

Ideas Lab: Engineering Technologies to Advance Underwater Sciences (ETAUS)

PROGRAM SOLICITATION NSF 22-617



National Science Foundation

Directorate for Engineering
Division of Electrical, Communications and Cyber Systems
Division of Civil, Mechanical and Manufacturing Innovation

Directorate for Geosciences
Division of Ocean Sciences
Office of Polar Programs

Directorate for Biological Sciences
Division of Environmental Biology
Division of Biological Infrastructure

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

Preliminary Proposal Due Date(s) (*required*) (due by 5 p.m. submitter's local time):

September 19, 2022

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

March 01, 2023

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, 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 revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 22-1](#)), which is effective for proposals submitted, or due, on or after October 4, 2021.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Engineering Technologies to Advance Underwater Sciences (ETAUS)

Synopsis of Program:

An Ideas Lab is an intensive meeting that brings together multiple diverse perspectives to focus on finding innovative cross-disciplinary solutions to a grand challenge problem. The aim of this Ideas Lab is to bring together experts from diverse scientific and engineering backgrounds to develop innovative engineering technologies and solutions that will enable real-time and reliable sensing, communications, localization, navigation, and mapping of aquatic environments, including glaciers, rivers, lakes, and oceans, for scientific research and economic development in a sustainable and environmentally responsible manner.

This Ideas Lab will seek and prioritize proposals which will measurably increase the diversity and participation of underrepresented minorities in STEM.

This Ideas Lab is organized by the Division of Electrical, Communications and Cyber Systems (ECCS) and Division of Civil, Mechanical and Manufacturing Innovation (CMMI) in the Directorate for Engineering (ENG), the Division of Ocean Sciences (OCE) and the Office of Polar Programs (OPP) in the Directorate for Geosciences (GEO), the Division of Environmental Biology (DEB) and the Division of Biological Infrastructure (DBI) in the Directorate for Biological Sciences (BIO), and the Office of Advanced Cyberinfrastructure (OAC) in the Directorate for Computer and Information Science and Engineering (CISE).

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.

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- Robert D. Fleischmann, BIO/DBI, telephone: (703) 292-7191, email: rfleisch@nsf.gov
- Kevin L. Thompson, CISE/OAC, telephone: (703) 292-4220, email: kthomps@nsf.gov

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

- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Continuing Grant

Estimated Number of Awards: 5 to 8

An award is expected to be according to the scope and extent of the research at the level of \$750,000-\$1,500,000 for up to 3 years. Five to eight awards are expected depending upon availability of funds and the type, scale, and variety of project ideas developed at the Ideas Lab.

Anticipated Funding Amount: \$8,200,000

The total funding available for this Ideas Lab is \$8,200,000 over 3 years to 5 to 8 selected awards. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and compelling proposals.

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:

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 Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **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:**
Not Applicable

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):
September 19, 2022
- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
March 01, 2023

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

America's oceans and coastlines contribute greatly to America's economy, supporting \$373 billion in economic activity annually and 2.3 million jobs (<https://oceanservice.noaa.gov/economy/>). Therefore, advancing understanding of our oceans and coastlines is important for the US economy. Improving sensing and communication capabilities in marine, freshwater, and polar environments is critical for making significant discovery-based and use-inspired research advances including predicting geohazards, predicting harmful algae blooms, increasing coastal resilience, mitigating climate change, improving national security and economic prosperity, and more.

Typical terrestrial sensing and communication technologies including conventional electronics, antennas, modulation and signal processing technologies cannot be readily deployed in marine and freshwater environments and especially in harsh polar environments. Tremendous signal loss in the saline, high-pressure, corrosive, low-temperature, and optically opaque environment are the major challenges to sensing and communications in the ocean including the Arctic and Antarctic. Sensing in freshwater environments can present similar challenges. Technologies currently used in underwater environments suffer from low data rates, are bulky and power hungry, are prone to security challenges due to their broad spatial signal patterns, and can have negative impacts on aquatic species. The large distances and vast volume of water add to the challenges. Several recent workshops attended by both engineers and marine scientists have emphasized the critical need for breakthroughs in cyberinfrastructure for water environments and in the ocean basins. These include: 1) Frontiers in Undersea Seafloor Science and Engineering, <https://web.northeastern.edu/fuse/>; 2) Seafloor Instrumentation workshop, <https://ctemps.org/announcement/seafloor-instrumentation-workshop-july-12-13-2018>; 3) NSF Workshop on Underwater Communications and Networking, <http://uwa.ua.edu>; 4) Smart Oceans, <https://www.smartoceans2020.org>; 5) Advancing Underwater Cyber Infrastructure for Blue Science, <https://blue-uci2021.org>.

The specific goal of this Ideas Lab is to develop transformative approaches for addressing the technological challenges and building cyberinfrastructure for water and ice environments, specifically in the areas of sensing, communications, localization, energy harvesting, while considering miniaturization and minimizing environmental impacts. The approach will be to develop new collaborations between engineers, data scientists and domain experts across disciplinary boundaries. Novel technologies and solutions will be sought to address critical sensing and communication challenges underwater, under-ice, below the seafloor, and across the ice-water-air interfaces. Competitive proposals submitted and anticipated awards will transgress the bounds of topic areas found in existing funding programs. The goal of this program aligns with NSF Strategic Plan for Fiscal Years 2022 – 2026 (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22068). Specifically, it aligns with the second strategic goal of creating new knowledge about our world, advancing the frontiers of research and accelerating discovery through strategic investments in ideas, people and infrastructure.

This program seeks broad and diverse representation of participants who reflect the Nation's demography and geography. The program also seeks to broaden representation of institutions, including a geographically diverse set of institutions (including those in EPSCoR jurisdictions, predominantly undergraduate institutions, non-R1 schools, and others). PIs who are women, nonbinary, LGBTQ+, early-career researchers, members of underrepresented minority groups in STEM, Indigenous, veterans, and persons with disabilities are especially encouraged to apply. The program encourages PIs to consider Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) requests as part of their proposal submission (see the PAPPG).

II. PROGRAM DESCRIPTION

1. Problems to be solved and objectives

This Ideas Lab (see below for more information about this format) is intended to identify critical opportunities for investment that will significantly advance the state-of-the-art of general sensing and communication capabilities under the water and ice. NSF challenges the research community to identify major technological and scientific barriers to the real-time and reliable data and information collection and communication in rivers, lakes, oceans, and polar regions, to explore novel and cross-disciplinary approaches, and to formulate, design, develop and demonstrate transformative and effective technological solutions. The proposed approaches should bring high-impact solutions and capabilities to address research bottlenecks. They may be high risk, but are expected to be based on sound science and to have the potential to significantly advance the state-of-the-art.

An Ideas Lab in-person workshop is planned to facilitate formation of unique, cross disciplinary teams that explore novel approaches relevant to these areas and develop ideas for full proposal submission by March 1, 2023. Virtual meetings before and after the workshop will also be used to facilitate team formation and idea exchange.

The following broad technical areas have been identified as possible avenues for improvement in marine and freshwater systems:

1. Underwater or under-ice wired and wireless communication & networks; water-to-air or ice-to-air communication interface & networking; underwater or under-ice positioning, navigation, timing (PNT), and tracking.
2. Underwater energy and energy harvesting systems; designs that increase power efficiency and improve energy storage capacity and efficiency in water and ice environments.
3. Underwater, below the seafloor, and under-ice sensing, imaging, observations, mapping, including adaptive and intelligent sensors & sensor networks.

Miniaturization is desirable for the proposed solutions. Approaches that can lead to solutions with small form-factors are sought for reduced cost and power consumption, increased reliability, and easier deployment.

PIs should take into consideration any potential environmental impacts by the proposed activities. To reduce potential negative impacts and the environmental footprint when conducting research, the solicitation encourages the community to incorporate environmentally sustainable engineering ideas (e.g., use of sustainable energy sources; biodegradable materials; reduction/elimination of anthropogenic noise) into proposed activities.

2. Expertise Needed from Different Areas

Several NSF directorates, divisions, and offices have partnered in recognition of the need for interdisciplinary teams and collaborations to address the challenges outlined in this solicitation.

Successful full proposals are expected to gather a broad base of expertise. Participating directorates, divisions, and offices encourage submission of preliminary proposal applications from their communities, to draw on their unique expertise and experience with research instrumentation challenges and limitations and to develop potential solutions. Programmatic areas of interest specific to the solicitation are described below to provide guidance on potential expertise relevant to the Ideas Lab workshop.

Important Note: Prospective PIs are strongly encouraged to consult with Cognizant Program Officers in the relevant research area(s) prior to submitting a preliminary proposal.

The Directorate for Engineering (ENG):

The Division of Electrical, Communications, and Cyber Systems (ECCS) supports enabling and transformative engineering research at the nano, micro, and macro scales that fuels progress in engineering system applications with high societal impact. ECCS programs encompass novel electronic, photonic, acoustic, and magnetic devices and the integration of these devices into circuits, systems, and networks for applications spanning communications and sensing technologies, energy and power, healthcare, environment, transportation, manufacturing, the Internet of Things, and other cyber-systems-related areas. ECCS

encourages submissions providing expertise and contributions in: 1) Underwater /under-ice communication and networking exploring multiple modalities including acoustics, electromagnetics (EM), quantum, and other novel concepts. 2) Microelectronics, semiconductor, and sensor technologies for underwater and under-ice harsh environments, including packaging technologies; and 3) Eco-friendly energy sources and energy harvesting.

The Division of Civil, Mechanical and Manufacturing Innovation (CMMI) funds transformative research to enable advances in manufacturing technologies across size, scales, design, control, and optimization methods, and resilient and sustainable civil infrastructure, including distributed infrastructure networks, with emphasis on efficiency, economy, and minimal environmental footprint. CMMI encourages submissions providing expertise and new design methodologies to improve real-time, long-term underwater remote monitoring of construction and operations of physical infrastructure and associated engineering systems, while minimizing environmental impacts. CMMI invites contributions to innovative approaches in design and manufacturing of sensor and robotics technologies and systems suitable for harsh ocean environments to ensure safety of operations and minimize workforce exposure to hazards. Direct, wireless under-water communications over long distances are essential for site investigation above and below the seafloor and detection of hazards to equipment and infrastructure.

The **Directorate for Geosciences (GEO)** supports fundamental research that advances the frontiers of knowledge and drives technological innovation while improving our understanding of the many processes that affect the global environment.

GEO's Office of Polar Programs (OPP) supports all areas of research in and about the Arctic and Antarctic regions. Across both polar regions, OPP is interested in technology that would support underwater and under ice observing capabilities. Improving navigability and reducing risk of equipment failure in near-ice and under ice environments are known operational challenges that currently limit the types of research questions that can be answered using in-situ measurements. PIs should note that proposals relevant to the Arctic and Antarctic can utilize field testing in more accessible analog environments rather than polar regions, when feasible; projects that include new fieldwork in the Antarctic or Arctic should generally be submitted to the relevant solicitations in OPP, not to this program.

For OPP [Antarctic Research](#), the 2015 "[Strategic Vision for NSF Investments in Antarctic and Southern Ocean Research](#)" recommended a "program to develop enabling technologies for polar research to include automation and robotics ... and advanced remote sensing systems for use on, under, and above the ice; and expand current deployed automated networks to lead the development of a comprehensive international terrestrial and Southern Ocean observing and prediction network." A [recently-released Mid-Term Assessment report](#) also emphasized that "Investment in new technologies, engineering development, and computing are critical to support the science goals of this priority," and that there is still "potential for major scientific advances from investments in technological resources that would be shared across research teams (e.g., new ocean robotics)."

For OPP [Arctic Research Opportunities](#), the US Arctic Research Plan 2022-2026 includes "novel underwater sensing" as part of the ARP's "Technology Innovation and Application" Foundational Activity. NSF recognizes the importance of including local experts and Indigenous Peoples in Arctic science and research efforts. OPP welcomes participation of Indigenous experts with interest in supporting the development of new technology that could be deployed in the Arctic. An underlying goal of such participation is to guide future innovations that are sensitive to the cultural and environmental impacts of operating in Arctic marine and freshwater systems.

The Division of Ocean Sciences (OCE) is particularly interested in and encourages submissions providing expertise and contributions to improving communication capabilities from the seafloor and through the water column to the air-sea interface, with a goal to communicate in real time from underwater instruments to the lab. Additionally, OCE has critical needs for developing underwater geopositioning capabilities and improving energy supply mechanisms, including energy extraction from the ambient environment. Improving the ability to sense deep below the seafloor in an environmentally friendly capacity also is a high priority. OCE acknowledges the importance of initial field testing of sensors and systems developed as part of these efforts.

The **Directorate for Biological Sciences (BIO)** aims to advance understanding of the principles and mechanisms governing life within which the Division of Environmental Biology (DEB) supports research and training on evolutionary and ecological processes acting at the level of populations, species, communities, and ecosystems and the Division for Biological Infrastructure (DBI) invests in the innovation and capacity-building of cutting-edge research infrastructure for fundamental biological science. In addition to solutions to operational and energy challenges to underwater/ice sensing and cyberinfrastructure described above, DEB and DBI encourage applications from individuals with interest and expertise in biological sensing, such as in situ eDNA and imaging capabilities that will enhance understanding of the spatial distribution and temporal dynamics of organisms. BIO also encourages participation from experts in ecological forecasting to elucidate needs for real-time sensing and promote advancements in adaptive and networked sensing capabilities that are responsive to changes in flow rate, water level, or other environmental parameters and more resilient to extreme events. Innovations that enhance dissemination and accessibility through cost reductions are also encouraged.

3. Award Selection Process

This program will consist of the following stages:

- 1) *Preliminary Proposal*: Any individual interested in participating in the Ideas Lab should respond to this solicitation by submitting a preliminary proposal (see Section V). The preliminary proposals will be reviewed by NSF and a subset of experts will be invited to participate in the Ideas Lab Workshop. Participants will be selected on the basis of the interests, expertise, and other characteristics described in their submitted preliminary proposals. Submission of the preliminary proposal will be considered an indication of availability to attend and participate through the full course of the Ideas Lab Workshop described below.
- 2) *Ideas Lab Workshop*: The workshop will be held to allow the invited experts to exchange ideas and form collaborative teams.
- 3) *Full proposal*: Selected collaborative teams from the Ideas Lab will be invited to submit full proposals to NSF by the full proposal deadline. These full proposals must reflect the outline developed at the meeting. The full proposals will undergo merit review at NSF, and a subset of proposals will be selected for awards.

4. The Ideas Lab Workshop

The Ideas Lab Workshop is an interactive gathering on a focused problem and involves up to 40 participants from diverse backgrounds that have not had significant prior interaction. This workshop aims to stimulate and facilitate creative thinking around conceptualizing and formulating promising new techniques and technologies to design, develop and implement new or significantly enhanced technologies in water and ice environments.

Participants will be expected to engage constructively in dialogue with one another, the facilitators, and the Director(s) and Mentors to develop collaborative research proposals. Collaboration is an integral aspect of the Ideas Lab.

4.1 How will the Ideas Lab Work?

The Ideas Lab is an intensive, interactive, and free-thinking environment, where a diverse group of participants from a range of disciplines and backgrounds gets together - away from their daily routines - to immerse themselves in collaborative thinking processes in order to construct innovative solutions and approaches for identifying and tackling challenging problems. The Ideas Lab in-person meeting will run over three days starting mid-morning on Day One and finishing mid-afternoon on Day Three. The in-person meeting will be followed by a set of virtual meetings to allow the teams to further exchange and develop their ideas. In

the event that an in-person meeting is not possible due to e.g., a pandemic, the entire Ideas Lab workshop will be conducted virtually.

The participants will work collaboratively to identify and define the scope of the research, engineering, and technology challenges relating to the design, development, and implementation of novel underwater/under ice capabilities. As the Ideas Lab progresses, participants will dynamically develop and hone novel ideas about how the identified challenges may be addressed, and then use these ideas and approaches to develop research projects, which would contain genuinely innovative and potentially risk-taking investigations.

The nature of the Ideas Lab requires a high degree of trust between participants in order to make the required breakthroughs in scientific thinking. This trust extends to allowing the free and frank exchange of scientific ideas, some being in the very early stages of development. The aim of the Ideas Lab is not to discuss ideas that are already well-developed but not yet published. Rather, the goal is to bring individuals from different disciplines together to interact and engage in free thinking on first principles, to learn from one another and create an integrated vision for future research projects. It is expected that the sharing of these ideas will be encouraged within the Ideas Lab, but their confidentiality will be respected outside the Ideas Lab.

The Ideas Lab will be led by Workshop Director(s) whose role will be to assist in defining the topics and help facilitate discussions at the event. The Director(s) will be joined by a small number of mentors and a team of professional facilitators. The mentors will be selected by NSF based on their intellectual standing, their impartiality and objectivity, and their broad understanding of, and enthusiasm for, the subject area. The Workshop Director(s) and mentors will take full part in the Ideas Lab but will not be eligible to receive research funding under this collaborative activity. They will, therefore, act as impartial peer reviewers in the process, providing a function analogous to that of an NSF review panel.

The process can be broken down into several stages:

- Defining the scope of the challenges
- Evolving common languages and terminologies amongst people from a diverse range of backgrounds and disciplines
- Sharing perspectives and understanding of the scientific challenges, as well as the diverse expertise brought by the participants to the Ideas Lab
- Taking part in break-out sessions focused on the challenges, using creative thinking techniques
- Capturing the outputs in the form of highly innovative research projects
- Using "real-time" peer review to develop projects at the Ideas Lab

The Ideas Lab will be an intensive event. However, there will be opportunities for networking and other activities as a break from the intensive technical discussions.

4.2 Who Should Apply to Participate?

The ability to develop and pursue new approaches will also be crucial. Expertise is required from a very broad range of disciplines, and applicants should not feel limited by conventional perceptions: the Ideas Lab approach is about bringing people together who would not normally interact. We actively encourage people to apply who are experts in their own research areas but have not yet applied it to these current technical challenges.

Having the right mix of participants influences the success or failure of such an activity. Applications are encouraged from individuals representing diverse research areas across a range of disciplines. Contributions to these current technical challenges could be made by researchers working in a variety of disciplines or research areas such as sensors and instrumentations, circuits and antennas, communication systems, edge computing, signal processing, semiconductor and optical devices, quantum sensors and detectors, control theory, energy and power, networking, robotics, oceanography, sea ice, sub-ice-sheet environments, environmental biology, and bioengineering.

This program seeks broad and diverse representation of participants who reflect the Nation's demography and geography. PIs from a diverse set of institutions (including those in EPSCoR jurisdictions, predominantly undergraduate institutions, non-R1 schools, and others) and PIs who are women, nonbinary, LGBTQ+, early-career researchers, members of underrepresented minority groups in STEM, indigenous, veterans, and persons with disabilities are especially encouraged to apply.

4.3 Location and Date

This Ideas Lab workshop is planned to take place in November 2022, with a tentative in-person event scheduled for November 8-10, 2022. The environment will encourage free and open-minded thinking, vital for the purposes of this event. Additional information about the venue and meeting logistics will be provided to the selected participants. Travel to the Ideas Lab workshop, accommodation, refreshments, breakfast, lunch, and dinner costs will be covered by NSF. However, all incidental costs incurred while at the event will be borne by the participant.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant

Estimated Number of Awards: 5 to 8

An award is expected to be according to the scope and extent of the research at the level of \$750,000-\$1,500,000 for up to 3 years. Five to eight awards are expected depending upon availability of funds and the type, scale, and variety of project ideas developed at the Ideas Lab.

Anticipated Funding Amount: \$8,200,000

The total funding available for this Ideas Lab is \$8,200,000 over 3 years to 5 to 8 selected awards. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and compelling proposals.

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:

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

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via Research.gov, even if full proposals will be submitted via Grants.gov.

Please note, the preliminary proposal must come from one individual and cannot include co-PIs or collaborators. Participants in the Idea Lab will be selected on the basis of information submitted in the preliminary proposal.

Preliminary Proposal Set-Up: Select "Prepare New Preliminary Proposal" in Research.gov. Search for and select this solicitation title in Step 1 of the Preliminary Proposal wizard. The information in Step 2 is pre-populated by the system.

Title: The title format is "Ideas Lab: ETAUS Preliminary Proposal:" followed by a descriptive title. Please note that Research.gov will automatically prepend the title with "Ideas Lab:".

As described in the PAPPG Chapter II.E.6, the **Project Description** section of the preliminary proposal is limited to two pages and should conform to the following guidelines:

Page One:

Q1. Please provide a brief summary of your professional background, including any relevant fieldwork or lab experience, or place-based experience with Arctic communities. (limit: 200 words)

Please note that if you are selected as a participant, information provided in answer to this question will be made available to the other participants to facilitate networking at the Ideas Lab meeting.

Q2. How do you see your expertise and interests contributing to realizing the goal of this Ideas Lab solicitation? Please frame your answer to explain your interests to an audience with a different expertise to your own. (limit: 250 words)

Page Two:

Please spend some time considering your answers to the following questions. Your responses (of no more than 100 words each) will help us assess your suitability (unrelated to your research track record) for the innovative and collaborative setting of the Ideas Lab.

Q3. Collaborative teamwork where everyone is regarded and respected as equal is essential to the innovation lab of this kind. What do you regard as your strengths here? (100 words)

Q4. The setting requires ease and ability to communicate with those with different discipline and expertise to your own. How do you see yourself suited? (100 words)

Q5. How do you deal with potential conflict when adapting your ideas to fit into something more community driven? (100 words)

Q6. The innovation lab is especially suited to individuals who can step outside their own area of expertise or interest, are positively driven, enjoy creative activity and can think innovatively. It is an intensive setting requiring you to develop novel approaches with individuals you may not know over several days. How do you consider yourself suited? (100 words)

Q7. What do you hope to gain from participating? (100 words)

Applicants must include a **Biographical Sketch** and a **Current and Pending Support** document (prepared in accordance with standard NSF formatting guidelines, available at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg).

No appendices or supplementary documents may be submitted.

Submission of the preliminary proposal will be considered an indication of availability to attend and participate through the full course of the three-day residential Ideas Lab workshop and the follow-up virtual meetings. Selected participants will be notified, and logistics arranged for travel to, and participation in, the Ideas Lab. Following the conclusion of the Ideas Lab, NSF program staff will invite the submission of full proposals related to one or more of the ideas developed during the Ideas Lab.

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

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

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.

Full proposals based on project ideas developed through interactions at the Ideas lab should conform to the project outline developed at the conclusion of the meeting. If substantive changes are contemplated, an NSF Program Director should be contacted for guidance.

Proposal Set-Up: Select "Prepare New Full Proposal" in Research.gov. Search for and select this solicitation title in Step One of the Full Proposal wizard. The information in Steps 2 and 3 are pre-populated by the system.

Title: The title format is "Ideas Lab: ETAUS" followed by a descriptive title. Please note that if submitting via Research.gov, the system will automatically prepend the title with "Ideas Lab:".

Other Supplementary Documents: The following special information must be provided as a Supplementary Document. This information is not considered part of the 15-page project description limitation but should not exceed a total of 5 pages.

A management plan including a 1) list of project personnel, including their affiliation, expertise and project roles; 2) plan for team coordination and project management; 3) detailed project schedule.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Each full proposal budget must include funding for travel to Washington, DC, for a PI or Co-PI and up to one other project participant to attend annual two-day PI meetings in the Washington, DC, area during the award period.

Projects that will be utilizing NSF research platforms (e.g., ships, submersibles, etc.) or other shared use facilities (e.g., field instrumentation, analytical or experimental facilities) are responsible for filing a copy of their Request for Facility Support as a supplementary document in their proposal. Any costs that will be associated with such facilities should be clearly documented, and PIs should coordinate their requests with the appropriate facility to ensure that access is available to the facility and fits within the timeline of the proposed research. The PIs should also consult with cognizant program directors in GEO/OCE regarding the appropriateness of costs associated with such facilities.

Projects that include new fieldwork in the Antarctic or Arctic should generally be submitted to the relevant solicitations in OPP, not to this program.

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):

September 19, 2022

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

March 01, 2023

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.

Additional Solicitation Specific Review Criteria

Full proposals derived from the Ideas Lab will be evaluated to determine

- whether the scientific themes/objectives in the proposal are congruent with the ideas presented at the Ideas Lab, and
- whether any significant changes in project scope or resources from those presented at the Ideas Lab have been justified.

Proposals will also be evaluated for how they will demonstrably increase the diversity in and participation of underrepresented minorities in STEM.

Full proposals submitted in response to this program solicitation will be reviewed internally by the cognizant NSF Program Officers, the Ideas Lab mentors, and other external reviewers, 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, Internal NSF Review, or Ideas Lab Mentors.

The Ideas Lab review and selection process is outlined in the PAPPG Chapter II.E.6.

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 or the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

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

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

Administrative and National Policy Requirements

Build America, Buy America

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

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

C. Reporting Requirements

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

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

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

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- Jenshan Lin, ENG/ECCS, telephone: (703) 292-7360, email: jenlin@nsf.gov
- Giovanna Biscontin, ENG/CMMI, telephone: (703) 292-2339, email: gibiscon@nsf.gov
- Kathryn Jablokow, ENG/CMMI, telephone: (703) 292-7933, email: kjabloko@nsf.gov
- Kandace S. Binkley, GEO/OCE, telephone: (703) 292-7577, email: kbinkley@nsf.gov
- Maurice A. Tivey, GEO/OCE, telephone: (703) 292-7298, email: mtivey@nsf.gov
- Kelly M. Brunt, GEO/OPP, telephone: (703) 292-8457, email: kbrunt@nsf.gov
- Olivia Lee, GEO/OPP, telephone: (703) 292-2611, email: olee@nsf.gov
- Allen J. Pope, GEO/OPP, telephone: (703) 292-2858, email: apope@nsf.gov
- Robyn Smyth, BIO/DEB, telephone: (703) 292-2996, email: rsmyth@nsf.gov
- Francisco B. Moore, BIO/DEB, telephone: (703) 292-5376, email: fbmoore@nsf.gov
- Robert D. Fleischmann, BIO/DBI, telephone: (703) 292-7191, email: rfleisch@nsf.gov
- Kevin L. Thompson, CISE/OAC, telephone: (703) 292-4220, email: kthomps@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
- FastLane Help Desk e-mail: fastlane@nsf.gov
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

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

For questions related to environmental compliance, please contact Holly E. Smith, Office of the General Counsel, phone (703) 292-7713, email hesmith@nsf.gov.

IX. OTHER INFORMATION

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

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

Facilitation Awards for Scientists and Engineers with Disabilities (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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