Centers for Innovation and Community Engagement in Solid Earth Geohazards

PROGRAM SOLICITATION
NSF 24-515

REPLACES DOCUMENT(S):
NSF 21-628

National Science Foundation
Directorate for Geosciences
Division of Earth Sciences

Full Proposal Target Date(s):

March 15, 2024

IMPORTANT INFORMATION AND REVISION NOTES

Letters of Intent (LOI) are no longer required.

This solicitation is only for Center Operation proposals.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Centers for Innovation and Community Engagement in Solid Earth Geohazards

Synopsis of Program:

The Centers for Innovation and Community Engagement in Solid Earth Geohazards program supports university-based centers to advance research on the fundamental solid Earth processes that underpin natural hazards. Centers will catalyze, coordinate, and produce transformative research, lead innovation, and enable convergent approaches for systems-level insights that require the collective efforts of a large group of individuals.

Centers focus on addressing major, fundamental science challenges for understanding solid Earth geohazards, primarily those related to faulting, volcanoes, mass movements, and other dynamic processes. In particular, the Centers will advance understanding in one or more of the priorities outlined in the National Academies of Science, Engineering, and Medicine decadal survey report The Earth in Time, including; *What is an earthquake*? *What drives volcanism*? *What are the causes and consequences of topographic change?* and *How can Earth science research reduce the risk and toll of geohazards?*

Centers will also foster different dimensions of community engagement to meaningfully improve the national welfare. Flagship community engagement activities will take bold and creative action to broaden participation of underrepresented groups in the geoscience workforce and expand the impact of fundamental research in solid Earth geohazards to inform and prepare a broader community. Centers will establish partnerships to enable public outreach, hazard mitigation and other community engagement activities.

In 2024, the Program competition will support **Center Operation** awards intended to support the operation of a fully developed center addressing topics focusing on the fundamental processes that create solid Earth geohazards, such as earthquakes, volcanoes, landslides, and/or other solid Earth or tectonic processes.

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.

- Luciana Astiz, telephone: (703) 292-4705, email: eargeohazards@nsf.gov
- Eva E. Zanzerkia, telephone: (703) 292-4734, email: eargeohazards@nsf.gov

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

- 47.050 --- Geosciences

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1 to 2

Anticipated Funding Amount: $7,000,000

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.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

Only one proposal may be submitted by any Lead institution.

Limit on Number of Proposals per PI or co-PI: 1

Any one individual may be the Principal Investigator (PI) or co-PI for only one Center Operation proposal. Individuals may be listed as participating Other Senior/Key Personnel on more than one proposal.

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:**

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

C. Due Dates

- **Full Proposal Target Date(s)**:

  March 15, 2024

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:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Earth's tectonics underpin many of the planet's processes at a broad range of spatial and temporal scales, including earthquakes, volcanic eruptions, landslides and allied hazards. These solid Earth geohazards are responsible for trillions of dollars in damage and the loss of millions of lives in the history of the U.S., and these risks are anticipated to increase in the future as population increases in hazardous areas. Major advances

in our understanding of the fundamental forces that drive catastrophic events are needed to respond effectively to this risk and to engage a well-informed populace living in the midst of these hazards.

The Centers for Innovation and Community Engagement in Solid Earth Geohazards are intended to catalyze, coordinate, and produce transformative research in the Earth processes that lead to solid Earth geohazards. Centers provide community-scale leadership in two areas: convergence and innovation in systems-level science, and community engagement to develop a diverse and inclusive workforce, as well as a well-prepared and informed public.

Centers will be built around a compelling research challenge or theme of significant scale and complexity that would require a coordinated approach beyond what can be accomplished by a small team of researchers. The program will support basic research on Earth processes, as well as the development of new methods needed to advance the science. The program will help facilitate new collaborations within observational, experimental, theoretical and computational domains that will be essential to address the most exciting questions at the cutting edge of Earth science. This program does not support efforts to operationalize monitoring, forecasting, or prediction of hazards, though partnerships could provide support for these activities.

Progress in advancing science requires a diverse and inclusive workforce that is highly skilled. Centers will meaningfully improve the national welfare through broadening participation activities, including historically underrepresented groups, and advance the geoscience workforce. The program's focus on societally relevant problems provides a platform to engage and train students and postdocs from communities that have been historically underrepresented in science, technology, engineering, and mathematics (STEM). Additionally, knowledge-sharing between groups carrying out fundamental research and those focused on mitigating and forecasting future hazards is critical for the health and safety of our country. Consequently, Centers will expand the impact of fundamental research to a wide range of stakeholders.

II. PROGRAM DESCRIPTION

Centers for Innovation and Community Engagement in Solid Earth Geohazards must have the following attributes:

1) Centers must have a **vision for innovative and transformative research that is ambitious in scope**. The complexity of the research would require more extensive resources, such as combinations of talents, skills, and/or disciplines or specialized infrastructure, that would not be feasible with standard support to individual investigators or small collaborative groups, such as is provided through core programs in the NSF Earth Sciences Division (for example, Geophysics, Tectonics, Geomorphology and Land-use Dynamics, Hydrologic Sciences, Petrology and Geochemistry, and others). While center proposals can be built upon prior support, Principal Investigators should ensure that their proposed project does not significantly overlap with ongoing federally-funded research for themselves or any of their team members. Developing a **distinct and distinctive** science portfolio is essential for each center. PIs considering potential projects that cross the shoreline should contact Program Officers in the Marine Geology and Geophysics program in the Division of Ocean Sciences.

2) Centers must have a vision and integrated set of activities for community engagement that places **a major emphasis on supporting activities that educate the next generation of researchers**. Centers must provide an exceptionally stimulating and dynamic environment for education in which the needs of students and researchers from all sectors of U.S. society are considered while positioning them to benefit from interactions with a large, interdisciplinary group of scientists at all career levels. Centers will also **prioritize broadening participation of historically underrepresented groups** in all facets of center activities, and proposals should demonstrate how this will be accomplished. Centers will be expected to take explicit steps to develop a culture of equity and inclusion at all levels of operation and in all research endeavors.

3) **Strategic planning** will be a key element of a Center. Strategic plans will cover all aspects of a center, including research, workforce development and other broader impact activities; management; broadening participation; and center-wide data approaches, including the development of explicit milestones to be achieved in each of these domains. Strategic plans will be openly available to the broader scientific community.

4) Centers will **have appropriately-scaled management plans** that address the leadership of the center, how decisions will be made, including the roles of any internal committees, and how synergy among projects and activities will be actively promoted in service of the Center's vision. They include appropriately scaled mechanisms for the ongoing assessment of research outcomes and broader impacts; development and implementation of strategic plans; allocation of resources; the ability to initiate new lines of research and terminate support for lower priority efforts; and approaches to encourage and promote effective communication throughout the center and with partners. Serving as the Principal Investigator of a center award requires scientific leadership and vision. It is also a significant commitment of time and will be a primary professional focus for the life of the Center. Similarly, all team members should expect the center to be a significant part of their professional efforts. Reviewers will be asked to evaluate the qualifications of the team and the resources available to the project, including researcher time and commitment.

Centers will practice **strong project management**. Therefore, centers will align proposed scope with realistic budgets and timelines for achieving those goals. Centers will also identify important milestones within the timeline of their award period that progress to the accomplishment of the Center's goals. Additional information on project management expectations for Center Operation proposals is provided in the proposal preparation guidance below.

5) Centers will be responsible for sound development and management of any **shared facilities, infrastructure or cyberinfrastructure** required

to meet the scientific goals of the center. Centers should demonstrate a plan for equitable development and access to instrumentation, laboratory, and analytical facilities; analysis tools; community models; computing and software resources; and data. NSF encourages the use and re-use of existing instrumentation, cyberinfrastructure, and facilities, including instrumentation pools, experimental or analytical capabilities, computational resources, software, and data sets. Centers are expected to deploy modern best practices in cyberinfrastructure development and implementation, including working towards FAIR (findability, accessibility, interoperability, and reusability) data practices, and data-sharing across collaborative groups, developing open-source and sustainable software and improving access to high performance computing, among others. New approaches to data management and cyberinfrastructure and innovations in providing support to the scientific community are encouraged. All center researchers are expected to store, access, share, and archive data, with emphasis on data-sharing across collaborative teams.

6) **Partnerships between the Center and Other Organizations** will be defined by strong collaborations that are led by the Center's Principal Investigators. Collaborations with partner organizations will support the execution of the Principal Investigators' and Center's vision and strategic plan. Proposals will demonstrate the alignment of the partners' goals with overall goals of the center. The role of the partners in center activities will be clearly articulated, and resources that partners bring to the Center will be explicitly stated. The project scope that will be supported by these resources will also be clearly defined. Partners' level of involvement in the center management team and their influence on programmatic decision making will be explained in the management plan. Partnerships may include stakeholders at the interface of the built environment and the natural system. Partnerships with engineers, decision and policy makers, and other stakeholders with mandates outside of basic science, can serve as important broader impacts for centers depending on their focus or organizational structure. Strong collaborations with computer and data scientists and facilities that support cutting edge computational methods, such as intelligent systems like machine learning, could forge new modes of inquiry at the frontiers of this emerging field. Additionally, collaborations across these domains and institutions should provide cross-training and opportunities for a diverse and inclusive workforce that can rise to tomorrow's challenges.

Center Operations

In FY 2024, the program will consider proposals built around a compelling research challenge or theme related to any solid Earth Geohazard processes, including earthquakes, volcanoes, landslides, and other solid Earth or tectonic process. The proposal's scope will align with one or more of the priorities outlined in the National Academies of Science, Engineering, and Medicine decadal survey report. The Earth in Time including: What is an earthquake? What drives volcanism? What are the causes and consequences of topographic change? and How can Earth science research reduce the risk and toll of geohazards?

Center Operations proposals are expected to outline broad, strategic, center-scale activities in accordance with the Center Attributes, as described earlier in this section. Centers will be agile structures that respond rapidly to emerging opportunities, promote synergy, enhance collaborations, and engage in potentially transformative research. Centers will integrate research, innovation, education, science communication, and efforts to broaden participation.

Center proposals will organize their scope into Major Activities, which will provide the framework for aligning the proposed scope with realistic budgets and timelines for achieving Center goals. A Major Activity will most frequently be a major research thrust of the Center but may also be a large-scale effort for workforce development, community-building, broadening participation, or other comparable effort to support broader impacts.

Centers may need flexibility to advance Major Activities or to respond quickly and effectively to emerging research and/or broader impact opportunities through subaward seed funding. These emerging areas may include (but are not limited to): high-risk research projects; emerging areas of interdisciplinary research; development of new cyberinfrastructure to support the Center; support for early-career faculty or for investigators changing fields; and innovative educational, diversity-promoting, or outreach ventures. Seed funding is not intended to provide a substitute for NSF individual investigator funding, nor should it be used to fund foundational operational support for the Center. Proposals should describe the criteria and mechanisms for selecting and evaluating projects that may require seed funding.

Key milestones will include periodic site visits and other oversight by NSF staff. The initial Center Operation awards will be made for up to five years (contingent on acceptable progress). Additional information is provided in the proposal preparation guidance for Center Operation full proposal.

III. AWARD INFORMATION

In FY 2024, NSF anticipates making up to two new Center Operation awards (up to $3,000,000 per year for up to 5 years) as cooperative agreements. Plans for anticipated awards are pending availability of funds and submission of sufficient quality proposals.

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.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

Only one proposal may be submitted by any Lead institution.

Limit on Number of Proposals per PI or co-PI: 1

Any one individual may be the Principal Investigator (PI) or co-PI for only one Center Operation proposal. Individuals may be listed as participating Other Senior/Key Personnel on more than one proposal.

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.

See PAPPG Chapter II.D.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.

Collaborative proposals should be submitted as a single proposal with subawards administered by the lead organization as described in Chapter II.D of the PAPPG. Separately submitted collaborative proposals are not permitted.

In addition to the guidance in the PAPPG and NSF Grants.gov Application Guide, the following items should be included and/or addressed in the proposal:

Type of Proposal. The "Center" type of proposal should be selected.

Title. Provide a short informative title for the proposed project. To assist NSF staff in sorting proposals for review, proposal titles must include "Center Operations:". Please note that if submitting via Research.gov, the system will automatically insert the prepended title "Center".

Project Summary. The Project Summary consists of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity. Include a description of proposed activities in education and human resource development; specific details for activities to promote the participation of groups traditionally underrepresented in the sciences and outreach to both the scientific community and the general public.

Project Description. The Project Description comprises of the following sections and is limited to no more than 50 pages, regardless of the number of Major Activities described. This section should be completed according to the general guidelines detailed in the NSF PAPPG, including the requirement for a separate section labeled "Broader Impacts."

Executive Summary. Provide a clear rationale for and description of the proposed Center and its potential impact. Briefly describe the institutional setting of the Center, its proposed scope and organization, activities in research and education and their integration, specific efforts to promote diversity and outreach activities to the scientific community and the general public, any shared experimental facilities, any collaborative activities with industry or other sectors, links with related major research centers on or off campus, and a concise summary of the management plan.

- **List of Participants**. List the PI, any co-PIs, and each participating senior personnel (faculty level or equivalent) by full name, and his or her institutional and departmental affiliation (Additional biographical information should be inserted in the Biographical Sketch section.)
- **Results from Prior NSF Support.** Describe achievements under prior NSF support that pertain to the present proposal. This should include both research results and the results of activities that pertain to broader impacts.
- **Research plan and Major Activities (MAs).** Describe proposed Center activities, in sufficient detail for reviewers to be able to evaluate the feasibility of the proposed work and its potential for transformative impact. The scope of the Center should be broken into high-level Major Activities, which will provide the framework for aligning the proposed scope with realistic budgets and timelines for achieving Center goals. For each proposed MA that involves a research thrust, provide a concise description of the long-term research goals and intellectual focus, and describe the planned research activities in sufficient detail to enable assessment of their scientific merit and significance. For an MA that involves workforce development, community-building, or other similar activities, the need for the activity should be clearly established, including justification for the approach, arguments for why the proposed Center is the appropriate vehicle for the activity, and the expected impacts on science and the community. In all cases, describe the role and intellectual contribution of each senior participant in the MA, and briefly outline the available or planned resources to accomplish the stated goals. The need for a center- or institute-like approach involving several investigators and the means of achieving this should be clearly established. The role of the MA in the context of the Center as a whole should be outlined, and connections between MAs making up the unit should be sufficiently articulated to justify their inclusion within the Center. Interactions with partners and other groups should be described. At the beginning of each MA section, name the senior personnel who will participate (these participating senior personnel also should be included in the overall List of Participants) and state the proposed number of postdoctoral, undergraduate student, and graduate student participants.
- **Shared Facilities or Infrastructure to be established**. Describe the shared facilities and infrastructure, including cyberinfrastructure, to be established. Also include specific plans for the development of instrumentation. Describe plans for maintaining and operating the facilities, including staffing, and plans for ensuring access to the facilities by outside participants. Distinguish clearly between existing facilities and those still to be acquired or developed.
- **Partnerships**. Describe any proposed partnerships, interactions, and collaborations with other institutions and sectors, including other federal agencies, national laboratories and industry, as appropriate. Define the goals of the collaborations and activities that would involve the partners. Describe the roles in these collaborations of any participants that have been listed as participating senior investigators. List the senior collaborating participants (Note that a statement of intent to participate is required from external collaborators as a Supplementary Document), the mechanisms planned to stimulate and facilitate knowledge transfer, and the potential long-term impact of the collaborations.
- **Management Plan.** Describe the plans for administration of the Center, including the functions of key personnel and the role of any advisory committee, executive committee, program committee, or their equivalent. Describe the procedures and criteria used to select, administer, and evaluate the Major Activities of the Center, and collaborative programs with other groups and institutions. Plans for administering shared facilities should be described in this section. Describe plans for administering the educational programs and outreach activities of the Center, as appropriate.

References Cited. List only references cited in the Project Description. See PAPPG for format instructions.

In addition to the requirements specified in the PAPPG, the following **Supplementary Documents** should be included:

- A one-paragraph statement (not to exceed one-half page) from each of those listed as participating senior investigators outlining how they view their role in the Center. This must be specific and not a general letter of support.
- Letters of Collaboration. Include only official letters of collaboration verifying specific collaborations and/or commitments of non-financial resources from participating institutions. Letters of collaboration must follow the single-sentence format:

  "If the proposal submitted by Dr. [insert the full name of the Principal Investigator] entitled [insert the proposal title] is selected for funding by the NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description."

- Data Management Plan not to exceed two pages and follow EAR Data Policy Guidelines.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Awards are up to $3,000,000 per year for up to five years. These proposals should include funds in the budget for personnel to participate in oversight events (site visits or reverse site visits) in the second, fourth and fifth years of the project.

Provide separate budget pages for the Center as a whole and for each participating institution. In the summary budget table, as described below, provide the overall support levels planned for each of the Major Activities of the Center (only year 1 and five-year totals are required.) This should be included as part of the budget justification narrative. This information augments but does not replace the NSF official budget page.

Summary Table of Requested NSF Support		
Activity	Year One	Five Year Total
Major Activity (MA) 1 (Title)		
MA 2 (title) (repeat for each MA)		
Shared Facilities or Infrastructure		
Management and Administration		
Total		

For each entry in the Table, include indirect costs. Column totals must equal the total budget requested from NSF for the period shown. Include major capital equipment under shared facilities.

C. Due Dates

- **Full Proposal Target Date(s)**:

    March 15, 2024

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 1-800-381-1532 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 Research.gov for further processing.

The NSF Grants.gov Proposal Processing in Research.gov informational page provides submission guidance to applicants and links to helpful resources including the NSF Grants.gov Application Guide, Grants.gov Proposal Processing in Research.gov how-to guide, and Grants.gov Submitted Proposals Frequently Asked Questions. Grants.gov proposals must pass all NSF pre-check and post-check validations in order to be accepted by Research.gov at NSF.

When submitting via Grants.gov, NSF strongly recommends applicants initiate proposal submission at least five business days in advance of a deadline to allow adequate time to address NSF compliance errors and resubmissions by 5:00 p.m. submitting organization's local time on the deadline. Please note that some errors cannot be corrected in Grants.gov. Once a proposal passes pre-checks but fails any post-check, an applicant can only correct and submit the in-progress proposal in Research.gov.

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 *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. 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.D.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.D.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 other underrepresented groups in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

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

Additional Solicitation Specific Review Criteria

In addition to the NSF Merit Review Criteria, reviewers of these proposals will be asked to consider the following:

- How well does the proposal articulate the vision of the future Center to advance innovative and transformative research that is ambitious in scope?
- How strong is the Center's vision for developing community engagement activities that train the next generation of researchers and have potential for broadening participation of underrepresented groups?

- How well does the proposal articulate a management plan that describes how the Center's goals and activities will be accomplished and assessed, including the leadership structure of the Center, how decisions will be made, the roles of any internal committees, and the role of partnerships in the center?
- How well does the proposal align the proposed scope with realistic budgets and timelines for achieving those goals, and does the proposal identify important milestones within the timeline of the award period that progress to the accomplishment of the Center's goals?
- How well does the Center infrastructure plan describe how shared facilities, infrastructure, and cyberinfrastructure will be developed and managed using modern standards and for use by the broader 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, or Reverse Site Review.

The review of individual proposals may use ad hoc written reviews from experts in the areas of science, community engagement and center management . Additional review input may be provided by a panel of experts spanning the broad range of topics covered by the proposals. The program may also request that the PIs respond in writing and/or to a panel with a presentation aimed to respond to issues identified during prior review stages. This presentation will be followed by a question-and-answer period to allow for free exchange between the PIs and the panel.

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

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new recipients 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 or the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. 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.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's Build America, Buy America webpage.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

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

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

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- Luciana Astiz, telephone: (703) 292-4705, email: eargeohazards@nsf.gov
- Eva E. Zanzerkia, telephone: (703) 292-4734, email: eargeohazards@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-381-1532
- 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.F.7 for instructions regarding preparation of these types of proposals.

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

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

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

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

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

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

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

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by proposers 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 proposers 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
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314

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