NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

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Dear Colleague Letter: Encouraging Mid-scale Research Infrastructure in Computer and Information Science and Engineering

June 8, 2020

Dear Colleagues:

With this Dear Colleague Letter (DCL), the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) encourages the community to contemplate and pursue critical needs for unique mid-scale research infrastructure (RI) that can serve one or more research communities at a national level, and have the potential to significantly advance NSF-supported research disciplines.

CISE has long supported RI projects at a range of scales through an array of programs, including the CISE Community Research Infrastructure (CCRI) program and NSF-wide programs such as the NSF Major Research Instrumentation (MRI) program and NSF Mid-scale RI programs (including Mid-Scale RI 1 and Mid-Scale RI 2). CISE mid-scale research infrastructure projects emphasize strong technical merit and target identified infrastructure needs of the research community at a national level. Examples of CISE-funded mid-scale RI projects include integrative, cross-disciplinary collaborative projects such as NSFFutureCloud[1], Platforms for Advanced Wireless Research (PAWR)[2], FABRIC[3], Sage[4], and the Pacific Research Platform and National Research Platform (PRP, NRP)[5], among others.

The NSF Mid-scale RI programs, in particular, constitute one of NSF's ten Big Ideas[6] and support capabilities in the mid-scale cost range, that is, above that supported by the MRI program and below that supported by the Major Research Equipment and Facility Construction (MREFC) program for major facilities. In FY 2019, the NSF released two mid-scale solicitations: Mid-scale RI-1 (NSF 19-537), for design and implementation projects requesting up to $20 million; and Mid-scale RI-2 (NSF 19-542), for implementation projects between $20 million and $70 million. A NSF mid-scale RI-1 design project can be a steppingstone to a future potential implementation project.

CISE encourages the community to prepare for potential future opportunities like the NSF Mid-scale RI programs noted above. CISE emphasizes interest in innovative and integrative mid-scale RI projects in areas not already well-supported by existing programs and guided by the following principles:

- *Science-driven*: Clearly identifies the target CISE areas, and/or other disciplinary research areas as appropriate; evidences the stated community need(s) for the RI and existing gap(s), for instance, through consensus community reports from workshops[7], blue ribbon panels, and agency survey results[8]; and articulates the intended positive impacts of the RI on the target community/communities. Projects that are motivated by and align with NSF initiatives such as the NSF Big Ideas and other national priorities, and/or that collaboratively address the needs of more than one research domain supported by NSF directorates, are particularly welcomed. Demonstrating community buy-in is a fundamental characteristic of successful mid-scale RI projects.
- *Holistic and integrative*: Seeks to innovatively bring together a range of CISE and/or other research disciplines as appropriate to address the identified infrastructure objectives. This might include computing, software, data, networking, algorithms and other research and infrastructure areas supported by CISE, along with those supported by other NSF directorates. This also comprises well-developed plans for student training and the involvement of a diverse workforce in all aspects of the mid-scale RI activities.
- *Service, performance, and sustainability oriented*: Led by a team that demonstrates technical and project management experience and expertise in designing, developing, and delivering sustained operational resources and capabilities for the CISE and/or other research discipline users as appropriate. This includes application of established principles and practices for project development and management, user-informed system design, service-oriented user operations, and setting and measuring against performance objectives and success metrics.

Please contact the following CISE cognizant program staff with any questions regarding this DCL and mid-scale RI more generally:

- Deep Medhi, dmedhi@nsf.gov;
- William Miller, wlmiller@nsf.gov.

Sincerely,

Margaret Martonosi
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REFERENCES

[1] Chameleon (https://www.chameleoncloud.org/; https://nsf.gov/awardsearch/showAward?AWD_ID=1743358). CloudLab (https://cloudlab.us/; https://nsf.gov/awardsearch/showAward?AWD_ID=1743363).

[2] PAWR (https://advancedwireless.org/; https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505316).

[3] FABRIC (https://fabric-testbed.net; https://nsf.gov/awardsearch/showAward?AWD_ID=1935966).

[4] Sage (https://sagecontinuum.org/; https://www.nsf.gov/awardsearch/showAward?AWD_ID=1935984).

[5] PRP/NRP (https://pacificresearchplatform.org/; https://nsf.gov/awardsearch/showAward?AWD_ID=1541349; https://www.nsf.gov/awardsearch/showAward?AWD_ID=1826967).

[6] NSF Big Ideas (https://www.nsf.gov/news/special_reports/big_ideas/).

[7] For an example of a related community activity, see the report of the 2020 Midscale Experimental Research Infrastructure Forum (MERIF), https://drive.google.com/file/d/18PT0QbivWwWxHFXPkftC0T9ywrk00fUO/view?usp=sharing.

[8] For instance, responses to NSF Requests for Information on community needs for cyberinfrastructure, available at https://www.nsf.gov/cise/oac/ci2030/rfi_responses.jsp and https://www.nsf.gov/cise/oac/datacirfi/rfi_responses.jsp.