NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

NSF 16-076

Dear Colleague Letter: Innovative Computational Infrastructure for Understanding the Brain

Dear Colleague:

April 26, 2016

Through this Dear Colleague Letter (DCL), the National Science Foundation (NSF) Directorate for Computer and Information Science and Engineering (CISE) aims to support initial exploratory activities toward the creation of comprehensive shared computational infrastructure solutions that are designed to transform the practice of collaborative neuroscience and enable systematic and grand-scale investigations of the brain and nervous system.

NSF supports fundamental research across the broad spectrum of disciplines associated with Understanding the Brain (see https://www.nsf.gov/brain), and is a partner in the federal "Brain Research through Advancing Innovative Neurotechnologies" (BRAIN) Initiative. In February 2016, NSF announced the intention to foster the development of national research infrastructure for neuroscience (i.e., "National Brain Observatory," NBO, effort) to support collaborative and team science for achieving a comprehensive understanding of the brain in action and context (NSF 16-047). Please refer to that DCL for NSF's overall interests and plans for NBO activities.

The present DCL encourages two types of funding requests: (1) Proposals for Conferences (community workshops) that are designed to bring together domain neuroscientists and computational infrastructure developers to explore needs for and opportunities to develop innovative computational infrastructure solutions that transform the practice of neuroscience; and (2) Early-Concept Grants for Exploratory Research (EAGERs) proposals for high risk/high reward innovative concepts and pilot projects that aim to ultimately result in deployment of ambitious, sustainable computational infrastructure resources, capabilities, and services that will enhance and accelerate the neuroscientific discovery process for a broad base of users.

Computational infrastructure comprises shared advanced computing resources and capabilities at the institutional, regional, and national scales. Comprehensive computational infrastructure solutions also include cyberinfrastructure elements such as workflow systems, software and data infrastructure, and networking capabilities, as well as related learning and workforce development, all designed to broadly serve communities of researchers and their collaborative activities.

NSF anticipates that such ambitious computational infrastructure solutions will have many enabling impacts on neuroscience, such as transforming the ability to integrate high-performance computing and data analytics resources into experimental and analytic workflows, to integrate and analyze data derived from different organismal levels, to compare data from different species, and to compare experimental data to computational models, at scales and for a neuroscience user base significantly beyond that which is currently feasible.

While such solutions may require a degree of *de novo* development, NSF is particularly interested in supporting exploratory, pilot, and planning activities that emphasize maximal leveraging of existing shared computational infrastructure resources and capabilities at the institutional, regional, and national levels (e.g., through expanded functionality and access, federation, introduction of scalability or interoperability, or other means), including but not limited to NSF-supported high-performance and high-throughput computing resources and other shared cyberinfrastructure, computational infrastructure developed within neuroscience that could be expanded to serve a significantly broader neuroscience user base, and computational infrastructure from other scientific domains that can be adapted to serve neuroscience at scale.

SPECIFIC GUIDANCE TO PROPOSERS RESPONDING TO THIS DCL

Proposers of conferences are expected to describe the neuroscientific and technical challenges to be addressed, and indicate how these will be addressed in the workshop agenda and through invitation of expert participants from both the neuroscience domain and the computational infrastructure developer/implementer communities. Conference requests must not exceed $50,000 for a one- or two-year duration.

Proposers of EAGERs are expected to identify and describe the immediate or anticipated need for the proposed computational infrastructure by one or more disciplines of brain science, and include at least one reference case or utilization scenario that will drive system requirements. EAGER projects should be based on a strong, mutually dependent collaboration between neuroscientists and computational infrastructure developers/implementers, and should not include domain neuroscientific research activities other than those that are directly necessary to the technical effort. EAGERs can be supported up to $300,000 for up to a two-year duration.

All proposers are encouraged, but not required, to capitalize on or indicate alignment with other NSF-funded projects that are supported by other NSF Understanding the Brain activities, such as but not limited to the awards associated with NSF's investments in the BRAIN Initiative, the Neural and Cognitive Systems (NCS) activity (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505132), and other NSF-funded cyberinfrastructure projects and resources. Proposers are also encouraged to describe the broader relevance of the proposed activities to other domains of science, that is, how the activities will contribute to strengthening the national research cyberinfrastructure ecosystem.

SUBMISSION PROCESS

Interested Principal Investigators (PIs) must email a 2-page (maximum) summary of their research ideas and planned activities to nsf-brain-ci@nsf.gov by 5:00 pm submitter's local time, Friday, May 20, 2016.

Conference and EAGER proposal inquiries will be accepted from a PI or any consortium of investigators led by a PI at an eligible U.S. institution. A PI may lead at most one conference proposal and one EAGER proposal pursuant to this DCL.

The summaries will be reviewed internally and ideas that best meet the goals of this Dear Colleague Letter will be encouraged to submit conference or EAGER proposals. PIs can expect to be notified by late May whether submission of a full conference or EAGER proposal is encouraged, and if encouraged, instructions will be included in the notification email for how and when (within June) to submit a full proposal. Proposals must be submitted via Fastlane or Grants.gov, following the instructions in NSF's Grant Proposal Guide (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Award activities will be funded through ACI's Strategic Technologies for Cyberinfrastructure (STCI) Program. It is anticipated that all awards will be made by September 2016.

Eventual proposals that fail to address the objectives and guidance described in this DCL will be returned without review.

Any questions should be directed to the email address nsf-brain-ci@nsf.gov; do not contact the signatory to this DCL.

Sincerely,

James Kurose
Assistant Director for Computer & Information Science & Engineering