Research on the Science and Technology Enterprise: Indicators, Statistics, and Methods (NCSES S&T)

PROGRAM SOLICITATION
NSF 21-627

REPLACES DOCUMENT(S):
NSF 15-521

National Science Foundation

Directorate for Social, Behavioral and Economic Sciences
National Center for Science and Engineering Statistics

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

January 18, 2022

Third Tuesday in January, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

Standard research proposals and Doctoral Dissertation Research Improvement Grant (DDRIG) proposals are submitted directly to this solicitation, Research on the Science and Technology Enterprise: Indicators, Statistics, and Methods (NCSES S&T).

The NCSES S&T program also supports Faculty Early Career Development (CAREER) awards and supplements for Research Experiences for Undergraduates (REU), as well as RAPID, EAGER, and conference awards. Please see the applicable program solicitation or the PAPPG for additional information.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 22-1), which is effective for proposals submitted, or due, on or after October 4, 2021.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Research on the Science and Technology Enterprise: Indicators, Statistics, and Methods (NCSES S&T)

Synopsis of Program:

The National Center for Science and Engineering Statistics (NCSES) of the National Science Foundation (NSF) is one of the thirteen principal federal statistical agencies within the United States. It is responsible for the collection, acquisition, analysis, reporting and dissemination of objective, statistical data related to the science and technology (S&T) enterprise in the United States and other nations that is relevant and useful to practitioners, researchers, policymakers and the public. NCSES uses this information to prepare a number of statistical data reports including *Women, Minorities and Persons with Disabilities in Science and Engineering* and the National Science Board's biennial report, *Science and Engineering (S&E) Indicators*.

The Center would like to enhance its efforts to support analytic and methodological research in support of its surveys as well as promote the education and training of researchers in the use of large-scale nationally representative datasets. NCSES welcomes efforts by the research community to use NCSES or other data to conduct research on the S&T enterprise, develop improved survey methodologies that could benefit NCSES surveys, explore alternate data sources that could supplement NCSES data, create and improve indicators of S&T activities and resources, strengthen methodologies to analyze S&T statistical data, and explore innovative ways to communicate S&T statistics. To that end, NCSES invites proposals for individual or multi-investigator research projects, doctoral dissertation improvement awards, conferences, experimental research, survey research and data collection, and dissemination projects under its program for Research on the Science and Technology Enterprise: Indicators, Statistics, and Methods (NCSES S&T).

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.

- Jennifer Sinibaldi, telephone: (703) 292-2348, email: jsinibal@nsf.gov

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

- 47.075 --- Social Behavioral and Economic Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 5 to 10

Based on the quality of proposals and the availability of funds, NSF expects to make 5 to 10 awards each year.

Anticipated Funding Amount: $1,500,000 subject to the availability of funds

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- **Standard research proposals**: The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Proposal and Award Policies and Procedures Guide (PAPPG), Chapter 1, Section E. Unaffiliated individuals are not eligible to submit proposals in response to this solicitation.
- **Doctoral Dissertation Research Improvement Grant proposals:** Doctoral Degree granting universities and colleges accredited in, and having a campus located in, the US acting on behalf of their faculty members.

Who May Serve as PI:

Standard research proposals: No special restrictions or limits.

Doctoral Dissertation Research Improvement Grant proposals: The dissertation advisor must be listed as the Principal Investigator and the student must be listed as the co-Principal Investigator.

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):

January 18, 2022

Third Tuesday in January, Annually Thereafter

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 National Center for Science and Engineering Statistics (NCSES) of the National Science Foundation (NSF) is responsible for the collection, acquisition, analysis, reporting and dissemination of objective, statistical data related to the science and technology (S&T) enterprise in the United States and other nations. This information should be relevant and useful to practitioners, researchers, policymakers and the public. NCSES uses this information to prepare a number of statistical data reports as well as analytical reports including *Women, Minorities and Persons with Disabilities in Science and Engineering* and the National Science Board's biennial report, *Science and Engineering (S&E) Indicators.*

The America COMPETES Reauthorization Act codifies the role of NCSES in supporting research using the data that it collects and its role in research methodologies related to its work. The legislation specifies the responsibilities of NCSES in supporting the education and training of researchers who use large-scale data sets, such as the ones NCSES now collects. The following activities form the core of NCSES work:

- The collection, acquisition, analysis, reporting, and dissemination of statistical data related to the United States and other nations;
- Support of research that uses NCSES data;
- Methodological research in areas related to its work; and
- Education and training of researchers in the use of large-scale nationally representative data sets.

II. PROGRAM DESCRIPTION

NCSES welcomes proposals for research, conferences, and studies to advance the understanding of the S&T enterprise and encourage development of methods that will improve the quality of our data. Research could include: improved approaches to indicator construction and presentation, new S&T indicator development, strengthening of data collection methodologies and privacy protection to improve surveys that collect S&T data, investigations of alternate data sources to study S&T topics, analyses to inform STEM education and workforce policy, and innovations in the communication of S&T statistics. NCSES encourages proposals that analyze NCSES data or NCSES data in conjunction with those from other sources but does not limit the work to the analysis of the data it collects.

A. AREAS OF INTEREST

Potential topics for consideration include but are not limited to:

- Improving analytical techniques to produce better indicators of issues related to: (1) the education and retention of scientists and engineers including minorities, women, or persons with disabilities, (2) the demand, supply, career pathways, and/or characteristics of science and engineering personnel, including those without bachelor's degrees (3) outcomes and impacts of research and development (R&D) expenditures in various sectors, countries, and fields including emerging science and technology fields, (4) estimates of current and near-term future S&T resources; and (5) measures of U.S. competitiveness in S&T.

- Developing new and/or improved methods of measuring the inputs, outputs, interactions, and social or economic impacts of S&T activities. These methods could involve the use of administrative records, social media, or novel data extraction methods.

- Developing new data, analyses, and/or indicators of the globalization of science, engineering, and technology, as well as analyses leading to a better understanding of the changing global economy. This could include: international comparisons of S&T capabilities and activities, indicators of international education and mobility of scientists and engineers, and foreign investment in S&T activities.

- Improving data collection methodologies for S&T surveys and censuses, including those conducted by NCSES. Such studies could research improvements in the target population, sample frame, and sample design, focusing on coverage and sampling error. Also included are developments of new data collection techniques and operational efficiencies such as adaptive survey design and passive data collection. Studies focused on the respondent experience and reduction in respondent burden such as modular survey design are also relevant.

- Improving analysis and data processing methodologies for NCSES data by researching topics such as imputation techniques, privacy protections, or data consistency with related surveys or administrative data. This research could also involve investigations of linkage of alternate data sources to supplement NCSES data and reporting.

- Pursuing innovations in the dissemination of S&T statistics to encourage communication of the information in a timely and user-friendly fashion. This could include interactive visualizations, studies of user needs, and new reporting formats for indicators.

B. DATA AVAILABILITY

NCSES encourages proposers to use NCSES data for their research. NCSES conducts the following surveys for which data are available:

Education of Scientists and Engineers

Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS)

Survey of Earned Doctorates (SED)

Science and Engineering Workforce

Survey of Doctorate Recipients (SDR)

National Survey of Recent College Graduates (NSRCG)

National Survey of College Graduates (NSCG)

(data from these three surveys are combined to form the SESTAT integrated data system)

Research and Development Funding and Expenditures

Survey of Industrial Research and Development (SIRD, also see BRDIS and BERD)

Business Research and Development and Innovation Survey (BRDIS)

Business Enterprise Research and Development Survey (BERD)

Survey of Research and Development Expenditures at Universities and Colleges (Acad R&D, also see HERD)

Higher Education Research and Development Survey (HERD) (beginning in 2010)

Survey of Federal Funds for Research and Development (FedFunds)

Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions (FedSupport)

Survey of R&D Expenditures at Federally Funded R&D Centers (FFRDC)

Survey of Research and Development Funding and Performance by Nonprofit Organizations (Nonprofit)

Nonprofit Research Activities Survey (Nonprofit)

Survey of State Research and Development Expenditures (State R&D)

Science and Engineering Research Facilities

Survey of Science and Engineering Research Facilities (Facilities)

Survey of Academic Research Instruments and Instrumentation Needs (Instruments)

For a broad overview of all of the surveys see: https://www.nsf.gov/statistics/srvyoverview/overview.cfm

To explore public use data, see: https://ncsesdata.nsf.gov/explorer.

C. DATA ACQUISITION

If proposers expect to use existing datasets, the proposal should indicate what those datasets are and whether the proposer expects to be able to acquire the data. Some NCSES datasets do require special procedures to acquire data. Data access requirements for each NCSES dataset are shown in the NCSES Dataset Availability Table.

NCSES Data License Requirements

The goal of having a restricted-use data License is to maximize the use of statistical information while protecting individually identifiable information from disclosure.

What is an NSF/NCSES restricted-use license?

The License is the method used to provide access to restricted-use data to institutions of higher education and other qualified organizations (e.g., non-Federal government agencies, non-statistical Federal agencies, nonprofit organizations or research contracting firms). Restricted-use data are NCSES statistical databases that contain individually identifiable records that were collected under a pledge of confidentiality.

Data on scientists and engineers from the following sources are currently available with a License:

Survey of Earned Doctorates (SED)

Survey of Doctorate Recipients (SDR)

National Survey of Recent College Graduates (NSRCG)

SESTAT Integrated Database

Use of licensed data for an NSF Award

Receiving an award from NSF for research using NCSES data does not imply that a license will be granted. Additionally, obtaining a license to use NSF data is not required to obtain an award, nor is an award required to obtain a license. Potential PIs planning on using NCSES data to conduct research proposed in their application are strongly encouraged to contact NCSES prior to finalizing their proposal to a) determine whether the proposed research is feasible with NCSES's licensed data; and b) determine whether it will be likely that a license will be granted. NCSES provides public-use microdata with complete documentation on both the public and restricted data that is available for use. Researchers are strongly encouraged to use these data to test the feasibility of their research.

Who can apply?

A license is held by an organization, not by an individual; therefore, all applications for a license must come from a requesting organization. Note that restricted-use data cannot leave the United States and therefore organizations cannot apply for use outside the U.S. The principal researcher is in charge of the day-to-day operations involving the License and must officially be a member of the organization (e.g. an employee). In addition, collaborating researchers at the same organization may be granted access to the restricted-use data on the same license. If collaborators do not belong to the PI's organization, they must apply for a separate license under their organization.

A license will only be issued to an organization whose goals for the restricted data are to do statistical analysis that furthers the mission of NCSES.

The following types of organizations are eligible to apply for a license

- Non-regulatory Federal Agencies, including components of the NSF other than NCSES
- State and Local Government Agencies
- Institutions of higher education
- Nonprofit Organizations
- Research contracting firms
- Non-NCSES contractors doing statistical analysis for which restricted-use data is necessary

To apply for a license, an organization must submit a data requirements document and a preliminary research plan so that NCSES can determine that the project is feasible and meets eligibility requirements. The data requirements should address the data files and variables required for the research. The preliminary research plan must include a short description of the research project including why the dataset(s) requested are suitable for the research, a justification for access to the restricted-use data, and a statement on why the publicly-available data are insufficient for the research. Potential applicants may contact the licensing officer at licensing@ncses.gov to obtain a template for these documents.

After the approval of the data requirements and research plan by NCSES, if NCSES and the researcher agree to start the formal process, the organization must submit:

- Security plan
- Signed License agreement
- Executed affidavits of nondisclosure for the principal researchers and all collaborating researchers

Once an application is received, the approval process to obtain an NCSES restricted-use license takes approximately 1 month.

Security

Strict security procedures are required to protect the data on individuals who responded to statistical Federal surveys; i.e., who provided individually identifiable information. The License presents the terms under which licensees must provide assurances of confidentiality necessary to comply with the pertinent laws. Potential licensees who anticipate matching NCSES restricted-use datasets with personally identifiable information will also be required to adhere to the NCSES data matching policy.

NCSES may provide access to the licensed data through a virtual data center. Potential licensees will be required to use this data center, with special equipment from NCSES. Licensees will be expected to pay for the cost of this equipment and use of the data center.

Census Research Data Center (RDC) Access Requirements

For information on how to obtain access to the SIRD, BRDIS, and BERD data, please see https://www.census.gov/programs-surveys/ces/data/restricted-use-data/apply-for-access.html.

Data Management Plan

To ensure efficient accessibility of new data, metrics and indicators that are developed via this solicitation, all research proposals that develop new data must include a data management plan. Proposers must adhere to NSF's general data policy (see the Data Management Plan for SBE Proposals). Data developed from NCSES restricted-use datasets may not be shared publicly, and will reside with NCSES at the end of the research period for additional dissemination by NCSES. For BRDIS data, any information developed as a result of a research project will be subject to Census RDC policies. Proposers should also apply the following requirements as appropriate.

Requirements for the data management plan for data developed from NCSES datasets:

- Statement regarding where any new or linked data will be archived. At a minimum, the proposal should include a letter of support from the specified data center.
- Identification of the data management point of contact and the person who is responsible for submitting the data, metadata and other documentation.
- Clear indication of which data are to be shared in the research community. Such data must be made available through an openly accessible data management system as soon as data are collected and verified.

Within the first three months of the award, investigators will provide a metadata inventory description (a high-level summary of the data to be developed) to the relevant archive. If a community-wide data coordination service is established, the metadata must be shared with this service. Every project must submit complete documentation and quality-controlled data to the appropriate archive in accordance with NSF's data policy.

In some cases the data that are developed or linked to NCSES data will be sensitive in nature. Proposers may request an exemption from the NCSES NSF program officer for those data. The request for exemption must clearly state why the data cannot be disseminated. In some cases, proposers might indicate a reasonable time period within which the data must be privately held.

D. GENERAL INFORMATION

Alignment with NCSES Mission

Proposals that do not target one or more of NCSES' core mission areas will be returned without review. The NCSES program overlaps with many other research activities and areas at NSF. Researchers with projects that do not meet specific NCSES criteria might consider other NSF programs and activities. Those programs that may be of particular interest to NCSES researchers are: Science of Science: Discovery, Communication, and Impact (SoS: DCI), Methodology, Measurement and Statistics (MMS), Science of Organizations (SoO), Science and Technology Studies (STS), SBE Science of Broadening Participation (SBE SBP), and Partnerships for Innovation (PFI).

NCSES' core mission areas are:

- The collection, acquisition, analysis, reporting, and dissemination of statistical data on science, engineering, technology and research and development related to the United States and other nations;
- Support of research that uses NCSES data;
- Methodological research in areas related to its work; and
- Education and training of researchers in the use of large-scale nationally representative data sets

Interaction with NCSES

Grantees are asked to include a virtual presentation to the National Center for Science and Engineering Statistics to report on their activities at the conclusion of their work.

Dissertation Awards

NCSES Doctoral Dissertation Research Improvement Grants (DDRIGs) help to defray direct costs associated with conducting research, including data set acquisition, original data collection, additional statistical or methodological training, meeting with scholars associated with original datasets, and fieldwork away from the student's home campus.

Doctoral Dissertation Research Improvement Grant proposals submitted to NCSES should be prepared in accordance with the guidelines for regular research proposals specified in NSF's Proposal and Award Policies and Procedures Guide (PAPPG). NCSES DDRIG proposals have additional requirements that are specified below. Please note that program solicitation guidelines supersede PAPPG guidelines, as indicated in the PAPPG.

- Project Duration: 12 months with possibility of renewal (with additional funding) based on progress toward completion.
- Project Budget: Dissertation grants are generally for $15,000 or less although higher levels of funding are possible with justification. Funds are for expenses associated with conducting the dissertation research (e.g., data collection, field work, payment to subjects, survey expenses, software, microfilm, data transcription, file creation and data merging, travel, and expenses incurred at sites away from the student's home institution). The grant does not support stipend, salary, or tuition reimbursement. Neither the PI (the dissertation advisor) nor any of the co-PIs (including the dissertation student) should be listed in Section A (Senior Personnel) on the Budget, since DDRIG proposals do not provide funds for salaries or stipends for the doctoral student, the dissertation advisor, or other faculty advisors. After the PI and the co-PI(s) are entered on the Cover Sheet, their names should be manually removed from Section A on the budget to avoid construal as voluntary committed cost sharing, which is not permitted.
- Proposal Title: This should begin with, "Doctoral Dissertation Research: ..."
- PI: The dissertation advisor must be listed as the Principal Investigator. The dissertation student must be listed as the co-Principal Investigator.

- Project Summary: Each proposal must contain a summary of the proposed project not more than one page in length. 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. The intellectual merit portion should include, minimally, background information on the research (theory, prior research), research hypotheses and/or questions, and a description of methods and expected findings. The broader impacts portion might address such questions as: ow well does the activity advance discovery and understanding? How does the work promote teaching, training, or learning? What may be the benefits of the proposed activity to society? (see the NSF PAPPG for more detail).
- Project Description: Must not exceed 10 single pages. Do not send transcripts and letters of recommendation but include any questionnaires or survey guides for original data collection as supplementary documents.
- Results from Prior NSF Support section: Not required for DDRIG proposals.

Dissertation Advice to Students

As a general rule, proposals that review well are those that clearly state a central research question, make an argument that engages and/or debates relevant literature, specifies the data the student will gather and the analytic procedures the student will apply to those data. Additionally, strong proposals state what the researcher expects to find or show through the research.

When preparing the proposal, write clearly and concisely. Reviewers will be selected from a variety of specialty areas so it is possible that one or more reviewers will not specialize in your particular area of research. Defining key terms and keeping your proposal free of jargon will ensure that all reviewers will be able to understand your proposal and evaluate it fairly.

* Note: Students doing international research, or having a formal affiliation with a foreign research institution, may be eligible for additional funding. Please contact the appropriate program in NSF's Office of International Science and Engineering.

III. AWARD INFORMATION

Based on the quality of proposals and the availability of funds, NSF expects to make 5 to 10 awards each year.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- **Standard research proposals:** The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Proposal and Award Policies and Procedures Guide (PAPPG), Chapter 1, Section E. Unaffiliated individuals are not eligible to submit proposals in response to this solicitation.
- **Doctoral Dissertation Research Improvement Grant proposals:** Doctoral Degree granting universities and colleges accredited in, and having a campus located in, the US acting on behalf of their faculty members.

Who May Serve as PI:

Standard research proposals: No special restrictions or limits.

Doctoral Dissertation Research Improvement Grant proposals: The dissertation advisor must be listed as the Principal Investigator and the student must be listed as the co-Principal Investigator.

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 FastLane or Research.gov. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.
- See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

See the Program Description section for special proposal preparation information.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

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

    January 18, 2022

    Third Tuesday in January, Annually Thereafter

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 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

Proposals will be evaluated based on their relevance to NCSES program goals and their prospect of improving the development, quality, or understanding of the S&T enterprise.

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.

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:

- Jennifer Sinibaldi, telephone: (703) 292-2348, email: jsinibal@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) 292-8134
>
> - **To Locate NSF Employees:**   (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

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

Suzanne H. Plimpton
Reports Clearance Officer
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314