

NSF Engineering - UKRI Engineering and Physical Sciences Research Council Lead Agency Opportunity (ENG-EPSRC)

PROGRAM SOLICITATION NSF 20-510

REPLACES DOCUMENT(S): NSF 18-067



National Science Foundation

Directorate for Engineering
Division of Chemical, Bioengineering, Environmental and Transport Systems
Division of Civil, Mechanical and Manufacturing Innovation
Division of Electrical, Communications and Cyber Systems



Engineering and Physical Sciences
Research Council

UK Engineering and Physical Science Research Council

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

Proposals Accepted Anytime

A Research Concept Outline (RCO) must be submitted to ENGUKRI@nsf.gov at least 60 days prior to the submission of a full proposal. A proposal that is submitted without a previously approved RCO will be returned without review (RWR).

IMPORTANT INFORMATION AND REVISION NOTES

Innovating and migrating proposal preparation and submission capabilities from FastLane to Research.gov is part of the ongoing NSF information technology modernization efforts, as described in [Important Notice No. 147](#). In support of these efforts, research proposals submitted in response to this program solicitation must be prepared and submitted via Research.gov or via Grants.gov, and may not be prepared or submitted via FastLane.

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

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

NSF Directorate for Engineering - UKRI Engineering and Physical Sciences Research Council Lead Agency Opportunity (ENG-EPSRC)

Synopsis of Program:

The Directorate for Engineering (ENG), Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), the Division of Civil, Mechanical and Manufacturing Innovation (CMMI), and the Division of Electrical, Communications and Cyber Systems (ECCS) of the National Science Foundation and the Engineering, ICT and Manufacturing the Future Themes of the UK Engineering and Physical Sciences Research Council (EPSRC) are pleased to announce the ENG-EPSRC Lead Agency Opportunity. The goal of this opportunity is to reduce some of the barriers that researchers currently encounter when working internationally. The ENG-EPSRC Lead Agency Opportunity will allow US and UK researchers to submit a single collaborative proposal that will undergo a single review process.

Proposals will be accepted for collaborative research in areas at the intersection of CBET, CMMI, and/or ECCS with the EPSRC Engineering, ICT and/or Manufacturing the Future Themes. Proposers choose either NSF or EPSRC to serve as the "lead" agency to review their proposal. The non-lead agency will honor the rigor of the review process and the decision of the lead agency. For research teams that would like EPSRC to act as lead agency, please see the instructions at: <https://epsrc.ukri.org/about/partner/international/agreements/nsf>.

Proposers should review the CBET, CMMI, and ECCS Program Descriptions for research supported through these divisions and the EPSRC website for further information on what areas of research are eligible for support through this activity. Proposals are expected to adhere to typical proposal budgets and durations for the relevant NSF programs and EPSRC Themes from which funding is sought.

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.

- Brandi Schotte, Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), telephone: (703) 292-4798, email: bschotte@nsf.gov
- Steven M. Zehnder, Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), telephone: (703) 292-7014, email: szehnder@nsf.gov
- Zhengdao Wang, Division of Electrical, Communications, and Cyber Systems (ECCS), telephone: (703) 292-7823, email: zwang@nsf.gov
- Jesus G. Alvelo Maurosa, Division of Civil, Mechanical, and Manufacturing Innovation (CMMI), telephone: (703) 292-8609, email: jalvelo@nsf.gov
- Catherine Walker, Chemical, Bioengineering, Environmental, and Transport Systems (CBET), telephone: (703) 292-7125, email: cawalker@nsf.gov
- Joanne Humphries, Engineering and Physical Sciences Research Council (EPSRC), telephone: 07895 208 211, email: international@epsrc.ac.uk

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

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 5 to 10

Average award size and duration (varies with different participating program limits) are subject to the availability of funds.

Anticipated Funding Amount: \$6,000,000

This annual amount is approximate, includes new and continuing increments, and is subject to availability of funds. The overall funding for the program is established independently by each participating division. Budgets are not set aside separately but are, instead, parts of existing program budgets. Participating divisions' staffs manage, review, and fund proposals and administer awards according to their own processes and without any central coordination. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. This annual amount is approximate, includes new and continuing increments, and is subject to availability of funds.

Eligibility Information

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E. Unaffiliated individuals are not eligible to submit proposals in response to this solicitation.

Who May Serve as PI:

Each proposal must include at least one US-eligible collaborator as lead PI and at least 1 UK-eligible collaborator as senior personnel.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

Not Applicable

- **Other Budgetary Limitations:**

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):

Proposals Accepted Anytime

A Research Concept Outline (RCO) must be submitted to ENGUKRI@nsf.gov at least 60 days prior to the submission of a full proposal. A proposal that is submitted without a previously approved RCO will be returned without review (RWR).

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria apply.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The Directorate for Engineering (ENG), Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), the Division of Civil, Mechanical and Manufacturing Innovation (CMMI), and the Division of Electrical, Communications and Cyber Systems (ECCS) of the National Science Foundation and the Engineering, ICT and Manufacturing the Future Themes of the UK Engineering and Physical Sciences Research Council (EPSRC) are pleased to announce the ENG-EPSRC Lead Agency Opportunity. The goal of this opportunity is to reduce some of the barriers that researchers currently encounter when working internationally. The ENG-EPSRC Lead Agency Opportunity will allow US and UK researchers to submit a single collaborative proposal that will undergo a single

review process.

Proposals will be accepted for collaborative research in areas at the intersection of CBET, CMMI, and/or ECCS with the EPSRC Engineering, ICT and/or Manufacturing the Future Themes. Proposers choose either NSF or EPSRC to serve as the "lead" agency to review their proposal. The non-lead agency will honor the rigor of the review process and decision of the lead agency. For research teams that would like EPSRC to act as lead agency, please see the instructions at: <https://epsrc.ukri.org/about/partner/international/agreements/nsf>.

Proposers should review the CBET, CMMI, and ECCS Program Descriptions for research supported through these divisions and the EPSRC website for further information on what areas of research are eligible for support through this opportunity. Proposals are expected to adhere to typical proposal budgets and durations for the relevant NSF programs and EPSRC Themes from which funding is sought.

II. PROGRAM DESCRIPTION

The core programs of ENG/CBET, ENG/CMMI, and ENG/ECCS, and UKRI/EPSRC recognize that researchers in both the US and the UK perform world-class research. While both agencies always encourage international collaborations on core program submissions, the need for two separate review processes made funding these types of collaborations difficult for US-UK research teams. This solicitation is designed to eliminate this complication by allowing a collaborative proposal that includes both an eligible US collaborator and an eligible UK collaborator to submit one joint proposal to one agency for one review process. Both agencies will honor the decision of this single review process, thereby paving the way for more potential US-UK Collaborative projects.

Before a team can submit a proposal, they must decide which investigator will lead the overall joint US-UK project. This typically, but not always, is determined by where the greatest proportion of research will be performed. The reviewing agency, NSF or EPSRC, should be that of the lead investigator. However, NSF and EPSRC reserve the right to make the final decision as to which agency will act as the lead for the review process. This solicitation is the mechanism for NSF to act as the "lead" agency. For research teams that would like EPSRC to act as lead, please see instructions at: <https://epsrc.ukri.org/about/partner/international/agreements/nsf>.

For a proposal to be eligible for this collaborative solicitation, the proposal topic must fall within the scope of a participating program in both NSF/ENG and EPSRC. For a list participating NSF programs, please see <https://www.nsf.gov/od/oise/IntlCollaborations/UK.jsp#ENG>. You are strongly encouraged to contact the cognizant NSF program director about US project funding limits (since they vary from program to program at NSF) if this limit is not outlined on the program page in question. For a description of relevant programs/topics at EPSRC, please see: <https://epsrc.ukri.org/about/partner/international/agreements/nsf>.

III. AWARD INFORMATION

The overall funding for the program is established independently by each participating division. Budgets are not set aside separately but are, instead, parts of existing program budgets. Participating divisions' staffs manage, review, and fund proposals and administer awards according to their own processes and without any central coordination. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. This annual amount is approximate, includes new and continuing increments, and is subject to availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E. Unaffiliated individuals are not eligible to submit proposals in response to this solicitation.

Who May Serve as PI:

Each proposal must include at least one US-eligible collaborator as lead PI and at least 1 UK-eligible collaborator as senior personnel.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via [Research.gov](https://www.research.gov) or [Grants.gov](https://www.grants.gov).

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide. To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via Research.gov. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

For submissions where EPSRC is intended as the lead institution, please see <https://epsrc.ukri.org/about/partner/international/agreements/nsf/> for more details and instructions.

For proposers to be invited to submit a formal proposal to NSF as the lead agency, **an expression of interest/white paper called a Research Concept Outline (RCO) must be emailed to ENGUKRI@nsf.gov no later than 60 days before the intended submission date. The document submitted should not exceed 5000 characters, including spaces.** The RCO should contain:

- An indication of the target program in both NSF-ENG and EPSRC for the proposed topic. Please note this is not the only program that will consider the topic, but it allows for faster review of the topic.
- A brief description of the proposed research - a breakdown of the UK/US components,
- The names and affiliations of the researchers, and
- Bottom line estimates of total funding (including indirect costs) to be requested from NSF and EPSRC (a detailed budget is not required at this time).

If the Research Concept Outline is within the scope of participating programs in both agencies, NSF will send instructions to the US PI to submit a full proposal.

Special Instructions for Full Proposal Submissions where NSF is the lead review agency for the following:

1. Cover Sheet
2. Title of the Proposal
3. Project Description
4. Biographical Sketches
5. Budget
6. Results from Prior NSF Support
7. Current and Pending Support
8. Supplementary Documents
9. Single Copy Documents - "Collaborators and Other Affiliations"

Cover Sheet

UK should be reported on the Cover Sheet under "International Activities: Country/Countries Involved." If additional countries are involved outside of the US and the UK, please include those here as well. **All UK researchers should be listed as "non-funded Senior Personnel" ONLY.** Do NOT list a UK collaborator as a PI or co-PI.

Title of the Proposal

The proposal should indicate it is to be considered under this Lead Agency Opportunity by prefacing the title with "CBET-EPSRC", "CMMI-EPSRC", or "ECCS-EPSRC" depending on the NSF division that will perform the proposal review.

Project Description

Proposals should clearly describe the work that will be accomplished by the entire team, including the UK partners. Please note that UK collaborators are exempt from the Results from Prior NSF Support section requirement.

Biographical Sketches

All UK collaborative partners should be listed as "non-funded Senior Personnel" and should have a Biographical Sketch in the appropriate section.

Budget

In addition to the US Budget and Budget Justification, the UK budget and budget justification should be included as a supplementary document using the UK Proposal form and Justification of Resources found on the EPSRC Je-S (<https://je-s.rcuk.ac.uk/JeS2WebLoginSite/Login.aspx>). These forms should be downloaded, completed, and attached to the NSF submission as supplementary documents. For a guide to eligible costs for UK researchers, please see <https://epsrc.ukri.org/funding/applicationprocess/fundingguide/>. The US budget and budget justification should ONLY include the costs for the US collaborators. The UK budget and budget justification should ONLY include the costs for the UK collaborators.

Current and Pending Support

This section must be filled out for all US PIs, co-PIs and Senior Personnel. All UK collaborative partners are exempt for this requirement unless they have

funding from a US government organization. Otherwise, please list "None" or \$0 if text is required for the UK collaborators.

Facilities, Equipment, and Other Resources

This section should contain descriptions of both US and UK facilities, equipment, and other resources.

SUPPLEMENTARY DOCUMENTS

Document 1: Postdoctoral Researcher Mentoring Plan for US-supported postdoctoral scholars (if Applicable) (up to 1 page)

Proposals that request funding to support postdoctoral researchers at any of the participating US organizations must include a description of the disciplinary and cross-disciplinary mentoring activities that will be provided for such individuals. Only one single-page mentoring plan is allowed per proposal even if multiple postdoctoral researchers from different organizations are involved. Thus, the postdoctoral researcher mentoring plan will be an additional means of providing cross-disciplinary mentoring across organizations and the project as a whole.

The US Postdoctoral Researcher Mentoring Plan must be submitted under the specific tab indicated in Supplementary Documents.

Document 2: Data Management Plan

This plan should describe issues related to information exchange, intellectual property rights, derived products, databases, software, model output, and materials sharing. For example, if the proposed activity is expected to result in community resources (such as databases or collections of materials and samples), the "Data Management Plan" should present a clear plan for sharing of these resources not only among the project participants, but also with the scientific community at large. The "Data Management Plan" should also address plans for determining authorship or proper attribution of credit for peer-reviewed or other publications, internet resources, etc. that may be expected to result from the activity. It should not exceed 2 pages.

Document 3: Other Supplementary Documents (one PDF containing the three documents described below, plus any other necessary documents described in the PAPPG).

Please note that NO Biographical Sketches should appear in this section.

1. A copy of the full proposal submission instructions notification from NSF sent in response to the RCO must be included as a supplementary document.
2. UK Budget and Budget Justification: The UK budget and budget justification must be included as a Supplementary Document. A detailed breakdown of funding requested from UKRI, using the EPSRC Proposal form and Justification of Resources, found on Je-S, must be added to the proposal as a Supplementary Document. This document will be shared with UKRI to verify eligibility of costs requested.
3. Letter(s) of Collaboration from participating UK institution(s).

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

If a proposal is selected for funding by NSF, the UK PI(s) will be contacted by EPSRC and instructed to submit a copy of the NSF award letter and a copy of the proposal to EPSRC to receive funding for the UK portion of the award.

Normal UKRI (EPSRC) financial rules apply for the UK portion of the projects. These can be found in the EPSRC Funding Guide (<https://epsrc.ukri.org/funding/applicationprocess/fundingguide/>).

Budget Preparation Instructions:

The Budget and Budget Justification sections of the proposal must contain ONLY the US collaborator expenses. A detailed breakdown of funding requested from EPSRC, using the EPSRC Je-S form, should be included as a Supplementary Document. This document will be shared with EPSRC to verify the eligibility of funds requested.

C. Due Dates

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

Proposals Accepted Anytime

A Research Concept Outline (RCO) must be submitted to ENGUKRI@nsf.gov at least 60 days prior to the submission of a full proposal. A proposal that is submitted without a previously approved RCO will be returned without review (RWR).

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <https://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

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

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.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.

B. Review and Selection Process

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

Before the proposal is reviewed, NSF will share ONLY the Letter of Collaboration(s) from UK organizations and the UK budgetary information with EPSRC for approval. At that time, EPSRC may suggest potential reviewers from the UK for the proposals. Proposals reviewed at NSF will be placed on the appropriate participating program panel and reviewed with other unsolicited proposals. This may include all of the following depending on the preferences of the reviewing program: adhoc 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.

EPSRC Process: For all proposals selected for funding, EPSRC will provide instructions on how to officially submit a copy of the proposal to EPSRC for award processing of the UK portion of the collaboration. Applicants may be required to provide further information in accordance with the policies and procedures of EPSRC. Once the proposal copy is received at EPSRC, NSF will share the unattributed reviews and, if applicable, unattributed panel summary for the proposal with EPSRC.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

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

Administrative and National Policy Requirements

Build America, Buy America

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

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

Special Award Conditions:

The successful UK applicants to this program will be funded by EPSRC. As such, the UK applicants will be required to comply with standard UKRI terms and conditions, found at <https://www.ukri.org/funding/information-for-award-holders/grant-terms-and-conditions>, in addition to any program specific terms and conditions of award.

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.

Standard reporting conditions are a requirement of UK supported awards. All Principal Investigators (for lead and component grants) are required to have a Researchfish account and to use the Researchfish system to provide updates on research outcomes annually during the period of the awards and usually for five years after their awards have finished. Further information can be found at <https://epsrc.ukri.org/funding/managing/ros/>.

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:

- Brandi Schotter, Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), telephone: (703) 292-4798, email: bschotte@nsf.gov
- Steven M. Zehnder, Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), telephone: (703) 292-7014, email: szehnder@nsf.gov
- Zhengdao Wang, Division of Electrical, Communications, and Cyber Systems (ECCS), telephone: (703) 292-7823, email: zwang@nsf.gov
- Jesus G. Alvelo Maurosa, Division of Civil, Mechanical, and Manufacturing Innovation (CMMI), telephone: (703) 292-8609, email: jalvelo@nsf.gov
- Catherine Walker, Chemical, Bioengineering, Environmental, and Transport Systems (CBET), telephone: (703) 292-7125, email: cawalker@nsf.gov
- Joanne Humphries, Engineering and Physical Sciences Research Council (EPSRC), telephone: 07895 208 211, email: international@epsrc.ac.uk

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 Representative (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.

All general NSF inquiries should be sent to ENGUKRI@nsf.gov. All general EPSRC inquiries should be sent to International@epsrc.ukri.org.

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 (FASSED) 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) 292-8134
- **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

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