediatric Brain Mapping Project and to developing mechanisms to connect their patients with ongoing or future clinical trials:* The Children's Neurobiological Solutions Foundation (CNS Foundation) seeks to expedite the search for treatment and cures for children with neurological disorders as well as to provide important information to parents and patients on recent advances in pediatric neurology. CNS Foundation's Pediatric Brain Mapping Project aims to identify all children living with pediatric neurological disorders and CNS Foundation is committing to doubling the population in the project in the next year, from approximately 5,000 to 10,000 children. With this information, CNS Foundation will be positioned to connect patients with scientists and researchers who are working on the goals of the BRAIN Initiative. This opportunity for active collaboration between patients, patient advocacy groups, biotechnology and pharmaceutical companies, doctors, and researchers will help lead to the discovery of the next generation of treatments and cures for the diseases and disorders these children face.

- *The Pacific Northwest is announcing plans to develop a vibrant neurotechnology regional cluster:* The Pacific Northwest Neuroscience Neighborhood (University of Washington, the Allen Institute for Neuroscience, Oregon Health & Science University, and 50 companies based in Oregon and Washington) will pilot a BRAIN Initiative 'regional cluster' in the spring and summer of 2015 to bring together the research, clinical, industry, academic, education, public, and advocacy communities to highlight and build on the BRAIN Initiative themes and goals in the Pacific Northwest. By aligning a series of neuroscience events and conferences, this "BRAIN BRIDGE" aims to be an innovative model for engaging multiple stakeholder groups in the Pacific Northwest to create opportunities for more effective advocacy, targeted policy development, improved research investment, stimulated entrepreneurial enterprise, new educational practice dissemination, and public engagement. The BRAIN BRIDGE will also establish a strategy for developing a vibrant neurotechnology cluster that will connect scientists, technology developers, and funders.

- *The Neurotechnology Architecting Network is committing to mentoring and training innovators who will develop new technologies to meet the goals of the BRAIN Initiative:* The Neurotechnology Architecting Network is an open organization of innovators across many for- and non-profit institutions who are developing tools and technologies to reveal

how the brain works. In support of the goals of the BRAIN Initiative, the Neurotechnology Architecting Network is committing to mentoring and training innovators who will design, prototype, assess, and distribute at least a dozen technologies for mapping, recording, and controlling neural circuits. This network will aim to create a distributed "neurotech valley" that will disseminate these tools to further both the basic understanding of the brain, as well as its repair.

Building on a Record of Accomplishment

The key private sector partners that helped launch the BRAIN Initiative in 2013 made important progress in their commitments, including:

- *The Allen Institute for Brain Science*: The Allen Institute, a nonprofit medical research organization, engages in large-scale brain research and the public sharing of data and tools. Consistent with its 2013 commitment to spend $60 million annually to support Allen Institute projects and partnerships related to the BRAIN Initiative, in 2014 the Institute completed a multi-year, large-scale project: the Allen Mouse Brain Connectivity Atlas (a map of the major highways connecting the mouse brain). The Institute has also partnered with Google to develop scalable computational solutions to advance our understanding of the brain. Finally, the Allen Institute helped establish an annual conference for the large brain initiatives with Keystone Symposia with the NIH, the Salk Institute, and the Human Brain Project in Europe.

- *Howard Hughes Medical Institute invested more than $70 million to support the goals of the BRAIN Initiative during the past year, and plans a similar level of commitment in 2015:* Howard Hughes Medical Institute (HHMI) has invested more than $70 million to support the BRAIN Initiative during the past year at its Janelia Research Campus and in the laboratories of HHMI Investigators at universities throughout the United States. This investment has been focused on developing new imaging technologies and understanding how information is stored and processed in neural networks. A similar level of commitment is expected in 2015, including large-scale efforts at Janelia for neuroanatomical studies using light and electron microscopy, and for the development of improved sensors of neuronal activity and other genetic reagents.

- *The Kavli Foundation is continuing its support for the goals of the BRAIN Initiative and for innovative brain research:* Consistent with its commitment in 2013, The Kavli Foundation intends to spend $40 million over the next ten years in support of the BRAIN Initiative. The Kavli Foundation will establish two new endowed neuroscience institutes by the end of 2015, which will join an existing worldwide network of Kavli Institutes. The Kavli Foundation is also fostering new cross-disciplinary opportunities between neuroscience and the physical sciences through regular meetings on campuses nationwide. With GE healthymagination, HHMI, and the Allen Institute for Brain Science, it has established a program, "Neurodata Without Borders," that promotes the sharing of neuroscience data among scientists. Recognizing the critical importance of a diversity of funding sources, the Foundation is leading efforts to forge new alliances among scientists, philanthropy, and industry through pilot projects.

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