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Sustained Availability of Biological Infrastructure (SABI) Core Program

PROGRAM SOLICITATION
NSF 19-569

National Science Foundation

Directorate for Biological Sciences
Division of Biological Infrastructure

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

Proposals Accepted Anytime

IMPORTANT INFORMATION AND REVISION NOTES

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 February 25, 2019.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Sustained Availability of Biological Infrastructure (SABI)
Core Program

Synopsis of Program:

The Sustained Availability of Biological Infrastructure program (SABI) supports the continued operation of extant infrastructure that will advance basic biological research. Infrastructure supported under this program may include cyberinfrastructure, instrumentation, experimental or observational facilities, biological living stocks which have ongoing costs of operation and maintenance that exceed the reasonable capacity of the host institution. Proposals must make a compelling case that sustained availability of the proposed infrastructure will advance or transform research in biological sciences as supported by the National Science Foundation.

While other programs in the Division of Biological Infrastructure focus on research leading to future infrastructure or on the development or implementation of shared infrastructure, this program focuses on awards that ensure the continued availability of mature infrastructure resources critical to sustain the ability of today's scientific community to conduct leading edge research. Awards made through this program are expected to lead to novel, impactful, and transformative science outcomes through research activities enabled by their use. Infrastructure that demonstrates substantial impact on research supported by the Directorate for Biological Sciences and its collaborating organizations is eligible for support under this program.

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.

- Peter H. McCartney, telephone: (703) 292-8470, email: pmccartn@nsf.gov
- Roland P. Roberts, telephone: (703) 292-7884, email: rolrober@nsf.gov
- Reed S. Beaman, telephone: (703) 292-7163, email: rsbeaman@nsf.gov

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

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant or Cooperative Agreement

Estimated Number of Awards: 1 to 3

Approximately 1-3 new awards will be made per year.

Anticipated Funding Amount: $5,000,000

Approximately $5 Million is anticipated for this activity. Funding levels for awards vary and are contingent upon available funds and demand for sustained resources.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - 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.
  - Full Proposals submitted via Research.gov: *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.
  - 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:**

  Not Applicable

C. Due Dates

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

Proposals Accepted Anytime

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:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Sustained Availability of Biological Infrastructure program provides limited support for the cost of ongoing operations and maintenance of existing infrastructure that is critical for the advancement of biological research supported by the Directorate of Biological Sciences. Resources supported under this program may include observational, experimental or instrumented facilities or resources, databases, software, computational services, user support and training activities. This operation and maintenance funding opportunity differs from other programs in the Division of Biological Infrastructure in that it does not provide funds for research or development leading to new capabilities or features, methods or tools. The primary purpose of this funding opportunity is to sustain activities and materials essential for maintaining the current level of functionality of a resource or infrastructure that is: a) at a mature stage of development; b) is in what would be considered an ongoing operational status; and c) is of demonstrated importance to a significant segment of the life sciences research community. The merits of sustaining awards will be assessed by the current scientific impacts of the proposed resource and by the justification for projected impacts during the award period.

Proposers should review the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)*, Introduction A for a general description of research topics normally outside the scope of NSF funding such as disease, clinical, or drug related or other biomedically related research. Proposals to develop or provide infrastructure that is primarily to enable research in these excluded topics will not be eligible for support under this program and will be returned without review.

II. PROGRAM DESCRIPTION

This solicitation invites proposals that seek support for the ongoing operation and maintenance of existing infrastructure to enable discovery in the biological sciences. Resources may consist of computational or data infrastructure, instrumentation, collections and living stocks, or other infrastructure that exhibits the following properties: a) it must be openly accessible to a broad scientific and educational community; b) it must be critical to sustained scientific outcomes: and c) its costs of operation must exceed those which its host institution can reasonably accommodate.

Competitive proposals will clearly describe the resource that will be sustained and present documentation of its past impacts in science and education and a compelling justification for why these impacts are expected to sustain or grow during the proposed award period.

Requests for sustaining awards may not include funds for research or development leading to new capabilities, or features, but must be limited to activities and materials essential for maintaining the current level of functionality. Budgets must describe only those expenses to be covered with the NSF funds and may not reference expenses covered by other sources of funding. Requests may include costs related to two general areas:

1. Human resource costs of daily operations, updating technical components as required by external technology changes for instrumentation or cyberinfrastructure; scaling of codes, schemas and physical capacities as required to accommodate new users of existing functionality or expanded content; and costs of providing support and training to user communities.
2. Costs associated with development and implementation of policies and procedures that shift some fraction of the cost burden onto revenue that is recovered directly from the members of user and stakeholder communities.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size and duration are subject to the availability of funds, the quality of submissions, and the anticipated benefits to biology. Both standard and continuing grants will be awarded. Large and complex projects may be awarded as cooperative agreements. The specific grant type will be determined on a proposal by proposal basis.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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

- 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) 292-8134 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 Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and 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) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.

- 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) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

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.

The following information provides instructions that supplement the PAPPG or NSF Grants.gov Application Guide.

Project Summary (1 page): Each Project Summary must include the following sections labelled as they are here:

Overview: This section should begin with a comma-separated list of keywords as the first sentence. It should then provide a brief overview of the proposed activities, planned deliverables, and the anticipated impacts on the research community.

Intellectual Merit: This section should include a brief description of the proposed activities and the anticipated impacts on basic biological research.

Broader Impacts: This section should include a brief description of the potential impacts beyond the targeted research community, including general science, educational, or public audiences.

Project Description

The project description should provide sufficient detail on the following topics to allow a conceptual understanding of the infrastructure resource to be sustained and an evaluation of its current and projected impacts on biological science.

The first paragraph of the project description should provide a concise, clear description of the resource or services that will be sustained under this award. Describe, using a minimum of specialized language, what it consists of, where it fits within the broader context of existing infrastructure, and how its continued availability will benefit the biological sciences. As per the PAPPG Chapter II.C.2.D.(i), this section should be labeled “Intellectual Merit”.

The remaining sections, described below, may appear in any order in the project description. They need not be explicitly labeled except as noted, but the content of each should be appropriately addressed.

Broader Impacts: The Project Description must contain, as its own distinct element within the narrative, a section labeled "Broader Impacts". General guidance is provided in the PAPPG Chapter II.C.2.d(i). For all activities or outcomes described under broader impacts, demonstrate how they will benefit from continued availability of the resource.

Results of Prior Research. The Project Description must contain, as its own distinct element within the narrative, a section labeled "Results of Prior Research". General guidance is provided in the PAPPG Chapter II.C.2.d(iii). Document the history of prior support for the resource from the institution including NSF, non-NSF funding sources, and/or cost-recovery in the form of contributed effort, facilities and equipment provided, and/or service fees collected.

Justification. Identify the critical areas of the biological sciences to be impacted, the significant research questions to be addressed, and how the proposed resource is uniquely positioned to enable outcomes. Provide summary information on the user community, its usage

statistics, demographics, geographic and disciplinary breadth in narrative, tabular, and/or graphical form. Identify, with appropriate citations, the impacts on science resulting from the use of the infrastructure to be supported under this proposal. Provide clear justification for projecting the estimated usage for the proposed period of support.

Description of product. Describe the specific resources and/or services to be provided under this request, using tabular or graphical summary as appropriate to convey the major components and services. This includes primary resources such as digital or physical as well as services provided, including maintenance, operations and support activities. Provide an outline of the logical and conceptual structure of the proposed infrastructure resource and a general outline of its physical implementation. Describe how the proposed resource operates within the broader context of a national (or international) community of comparable or complimentary resources, including identification of resources it is dependent on, resources that depend on it, and how these interactions are enabled.

Technical Implementation. Describe the relevant systems and technologies essential to implementing and operating the proposed resource: computation resources (hardware and software), digital and physical storage capacity, instrumentation, experimental facilities, software, networking and communications systems, or any other technological or capital components. Describe any policies and procedures related to sustaining these systems during the award period.

Project Management Operations. Describe the organization and management of the project including the roles of principal participating institutions, key personnel, and collaborators. For existing or future collaborations with national or international groups, describe the relationship to the proposed activity and how the components will be coordinated. Document mechanisms for interacting with the user community, including advisory boards, feedback mechanisms, support services, outreach and training, etc.

*Outcomes Assessment***.** Identify what metrics will be used to measure success toward the stated goals of the project (both for Intellectual Merit and Broader Impacts) and by what process the project will collect and evaluate them.

Business Planning. Provide an overview of the short term (the duration of this award) and long term (post award expiration) fiscal planning for the project. For the short term, indicate any planned or potential sources of support (in qualitative terms) for activities complementary to those supported by this request. Note that NSF restrictions on cost share precludes co-mingling of funds with those requested from NSF for the same scope of work. Be sure to indicate how any additional support for the project will be used for activities above and beyond the specific scope of this project yet contribute to the overall success of the resource. For the long term, discuss planned or potential sources of revenue that might provide partial or full support for activities currently supported by this award. Potential sources may include other government or private grants, fees for service, subscriptions, donations, or any other means as applicable.

Budget Guidance: Budgets should be well justified according to the effort required to carry out the proposed work. Typical award budgets are expected to vary widely depending on the nature of the infrastructure, the resources and effort required to sustain them, and the relative breadth of the biological science community likely to be impacted. Proposers are advised to pay close attention to the following guidelines:

- The budget justification should clearly identify how the NSF funds will be allocated to the major activities and deliverables identified in the PEP. It must be clear how the effort requested for each individual is apportioned to the activities they will be doing.
- Proposers should carefully read the NSF PAPPG section II.C.2.g.i.a concerning Senior Project Personnel Salaries. A soft-money position is not, by itself, sufficient justification for exceeding the 2 month limit.
- For major equipment or software purchases, a vendor, model, and price quote should be included or referenced with a URL or catalog citation. Justification should explicitly address why the need cannot be met by existing facilities either at the institution or within national cyberinfrastructure supported by other NSF programs. Requests for equipment must account for administration and maintenance both during, and beyond, the tenure of the award. For computing equipment, the proposal should also explain how any cycles or storage space not consumed by the project would be made available to the broader scientific community at the campus, regional or even national scale
- Travel requests must be justified to specific research, collaboration, or dissemination activities described in the proposal. Foreign travel must identify the destination country or countries. PIs are encouraged to include requests for travel and participation in training programs in sustainable fiscal planning such as the Ecological Society of America's Sustaining Biological Infrastructure program (https://esa.org/sbi/)
- If there is an institutional policy setting direct cost fees for the use of computational facilities by sponsored projects, then funds for these fees should be included on line G4 Computer Services as per the NSF PAPPG section II.C.2.g.vi.d.

Note that resources or effort that will be contributed from non-NSF sources will be regarded as an important indicator of commitment to the resource by the institution and the stakeholder community. However, such contributions must ONLY be described in narrative form (non-fiscal terms) in the Facilities, Equipment and Other Resources section of the proposal and may NOT be discussed in the budget justification.

Facilities, Equipment and Other Resources (Maximum length 2 pages): The purpose of the facilities section is to document those existing resources, including space, computational equipment, or effort that will contribute to the project goals. List only those resources that will be used by the project and understand that listing them implies a commitment that they will be available. No dollar amounts may be referenced for any resource discussed in the Facilities section. If the budget requests funds for equipment, materials, or resources identified in the facilities section, the budget justification should clearly account for the duplication. The Division of Biological Infrastructure expects that institutions suitable for the development of advanced infrastructure will typically have adequate computing and equipment resources as well as appropriate support staff to facilitate the proposed research.

Special Information and Supplementary Documents

This section may contain ONLY the following types of documents.

Letters of Collaboration. All Proposed activities must be documented in the Project Description. Statements from individuals whose role is discussed in the Project Description as providing assistance or collaboration to the project (but are not included in the budget, refer to PAPPG Chapter II.C.2.d.iv Unfunded Collaborations) must verify their participation with a document in the following format. Proposal including letters with expanded text or letters of support or endorsement may be returned without review.

To: Program Director(s).

By signing below, I acknowledge that I will provide the assistance or collaborate as indicated in the proposal, entitled "_____" with _____ as the Principal Investigator. I agree to _____(description up to 140 characters)_____, as described in the Project Description or Facilities, Equipment and Other Resources section of the proposal.

Signed: _____ Print Name: _____

Date: _____ Institution: _____

Data Management Plan (DMP; maximum 4 pages): This plan should describe how the project will manage and disseminate **data**, **software**, and other **digital products** that may be generated or handled during and beyond the award period. Elements of the DMP will be fully evaluated by the reviewers, using NSF review criteria. Please note that FastLane will not allow submission of a proposal with a DMP in excess of the 2-page maximum. ***For this reason, you must submit a single sheet in the DMP module and add the text "SEE DATA MANAGEMENT PLAN UPLOADED AS A SUPPLEMENTARY DOCUMENT".*** The following issues should be addressed as applicable:

- Summary description of the types of data, software, curriculum materials, and other materials to be produced in the course of the project.
- The standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies).
- Plans for the physical management and curation of data, source code, binaries, ontologies, samples, and other research products. Discuss any provisions for documentation, versioning, security, etc.
- Policies for access and use by science and engineering researchers and educators in the non-profit sector, such as education institutions, research institutions, and government laboratories.
- Provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements.
- Policies and provisions for re-use and re-distribution of, and the production of derivatives from, data and software products managed or developed under this award. Any licenses or user agreements covering the use of shared materials should be discussed and a justification for their selection provided. Where appropriate, terms covering partial or complete transfer of resources or services for assumption of operations and maintenance by another party should be discussed.

*Cost Estimates***:** Provide any independent quotes, estimates or other documentation used to determine the costs for any equipment, contracts, or consulting services included in the budget.

*Biosketches***:** Any additional biosketches for personnel beyond the PI, Co-PIs, or Other Senior Personnel can be included in the Supplementary documents.

Authorities: Memoranda of Understanding, Permits, Licenses, Agreements, or other documents as appropriate that demonstrate that the awardee institution has the appropriate authority to carry out proposed activities on property or resources owned by other organizations. For example, permits allowing a university to improve a facility on federally owned land.

Single-Copy Documents

Collaborators and Other Affiliations Information: Proposers should follow the guidance specified in Chapter II.C.1.e of the NSF PAPPG.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

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

  Proposals Accepted Anytime

D. FastLane / Research.gov / Grants.gov Requirements

For Proposals Submitted Via FastLane or Research.gov:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For FastLane or Research.gov user support, call the FastLane and Research.gov Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov or rgov@nsf.gov. The FastLane and Research.gov Help Desk answers general technical questions related to the use of the FastLane and Research.gov systems. 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 or Research.gov may use Research.gov 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

Reviewers will be instructed to consider the following additional criteria:

- Demonstration of transformative impacts on research supported by the Biology Directorate or in partnership with other funding organizations that will result from continued availability of the proposed resource;
- The size, diversity, and significance of the targeted user community at a scale beyond that of the proposing institution;
- Completeness, detail, and quality of the needs assessment, design, and cost documentation provided in the proposal;
- The assessment plans for setting milestones, evaluation criteria, and performance accounting;
- The plan for how the project, and its resulting products, will enable broader impacts beyond the fundamental science audiences; and
- The efforts of the project and its institution to offset the costs of ongoing operation through resources described in the Facilities section or through other cost recovery mechanisms.

B. Review and Selection Process

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

Review of requests typically follows a two-phase process. The first focuses on the scientific justification for the request and will assess the evidence for prior impacts in enabling research and education in the biological sciences, and the potential for these impacts to continue or grow in during the requested period of support. This phase will be conducted by panel and/or ad hoc review. The second, conditional upon satisfactory outcome of the first, will consist of a detailed review of the proposed activities, costs, and deliverables. Depending on the size of the award, this phase will be conducted either by an internal review by program officers or by an external site visit panel.

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 Grants and Agreements 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 Grants Officer in the Division of Grants and Agreements. 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) 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) 292-8134 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=pappg.

Special Award Conditions:

Large awards with complex workplans may be required to complete a Project Execution Plan (PEP) with additional details on scope of work, schedule, costs, and project management. In addition, these projects may be required to provide further documentation on cost estimates. Where this is applicable, the program officer will notify the PI and provide the necessary templates and guidelines for creating the required documents. These documents must be completed prior to a final recommendation being made but are not required at time of submission. If awarded, PIs will be expected to address progress on PEP task items in their annual reports.

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=pappg.

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:

- Peter H. McCartney, telephone: (703) 292-8470, email: pmccartn@nsf.gov
- Roland P. Roberts, telephone: (703) 292-7884, email: rolrober@nsf.gov
- Reed S. Beaman, telephone: (703) 292-7163, email: rsbeaman@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188

  FastLane Help Desk e-mail: fastlane@nsf.gov.

  Research.gov Help Desk e-mail: rgov@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.

Other Related Sources of Support

Requests for substantial improvement or modification of existing infrastructure for the purpose of providing new functionality, gains in performance or efficiency, or expansion to new user communities should be directed to appropriate programs that support development of infrastructure resources. These may include

Innovation in Infrastructure for Biology Research cluster (IIBR). Proposals where the focus is on research into novel

technologies or methods and where the primary products will be publications, prototypes, or demonstrations should be submitted to the IIB program.

Infrastructure Capacity for Biology cluster (ICB). Proposals for the development, improvement and/or deployment of shared infrastructure should be submitted to the appropriate core program in ICB.

Core BIO research programs. Biological informatics activities that address a specific biological research question or involve the generation or curation of data for use with existing computational methods or data resources may find support from those programs within the BIO Directorate that fund that particular area of biological research.

The Information and Intelligent Systems Division (IIS) of the Directorate for Computer and Information Science and Engineering (CISE) supports computer science research on integration of information and informatics applications in all sciences, including biology.

The Office of Advanced Cyberinfrastructure (OAC) of the Directorate for Computer and Information Science and Engineering offers funding opportunities in advanced computing infrastructure, long-term data preservation, data interoperability, software development, and other topics.

SBIR/STTR may provide support commercialization of outcomes of NSF funded projects.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at https://www.nsf.gov

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

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Reports Clearance Officer
Office of the General Counsel
National Science Foundation
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