NATIONAL SCIENCE FOUNDATION
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ARLINGTON, VIRGINIA 22230

NSF 17-031

Dear Colleague Letter: Request for Information on Future Needs for Advanced Cyberinfrastructure to Support Science and Engineering Research (NSF CI 2030)

January 5, 2017

Dear Colleagues:

In the past two decades, advanced cyberinfrastructure has become a critical element of science and engineering research – a result of the increasing scope and accuracy of simulations of natural and engineered systems as well as the growing volume of data generated by instruments, simulations, experiments and observations. The National Science Foundation (NSF) embraces an expansive, ecosystem view of research cyberinfrastructure – spanning advanced computing resources, data and software infrastructure, workflow systems and approaches, networking, cybersecurity and associated workforce development – elements whose design and deployment are motivated by evolving research priorities as well as the dynamics of the scientific process. The critical role of this broad spectrum of shared cyberinfrastructure resources, capabilities and services – and their integration – in enabling science and engineering research has been reaffirmed by the National Strategic Computing Initiative, which was announced in July 2015, and in the National Academies' 2016 report on Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017-2020. While these efforts are computing-centric, they expose the inherent inseparability of computing from the larger cyber ecosystem. With this DCL, NSF seeks input that provides a holistic view of the future needs for advanced cyberinfrastructure for advancing the Nation's research enterprise.

In 2009, NSF undertook a community-informed analysis of cyberinfrastructure needs that led to the formulation of a vision, a strategy, and a set of programmatic initiatives together comprising the current NSF-wide effort entitled Cyberinfrastructure for 21st Century Science and Engineering (CIF21). Since that analysis, many changes have taken place in terms of scientific challenges and opportunities as well as technological progress. To continue to take full advantage of the potential provided by cyberinfrastructure to advance science and engineering research, NSF is beginning to formulate an updated strategy as well as concrete plans for future investments in this area. In this endeavor, NSF will focus on complementing and supporting forward-looking cyberinfrastructure for research that institutions and universities are unlikely to be able to deploy on their own. In addition, NSF seeks to stimulate innovative use of cyberinfrastructure for research to spur advances not otherwise possible, particularly in emerging areas of science and engineering research. Finally, NSF supports the exploration of approaches to sustainability that address the unique needs of research cyberinfrastructure, including the

scientific, technical and human aspects of cyberinfrastructure.

In this Request for Information (RFI), NSF encourages community input to inform the Foundation's strategy and plans for an advanced cyberinfrastructure that will enable the frontiers of science and engineering to continue to advance over the next decade and beyond (NSF CI 2030). This whole-of-NSF activity recognizes that researchers in different disciplines may need different resources; may have differing priorities for access, interoperability, and continuity; and may require external expertise to address the most critical problems in their discipline. We therefore strongly encourage researchers in all fields of science, engineering and education to respond to this Request for Information.

HOW TO RESPOND TO THIS RFI

NSF invites both individuals and groups of individuals to provide input on the specific scientific and engineering research challenges that require advanced cyberinfrastructure for their solutions, via the following submission website: **http://www.nsfci2030.org**.

The online submission form requires the following information[1]:

- Author names(s) and affiliation(s).
- Valid contact email address.
- Research domain(s), discipline(s)/sub-discipline(s) of the author(s).
- Title of the response, and an abstract (200 words) summarizing the response.
- Question 1 (maximum 1200 words) – Research Challenge(s). *Describe current or emerging science or engineering research challenge(s), providing context in terms of recent research activities and standing questions in the field.*
- Question 2 (maximum 1200 words) – Cyberinfrastructure Needed to Address the Research Challenge(s). *Describe any limitations or absence of existing cyberinfrastructure, and/or specific technical advancements in cyberinfrastructure (e.g. advanced computing, data infrastructure, software infrastructure, applications, networking, cybersecurity), that must be addressed to accomplish the identified research challenge(s).*
- Question 3 (maximum 1200 words, optional) – Other considerations. *Any other relevant aspects, such as organization, process, learning and workforce development, access, and sustainability, that need to be addressed; or any other issues that NSF should consider.*
- Checkbox to consent to NSF's use and display of the submitted information, consistent with the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode). *NSF anticipates making submissions publically accessible through an NSF CI 2030 website*[2].

SUBMISSION DEADLINE

Contributions must be made using the submission website http://www.nsfci2030.org **on or before 5:00 PM Eastern time on April 5, 2017**.

NSF plans to use these contributions over the next year to assist in formulating plans for supporting the NSF community in the exploration, development, and deployment of an advanced cyberinfrastructure for the next decade.

We invite you to step outside of the immediate demands of your current research and to think boldly about the opportunities for advancing your discipline in the next decade. We look forward to your contribution to our plans for the future of advanced cyberinfrastructure for the NSF-supported community.

For questions concerning this effort and submission of input, please contact William Miller, Science Advisor, NSF Office of Advanced Cyberinfrastructure, at the following address: nsfci2030rfi@nsf.gov.

Sincerely,

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Computer and Information Science and Engineering

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[1] The valid OMB control number for this collection is 3145-0215. The time required to complete this information collection is estimated to be approximately 60 minutes per response.

[2] Submissions are expected to be professional in tone and addressing subject matter relevant to this effort. NSF reserves the right to remove offensive or otherwise unprofessional responses.