

This solicitation has been archived and replaced by [NSF 19-575](#).

Methodology, Measurement, and Statistics (MMS)

PROGRAM SOLICITATION

NSF 19-520

REPLACES DOCUMENT(S):

NSF 14-574



National Science Foundation

Directorate for Social, Behavioral & Economic Sciences
Division of Social and Economic Sciences

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

January 31, 2019

Last Thursday in January, Annually Thereafter

August 29, 2019

Last Thursday in August, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

This solicitation increases the total amount of funding provided through an MMS Doctoral Dissertation Research Improvement (DDRI) award to \$18,000. This total includes both direct and indirect costs and covers the entire duration of the award.

If a project is being undertaken by researchers at multiple organizations, a single organization must be identified as the prime, and a single proposal describing the entire project must be submitted by that organization, with funds distributed among partner organizations via subawards from the prime organization. Direct submission of linked collaborative sets of proposals by multiple organizations is not permitted.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 18-1](#)), which is effective for proposals submitted, or due, on or after January 29, 2018.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Methodology, Measurement, and Statistics (MMS)

Synopsis of Program:

The Methodology, Measurement, and Statistics (MMS) Program is an interdisciplinary program in the Directorate for Social, Behavioral, and Economic Sciences that supports the development of innovative analytical and statistical methods and models for those sciences. MMS seeks proposals that are methodologically innovative, grounded in theory, and have potential utility for multiple fields within the social, behavioral, and economic sciences. As part of its larger portfolio, the MMS Program partners with a consortium of federal statistical agencies to support research proposals that further the production and use of official statistics.

The MMS Program provides support through a number of different funding mechanisms. The following mechanisms are addressed in this solicitation:

- Regular Research Awards
- Awards for conferences and community-development activities
- Doctoral Dissertation Research Improvement (DDRI) Grants
- Research Experience for Undergraduates (REU) Supplements

MMS also supports Faculty Early Career Development (CAREER) awards. Please see the [CAREER Program Web](#)

[Site](#) for more information about this activity.

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.

- Cheryl L. Eavey - Program Director, telephone: (703) 292-7269, email: ceavey@nsf.gov
- Liana A. Denola - Social Scientist, telephone: (703) 292-2675, email: ldenola@nsf.gov
- Robbie W. Brown - Program Specialist, telephone: (703) 292-7264, email: rbrown@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: 15 to 35

Anticipated Funding Amount: \$3,760,000

Approximately \$3.76 million will be awarded annually, contingent upon the availability of funds. Additional funds may be available from participating federal statistical agencies for competitive research proposals of interest to those agencies. Project budgets should be developed at scales appropriate for the work to be conducted.

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:

Doctoral Dissertation Research Improvement Awards: DDRI proposals must be submitted with a principal investigator (PI) and a co-principal investigator (co-PI). The PI must be the advisor of the doctoral student or another faculty member at the U.S. institution where the doctoral student is enrolled. The co-PI must be the doctoral student whose dissertation research will be supported.

For all other types of awards, there are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via 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 Deadline(s)** (due by 5 p.m. submitter's local time):
 - January 31, 2019
 - Last Thursday in January, Annually Thereafter
 - August 29, 2019
 - Last Thursday in August, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria apply.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

TABLE OF CONTENTS

Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Award Information**
- IV. **Eligibility Information**
- V. **Proposal Preparation and Submission Instructions**
 - A. Proposal Preparation Instructions
 - B. Budgetary Information
 - C. Due Dates
 - D. FastLane/Grants.gov Requirements
- VI. **NSF Proposal Processing and Review Procedures**
 - A. Merit Review Principles and Criteria
 - B. Review and Selection Process
- VII. **Award Administration Information**
 - A. Notification of the Award
 - B. Award Conditions
 - C. Reporting Requirements
- VIII. **Agency Contacts**
- IX. **Other Information**

I. INTRODUCTION

The Methodology, Measurement, and Statistics (MMS) Program is a standing, interdisciplinary program in the Directorate for Social, Behavioral, and Economic Sciences (SBE). MMS supports the development of innovative analytical and statistical methods and models for those sciences. The Program interacts with the other programs in SBE as well as other programs in the Foundation. The Program also partners with a consortium of federal statistical agencies to support research proposals that further the production and use of official statistics.

II. PROGRAM DESCRIPTION

Program Mission Statement

The MMS Program seeks proposals that are methodologically innovative, grounded in theory, and have potential utility for multiple fields within the social, behavioral, and economic sciences. Successful proposals often integrate across the following areas:

- The development, application, and extension of formal models and methodology for social, behavioral, and economic research, including methods for improving measurement. The proposed research must show promise for having value for multiple fields in the social, behavioral, and economic science.
- The development of formal models that cross traditional disciplinary boundaries, including research on statistical methodology or statistical modeling. The proposed research must show promise for having value for multiple social and behavioral science fields.
- Research on methodological aspects of new or existing procedures for data collection, including
 - methodological advances for survey research;
 - research to evaluate or compare existing databases and data collection procedures; and
 - research on methodological issues related to the use and analysis of new sources of data for the social, behavioral, and economic sciences.
- Infrastructure projects that facilitate the research activities of the MMS community.

The MMS Program provides support through a number of different types of proposals including:

- Regular Research Awards
- Awards for conferences and community-development activities
- Doctoral Dissertation Research Improvement (DDR) Grants
- Research Experience for Undergraduates (REU) Supplements

MMS also supports Faculty Early Career Development (CAREER) awards. Please see the [CAREER Program Web Site](#) for more information on this activity.

Types of Proposals

1) Regular Research Awards

Most of the proposals submitted to the MMS Program fall into the category of regular research awards. With the exception of a long-standing partnership with a consortium of federal statistical agencies (described in detail below) and the occasional NSF Dear Colleague letter, the MMS Program does not solicit particular areas of research. Rather, the Program invites the community to submit a broad range of cutting-edge methodological research for the social, behavioral, and economic sciences.

The Program also supports some infrastructure-type activities for the social, behavioral, and economic sciences. Infrastructure proposals must demonstrate the value of the proposed activities for the broader community of social, behavioral, and economic scientists. The full portfolio of active MMS awards is available on the [MMS Program Web Site](#).

Data Collection Methods

The Federal Statistical System faces the challenge of gathering relevant and reliable data for the next decade and beyond. The potential for conducting surveys via the web, for example, raises a host of important methodological questions. Questions regarding the impact of nonresponse on the validity and reliability of survey data need to be addressed. The increasing use of multi-mode surveys, in part to address declining response, has raised new methodological challenges.

Since 1999, the MMS Program has collaborated with a consortium of federal statistical agencies represented by the Interagency Council on Statistical Policy (ICSP) and the Federal Committee on Statistical Methodology (FCSM) to further research related to the production and use of official statistics. In the past, the solicitation has emphasized the development of new and innovative approaches to surveys and methods for the analysis of survey data. In addition to those two areas of research, this solicitation encourages research on alternatives to survey-based approaches to producing statistics.

Researchers need to think creatively regarding the development of methods for the production and use of data. Potential topics for consideration include, but are not limited to the following:

- Measurement Issues (e.g., investigation of measurement implications of multi-mode surveys; methods for evaluation of the quality of data obtained from administrative records and other organic sources; the combination of survey and other data sources);
- Questionnaire Design (e.g., applications of psychology or linguistics to questionnaire design);
- Survey Design and Technology (e.g., frame development and refinement; address-based sampling; designs for rare or hard-

to-reach subpopulations; designs for complex households or complex economic units; design and evaluation of complex edit and imputation procedures; adaptive design);

- Analytical Issues (e.g., uses of administrative records, paradata, or other organic sources to supplement surveys);
- Small Area Estimation (e.g., improvements in current estimation and inference methods);
- Inferential Methods and Related Tools (e.g., estimation and inference methods appropriate for data collected from, for example, complex adaptive designs or non-probability designs; methods for using combined data sources);
- Data Improvement (e.g., disclosure limitation methods; development of metrics that quantify nonresponse bias without a traditional follow-up survey; assessment of the quality of survey and non-survey data sources);
- Data Dissemination and Visualization.

Although proposals submitted in response to this solicitation may address any aspect of the topics listed above, priority will be given to basic research proposals that are interdisciplinary in nature, have broad implications for the field in general, and have the greatest potential for creating fundamental knowledge of value to the Federal Statistical System. Because methodological problems often require knowledge and expertise from multiple disciplines, collaborations among the relevant sciences, including the social sciences, linguistics, cognitive science, statistics, computer science, and economics are welcome. Although proposals on the above topics may be submitted to either one of the two MMS deadline dates, only proposals submitted to the January due date are guaranteed full consideration by the federal statistical agencies.

Grantees for awards funded with support from the federal statistical agencies may be invited to participate in a one-or two-day meeting in the Washington, DC area to report on their activities and interact with other grantees and federal agency staffers. Budget requests should include travel funds to accommodate that possibility.

MMS will coordinate and manage the review of proposals jointly considered by MMS and the federal statistical agencies. Relevant information about proposals and reviews of proposals will be shared with participating organizations as appropriate.

Information about Participating Federal Statistical Agencies

The Interagency Council on Statistical Policy (ICSP) consists of the heads of the 14 largest statistical agencies and is chaired by the chief statistician of the Office of Management and Budget. It was formally established by the Paperwork Reduction Act of 1995 to discuss and determine statistical policy issues. The Federal Committee on Statistical Methodology (FCSM) consists of experts from within the Federal Statistical System who consider methodological issues of importance to the statistical system. The Federal Statistical System includes 10 agencies that have statistical activities as their principal mission and about 60 agencies that carry out statistical activities in conjunction with other missions, such as providing services or enforcing regulations.

Consortium agencies include the following:

Department of Agriculture (National Agricultural Statistics Service; Economic Research Service)
Department of Commerce (Bureau of the Census; Bureau of Economic Analysis)
Department of Education (National Center for Education Statistics)
Department of Energy (Energy Information Administration)
Department of Health and Human Services (National Center for Health Statistics)
Department of Justice (Bureau of Justice Statistics)
Department of Labor (Bureau of Labor Statistics)
Department of Transportation (Bureau of Transportation Statistics)
Department of Treasury (Statistics of Income Division, Internal Revenue Service (IRS))
National Science Foundation (National Center for Science and Engineering Statistics)
Social Security Administration (Office of Research, Evaluation, and Statistics)

2) Awards for conferences and community-development activities

As part of its infrastructure activities, the Program accepts and reviews proposals for the conduct of conferences that contribute in meaningful ways to the development of methods for the social, behavioral, and economic sciences. The Program specifically encourages proposals that support activities designed to further the development of an MMS community of scholars with complementary interests across the social, behavioral, and economic sciences. Conferences that bring diverse sets of MMS methodologists together to identify complementary approaches and gaps in knowledge are particularly welcome.

3) Doctoral Dissertation Research Improvement (DDRI) Awards

In an effort to improve the quality of dissertation research, the Methodology, Measurement, and Statistics Program accepts and reviews DDRI proposals. The proposal should describe the scientific significance of the proposed work, including its relationship to other current research, and the design of the project in sufficient detail to permit evaluation. If the project is already underway, the proposal should present and interpret progress to date. A research schedule should be included. Although the student cannot submit a proposal independently, it is expected that the intellectual input to the proposed research be predominantly that of the student. The funds are to be used for expenses associated with the conduct of the dissertation research that normally are not underwritten by the home institution.

DDRI proposals must be submitted by a U.S. IHE on behalf of the dissertation advisor and graduate student who is at the point of initiating or already conducting dissertation research. The advisor serves as the principal investigator and the student as the co-principal investigator. The student must be enrolled at a U.S. IHE but does not need to be a U.S. citizen.

DDRI **Project Descriptions** may be no more than **10** (ten) pages in length; however, the **Results from Prior Support** section is not required. Appendices are not allowed. "Doctoral Dissertation Research:" should be the prefix before the substantive title of the DDRI proposal.

DDRI awards are not intended to provide the full costs of a student's doctoral dissertation research. DDRI awards recommended by MMS will not exceed \$18,000, a total that includes both allowable direct costs and appropriate indirect costs over the duration of the award. Project budgets should be developed at scales appropriate for the work to be conducted and may only include costs directly associated with the conduct of dissertation research.

DDRI awards provide funding for research costs not normally covered by the student's university. Examples of the kinds of expenses that may be included in a DDRI proposal budget are the following:

- Costs associated with travel and related expenses to conduct research at field sites, archives, specialized collections, and/or facilities away from the student's campus.
- Costs for data-collection activities, including the conduct of surveys, questionnaires, and/or focus groups or the purchase of extant data.
- Costs for equipment necessary for the conduct of the project that will be devoted to the project over the duration of the award. (Note that any equipment purchased with NSF funds becomes property of the awardee organization.)
- Costs for payments to research subjects and/or informants.
- Costs for materials and supplies required for the conduct of the project.
- Costs for analysis and research services not otherwise available.
- Costs for travel to one or two professional meetings to present preliminary research results and obtain feedback to further improve the project. (Note also that MMS will not recommend a DDRI award solely to provide support to share research results at conferences.)

Costs that cannot be reimbursed by DDRI awards include the following:

- A stipend or salary for the doctoral student or advisor. (Note that salaries or payments for work by other individuals whose assistance may be essential for the conduct of the project may be permitted when there is sound justification for such expenses.)
- Costs for tuition, textbooks, or other items not directly related to the conduct of dissertation research.
- Publication costs for articles based on the dissertation, except when the university's degree requirements permit the substitution of published research results for a free-standing dissertation.
- Costs for travel of the advisor to the field site and/or professional meetings.

DDRI awards may be for one or two years in duration. The dissertation does not have to be completed during that time period, but costs associated with research activities to be reimbursed with DDRI funds must be incurred when the award is active.

Note: Since salaries or stipends for the doctoral student or their advisor(s) are not eligible for support, after the PI and Co-PI(s) are entered on the Cover Sheet, their names should be manually removed from the Senior Personnel Listing on the budget pages. This is to avoid construal as voluntary committed cost sharing which is not permitted.

Research Experiences for Undergraduates (REU) Supplements

To enhance undergraduate education and training in the development of methods for the social, behavioral, and economic sciences and to broaden the participation of underrepresented students in high-quality research projects, the MMS Program encourages the submission of REU supplements to ongoing MMS-supported research projects. The supplement request should not exceed three pages and should describe the proposed student's involvement in the project, identifying the value of the student's participation both for the conduct of the research and for the student's academic development. The experience of the investigator in involving undergraduates in research should be discussed, including the results of prior REU supplement support (if applicable). If the student has been preselected, the supplement request should describe the grounds for selection and include a brief biographical sketch of the student. If the student has not been preselected, the supplement request should discuss the process and criteria for selecting the student. The MMS Program particularly encourages the submission of REU supplements to support the participation of women and other underrepresented groups in the research process.

Undergraduate student participants must be U.S. citizens, U.S. nationals, or permanent residents of the United States. All students costs must be entered under Participant Support Costs (Line F on the FastLane/Research.gov Budget and Field E on the Grants.gov Budget). (Indirect costs are not allowed on Participant Support Costs.) Costs associated with an REU supplement may not exceed \$8,000 per student, with a maximum of two students supported. See the NSF-wide [Research Experience for Undergraduates \(REU\) solicitation](#) for additional information.

Investigators may submit REU supplement requests at any time. It is recommended, however, that the investigator contact the program officer prior to submission. The Program generally will consider no more than one REU supplement per award.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant or Standard Grant

Estimated Number of Awards: 15 to 35 contingent upon the availability of funds. Additional funds may be available from participating federal statistical agencies for competitive research proposals of interest to those agencies.)

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:

Doctoral Dissertation Research Improvement Awards: DDRI proposals must be submitted with a principal investigator (PI) and a co-principal investigator (co-PI). The PI must be the advisor of the doctoral student or another faculty member at the U.S. institution where the doctoral student is enrolled. The co-PI must be the doctoral student whose dissertation research will be supported.

For all other types of awards, there are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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

- 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) 292-7827 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 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) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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.

In addition to guidance in the PAPPG or the NSF Grants.gov Application Guide, special instructions exist for proposals submitted in response to this solicitation.

Proposal Cover Sheet

For DDRI proposals, "Doctoral Dissertation Research:" should be the prefix before the substantive title.

Project Description

For DDRI proposals, the project description may not exceed ten (10) pages in length. The "Results from Prior NSF Support" section is not required for DDRI proposals.

Special Information and Supplementary Documentation

Data Management Plan (DMP)

All proposals must include as a supplementary document a plan for data management and sharing of the digital products of research. The DMP must be no longer than two (2) pages in length.

In preparing the data management plan, proposers should consult Chapter II.C.2.j of the *PAPPG* or the comparable section of the *NSF Grants.gov Application Guide* and the [SBE-specific guidance](#). MMS expects the DMP to describe the digital management of the products of research, including computer code/programs/software. Proposers are encouraged to specify how they intend to make data, software, and other products of the research readily available to potential users through organizationally based archives, public repositories, and/or distribution networks so that the products may be easily accessed by others over long periods of time.

Letters of Collaboration Brief statements, whether written as letters or as free-standing email messages from individuals and/or organizations that will work with the PIs and/or assist in the conduct of the proposed project, may be included as Supplementary Documents. Such letters are not needed from individuals included as senior personnel on a project or from subawardee organizations, because their involvement in the project is affirmed by the inclusion of their biographical sketches and/or subaward budgets.

Letters of collaboration included as a Supplementary Document must focus solely on the willingness of the letter's author and/or the author's organization to directly collaborate with the investigators and/or assist in the conduct of the project in ways that have been outlined in the Project Description. Such letters should not argue for support of the project by articulating in greater detail what activities the collaborator will undertake and/or by elaborating reasons for supporting the project. (If proposers wish to include letters from others written explicitly to express support for a project or to articulate more fully how the individual or organization would assist with the project, they can include the text of such letters in the Project Description, although the number of pages permitted for the Project Description may not be increased to accommodate such text.)

The MMS Program strongly encourage the use of a template like the following for letters of collaboration. If this template or very similar text is not used, the text provided by the letter's author must be equally brief and to-the-point. Inclusion of longer letters may result in the PIs being forced to remove such letters (with no other changes to the proposal permitted), or NSF may return the proposal without review. If proposers want to ascertain whether alternate text will be acceptable, they should send a draft of any questionable letters to the MMS program director for comment at least one week prior to the submission of the proposal.

Other Issues to Address When Preparing a Proposal for This Solicitation

For DDRI Proposals: Signed Statement from the Principal Investigator

The advisor serving as the principal investigator of the proposal must submit a signed statement affirming that the student will be able to undertake the proposed research soon after the DDRI award is made. In addition, the PI must affirm that he/she has read the proposal and believes that it makes a strong case for support of the dissertation research project.

The following template must be used to prepare this statement, with changes permitted only to provide information where there are blank lines in the template. Additional text is not permitted. The statement must be signed by the PI.

For DDRI Proposals: Required template for a statement signed by the PI:

To: NSF Methodology, Measurement, and Statistics Program

From: _____ [Insert name of the PI]

I affirm that the doctoral student is at a stage in his/her graduate program that makes it very likely that the student will be able to undertake the dissertation research described in the proposal soon after a DDRI award is made.

I affirm that I have read this proposal, and I believe that the proposal makes a strong case for NSF support for this project.

Signed: _____ [Insert PI's signature]

IHE: _____ [Insert IHE name]

Date: _____ [Insert date that the statement is signed by the PI]

Proposals Involving Multiple Organizations

In the case of a proposal involving multiple organizations, a single organization must be identified as the prime, and a single proposal describing the entire project must be submitted by that organization. Funds may be distributed among partner organizations via subawards from the prime organization. A standard NSF Budget should be submitted for each subawardee. The requirement for a single organization to submit the sole proposal for a project is designed to facilitate effective coordination among participating organizations and to avoid difficulties that ensue in funded projects when individuals change organizations and/or cease to fulfill project responsibilities. Of the two types of collaborative proposal formats described in the PAPPG, this solicitation allows only a single proposal submission with subawards administered by the prime organization. Direct submission of linked collaborative sets of proposals by multiple organizations is not permitted.

Proposals Involving Collaborators at Foreign Organizations

Proposers are reminded they must provide biographical sketches of all senior project personnel, including those associated with foreign organizations.

Letters of collaboration (prepared in accordance with the guidelines specified in an earlier subsection in this solicitation) should be provided as supplementary documents from organizations that will not be supported through subawards.

While non-U.S. organizations are not eligible to submit proposals to this competition, the prime U.S. institution may, in limited cases, request funding for non-U.S. organizations through subawards. Indirect costs for such organizations should be determined in accordance with guidance provided in Chapter II.C.2.g.viii of the PAPPG and the comparable section of the *NSF Grants.gov Application Guide*.

Subawards

In accordance with the applicable award terms and conditions, proposers are reminded of their responsibilities with regard to subawardees. Should an award be made, the prime awardee is responsible for flowing down the appropriate terms and conditions to, as well as management and oversight of, any subawardees on the project, including any foreign subawardees.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

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

C. Due Dates

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

January 31, 2019

Last Thursday in January, Annually Thereafter

August 29, 2019

Last Thursday in August, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane 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: <http://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. These strategies are integrated

in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?

4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

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

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) 292-7827 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](https://www.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](https://www.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](https://www.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:

- Cheryl L. Eavey - Program Director, telephone: (703) 292-7269, email: ceavey@nsf.gov
- Liana A. Denola - Social Scientist, telephone: (703) 292-2675, email: ldenola@nsf.gov
- Robbie W. Brown - Program Specialist, telephone: (703) 292-7264, email: rbrown@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to

more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

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

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

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

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

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

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

- **Location:** 2415 Eisenhower Avenue,
Alexandria, VA 22314
 - **For General Information**
(NSF Information Center): (703) 292-5111
 - **TDD (for the hearing-impaired):** (703) 292-5090
 - **To Order Publications or Forms:**
- Send an e-mail to: nsfpubs@nsf.gov
- or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

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

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



National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA
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