Sustaining Infrastructure for Biological Research (Sustaining)

PROGRAM SOLICITATION
NSF 21-503

REPLACES DOCUMENT(S):
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

IMPORTANT INFORMATION

Innovating and migrating proposal preparation and submission capabilities from FastLane to Research.gov is part of the ongoing NSF information technology modernization efforts, as described in Important Notice No. 147. In support of these efforts, the Directorate for Biological Sciences (BIO) is now requiring the use of Research.gov for the preparation and submission of proposals in response to its core programs that do not have deadline dates (see Dear Colleague Letter NSF 20-129). As such, full research proposals submitted in response to this program solicitation must be prepared and submitted via Research.gov. Proposals also may continue to be submitted via use of Grants.gov.

NSF is taking proactive steps to move the preparation and submission of all proposals from FastLane to Research.gov, however until capabilities are fully implemented, the other types of proposals outlined in Chapter II.E of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), as well as accomplishment-based renewal proposals, must be prepared and submitted via FastLane or Grants.gov in accordance with the applicable guidance contained in the PAPPG or the *NSF Grants.gov Application Guide*.

REVISION NOTES

A description of how to report the public release of data from previously funded projects in the "Results from Prior NSF Support" section has been updated.

Full research proposals submitted in response to this program solicitation can no longer be prepared and submitted via FastLane.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Sustaining Infrastructure for Biological Research (Sustaining)

Synopsis of Program:

The Sustaining Infrastructure for Biological Research (Sustaining) Program supports the continued operation of existing research infrastructure that advances contemporary biology in any research area supported by the Directorate for Biological Sciences (BIO) at NSF. The Sustaining Program focuses primarily on sustaining critical research infrastructure that is cyberinfrastructure or biological living stocks and that is broadly applicable to a wide range of researchers. Projects are expected to ensure continued availability of existing, mature resources that will enable important science outcomes achieved by users representing a broad range of research supported by BIO and its collaborating organizations.

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.

Sustaining Program, telephone: (703) 292-8470, email: SustainingDBI@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 availability of 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 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 criteria 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

Transformative discoveries in the biological sciences are often catalyzed by the development and dissemination of new research tools and methods. For such advancements to take place, research infrastructure needs to be supported at all stages of its life-cycle that includes: **Innovation** (the design of novel or greatly-improved research infrastructure), **Capacity** (the scaling of or major improvements to infrastructure), and **Sustainability** (continued operation of existing infrastructure). The Division of Biological Infrastructure (DBI) supports this life-cycle of research resources in biology by having three different programs focused on each of these important stages of development of research infrastructure in resources and services. The goals of the **Sustaining** program are aligned with the third stage in this cycle to advance contemporary biology in any research area supported by the Directorate for Biological Sciences at NSF.

DBI is particularly interested in increasing the participation of underrepresented groups in biological research and education such as women, persons with disabilities, and underrepresented minorities[1] [2], and those from geographically underrepresented areas in science, technology, engineering, and mathematics (STEM). Proposals submitted to any program described in this solicitation are strongly encouraged to involve PIs, co-PIs, postdoctoral fellows, students, and other personnel who are members of these groups. Proposers are also strongly encouraged to consider involving veterans of the U.S. Armed Forces as part of NSF's broader effort to promote veteran involvement in STEM research and education.

Proposers should review the Introduction section of the PAPPG 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.

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[1] https://ncses.nsf.gov/pubs/nsf19304/digest/introduction

[2] https://www.nsf.gov/od/oia/activities/ceose/reports/CEOSE_ReportToCongress_RP_FVmp_508.pdf

II. PROGRAM DESCRIPTION

The Sustaining Infrastructure for Biological Research Program (Sustaining) supports the continued operation of existing research infrastructure that advances contemporary biology in any research area supported by the Directorate for Biological Sciences (BIO) at NSF. The Sustaining Program focuses primarily on sustaining critical research infrastructure that is cyberinfrastructure or biological living stocks and that is broadly applicable to a wide range of researchers. Projects are expected to ensure continued availability of existing, mature resources that will enable important science outcomes achieved by users representing a broad range of research supported by BIO and its collaborating organizations.

The Sustaining Program is an operation and maintenance funding opportunity, which 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.

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. The budget justification should clearly identify how the NSF funds will be allocated to the major activities and deliverables identified in the proposal. 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.

This program serves all research areas supported by the BIO. Funds are limited, and individual awards may not be sufficient to cover 100% of the operating costs of a given resource. While institutional cost-share is not allowed, it is expected that resources supported under this program will make every effort to generate revenue through the development of a business plan that will spread some of its operating costs onto its user community or other funding sources in a manner that does not unduly restrict open and fair access for research, education and the public. Continued support through this program may be contingent on evidence of cost recovery efforts to reduce the dependency on direct NSF support for ongoing operations. In developing a business plan, PIs should be aware that proposals submitted to any NSF research program that rely on the use of infrastructure such as data repositories, collections, or computational services may include in their budget funds to cover the cost of certain fees associated with those resources (see NSF 19-069, Effective Practices for Data, https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf19069).

III. AWARD INFORMATION

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

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 availability of funds and demand for sustained resources.

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 Research.gov or Grants.gov.

- 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 Research.gov. 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 line. 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 (maximum length 15 pages):

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.

Overview.

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.

The remaining sections, described below, may appear in any order in the project description, but should be labelled as such.

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.

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.

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.

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.

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.

Results from Prior NSF Support.

The Project Description must contain, as its own distinct element within the narrative, a section labeled "Results from Prior NSF Support". 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. When appropriate, this section must include evidence of deposition of samples, data and/or data products in recognized, accessible, community-accepted repositories by listing such repositories and, if practical, metadata. All publications, data, data products, programs and/or scripts that are specifically mentioned in the Results from Prior NSF Support section must be referenced in the References Cited section and must provide unique, resolvable and persistent identifiers (such as Digital Object Identifiers [DOIs]; Uniform Resource Locators (URLs), or similar).

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 who are identified in the Project Description as providing assistance or collaboration to the project, but are not included in the budget, should verify their participation with brief statement as per the PAPPG Chapter II.C.2.d.iv Unfunded Collaborations. Proposal including letters with expanded text or letters of support or endorsement will be asked to remove them and this may delay review.

Data Management Plan.

The Data Management Plan (DMP) should discuss the long-term availability of data, software or services generated as deliverables under this funding. This includes identification of which deliverables are appropriate for long-term preservation and the process the project will use in selecting them. It should specify any policies developed, or followed, by the project that cover the intellectual property rights, confidentiality, access conditions, or terms of use, for any research products that have been produced this project, or that may be deposited with, or accessed from, a resource developed under this project. The DMP should indicate how dissemination of digital products makes full use of independent, broadly recognized repositories and is compliant with any relevant community standards. The DMP should explain how users of infrastructure supported under this program will be advised of their obligations to share data generated from its use in accordance with NSF policies and what the operators of this infrastructure will do to facilitate that goal. For further guidance on DMP's refer to the Biological Sciences Guide to Data Management Plans (https://www.nsf.gov/bio/biodmp.jsp).

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.

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 with resources owned by other organizations. For example, documents authorizing use of external computing facilities or non-public data resources.

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.

Budget Preparation Instructions:

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. 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 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.

C. Due Dates

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

    Proposals Accepted Anytime

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

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 Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov 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: https://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 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:

- What evidence is there that this resource is critical for continued discovery within a significant segment of the biological sciences?
- How clearly are the elements of the resource and its operation defined with respect to their specifications, costs, and interoperability such that its unique contribution to the broader national capacity can be evaluated?
- What evidence is presented to show the resource is mature and adequately engineered to be robust and scalable to meet the needs of its user community?
- How well is the project managed to ensure reliable operations and effective interactions both internally and with its users, partners, and stakeholders?
- How clearly are metrics of success defined and will the project be able to assess impacts adequately to evaluate its critical importance to research, education, and broader communities?
- How has the project planned for its fiscal health both for the short and long term, and how well positioned is it for sustainability?

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 will typically follow a two-stage process. The first stage will consist of ad hoc review of the proposal, which will focus primarily on the justification for the proposed activities and evidence for current and potential impacts on science and education. Reviewers will be asked to evaluate proposals using the two National Science Board-approved merit review criteria (Intellectual Merit and Broader Impacts) and additional criteria stated in this solicitation. A summary rating and accompanying narrative will be completed and submitted by each reviewer. A Program Advisory Team of BIO Program Directors and the managing Program Director will evaluate whether the proposed resource constitutes critical infrastructure, defined as infrastructure with demonstrable past and potential evidence of its unique and essential role in enabling scientific advances in research areas seen as priorities for the Directorate for Biological Sciences.

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.

PIs are required to list in their annual reports all unique, resolvable and persistent identifiers (such as Digital Object Identifiers [DOIs]; Uniform Resource Locators (URLs), or similar) for any products described in the report

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:

- Sustaining Program, telephone: (703) 292-8470, email: SustainingDBI@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 https://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:

Infrastructure Innovation for Biological Research Program (Innovation). Supports research to design novel or greatly improved research tools and methods that advance contemporary biology in any research area supported by the Directorate for Biological Sciences at NSF. The Innovation Program focuses on research infrastructure that is broadly applicable to researchers in three programmatic areas: Bioinformatics, Instrumentation, and Research Methods.

Infrastructure Capacity for Biology Program (Capacity). Supports the implementation of, scaling of, or major improvements to research tools, products, and services that advance contemporary biology in any research area supported by the Biological Sciences Directorate at NSF. The Capacity Program focuses on building capacity in research infrastructure that is broadly applicable to a wide range of researchers in three programmatic areas: Cyberinfrastructure, Biological Collections, and Biological Field Stations and Marine Laboratories.

Programs in 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.

Programs in 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**   (703) 292-5111
  (NSF Information Center)**:**

- **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 System of Record Notices, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." 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:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314

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