International Research and education Network Connections (IRNC)

Base

PROGRAM SOLICITATION
NSF 20-535

REPLACES DOCUMENT(S):
NSF 14-554, NSF 16-523

National Science Foundation

Directorate for Computer and Information Science and Engineering
    Office of Advanced Cyberinfrastructure

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

April 08, 2020

IMPORTANT INFORMATION AND REVISION NOTES

This solicitation has modified NSF 14-554 as follows:

- Modifies and combines the former Production network connections and services (IRNC: Backbone) and Infrastructure and Innovation of U.S. R&E Open Exchange Points (IRNC: RXP) program areas into the Backbone and Exchange Point International Networking (IRNC: Core) program area, and distinguishes the new infrastructure category from the infrastructure improvement and support category;
- Adds a new Testbeds Infrastructure Supporting Network-based Experimentation program area (IRNC: Testbed);
- Removes Network Operations Center (IRNC: NOC) as a separate program area;
- Removes the Advanced Network Measurement Infrastructure (AMI) as a separate program area; and
- Removes Type 2 of the IRNC: ENgage program area.

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:

International Research and education Network Connections (IRNC) Base

Synopsis of Program:

The International Research and education Network Connections (IRNC) Base program supports high-performance network connectivity required by international science and engineering research and education collaborations involving the NSF research community. High-performance network connections and infrastructure funded by this program are intended to support science and engineering research and education applications, and preference will be given to solutions that provide the best economy of scale and demonstrate the ability to support the largest communities of interest with the broadest services. Funded projects will assist the U.S. research and education community by enabling state-of-the-art international network services and access to increased collaboration and data services. NSF expects to make 3 to 10 awards in production R&E network infrastructure; 1 to 3 awards in international testbeds; and 1 award in Engagement.

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.

- Kevin L. Thompson, telephone: (703) 292-4220, email: kthompso@nsf.gov

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

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

Estimated Number of Awards: 5 to 14

The estimated number of awards is 5-14 in total: 3-10 IRNC: Core awards; 1-3 IRNC: Testbed awards, and 1 IRNC: ENgage award.

Because of the nature and geographic extent of the efforts involved, interested parties are encouraged to form consortia of organizations that can work together to provide the needed services. Consortia may consist of any number of U.S. and foreign, profit and non-profit entities. The award(s) resulting from responses to this solicitation will be made to U.S. organizations as cooperative agreements or standard or continuing grants. Any award will be for a maximum of five years.

Anticipated Funding Amount: $20,000,000 to $50,000,000

pending availability of funds and quality of proposals received.

Each program area will support awards pursuant to the following budget and duration:

- IRNC: Core awards will be supported at up to $1,400,000 per year for up to 5 years;
- IRNC: Testbed awards will be supported at up to $1,000,000 per year for up to 3 years; and,
- IRNC: ENgage awards will be supported at up to $1,000,000 per year for up to 5 years.

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):

    April 08, 2020

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:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

For 30 years, NSF has invested in Internet connectivity linking the scientific research and education (R&E) communities in the U.S. to the rest of the world. At first, NSF was the sole funder of international R&E connectivity. In that time span, external funding elsewhere has grown substantially. Today, trans-oceanic 100 Gigabit per second (Gbps) links made available specifically to the R&E community approach or exceed an aggregate Terabit per second (Tbps) between some continents, with some 100Gbps links dedicated to specific science communities and instruments. Consortia of funding sources have formed for some of these paths and the levels of support, cooperation, and planning among participating National R&E Networks (NRENs) and among other network asset owners and operators have never been stronger. The nature of investments has also evolved, with funding entities moving beyond multi-year circuit leases to long-term acquisition of submarine cable spectrum and even partnering in building and operating new cable systems. The emergence of new fiber and wireless based initiatives, both underway and in planning phases, promises new opportunities for R&E network connectivity to some scientific research and education locations currently lacking sufficient bandwidth.

NRENs and other organizations have progressed in leveraging high performance R&E networking at regional and country levels in building and establishing shared, virtualized, distributed computing and storage platforms. Those activities and assets also present continued opportunities for international R&E infrastructure and services to significantly advance in both the integration of network capabilities and services up the stack, as well as supporting the federation of those resources and services on a global scale.

Several constants remain in the global environment; not all communities are connected sufficiently, and those communities often lack the training, relationships, and resources to complete the end-to-end linkages required for full participation in science in the 21st century scientific R&E enterprise.

Through the IRNC program and other infrastructure activities, NSF will continue its role in enabling the growth and enrichment of a globally connected science community through targeted investments to strategically evolve the R&E network fabric over the next 5-10 years. Tangible goals for the IRNC program include: targeted expansion of the reach and production use of multi Gbps connectivity to remote science instrumentation and R&E communities; significantly greater use of the R&E fabric for science through deeper integration of the network with other tools and cyberinfrastructure (CI) resources; establishment of pathways for contributors to international R&E infrastructure; new and enhanced engagements with research groups and their scientific applications; and strengthening the services and physical pathways for U.S. science collaborations globally.

This solicitation for the IRNC Base program supports: coordinated investment in international R&E networking infrastructure and services; experimental deployment of new capabilities using testbeds; and broadening impact and participation through data network centric activities.

NSF will separately address "Applied" IRNC topics including: high performance network connectivity to remote scientific instruments and sites; and innovation and advancement of network services, engineering, capabilities through end-to-end scientific workflow integration with research platforms.

II. PROGRAM DESCRIPTION

The IRNC Base program is divided into three distinct but related program areas: (1) IRNC: Core - Backbone and Exchange Point International Networking; (2) IRNC: Testbed - International Testbeds; (3) IRNC: ENgage - Engagement for Training and Human and Network Capacity Building.

General Information

The infrastructure and associated services proposed in response to this solicitation must address U.S. research and education needs with respect to international collaboration and communication that advance science and engineering. The science that will be enabled by the proposal should be detailed. Plans for meeting the evolving service needs of the research and education community should also be described.

The Project Description for all proposals, which can be up to 15 pages and, in addition to addressing the scientific impact of the project, should include discussions of the criteria detailed in the following section for one of the three program areas described below. The Project Description must also include a discussion of risk mitigation and post-award management. The number of letters of collaboration from third parties is limited to eight. Inclusion of additional supplementary materials (appendixes, etc.) is specified in each program area or is otherwise not allowed.

General Organization Description

Because of the nature and geographic extent of the efforts involved, interested parties may choose to form consortia that can work together to provide the needed services. Consortia may consist of any number of U.S. and foreign for-profit and not-for-profit entities. Awards resulting from this solicitation will be made to the eligible lead U.S. organizations.

Proposals in any of the three program areas should describe the organizations that are involved including:

- Identification of the lead U.S. organization;
- Experience and qualifications of all participating organizations applicable to the provisioning, operation, and management of the proposed projects; for the lead organizations, evidence of effective project management experience including management of subawards (if any);
- Experience the consortia members have had working together in similar projects;
- Planned organization and governance of the proposing consortium;
- A description of each organization's proposed facilities (in appropriate amount of detail to reflect the relative role of each organization); and
- Documentation of technical and managerial qualifications of key personnel, including those who are part of any subawards.

Each proposal should clearly identify and justify the single IRNC program area to which it is being submitted.

Program Area 1: Backbone and Exchange Point International Networking (IRNC: Core)

Two key ingredients of networked global scientific collaboration continue to be (i) high-capacity high-performance network links between the U.S. and other regions of the world, and (ii) U.S.-based exchange points for international R&E traffic. The limited availability of limited resources means that preference will be given to solutions providing the most efficient economies of scale and demonstrating the ability to link the largest communities of interest with the broadest services. Proposals should describe how this will be accomplished over a five-year period. Proposals can focus activities on either component – Backbone link or exchange point – or both components in combination.

This program area supports new data networking connectivity and infrastructure to help to lower the barrier of entry for scientific U.S. collaborations internationally. Support for new infrastructure investment is described in (1.1) below. NSF also recognizes the long-term value in sustaining and improving upon parts of the international networking fabric. This opportunity is described in (1.2) below.

NSF is also interested in innovative and forward-looking approaches to promote the development of a rational global network architecture. In this regard, proposals should address the question of how their international links will become an integral component of the global science and engineering R&E network environment and how these links will fit into a rational global network architecture. For example, solutions which offer partnering and engineering incentives to foreign connection points to share circuits, spectrum, or other form of capacity, or encourage the establishment of national or regional distributed exchange points, might be considered.

Unless otherwise noted, all requested, suggested, and required elements should be addressed in the proposal Project Description.

Program Area 1 Categories: (1.1) New Infrastructure and (1.2) Infrastructure Improvement and Support

Each proposal in this program area will be categorized as (1.1) New Infrastructure or (1.2) Improvement and Support.

1.1: New Infrastructure

Creation of new data network connections and R&E network exchange points (not currently supported by IRNC) will be considered New Infrastructure. Proposals for new infrastructure are expected to cite any related and existing connectivity with similar functionality, and are expected to make a compelling case for the need for this new infrastructure in that context.

New infrastructure proposals may be proposed for up to 5 years.

Proposals whose duration is beyond 2 years should expect a NSF site visit and review after 18 months to evaluate the viability and impact of the activities. This review will provide guidance to NSF on whether to continue funding the activities for years 3-5.

Proposals should build into their first 2 years a plan to establish and measure viability and impact of the new connectivity and services. Proposals should describe expected longer-term operational impact on international science flows.

Note that proposals in this program area cannot fully duplicate circuit paths currently supported under IRNC awards. See http://docs.globalnoc.iu.edu/irnc/index.html for a complete list and specification of those connections.

Proposals in this program area addressing new infrastructure are required to have titles that begin with "IRNC: Core New:" followed by the title of the project.

1.2: Infrastructure Improvement and Support

NSF recognizes the need to also support the improvement and ongoing support of existing IRNC infrastructure with a tangible user base among the NSF community. Proposals addressing Improvement and Support must: identify the pre-existing elements for continuation and make a compelling case for why the connectivity, services, and infrastructure justify continuation and improvement. Such projects address the improvement of existing infrastructure with a track record of production use and impact on domain sciences and engineering.

Work must focus on community-driven enhancements that are documented by user requirements and applied to existing deployed network infrastructure. Operations and Maintenance and support functions are also relevant for award activities.

Note – proposals in this program area are allowed only to renew and extend existing award activities under the Backbone and RXP categories of current IRNC awards. See http://docs.globalnoc.iu.edu/irnc/index.html for a complete list and specification of those connections.

Proposals in this program area addressing improvements to existing infrastructure under active IRNC program funding are required to have titles that begin with "IRNC: Core Improvement:" followed by the title of the project.

Backbone Services and System Design

All IRNC: Core proposals should describe the services to be provided, and the technologies (including protocols) that provide a reliable, leading-edge service for research and education. The system design should provide this capability consistent with high-capacity and long-distance delay products. Proposed technologies must also be compatible with the research networks of the countries that are to be connected, and with their plans (where available) for the introduction of new technologies.

Proposed assets may include leased circuits, spectrum, or other communication link technologies or solutions, as well as required networking equipment to support the proposed connection(s).

Proposals should describe the relevance of the proposed networking capabilities to domain science communities, projects, and users, and their approach to supporting proposed networking services such as shared Internet Protocol (IP) services. For proposals with services that include the explicit operation of a layer 3 (shared IP) service, and which therefore involve the management of router equipment, support for the current Internet Protocol (IPv4) and the next generation Internet Protocol (IPv6) is required. Proposals including routed IP services should discuss their plans with respect to route monitoring, Border Gateway Protocol (BGP) security (such as resource public key infrastructure), and traffic engineering cooperation with other R&E connections on similar paths, where appropriate. Service provisioning will require management and operations at multiple protocol levels.

Proposals should describe the overall system design including: connection plans on both ends of the international links; the networks to be connected, and the technical characteristics of the IRNC links; supported layer 1-3 technologies; routing and switching strategies; security mechanisms and privacy policies; and relevant timelines for technology deployment and service activation. Alternate designs, each separately priced, for providing reliable services may also be provided.

In addition to the description of the initial technologies and equipment to be employed, proposals should outline how the proposed IRNC should evolve and specify the plans for introducing new networking technologies, equipment, and services. Proposals should assess the risks and benefits of adopting such new technologies including plans to assure high quality services during the transition to any proposed future deployments. NSF recognizes that proposed activities in this program area, as well as all other program areas in the solicitation, offer opportunities for innovation and support for network-level experimentation in the community. Proposals are encouraged to consider how to best support Software-Defined Networking (SDN) and how to move from an experimental and developmental phase to potential production support over a five-year time horizon. Proposals are encouraged to weigh current network traffic demand against future estimated needs in planning for capacity increases, where relevant.

Links funded by this program are intended to support science and engineering research and education applications. Therefore, the networks they connect must also be primarily for these purposes. These networks typically have appropriate use policies and those policies shall govern traffic flow over the IRNC links. Known or expected usage policies, along with processes for enforcing or implementing the policies, should be described. A proposal in this program area must identify a physical and logical landing point in the continental Unites States for any circuit or capacity proposed. Gathering of metrics should be included, especially the definition of metrics used to judge the project's impact and success. Where appropriate, compatibility with emerging best practice international research and education should be addressed. Connection points may enforce their own routing policies. Proposers should describe their proposed U.S. and international connection policies. NSF will give preference to proposals conveying open policies (e.g., free R&E transit) and collaboration. NSF will give preference to proposals leveraging open exchange points as physical and logical endpoints to international circuits.

NSF views leases and acquisitions as potentially long-term community assets whose value and operation may last well beyond the lifetime of the award.

Proposals including such long-term asset acquisition are strongly encouraged to address sustainability and describe how the asset will be leveraged and managed by the community past the lifetime of the award.

Leveraging existing infrastructure is strongly encouraged. Successful proposals will address how their activities blend consistently into, and especially augment, the existing end-to-end domestic and international network infrastructure and emerging services and best practices. Proposals adding to significant pre-existing R&E network capacity along the same or similar path are strongly encouraged to make the case for why NSF's additional investment is needed and the additional value being provided to science.

Any network capacity leases and acquisitions are required to be represented with documented quotations from the asset provider, included as a **Supplementary document.**

Open Exchange Points

Network exchange points for research and education flows have served a pivotal role over the last 25 years in extending network connectivity internationally, providing regional R&E networking leadership, and supporting experimental networking. Through years of operational experience combined with international peering relationships, engineering activities, and international networking forums, a set of guiding principles have emerged for successful approaches to an open exchange point.

Proposals submitted to this program area should address the enhancements needed for exchange points in the United States to become platforms of network innovation supporting the research and education needs of global scientific collaborations led by or including U.S. researchers and educators. While proposals are expected to come from entities currently operating international R&E exchange points, proposals may also come from institutions proposing to create a new exchange point.

Proposals should address in their proposed activities support for, and optionally direct participation in, network innovation, trials, and ongoing experimentation. Industry participation, teaming and collaboration with partners capable of contributing to advances in network engineering and technology are encouraged. Proposals should describe their connectivity policies and how they adhere to community-driven best practices for R&E network exchange points. Proposals should address support for jumbo frames. Proposals may include support for development and deployment of production level network services. Proposals may request nominal amounts of computing and storage as part of a plan to develop integrated capabilities.

Proposals must demonstrate a commitment to operation of an open exchange point, for example: support for homing of multiple international links; high capacity connectivity to Internet2, ESNet, and, if relevant, FABRIC; providing maximum flexibility in connectivity and peering; automated, dynamic switching network services; and, in the best interests of the end users - the researchers, educators, and students in the U.S. - a demonstrated commitment to a productive partnership and collaboration with Internet2, the primary NREN for the NSF community. Proposals must describe their exchange point architecture and justify any core equipment purchase requests. Proposals must address measurement and monitoring for any equipment and infrastructure that is part of the proposal. Proposals must address the scalability and growth constraints of their facilities in terms of overall floor space, power budget, and other physical restrictions.

Additional Guidance for All Program Area 1 IRNC: Core Proposals

Network operations center (NOC) services should be included in all IRNC: Core proposals. This IRNC program solicitation does not support NOC services directly through a NOC award.

Measurement, monitoring and usage reporting should be included in all IRNC: Core proposals. This IRNC program solicitation does not support development and availability of measurement services directly through a measurement award. Proposals in IRNC: Core should describe their measurement plan and approach to disseminate and report on network measurement data - proposals should include the granularity of their utilization measurements. All proposals in the IRNC: Core area are required to describe their measurement plans and address availability of privacy preserving usage and performance data, as a **Supplementary Document** of up to 3 pages. Proposals are encouraged to leverage existing measurement and reporting services.

Proposals in this program area are allowed to account for the NOC and measurement approach explicitly in their proposal budgets.

Letters of commitment, submitted as a **Supplementary Document**, should be included for all international partners in a proposal, and are encouraged to include the partners' view of the relationship with, and value of, the proposed project, and the nature of their interactions.

Proposals are strongly encouraged to identify specific capacity and equipment costs where possible.

Proposals should clearly define tangible development goals and milestones.

NSF expects to make 3-10 awards in IRNC: Core as described above, at up to $1,400,000 per year for up to 5 years, pending availability of funds.

Summary of Program Area#1 Requirements:

- Proposals can focus activities on either component - Backbone link or exchange point - or both components in combination.
- Proposals addressing 1.1 New Infrastructure are required to: have titles that begin with: "IRNC: Core New:" followed by the title of the project; and cannot fully duplicate circuit paths currently supported under IRNC awards.
- Proposals addressing 1.2 Infrastructure Improvement and Support Improvement are required to: have titles that begin with "IRNC: Core Improvement:" followed by the title of the project; focus on community-driven enhancements documented by user requirements and applied to existing deployed network infrastructure; and renew and extend existing award activities under the Backbone and RXP categories of current IRNC awards
- Proposals including Backbone services are required to: support IPv4, IPv6 and address management and operations at multiple protocol levels if router equipment is included in the proposal; have R&E network interconnection as the primary purpose of prosed links/circuits; identify a physical and logical landing point in the continental United States for any circuit or capacity proposed; and provide quotations for any circuit or capacity proposed as a **Supplementary document**.
- Proposals including Open Exchange Point activities are required to: demonstrate a commitment to operating an open R&E exchange point; describe their exchange point architecture and justify any core equipment purchases; address measurement and monitoring for any equipment and infrastructure in the proposal; and address scalability and growth constraints of the facility.
- Proposals are required to describe measurement plans and address availability of privacy preserving usage and performance data in a **Supplementary document** of up to 3 pages.
- Proposals should include Letters of Commitment, submitted as a **Supplementary Document**, for all international partners in a proposal, and are encouraged to include the partners' view of the relationship with, and value of, the proposed project, and the nature of their interactions.

Program Area 2: International Testbeds (IRNC: Testbed)

Proposals in this program area address experimental network testbed environments supporting international collaborative network experimentation. Proposals are expected to describe domain science applications, workflows, future scenarios, and partnerships driving the applied research and development on the proposed testbeds.

Proposals are expected to address federation connecting different testbeds in the U.S. for international connectivity and how collaborative experimentation can be enabled by such federation.

Unlike Program Area B.1, IRNC: Core, the Testbed program area has no production scientific data networking responsibilities, and activities are not expected to support production services.

Proposals are expected to consider innovative functionalities in the testbed that will allow simultaneous multi-location collaborative science engagement, for example, that may require large-scale visualization. Proposals are expected to describe approaches by which new and innovative capabilities can be experimentally deployed and studied quantitatively, and how successful experimentation can translate into new and routinely available capabilities for supporting networking needs of science.

Proposals may request nominal amounts of computing and storage as part of a plan to develop experimental integrated capabilities. Any equipment and capacity resources proposed in the first two years should be accompanied by sales quotations included as supplementary material.

Proposals may consider connectivity that directly connects multiple testbeds across U.S. and other parts of the world such as:

- EU OCRE https://www.ocre-project.eu;
- OneLab: https://onelab.eu; and
- EdgeNet http://edge-net.org

Proposals are encouraged to consider how to connect with and leverage FABRIC for experimental deployment, protocol testing, measurement and evaluation (https://www.fabric-testbed.net). FABRIC (NSF Award #1935966) is a nationwide next generation network testbed comprised of novel extensible network elements equipped with compute and storage capabilities located throughout the network, and interconnected by high speed dedicated optical links. FABRIC's programmability, combined with high fidelity measurement capabilities, allows a compelling research infrastructure to support applied network research. Proposals addressing use of FABRIC are advised to build into their schedule the planned use of FABRIC starting after November 1, 2020.

Proposals in this program area must identify, in the Project Description, one or more supported science or engineering research projects or applications and describe how the proposed network integration activities will support those projects, for example, in addressing data movement, throughput, and predictable performance end-to-end.

Proposals in this program area must include, in the Project Description, a Project Plan addressing clear project goals and milestones. Proposals must define base metrics relevant to the proposal goals and address measurement and evaluation. Any software development under proposed activities must be made available under an open source license.

NSF expects to make 1-3 awards in IRNC: Testbed as described above, at up to $1,000,000 per year for up to 3 years, pending availability of funds.

Proposals in this program area are required to have titles that begin with "IRNC: Testbed:" followed by the title of the project.

Summary of Program Area#2 Requirements:

- Proposals address experimental network testbed environments supporting international collaborative network experimentation.
- Proposals do not address production scientific data networking.
- Proposals must include a Project Plan addressing clear project goals and milestones.
- Proposals must define base metrics relevant to the proposal goals and address measurement and evaluation.
- Proposals with software development must use an open source license.
- Proposals are required to have titles that begin with "IRNC: Testbed:" followed by the title of the project.

Program Area 3: Engagement for Training and Human and Network Capacity Building (IRNC: ENgage)

Proposals in this program area should address training opportunities, contributions to NREN development, collaboration with international R&E communities and industry, and overall infrastructure for human and network capacity building internationally. The focus here is on local and regional engagements at the network engineering and design level, especially in areas of the world where research and education network connectivity remain a challenge to collaborations with U.S. scientists and educators. Coincident with the broadening global participation in scientific research, the international networking research and education community continues to expand, with increasing complexity in engineering issues and opportunities for greater engineering engagement and coordination.

Proposals should outline and describe a 3- to 5-year plan of effort, identifying goals, key issues and opportunities in network engineering coordination, and plans to address those challenges.

Proposals should include event coordination and travel costs to accomplish the proposed activities. Proposals should address the team's role in terms of past position and experience in the community. Key priority areas for consideration include: infrastructure building consistent with the guiding principles stated above; coordinating globally interconnected testbed facilities; and human network community building through development of a strategy addressing community growth in network engineering experts, student exchange, and training. Finally, engagement activities should consider plans and approaches in working with the NSF science, engineering, and education communities and support of their international collaborations.

NSF expects to make a single award in IRNC: ENgage as described above, at up to $1,000,000 per year for up to 5 years, pending availability of funds.

Proposals in this program area are required to have titles that begin with "IRNC: ENgage: " followed by the title of the project.

If applicable, any proposal in this solicitation may include the following Supplementary Documents:

- Letters of collaboration from individuals who are from organizations other than the proposing organization or proposed subawardees and who

are described in the Project Description as involved in the project in a senior capacity, or from authorized representatives of institutions or organizations collaborating with the lead institution.

- The number of collaboration letters from third parties is limited to eight.

III. AWARD INFORMATION

The estimated program budget is a total of $20,000,000 to $50,000,000 for this solicitation. NSF expects to make 5 - 14 awards, subject to the availability of funds.

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.

Refer to Section II, Program Description, for specific proposal preparation information and instructions.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Budgets should include travel funds for the project principal investigators and other team members as appropriate from all collaborating institutions to attend one Principal Investigators' meeting. That meeting is expected to occur in year 2 or 3 of the award.

C. Due Dates

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

    April 08, 2020

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: 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 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

Proposals will be evaluated with careful attention to the following:

- The expected impact of the proposed international networking activities, either directly or indirectly, across the NSF community; and
- The experience and record of the PI team in delivering reliable, robust, dependable, and state-of-the-art capabilities in international R&E networking.

For the IRNC: Core program area, proposals will also be evaluated on the expected level of production quality in the resulting capabilities made available to the NSF community.

B. Review and Selection Process

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

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

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

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of 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:

The awardee is responsible for security of all equipment and information systems funded directly or indirectly by this award. The awardee may be required to present to the cognizant NSF Program Officer and Grants and Agreements Officer an IT security plan addressing policies and procedures for review and approval within 60 days of award. The plan should include evaluation criteria that will measure the successful implementation and deployment of the plans, policies and procedures.

Awards in Program Area 1.1 New Infrastructure whose duration exceeds 2 years will have a site visit and review after 18 months to evaluate the viability and impact of the activities. The review will provide guidance to NSF on whether to continue funding the activities for years 3-5.

Awards with significant software development or application interactions will be subject to the following conditions:

* Within the first year of the award, the open source license to be used for any software products that emerge from the project must be identified.

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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

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:

- Kevin L. Thompson, telephone: (703) 292-4220, email: kthompso@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.

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) 292-7827
> - **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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