

Mid-scale Research Infrastructure-2 (Mid-scale RI-2)

PROGRAM SOLICITATION NSF 19-542



National Science Foundation

Letter of Intent Due Date(s) (required) (due by 5 p.m. submitter's local time):

February 08, 2019

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. submitter's local time):

March 11, 2019

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

August 02, 2019

Submission by invitation only.

IMPORTANT INFORMATION AND REVISION NOTES

A letter of intent is required by the due date indicated above for subsequent preliminary proposal submission and review.

Preliminary proposals must be submitted by an Authorized Organizational Representative by the due date indicated.

Full proposals may only be submitted by invitation after the review of the preliminary proposals is completed.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 19-1](#)), which is effective for proposals submitted, or due, on or after January 28, 2019.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Mid-scale Research Infrastructure-2 (Mid-scale RI-2)

Synopsis of Program:

In 2016, the National Science Foundation (NSF) unveiled a set of "Big Ideas," 10 bold, long-term research and process ideas that identify areas for future investment at the frontiers of science and engineering (see https://www.nsf.gov/news/special_reports/big_ideas/index.jsp). The Big Ideas represent unique opportunities to position our Nation at the cutting edge of global science and engineering leadership by bringing together diverse disciplinary perspectives to support convergence research. As such, when responding to this solicitation, even though proposals must be submitted to the Office of Integrative Activities, once received, the proposals will be managed by a cross-disciplinary team of NSF Program Directors.

The need for a well-defined NSF mid-scale funding program has been recognized by stakeholders in the scientific community and by Congress in the American Innovation and Competitiveness Act (AICA) of 2017. As one of four "process ideas" in the NSF suite of 10 Big Ideas, the Mid-scale Research Infrastructure Program is aimed at transforming scientific and engineering research fields as well as science, technology, engineering and mathematics (STEM) education research fields by making available new capabilities, while simultaneously training early-career researchers in the development, design, and construction of cutting-edge infrastructure.

The NSF Mid-scale Research Infrastructure-2 Program (Mid-scale RI-2) supports implementation of projects that comprise any combination of equipment, instrumentation, computational hardware and software, and the necessary commissioning and human capital in support of implementation of the same. The total cost for Mid-scale RI-2 projects

ranges from \$20 million to below the minimum award funded by the Major Research Equipment and Facilities Construction (MREFC) Program, currently \$70 million. Mid-scale RI-2 projects will directly enable advances in any of the research domains supported by NSF, including STEM education. Projects may also include upgrades to existing research infrastructure.

The Mid-scale RI-2 Program emphasizes strong scientific merit and response to an identified need of the research community, technical and managerial readiness for implementation, and a well-developed plan for student training and involvement of a diverse workforce in mid-scale facility development, and/or associated data management.

Mid-scale RI-2 will consider only the implementation (typically construction or acquisition) stage of a project, including a limited degree of advanced development immediately preparatory to implementation. It is thus intended that Mid-scale RI-2 will support projects in high states of readiness for implementation, i.e., those that have already matured through previous developmental investments. Accordingly, Mid-scale RI-2 does not support pre-implementation (early-stage design or development). Mid-scale RI-2 also does not support post-implementation research, operations or maintenance, the anticipated source(s) of which are expected to be discussed in the proposal.

It is anticipated that solicitations will be issued approximately biennially after the first issuance.

Research infrastructure and instrumentation in the range just above the current Major Research Instrumentation Program threshold and below the Mid-scale RI-2 threshold is the subject of the Mid-scale Research Infrastructure-1 solicitation.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Brian Midson, GEO, telephone: (703) 292-8145, email: bmidson@nsf.gov
- Allena K. Opper, MPS, telephone: (703) 292-8958, email: aopper@nsf.gov
- Joy M. Pauschke, ENG, telephone: (703) 292-7024, email: jpauschk@nsf.gov
- William L. Miller, CISE, telephone: (703) 292-7886, email: wlmiller@nsf.gov
- Sridhar Raghavachari, BIO, telephone: (703) 292-4845, email: sraghava@nsf.gov
- Brian Humes, SBE, telephone: (703) 292-7284, email: bhumes@nsf.gov
- Lee L. Zia, EHR, telephone: (703) 292-5140, email: lzia@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.079 --- Office of International Science and Engineering
- 47.083 --- Office of Integrative Activities (OIA)

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 4 to 6

Subject to the availability of funds and quality of proposals received.

Anticipated Funding Amount: \$150,000,000

Total funds available are anticipated to be approximately \$150 million over five years.

Individual awards from \$20 million to \$70 million are anticipated for advanced design and implementation, pending availability of funds. Duration of the award may be up to five (5) years.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

Proposals may only be submitted by organizations located in the United States, its territories or possessions, as follows:

1. Institutions of higher education (Ph.D.-granting and non-Ph.D.-granting), acting on behalf of their faculty members, that are accredited in and have their main campus in the United States, its territories or possessions. Distinct academic campuses (e.g., that award their own degrees, have independent administrative structures, admissions policies, alumni associations, etc.) within multi-campus systems qualify as separate submission-eligible institutions.
2. Not-for-profit, non-degree-granting domestic U.S. organizations, acting on behalf of their employees, for example (but not

limited to) independent museums and science centers, observatories, research laboratories and similar organizations that are directly associated with the Nation's research activities. These organizations must have an independent, permanent administrative organization (e.g., a sponsored projects office) located in the United States, its territories or possessions, and have 501(c)(3) tax status.

3. Consortia as follows:

- a. A legally incorporated, not-for-profit consortium that include two or more submission-eligible organizations as described in items (1) and (2) above. Such a consortium is one with an independent administrative structure (e.g., a sponsored projects office) located in the United States, its territories or possessions and has 501(c)(3) status.
- b. Submission-eligible organizations as described in items (1) and (2) above, on behalf of an informal consortium. The cover sheet of such a proposal *must* identify both a PI and co-PI(s) from *at least two* Mid-scale RI-2 submission-eligible organizations (items 1 and/or 2 above) as lead investigators in the consortium. These consortium proposals may also include as partners other U.S. and non-U.S. organizations that are not eligible to submit Mid-scale RI-2 proposals.

In either case, the proposal title should indicate that a consortium is proposing.

For-profit commercial organizations, especially U.S. small businesses with strong capabilities in scientific or engineering research or education, are eligible for infrastructure development support through subawards/subcontracts as private sector partners with submitting organizations; they may not submit proposals. Such partnerships must be substantive and meaningful, and build capacity for infrastructure development within Mid-scale RI-2 submission-eligible organization(s). Unless otherwise specified in the award, the title to the resulting infrastructure should be retained by the Mid-scale RI-2-eligible performing organization(s). Prospective PIs may contact the cognizant Mid-scale RI-2 program officer regarding organizational eligibility, and for information on other NSF funding opportunities for instrumentation and research infrastructure.

Additionally:

- o **MREFC-related Proposals:** The Mid-scale RI-2 program will not accept proposals for an instrument or other infrastructure that augments an ongoing Major Facility Project in the Construction Stage because the scope of those projects is already defined and subject to NSF's No Cost Overrun Policy. A list of such facilities can be found at <https://www.nsf.gov/bfa/ifo/>.
- o **FFRDC-related Proposals:** Although NSF's Federally Funded Research and Development Centers (FFRDCs) are eligible to submit under item 2) above, proposals involving another Federal agency or one of their FFRDCs can only be submitted as a consortium proposal by a Mid-scale RI-2 submission-eligible organization under item 3(b) above. In addition to at least two Mid-scale RI-2 eligible organizations, the proposal must include the agency/FFRDC (or its managing organization) as a partner in the consortium, even if the role of the FFRDC in the project is solely to house the infrastructure. The research infrastructure must make unique contributions to the needs of researchers within the consortium and/or establish access to new multi-user research capabilities. Preliminary inquiry to the cognizant Mid-scale RI-2 point of contact should be made before preparing a proposal for submission.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There is no limit on the number of proposals an organization may submit. Simultaneously submitted collaborative proposals are not allowed; funding to partner institutions must be through subawards.

Limit on Number of Proposals per PI or Co-PI: 2

Any individual may serve as the Principal Investigator (PI) or a co-Principal Investigator (co-PI) for no more than two (2) proposals.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
 - o Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - o Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**

Not Applicable

- **Other Budgetary Limitations:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. submitter's local time):

February 08, 2019

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):

March 11, 2019

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

August 02, 2019

Submission by invitation only.

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The NSF Mid-scale Research Infrastructure-2 Program (Mid-scale RI-2) supports implementation of projects that comprise any combination of equipment, instrumentation, computational hardware and software, and the necessary commissioning and human capital in support of implementation of the same. The total cost for Mid-scale RI-2 projects ranges from \$20 million to below the minimum award funded by the Major Research Equipment and Facilities Construction (MREFC) Program, currently \$70 million. Mid-scale RI-2 projects will directly enable advances in any of the research domains supported by NSF, including STEM education. Projects may also include upgrades to existing research infrastructure. The need for a well-defined NSF mid-scale funding program has been recognized by stakeholders in the scientific community and by Congress in the *American Innovation and Competitiveness Act (AICA)* of 2017. The Mid-scale Research Infrastructure Big Idea is one of four "process ideas" in the NSF suite of 10 Big Ideas and is aimed at transforming scientific and engineering research fields and STEM education research fields by making available new capabilities, while simultaneously training early-career researchers in the development, design, and construction of cutting-edge infrastructure.

II. PROGRAM DESCRIPTION

Mid-scale RI-2 is an NSF-wide competitive program that addresses scientific demand for research infrastructure in the \$20 million - \$70 million cost range for implementation. Mid-scale RI-2 supports a wide variety of research infrastructure implementation activities that may comprise any combination of equipment, instrumentation, upgrades to major research facilities, computational hardware and software, and the necessary commissioning and human capital in support of implementation of the same, all leading to the direct advancement of fundamental science, engineering, or STEM education research. Infrastructure acquired or developed with support from the Mid-scale RI-2 Program is expected to be operational by the end of the award period to enable the research for which the instrumentation was proposed. Examples of projects that may be supported by Mid-scale RI-2 include, but are not limited to, upgrades and new major instruments or cyberinfrastructure for existing major infrastructure, infrastructure that supports targeted high-priority experiments, and major shared community infrastructure and resources as may be required to enable community-scale research.

Mid-scale RI-2 is intended to support the implementation stage on a wide variety of mid-scale research infrastructure projects. Mid-scale RI-2 therefore uses an inclusive definition of implementation, which can include traditional stand-alone construction or acquisition as well as a degree of advanced development for instrumentation and equipment projects. For example, it could include a spiral development step leading to a larger system acquisition for cyberinfrastructure or other shared community research capability. The Total Project Cost (TPC) to NSF for implementation must be at least \$20 million and less than \$70 million.

The Mid-scale RI-2 program will NOT support proposals that include the following:

- Pre-implementation research and development and other community or technical preparatory activities;
- Science research (except for validation of operational capability);
- Post-implementation research, operations, and maintenance; and
- General-purpose support systems and equipment that are not directly required for the implementation and eventual operation of the proposed infrastructure.

Proposals seeking support are subject to return without review if noncompliance with the above criteria is established prior to review, or declination if noncompliance is established as a result of merit review.

Mid-scale projects can be ideal incubators for training the next generation of leaders in engineering, science and technology and creators of cutting-edge new capabilities. Solving the most pressing scientific and societal problems of the day – such as those called out in National Academies reports and decadal surveys or identified through research community planning and prioritizing exercises – using new technologies, techniques, and concepts is encouraged in this competition. As such, Mid-scale RI-2 should focus on innovative, potentially transformative, projects that include a strong component of student training in instrumentation and research infrastructure development. The scientific justification should demonstrate how the proposed infrastructure provides unique research capability relative to what is currently available to the general U.S. research community.

All proposals should show the project's value and benefit to the U.S. science community. Examples of benefit include, but are not limited to, new and unique research capability, access to the research facility or observing time on the facility, access to data products and software, and cooperation and sharing of technology with other projects.

Strong project management and cost controls should be demonstrated features of the proposed project plan, particularly as regards to identification and mitigation of foreseeable risks, budget management and project controls, including plans for budget contingency as appropriate.

It should be noted that, prior to making a funding decision, NSF may be required to comply with applicable federal environmental authorities such as the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA). For example, these statutes require NSF to consider the potential impacts of activities associated with proposals under consideration for NSF funding on a broad range of environmental resources (NEPA), significant historic properties (NHPA), and endangered and/or threatened species (ESA). To assist NSF in determining which environmental statutes may apply and what level of environmental oversight may be appropriate, preliminary proposals and full proposals should indicate whether activities are anticipated to impact the natural or cultural environment, especially those involving renovation, construction, or major fixed equipment installation. In order to support NSF's federal environmental review and compliance obligations, additional information may be requested from the PI.

The Mid-scale RI-2 program will evaluate projects based on standard NSF merit review criteria of Intellectual Merit and Broader Impacts, as well as the solicitation-specific criteria presented below that include special attention to relevance to science drivers and community-established strategic goals and roadmaps, demonstration of technical maturity, project management, and planning for operations including data management.

Preliminary proposals will be evaluated and ranked for Intellectual Merit and Broader Impacts and the additional solicitation-specific review criteria via external merit review panels. Highly ranked preliminary proposals will be invited to submit full proposals. Additional NSF-organized Reverse Site Visit and Final Design Review may also be required before full funding is awarded.

In the Facilities, Equipment and Other Resources section of the proposal, proposers should include an aggregated description of the internal and external resources that the organization and its collaborators will provide to the project, should it be funded. The description should not include any quantifiable financial information.

Required supporting materials should be included as Supplementary Documents, as necessary. See Section V.A for additional information.

Proposals will be funded for no more than five (5) years.

Guidance on Proposals for Advanced Cyberinfrastructure Projects:

The Mid-scale RI-2 program will consider proposals for mature, implementation-ready cyberinfrastructure (CI) projects that aim to significantly enable new science and engineering research at the community, regional, national and international scales. Such CI proposals must be strongly driven by identified research needs of one or more communities. Proposals to the Mid-scale RI-2 program that are specifically for broadly provisioned high-performance computing resources will not be supported. Prospective principal investigators (PIs) with questions should contact the Mid-scale RI-2 Program team.

International Projects:

Projects with an international component may be submitted to the Mid-scale RI-2 program, in accordance with the eligibility requirements above. International projects typically involve partnering a U.S. project with one or more international collaborators in a specific institution or organization. Successful international projects include (1) true intellectual collaboration with a foreign partner and (2) benefits that are realized from the expertise, specialized skills, facilities, phenomena, or other resources that the foreign collaborator or research environment provides.

III. AWARD INFORMATION

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 4 to 6

Anticipated Funding Amount: \$150,000,000

Total funds available are anticipated to be approximately \$150 million over five years.

Individual awards from \$20 million to \$70 million are anticipated for advanced design and implementation, pending availability of funds. Duration of the award may be up to five (5) years.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

Proposals may only be submitted by organizations located in the United States, its territories or possessions, as follows:

1. Institutions of higher education (Ph.D.-granting and non-Ph.D.-granting), acting on behalf of their faculty members, that are accredited in and have their main campus in the United States, its territories or possessions. Distinct academic campuses (e.g., that award their own degrees, have independent administrative structures, admissions policies, alumni associations, etc.) within multi-campus systems qualify as separate submission-eligible institutions.
2. Not-for-profit, non-degree-granting domestic U.S. organizations, acting on behalf of their employees, for example (but not limited to) independent museums and science centers, observatories, research laboratories and similar organizations that are directly associated with the Nation's research activities. These organizations must have an independent, permanent administrative organization (e.g., a sponsored projects office) located in the United States, its territories or possessions, and have 501(c)(3) tax status.
3. Consortia as follows:
 - a. A legally incorporated, not-for-profit consortium that include two or more submission-eligible organizations as described in items (1) and (2) above. Such a consortium is one with an independent administrative structure (e.g., a sponsored projects office) located in the United States, its territories or possessions and has 501(c)(3) status.
 - b. Submission-eligible organizations as described in items (1) and (2) above, on behalf of an informal consortium. The cover sheet of such a proposal *must* identify both a PI and co-PI(s) from *at least two* Mid-scale RI-2 submission-eligible organizations (items 1 and/or 2 above) as lead investigators in the consortium. These consortium proposals may also include as partners other U.S. and non-U.S. organizations that are not eligible to submit Mid-scale RI-2 proposals.

In either case, the proposal title should indicate that a consortium is proposing.

For-profit commercial organizations, especially U.S. small businesses with strong capabilities in scientific or engineering research or education, are eligible for infrastructure development support through subawards/subcontracts as private sector partners with submitting organizations; they may not submit proposals. Such partnerships must be substantive and meaningful, and build capacity for infrastructure development within Mid-scale RI-2 submission-eligible organization(s). Unless otherwise specified in the award, the title to the resulting infrastructure should be retained by the Mid-scale RI-2-eligible performing organization(s). Prospective PIs may contact the cognizant Mid-scale RI-2 program officer regarding organizational eligibility, and for information on other NSF funding opportunities for instrumentation and research infrastructure.

Additionally:

- o **MREFC-related Proposals:** The Mid-scale RI-2 program will not accept proposals for an instrument or other infrastructure that augments an ongoing Major Facility Project in the Construction Stage because the scope of those projects is already defined and subject to NSF's No Cost Overrun Policy. A list of such facilities can be found at <https://www.nsf.gov/bfa/ffo/>.
- o **FFRDC-related Proposals:** Although NSF's Federally Funded Research and Development Centers (FFRDCs) are eligible to submit under item 2) above, proposals involving another Federal agency or one of their FFRDCs can only be submitted as a consortium proposal by a Mid-scale RI-2 submission-eligible organization under item 3(b) above. In addition to at least two Mid-scale RI-2 eligible organizations, the proposal must include the agency/FFRDC (or its managing organization) as a partner in the consortium, even if the role of the FFRDC in the project is solely to house the infrastructure. The research infrastructure must make unique contributions to the needs of researchers within the consortium and/or establish access to new multi-user research capabilities. Preliminary inquiry to the cognizant Mid-scale RI-2 point of contact should be made before preparing a proposal for submission.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There is no limit on the number of proposals an organization may submit. Simultaneously submitted collaborative proposals are not allowed; funding to partner institutions must be through subawards.

Limit on Number of Proposals per PI or Co-PI: 2

Any individual may serve as the Principal Investigator (PI) or a co-Principal Investigator (co-PI) for no more than two (2) proposals.

Additional Eligibility Info:

Although more than one institution may participate in a proposal, a single organization must accept overall management responsibility for the project. The proposal must be submitted by one organization, with funding provided to any other organization through subawards; use of the separately submitted collaborative proposal method is not permitted.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent (required):

A compliant Letter of Intent (LOI) submitted by only the **lead institution** is required for proposal submission. LOIs are used by NSF to gauge the level of effort for review. They will not be used as pre-approval mechanisms for the submission of proposals, and no feedback will be provided to the submitters. However, the LOI is specific to the project, project title and PI; both preliminary proposal and full proposal review requires that a compliant LOI be submitted by the deadline.

The LOI may be up to three pages in length and must be submitted through FastLane by the due date with the following information:

- Project Title: The title must begin with "Mid-scale RI-2: *TITLE*", or "Mid-scale RI-2 Consortium: *TITLE*", as applicable.
- The name and departmental affiliation of the Principal Investigator (PI).
- The name(s) and departmental affiliation(s) of the Co-PI(s) and all senior personnel.
- The names(s) of any other (non-lead) participating institutions or organizations, including all sub-awardees.
- Project Synopsis (up to 2500 text characters including project organization structure): Provide a brief summary of the project, anticipated impact to the research community, and the need for the project.
- Target Disciplines: List up to 5 primary disciplinary areas contributing to the research focus.

Submission of multiple LOIs for a single project is not allowed and each LOI is specific to the project, project title and PI.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Submission by an Authorized Organizational Representative (AOR) is required when submitting Letters of Intent.
- A Minimum of 0 and Maximum of 20

Other Participating Organizations are permitted

- Target discipline/s that contribute to the research focus is required when submitting Letters of Intent
- Submission of multiple Letters of Intent is not permitted

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

Separately submitted collaborative preliminary proposals will not be accepted; funding to partner institutions must be through subawards.

Preliminary Proposal Contents

The preliminary proposal should consist of the following elements

Cover Sheet. For planning purposes, August 1, 2020 should be shown as the start date. Be sure to check the block indicating that a preliminary proposal is being submitted, and identify the program solicitation number in the program announcement/solicitation block. When submitted, preliminary proposals will first reside in the Office of Integrative Activities which coordinates the Mid-scale RI-2 program in partnership with NSF Directorates.

The project title must be concise and include the primary Mid-scale RI-2 purpose of the proposal, e.g., "Mid-scale RI-2: *TITLE*", or "Mid-scale RI-2 Consortium: *TITLE*". **Proposal titles must be identical to the corresponding LOI title that was previously submitted.**

NSF proposals identify only a single PI and up to four co-PIs with those titles. Other major participants may be designated as "senior personnel." Please see the NSF PAPPG for definitions of Senior Personnel.

Project Summary. (1 page maximum) The first line of the Project Summary should list the most relevant Directorates(s)/Division(s) for review of the preliminary proposal. Required elements include an overview of the proposed program, and separate entries addressing the intellectual merit and broader impacts. The summary should be written in the third person, informative to those working in the same or related field(s), and understandable to a scientifically or technically literate reader. Please see the NSF PAPPG.

Table of Contents. A Table of Contents is automatically generated for the proposal by the FastLane system. The proposer cannot edit this form.

Project Description (10 pages maximum). The Project Description should address the review criteria **including the solicitation-specific criteria**. Include the following:

- Any project-related activities that are anticipated to have significant environmental and/or cultural impacts should be noted at the beginning of the Project Description.
- As part of the **Intellectual Merit**, describe the scientific justification, including the uniqueness or lack of general availability of the requested infrastructure and its potential to significantly advance the Nation's research infrastructure.
- Also, as part of the Intellectual Merit, include a description of the research community's priority of the infrastructure. Estimate the size of the user base of the proposed research infrastructure.
- An outline of the Project Execution Plan. Greater detail will be required in full proposals, should they be invited.
- A description of the **Broader Impacts**, for example student training and increased participation of underrepresented minorities and women in design and implementation of research infrastructure.

Preliminary proposals with an international component should include a description of the foreign collaborator's role in the project.

Note: Results from Prior NSF Support of only the PI and co-PIs should be included. Also, links to URLs may not be used.

References Cited. See NSF PAPPG for instructions.

Biographical Sketches (2 pages each). Biographical Sketches are required for the PI, all co-PIs, and any additional senior personnel at all participating institutions. See PAPPG for details.

Budget and Budget Justification, including budgets for any subawards. For preliminary proposals cost estimates may be preliminary estimates with the basis of estimates included. Vendor quotations should not be included in preliminary proposals. Preliminary proposals *must* include an outline of five-year initial operations and maintenance plans, including an estimate of any needs for NSF-supported operations and maintenance that may be requested outside of the Mid-scale RI-2 program.

Facilities, Equipment, and Other Resources: In order for NSF, and its reviewers, to assess the scope of a proposed project, all organizational resources necessary for, and available to a project, must be described in this section of the proposal. Proposers should describe only those resources that are directly applicable. The description should not include any quantifiable financial information. Proposers should include a description of the internal and external resources (both physical and personnel) that the organization and its collaborators will provide to the project, should it be funded. Such information must be provided in this section, in lieu of other parts of the proposal (e.g., Budget Justification, Project Description).

Supplementary Documents: (to be entered in the Supplementary Documents section of FastLane). 1) A list of all Senior Personnel (funded and un-funded, U.S. and non-U.S., advisory board members, etc.) who will collaborate on the project, their affiliations, and their role in the project; 2) A list of Partner Institutions to be funded via subawards, and the role of each in the project. Biographical Sketches for foreign collaborators and letters of collaboration from foreign institutions organizations should be included as supplemental documents to ensure commitment to the collaboration.

No other items or appendices should be included. Information pertaining to "Current and Pending Support", "Data Management Plan",

and "Postdoctoral Mentoring Plan" is not required for preliminary proposals and should not be included. Preliminary proposals containing items other than those required above will be returned without review.

Information to be submitted to NSF via the FastLane Single Copy Documents Section

Required: Collaborators & Other Affiliations (COA). This information must be submitted for all Senior Personnel (funded and unfunded, U.S. and non-U.S.) who will collaborate on the project. Information specified in the PAPPG should be submitted using the instructions and spreadsheet template found at <https://www.nsf.gov/bfa/dias/policy/coa.jsp>.

Optional: Proprietary or privileged information (if applicable). Any available, relevant environmental reports and/or documentation (e.g., permits, authorizations, etc.), if applicable, should be submitted in the Single Copy Document section.

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

Special instructions for submitting to this Big Idea solicitation

FastLane Users: Proposers are reminded to identify the program solicitation number (located on the first page of this document) in the first block on the NSF Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Please note that even though proposals must be submitted to the Office of Integrative Activities, once received the proposals will be managed by a cross-disciplinary team of NSF Program Directors.

Grants.gov Users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page, however you will need to locate the Division Code, Program Code, Division Name, and Program Name for the specific solicitation you are applying to by visiting <https://www.fastlane.nsf.gov/pgmannounce.jsp>. As stated previously, even though proposals must be submitted to the Office of Integrative Activities, once received the proposals will be managed by a cross-disciplinary team of NSF Program Directors."

Proposal Contents

The proposal should consist of the following elements:

1. **Cover Sheet:** For planning purposes, August 1, 2020 should be shown as the start date. Identify the program solicitation number in the program announcement/solicitation block.

FastLane Users: Select this Mid-scale RI-2 program solicitation number from the pull-down list.

Grants.gov Users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page. Select "Mid-scale Research Infrastructure" as the program for your proposal.

The project title must be concise and convey the primary purpose of the proposal, e.g., "Mid-scale RI-2: *Title*." Consortium project titles must also be identified in the title: "Mid-scale RI-2 Consortium: *Title*." **Proposal titles must be identical to the corresponding preliminary proposal title and corresponding LOI title that were previously submitted.**

NSF proposals identify only a single PI and up to four co-PIs with those titles. For the purposes of the Mid-scale RI-2 program, other major participants may be indicated as "Senior Personnel." Please see the NSF PAPPG for definitions of Senior Personnel.

Note: NSF reserves the right to assign proposals to programs that are deemed to be the most appropriate for review.

2. **Project Summary (1 page maximum):** See instructions for Preliminary Proposals. The first line of the Project Summary should list the most relevant Directorates(s)/Division(s) for review of the proposal.
3. **Table of Contents:** A Table of Contents is automatically generated for the proposal by the system. The proposer cannot edit this form.
4. **Project Description (25 pages maximum):** Must include the following sections with the indicated headers:
 - A. **Science Drivers:** Describe the potential for addressing one or more identified high-priority science goals within the relevant research community, its potential for advancing scientific discovery, and the project's potential benefit to the broader U.S. research community. Explain how the proposed infrastructure provides unique research capability or

increased general availability to major research infrastructure. Discuss relationship to NSF's six research Big Ideas, if applicable. Discuss benefits to the research community (access to instrumentation, new research resources, data products, etc.). Identify how the proposed instrumentation responds to identified high-priority needs of a research community.

- B. Pre-implementation Activities Accomplished: Include results from prior NSF support and other relevant activities that have prepared the infrastructure project to be implemented, including identification of the primary scientific, technical and system performance requirements, and associated designs and specifications.
 - C. Implementation Plan: Discuss the management and technical activities that will be accomplished to prepare, initiate, execute and conclude implementation of the project through commissioning. This section should include a summary of the Project Execution Plan including a description of technical readiness and project management, and an organizational chart or list of senior personnel and their roles (see Supplementary Documents).
 - D. Operations and Utilization Plan: Discuss the overall plan for operating the infrastructure including as a minimum management/governance plans, strategy for access and utilization of the infrastructure by the target research communities, and planned metrics and evaluation of the success and impact of the NSF investment in this infrastructure. This section must also identify the anticipated sources of operations and maintenance funding, including any needs for ongoing, NSF-supported operations and maintenance that may be requested outside of the Mid-scale RI-2 program.
 - E. Lifecycle Cost Estimation summary: Summarize the lifecycle cost estimation (see Supplementary Documentation). Include a summary of activities and key cost drivers for each future lifecycle stage starting with implementation and ending with divestment.
 - F. Broader Impacts: This section should describe the anticipated broader impacts of the infrastructure, and specifically include how the implementation of the proposed infrastructure contributes to student training and involvement of a diverse workforce in mid-scale infrastructure development, and/or data management and the research activities stemming from such facilities. Provide an estimate of the size of the anticipated user base for the proposed research infrastructure and the basis of this estimate.
 - G. International Component (when applicable): Proposals with an international component should include a description of the foreign collaborator's role in the project.
5. **References Cited:** See NSF PAPPG for instructions.
 6. **Biographical Sketches (2 pages each):** Biographical Sketches are required for the PI and all co-PIs additional senior personnel and senior personnel at all participating institutions. See PAPPG for details.
 7. **Budget and Budget Justification:** Include budgets for any subawards. Projects must submit their budgets in accordance with the PAPPG. If the budget includes contingency, that contingency should cover the "known unknowns" and be used to mitigate identified risks. Use of Earned Value Management (EVM) should be considered. PIs should consult the NSF Large Facility Manual (LFM) (NSF 17-066) for discussion of risk, EVM and Fee. Proposed budgets for CI projects should not include contingency. The payment of fee is authorized for this announcement. Refer to the NSF LFM for further information.
 8. **Facilities, Equipment, and Other Resources:** For NSF to review the scope of a proposed project, all organizational resources necessary for, and available to, a project must be described in this section of the proposal. Proposers should describe only those resources that are directly applicable. The description should not include any quantifiable financial information. Proposers should include a description of the internal and external resources (both physical and personnel) that the organization and its collaborators will provide to the project, if funded. Such information must be provided in this section, in lieu of other parts of the proposal (e.g., budget justification, project description).
 9. **Supplementary Documents (to be entered in the Supplementary Documents section of FastLane or Grants.gov):**
 - a. **For all proposals:** List of all Senior Personnel (funded and un-funded, U.S. and non-U.S., advisory board members, etc.) who will collaborate on the project, their affiliations, and their role in the project.
 - b. **For all proposals:** List of partner Institutions including those to be funded via subawards, and the role of each in the project.
 - c. **For all proposals:** Project Execution Plan (PEP). Mid-scale projects should be executed using well-established project management methodology. The specific project management approach used should be scaled to the needs of the project. The following list provides the minimum required components of the PEP for a mid-scale project. The content for each of these PEP components is defined in the NSF Large Facilities Manual (NSF 17-066). The contents of each PEP should be tailored in both detail and scope to the specifics of the project. Should a proposed Mid-scale RI-2 project believe that some elements of the PEP are not applicable, the specific section(s) of the proposal's PEP should include a justification for exclusion. Some material may be a duplication from other sections of the Mid-scale RI-2 proposal but should nevertheless be included in the PEP for completeness and reference as the project proceeds.
 1. Introduction
 2. Organization
 3. Construction Project Definition
 4. Risk and Opportunity Management
 5. Configuration Control
 6. Acquisitions
 7. Project Management Controls (Note: the scope, complexity, budget profile, and duration of a project should be assessed to determine the need for Earned Value reporting.)
 8. Cyberinfrastructure (Note: Proposed Mid-scale RI-2 projects that are focused on Cyberinfrastructure should use sections 2 and 3 to fully describe the project. In all cases, proposals that include use of existing external shared cyberinfrastructure including computing, data, software, and networking infrastructure and resources should discuss that utilization here.)
 9. Integration and Commissioning (Note: If the project will be integrated into a larger facility or instrument, the proposal should include a section discussing planned system engineering activities. If the site selected has any known or potential requirements for permitting or federal environmental compliance, a discussion of this should be included in the PEP.)
 - d. **For all proposals:** Cost and schedule for all stages of the project lifecycle: development, design, implementation, operations, and divestment. Actual costs should be included for development and design prior to the Mid-scale RI-2 proposal submission. Detailed budgets for implementation must be supported by well-documented bases of estimate (BoE) in accordance with Section 4.2 of the LFM. Budget estimates should also be included for one year of operations and preliminary estimates for the divestment stage. Collectively, the proposed scope, budget, and

¹ GAO Schedule Assessment Guide: Best Practices for Project Schedules (GAO-16-89G December 2015, or subsequent revision).

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Please see the Program Description for more information.

C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. submitter's local time):
February 08, 2019
- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):
March 11, 2019
- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
August 02, 2019
Submission by invitation only.

A letter of intent is required and must be submitted by an Authorized Organizational Representative by the due date indicated above for subsequent preliminary proposal submission and review.

Preliminary proposals must be submitted by an Authorized Organizational Representative by the due date indicated.

Full proposal submission is by invitation only.

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <http://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be

asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to the general NSF merit review criteria (Intellectual Merit and Broader Impacts), reviewers will address the following:

1. **Science drivers:** the proposal will be evaluated on its potential for addressing one or more identified high-priority science goals within the relevant research community, its potential for advancing scientific discovery, and the project's potential benefit to the broader U.S. research community. Examples of benefit include, but are not limited to, new and unique research capability, access to the infrastructure, access to data products and software, and cooperation and sharing of technology with other projects.
2. **Pre-implementation activities accomplished:** the proposal will be evaluated on the readiness of the development and design activities that have led to the project being ready for mid-scale support and the breadth of a user base for the completed instrumentation.
3. **Technical readiness:** the proposal will be evaluated on the technical readiness of the project to be implemented within the proposed award duration.
4. **Project management:** the proposal will be evaluated on the strength and maturity of the plan to execute and manage the project including but not limited to project management methods, soundness of the cost estimate, feasibility of the schedule, and comprehensiveness of the risk management plan, as described in Section V.A., Proposal Preparation Instructions for Full Proposals.
5. **Operations plan and project lifecycle:** the proposal will be evaluated on the strength of the anticipated lifecycle plans including utilization by and anticipated impact on the target research communities and US research; and consideration of the anticipated lifecycle costs. Cost estimates for i) implementation, ii) operation and maintenance, and iii) decommissioning and divestment will be evaluated.
6. **Training of a diverse workforce:** The proposal will be evaluated on how it will contribute to student training and the involvement of a diverse workforce in instrumentation, facility development, or data management/analysis.

Mid-scale RI-2 projects are not subject to the stage-gate review process used for major facilities. However, the internal proposal review process used by NSF will be sufficiently robust to assess readiness for the construction/acquisition award using a similar philosophy to the Final Design Review but scaled appropriately to the project.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Reverse Site Review.

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, Reverse Site Review, and Cost, Schedule, & Management Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grant and Agreement Officer in the Division of Acquisition and Cooperative Support. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC), the Modifications and Supplemental Financial and Administrative Terms and Conditions for Major Multi-User Research Facility Projects and Federally Funded Research and Development Centers and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg.

Special Award Conditions:

NSF may require in-person meetings, site visits, and periodic reviews depending on project scope. The award oversight will depend on project scope and complexity.

Grantees will be required to include appropriate acknowledgment of NSF support under the Mid-Scale Research Infrastructure Big Idea in any publication (including World Wide Web pages) of any material based on or developed under the project, in the following terms:

"This material is based upon work supported by the National Science Foundation Mid-Scale Research Infrastructure Big Idea under Grant No. (Grantee enters NSF grant number.)"

Grantees also will be required to orally acknowledge NSF support using the language specified above during all news media interviews, including popular media such as radio, television and news magazines.

TBD - Programmatic Terms and Conditions:

Programmatic Terms and Conditions will be appropriate to the complexity of the award and be determined by the cognizant PO.

TBD - Financial and Administrative Terms and Conditions:

Financial and Administrative Terms and Conditions will be appropriate to the complexity of the award and be determined by the cognizant PO with assistance from the NSF Office of Budget, Finance, and Award Management or with assistance from an NSF Integrated Project Team, as appropriate.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report

to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg.

Additional reporting and possible site visits to enable NSF oversight of the funded project may be required as part of the terms and conditions of the cooperative agreement. The level of oversight will be appropriate to the complexity of the award.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Brian Midson, GEO, telephone: (703) 292-8145, email: bmidson@nsf.gov
- Allena K. Opper, MPS, telephone: (703) 292-8958, email: aopper@nsf.gov
- Joy M. Pauschke, ENG, telephone: (703) 292-7024, email: jpauschk@nsf.gov
- William L. Miller, CISE, telephone: (703) 292-7886, email: wmiller@nsf.gov
- Sridhar Raghavachari, BIO, telephone: (703) 292-4845, email: sraghava@nsf.gov
- Brian Humes, SBE, telephone: (703) 292-7284, email: bhumes@nsf.gov
- Lee L. Zia, EHR, telephone: (703) 292-5140, email: lzia@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

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