Accelerate the development and application of innovative technologies to construct a dynamic picture of brain function that integrates neuronal and circuit activity over time and space.

Build on neuroscience, genetics, physics, engineering, informatics, nanoscience, chemistry, mathematics, to catalyze an interdisciplinary effort of unprecedented scope.
BRAIN INITIATIVE WORKING GROUP

Cornelia Bargmann and Bill Newsome (co-chairs)

David Anderson, Caltech
Emery Brown, MIT
Karl Deisseroth, Stanford
John Donoghue, Brown
Peter MacLeish, Morehouse
Eve Marder, Brandeis
Richard Normann, Utah
Joshua Sanes, Harvard
Mark Schnitzer, Stanford
Terry Sejnowski, Salk
David Tank, Princeton
Roger Tsien, UCSD
Kamil Ugurbil, Minnesota

Ex Officio Members

Kathy Hudson, NIH
Geoffrey Ling, DARPA
John Wingfield, NSF

Executive Secretary

Lyric Jorgenson, NIH
OUR PLAN

Review neuroscience landscape + Articulate short-, mid- and long-range scientific goals

Develop rigorous scientific plan, including
- High-priority research areas
- Principles and appropriate structures
- Collaboration opportunities
- Timelines, milestones and cost estimates (Next)

Delivered interim report on high-priority areas for NIH FY14 funding in September 2013, Deliver final report in June 2014
OUR PROCESS

FOUR WORKSHOPS (SPRING/SUMMER 2013)

48 outside experts
Opportunities for public commentary

Molecular approaches
San Francisco, CA, May 29-30

Human neuroscience
Minneapolis, MN, August 29-30

Theory, computation and big data
Boston, MA, July 29-30

Large-scale recording and structural neurobiology
New York, NY, June 26-27

THREE ADDITIONAL MEETINGS
April 16, May 5, September 8

INTERIM REPORT TO THE ACD
September 16
To map the circuits of the brain, measure the fluctuating patterns of electrical and chemical activity flowing within those circuits, and understand how their interplay creates our unique cognitive and behavioral capabilities.
The BRAIN Initiative must accelerate other areas of neuroscience research

• In 2014 NIH will spend $5.5B on neuroscience research, and BRAIN will be $40M (<1%). It must focus, yet have broad impact.

Technology is not an end in itself

• Focus is on acquiring fundamental insight about nervous system function in health and disease. What tools and infrastructure are needed?

Pose the problems, don’t dictate the solutions

• Allow the most compelling ideas to flourish – it is early and new approaches are still emerging. Encourage collaboration.
Maps of the Brain:

- **Cellular maps** – with molecular components
- **Activity maps** – electrical and chemical
- **Connectivity maps** – local and long-range
- **Functional maps** – perturbations and behavior
- **Conceptual maps** – theory and understanding

**An Interdisciplinary Effort** for:

- **Discovery** of fundamental circuit properties and principles
- **Insight** into circuits relevant to human brain function & disease
- **Acceleration** of basic science, medicine, and technology
INTERIM REPORT -- PRINCIPLES

1. Use appropriate experimental systems and models
2. Cross boundaries in interdisciplinary collaborations
3. Integrate spatial and temporal scales
4. Establish platforms for sharing data
5. Validate and disseminate technology
6. Consider ethical implications of neuroscience research
1) Generate a census of cell types
2) Create structural maps of the brain
3) Develop new large-scale network recording capabilities
4) Develop a suite of tools for circuit manipulation
5) Link neuronal activity to behavior
6) Integrate theory, modeling, statistics, and computation with experimentation
7) Delineate mechanisms underlying human imaging technologies
8) Create mechanisms to enable collection of human data
9) Disseminate knowledge and training
Feedback was solicited at events associated with the **Society for Neuroscience** meeting

November, 2013, San Diego

1) Open SFN panel discussion with US agencies (NIH, NSF and DARPA) and European Commission (Human Brain Project)

2) Town hall with scientific community (Newsome & Bargmann)

3) National Academy of Sciences, neuroscience members

4) ACD Working group meeting (November 13):
   
   Discussion with outgoing President Swanson, President Mason, and President-elect Hyman of the Society for Neuroscience

   Presentations by and discussion with NSF, DARPA, HHMI, Allen Brain Institute, Kavli representatives
Response to scientific program has been very positive.

Actions needed in response to feedback:

- State explicitly how the **BRAIN Initiative will positively impact multiple areas of neuroscience**: cellular and molecular, genetics, developmental and stem cells, cognitive, disease-focused.

- Address concerns about the **NIH funding climate**: will BRAIN generate new resources?

- Clarify how NIH and other **BRAIN partners** will cooperate with each other, with international efforts, and with private sector groups.
Interim report articulated a scientific and technological agenda for understanding neuronal circuits and how they mediate cognition and behavior.

Next meeting, January 16-17, 2014, Washington DC

- Discussion with NIH Big Data to Knowledge representative
- Identify core goals for a 10-year national BRAIN Initiative.
- Identify essential technologies for achieving these goals.
- Recommend appropriate structures for achieving the goals: Small scale collaborations? Larger group efforts? Dedicated centers?
- Develop time-lines and specific milestones toward achieving the goals.
NEXT STEPS

• Stakeholder meeting to refine recommendations.
  March 5-6, 2014, Washington DC
  – Brain Initiative partners, public and private
  – NIH Neuroscience leadership
  – Representatives of The Society for Neuroscience
  – Patient advocacy organizations
  – Additional suggestions

• Deliver final report to ACD, June 5, 2014
Goals, critical technologies, mechanisms, time-lines and milestones.