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NSF 24-552: Ideas Lab: Advancing Cell-Free Systems Toward Increased Range of Use-Inspired Applications

Program Solicitation

Document Information

Document History

- **Posted:** March 1, 2024

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National Science Foundation

Directorate for Technology, Innovation and Partnerships
Innovation and Technology Ecosystems

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

May 17, 2024

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

September 20, 2024



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Important Information And Revision Notes

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

Summary Of Program Requirements

General Information

Program Title:

Ideas Lab: Advancing Cell-Free Systems Toward Increased Range of Use-Inspired Applications (CFIRE)

Synopsis of Program:

The U.S. National Science Foundation's Directorate for Technology, Innovation and Partnerships (TIP) is charged with accelerating use-inspired and translational research and development (R&D) to advance U.S. competitiveness in [key technology focus areas](#).

The *Advancing Cell-Free Systems Toward Increased Range of Use-Inspired Applications (CFIRE)* initiative will accelerate the adoption of cell-free systems, enable new applications of this technology and contribute to the growth of the U.S. bioeconomy.

A nascent industry has formed around the ability to carry out biochemical processes, such as DNA transcription/translation, in cell-free *in-vitro* systems instead of in traditional cell-based *in-vivo* bioreactors. This approach has a number of potential advantages, including rapid turn-around, distributed and highly retargetable manufacturing, high-fidelity instrumentation and control of the manufacturing environments – without the constraints of biological growth and the interference caused by cell biomass and cell membranes during product purification. Furthermore, cell-free systems can produce products that are challenging to manufacture in cell-based cultures, such as those inherently toxic to cells or hydrocarbon products that are consumed by the cellular machinery.

Despite these advantages, present-day cell-free manufacturing is significantly more expensive than cell-based methods and cell-free systems have a limited range of applications.

CFIRE aims to:

1. Reduce the cost of cell-free systems;
2. Increase the range and capabilities of cell-free systems; and
3. Develop and demonstrate cost-effective use-inspired applications.

CFIRE will address the key limitations of cell-free technology by identifying technical approaches that can enable ongoing cycles of improvement. The objective is to place cell-free technology on an exponential growth path in which reduced costs lead to increasing adoption which, in turn, generates the learning and investment required to further reduce costs. In order to keep the work focused and to stimulate increasing adoption, efforts funded through this initiative will focus on one or more specific use cases.

CFIRE seeks significant breakthroughs that will accelerate the adoption of cell-free systems by:

- (a) Demonstrating the feasibility and advantages of cell-free systems through use-inspired applications with specific emphasis on applications beyond human therapeutics;
- (b) Creating infrastructure components, such as tools, protocols, kits, datasets, and characterization services that can readily be accessed by third parties; and
- (c) Investing in workforce components focused on the training of translational talent with the skills and passion to engage in use-driven cell-free applications.

CFIRE will use the Ideas Lab process (see PAPPG Chapter II.F.6), starting with an intensive meeting that brings together multiple diverse perspectives. The primary objectives of this Ideas Lab workshop will be to: identify specific opportunities to significantly reduce the cost of cell-free systems; establish acceptable standards for the fidelity and reproducibility; expand the range of capabilities in order to facilitate broader adoption of the technology; and identify and prioritize use-driven applications beyond human therapeutics.

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.

- Waleed Nasser, telephone: (703) 292-8172, email: wnasser@nsf.gov

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

- 47.084 --- NSF Technology, Innovation and Partnerships

Award Information

Anticipated Type of Award: Standard Grant or Cooperative Agreement

Estimated Number of Awards: 2 to 8

Up to 8 awards are anticipated depending upon availability of funds and the quality, scale, transformative-potential and diversity of project ideas developed at the Ideas Lab. Awards will be funded up to **\$3,750,000** per year for up to **3** years. The budget for a given proposal should be commensurate with the complexity of the proposed research and development plan and the final maturity level and translational impact of the results.

Anticipated Funding Amount: \$40,000,000

The total funding available for this activity is up to \$40,000,000 over **3** years. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.
- For-profit organizations: U.S.-based commercial organizations, including small businesses, with strong capabilities in scientific or engineering research or education and a passion for innovation.
- Tribal Nations: An American Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges as a federally recognized tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. §§ 5130-5131.
- Foreign organizations: For cooperative projects involving U.S. and foreign organizations, support will only be provided for the U.S. portion.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.

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: 1

An individual may serve as PI or co-PI on only one Ideas Lab proposal in this competition but may serve as Other Senior/Key Personnel on any number of Ideas Lab proposals in this competition.

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):

May 17, 2024

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

September 20, 2024

Proposal Review Information Criteria

Merit Review Criteria:

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

Award Administration Information

Award Conditions:

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

Reporting Requirements:

Standard NSF reporting requirements apply.

I. Introduction

The U.S. National Science Foundation's Directorate for Technology, Innovation and Partnerships (TIP) is charged with accelerating use-inspired and translational research and development (R&D) to advance U.S. competitiveness in key [technology focus areas](#).

The *Advancing Cell-Free Systems Toward Increased Range of Use-Inspired Applications (CFIRE)* initiative will accelerate the adoption of cell-free systems, enable new applications of this technology and contribute to the growth of the U.S. bioeconomy.

A nascent industry has formed around the ability to carry out biochemical processes, such as DNA transcription/translation, in cell-free *in-vitro* systems instead of in traditional cell-based *in-vivo* bioreactors. This approach has a number of potential advantages, including rapid turn-around, distributed and highly retargetable manufacturing, high fidelity instrumentation and control of the manufacturing environments – without the constraints of biological growth and the interference caused by cell biomass

and cell membrane during product purification. Furthermore, cell-free systems can produce products that are challenging to manufacture in cell-based cultures, such as those inherently toxic to cells or hydrocarbon products that are consumed by the cellular machinery.

Despite these advantages, present-day cell-free manufacturing is significantly more expensive than cell-based methods and cell-free systems have a limited range of applications.

CFIRE aims to:

1. Reduce the cost of cell-free systems;
2. Increase the range and capabilities of cell-free systems; and
3. Develop and demonstrate cost-effective use-inspired applications.

CFIRE will address the key limitations of cell-free technology by identifying technical approaches that can enable ongoing cycles of improvement. The objective is to place cell-free technology on an exponential growth path in which reduced costs lead to increasing adoption which, in turn, generates the learning and investment required to further reduce costs. In order to keep the work focused and to stimulate increasing adoption, efforts funded through this initiative will focus on one or more specific use cases.

CFIRE seeks significant breakthroughs that will accelerate the adoption of cell-free systems by:

- (a) Demonstrating the feasibility and advantages of cell-free systems through use-inspired applications with specific emphasis on applications beyond human therapeutics;
- (b) Creating infrastructure components, such as tools, protocols, kits, datasets, and characterization services that can readily be accessed by third parties; and
- (c) Investing in workforce components focused on the training of translational talent with the skills and passion to engage in use-driven cell-free applications.

II. Program Description

CFIRE will use the Ideas Lab process (see PAPPG Chapter II.F.6), starting with an intensive meeting that brings together multiple diverse perspectives. The primary objectives of this Ideas Lab workshop will be to: identify specific opportunities to significantly reduce the cost of cell-free systems; establish acceptable standards for the fidelity and reproducibility; expand the range of capabilities in order to facilitate broader adoption of the technology; and identify and prioritize use-driven applications beyond human therapeutics.

CFIRE has the following tracks:

Track I: Reducing the cost of cell-free systems.

Proposals in this track will demonstrate approaches that can enable a series of ongoing and significant reductions in the cost of utilizing cell-free systems, such as an approach that could, through a series of steps, reduce the cost by a factor of two every two years. Over the course of multiple generations, these improvements could narrow the economic gap between cell-free and cell-based manufacturing.

Whether utilizing reconstituted systems or cell extracts, proposals in this section should address lowering the overall cost per unit output of cell-free systems. Proposals may address individual components of the cell-free system, or the system as a whole to significantly increase the yield and the rate of production. Approaches may include but are not limited to: engineering proteins or other system components for stability and/or processivity; engineering organisms and/or utilizing a variety of different organisms for enhanced productivity of cell extracts; enhancing ribosomal activity and longevity; optimizing reaction conditions; optimizing purification conditions/techniques; stabilizing storage conditions (e.g., lyophilization) for increased shelf-life and ease of

distribution; and utilizing/adopting cheaper components, e.g., energy input, co-factors (co-factor analogs), transfer RNAs, native and non-native amino acids etc.

Proposals in this track must address the fidelity and reproducibility of the system, and meet the cost reduction goals and reproducibility targets established in the Ideas Lab workshop.

Track II: Increasing the range and capabilities of cell-free systems.

Proposals in this track will address the versatility of cell-free systems and will focus on expanding the range of applications.

Proposals may enable the “scale-up” of cell-free manufacturing from milliliters to liters and kiloliters. Alternatively, proposals could enable “scale-out” applications of cell-free technologies through the use of vast numbers of pico/micro-liter reactors as biosensors and/or point of use diagnostics.

Proposals may also include the integration of capabilities, such as: post-translational modifications; optimized production of newly designed enzymes; manufacturing of membrane proteins; multi-step reactions to produce complex biomolecules; coupling metabolic cycles with protein production; increased length of DNA transcription / translation (e.g., bacteriophage-scale). New capabilities may include quality control (QC) methods to assess the purity and yield of intermediate or final products, and means to incorporate those assays within cell-free systems. Proposals to extend capabilities should focus on the integration of previously demonstrated capabilities into cell-free systems rather than basic research.

The Ideas Lab workshop will identify and prioritize the capabilities to be pursued, together with relevant metrics, goals, and QC criteria.

Track III: Develop and demonstrate cost-effective use-inspired applications.

Proposals in this track will focus on the demonstration of specific applications, beyond prototyping and human therapeutics, such as advanced manufacturing, environmental sustainability/remediation, agriculture, and climate resilience.

Proposals must include the development and demonstration of a prototype that addresses one or more specific applications.

Applications may include at scale production of specific material or biomolecules, e.g., engineered enzymes that promote sustainability, or may include ready-to-use kits or paper/plastic-based modules that require very small reaction volumes, e.g., easily deployable biosensors that benefit animal or plant health and/or for use in environmental safety applications, such as wastewater monitoring.

The Ideas Lab workshop will prioritize the use-inspired applications and the specific metrics and goals to be demonstrated.

Proposals in Tracks I and II must include at least one Track III use case, in which the application is demonstrated by a third party.

The Ideas Lab workshop will establish aggressive (yet attainable) goals to advance cell-free systems, set standards for robust and reliable batch-to-batch consistency, identify key approaches to reduce costs to competitive levels, pinpoint key areas for expanding the range and capabilities of cell-free systems, and select use-inspired applications for cell-free systems.

The Ideas Lab workshop will also establish the metrics through which progress will be measured in each track, and acceptable deliverables to be completed at the end of the project.

Specific sub-goals for the infrastructure, applications and workforce components will be identified.

The Ideas Lab workshop will address the biosafety and biosecurity ramifications posed by cell-free systems and recommend measures to curb and circumvent related safety and security issues.

The Ideas Lab

An Ideas Lab is an interactive workshop of experts and stakeholders, from academia and industry, interested in collaboratively developing solutions to a specific topic/problem. The workshop typically involves approximately 30-40 participants.

The intensive and focused Ideas Lab workshop will run for up to five days starting mid-morning on Day One and finishing mid-afternoon on the Final Day. At the workshop, the participants will work collaboratively to identify an integrated R&D approach to: use-driven applications; cost reduction and/or increased range of capabilities of cell-free systems; standards; and infrastructure and workforce components. Following the Ideas Lab workshop, proposals may be submitted by teams invited to submit a full proposal.

The participants are drawn from diverse backgrounds and a broad range of expertise relevant to the posed topic/problem of interest. The goal is to facilitate a brainstorming effort among a team of experts who may not otherwise come together. Hence, the participants are not necessarily expected to have had significant prior research or technology development interactions amongst themselves. Participants will be expected to engage constructively in dialogue with one another, the facilitators, and the Director and Mentors to develop collaborative proposals. Collaboration is an integral aspect of the activity.

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 for up to five days – away from their everyday worlds – to immerse themselves in collaborative thinking and come up with innovative approaches. The in-person workshop may be preceded and followed by a set of virtual meetings to allow the participants to get to know each other and assemble teams to further exchange and develop their ideas.

The nature of the Ideas Lab requires a high degree of trust among participants. This trust extends to allowing the free and frank exchange of scientific and other pre-competitive ideas. It is expected that these ideas would be shared within the Ideas Lab, but their confidentiality would be respected outside the Ideas Lab.

The Ideas Lab may be led by a Workshop Director (or Directors) whose role will be to assist in defining the topics and help facilitate discussions at the event. The workshop will be joined by a small number of mentors and a team of professional facilitators. The Workshop Director(s) and Mentors will be selected by NSF based on their intellectual standing 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. Some or all of them, therefore, will act as impartial peer reviewers in the process, providing a function analogous to that of an NSF review panel.

The workshop process can be broken down into several stages:

- Defining the scope of the challenges;
- Evolving common languages and terminologies amongst people from academia, industry, vertical markets, and technology translation;
- Sharing perspectives and understanding of the 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 and collaborative problem-solving techniques;
- Capturing the outputs in the form of innovative potential solutions; and
- Using "real-time" peer review to revise and refine proposed solutions.

The Ideas Lab will be an intensive event. For the well-being of participants, the venue offers opportunities for relaxation, and the timetable will include networking and other activities as a break from the detailed technical discussions.

Award Selection Process

This Ideas Lab program will consist of the following three stages:

1) *Preliminary Proposal*: Any individual (not an organization) interested in participating in this Ideas Lab should respond to this solicitation by submitting a preliminary, 2-page, proposal (see Section V). The preliminary proposals will be reviewed by NSF and a subset of respondents will be invited to participate in the Ideas Lab Workshop. Participants will be selected on the basis of their interests, expertise, experience and other relevant characteristics described in the submitted preliminary proposals. **Submission of a preliminary proposal will be considered an indication of availability to attend and participate in the full course of the Ideas Lab Workshop described below.**

2) *Ideas Lab Workshop*: The Ideas Lab workshop will be held to allow the invited experts to exchange ideas and form collaborative teams formulating comprehensive solutions to the problems/challenges posed in this solicitation. At the end of the workshop, the self-assembled collaborative teams will pitch proposed projects that include their integrated R&D approach to use-driven applications, cost reduction and/or increased range of capabilities of cell-free systems, standards, and infrastructure and workforce components to the NSF Program Officer(s).

3) *Full proposal*: Collaborative teams from the Ideas Lab may be invited to submit full proposals to NSF by the full proposal deadline. Additional expertise needed for the success of the proposed activities can be added after the ideas Lab Workshop. These full proposals must reflect the outline developed and pitched to NSF at the Ideas Lab workshop. The full proposals will undergo merit review, and a subset of the full proposals will be selected for awards.

Who Should Apply to Participate?

Having the right mix of participants is critically important to achieving the goals of this Ideas Lab. Applications are encouraged from individuals representing diverse areas, such as startups, established companies, academia, and non-profits, with expertise across a range of disciplines of relevance to the application of cell-free systems including, but not limited to, application-specific expertise, biochemistry, enzymology, bioengineering, molecular biology, bio-processing/bio-manufacturing, biophysics, mathematical modeling, statistics, chemistry, computer science, standards, biosafety/biosecurity, techno-economic analysis, and the evaluation of the ethical, legal and social implications of emerging biotechnologies. However, we are not limiting the disciplines that should be represented at this Ideas Lab; rather we are asking potential participants to indicate how their expertise can address the challenges associated with cell-free systems.

The ability to develop and pursue a new approach will also be crucial. Applicants should not feel limited by conventional perceptions; the Ideas Lab approach is about bringing together people who would not normally interact. We actively encourage applications from people who are experts in their own domains but have not yet applied it to this challenge.

This is an opportunity to share ideas and develop future collaborations. Participants at any stage of their career are welcomed.

Location and Date

This Ideas Lab will take place in person at a location to be determined, in the vicinity of NSF headquarters in Alexandria, Virginia, from July 15 to 19, 2024. The environment will encourage free and open-minded thinking, which are vital for the success of such an event. Additional information about the venue and meeting logistics will be provided to the selected participants. All travel to the Ideas Lab, 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.

Applications for this Activity

Any individual interested in participating in the Ideas Lab should respond to this solicitation by submitting a preliminary proposal. Participation in the Ideas Lab is by invitation only from the pool of applicants who submitted a preliminary proposal.

Submission of the preliminary proposal will be considered an indication of availability to attend and participate through the full course of up to five days of the residential workshop and the preceding and follow-up virtual meetings.

Participants will be selected on the basis of their interests, expertise, experience and other relevant characteristics described in the submitted preliminary proposals. The participants should be willing to engage in frank disclosure and assessment of ideas in a collegial, professional, and responsible fashion. An independent selection committee will recommend a list of potential participants from all applicants. NSF Staff will select the final list of participants from the submitted preliminary proposals.

Following the Ideas Lab workshop, some or all of the teams formed in the Ideas Lab workshop will be invited to submit full proposals to NSF, based on the outline developed at the workshop, by the September 20, 2024, deadline. Proposals may be reviewed as they are received.

III. Award Information

Anticipated Type of Award: Cooperative Agreement or Standard Grant

Estimated Number of Awards: 2 to 8

Up to 8 awards are anticipated depending upon availability of funds and the quality, scale, transformative-potential and diversity of project ideas developed at the Ideas Lab. Awards will be funded up to **\$3,750,000** per year for up to **3** years. The budget for a given proposal should be commensurate with the complexity of the proposed research and development plan and the final maturity level and translational impact of the results.

Anticipated Funding Amount: \$40,000,000

The total funding available for this activity is up to \$40,000,000 over **3** years. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.
- For-profit organizations: U.S.-based commercial organizations, including small businesses, with strong capabilities in scientific or engineering research or education and a passion for innovation.
- Tribal Nations: An American Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges as a federally recognized tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. §§ 5130-5131.
- Foreign organizations: For cooperative projects involving U.S. and foreign organizations, support will only be provided for the U.S. portion.

- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs):
Contact the appropriate program before preparing a proposal for submission.

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: 1

An individual may serve as PI or co-PI on only one Ideas Lab proposal in this competition but may serve as Other Senior/Key Personnel on any number of Ideas Lab proposals in this competition.

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.

Submission of Preliminary Proposals is required for participation in the Ideas Lab. 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: **CFIRE** 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.F.6, the **Project Description** section of the preliminary proposal is limited to two pages and should conform to the following guidelines:

Page One:

- Please include the sentence, "I am available July 15 to 19, 2024 and can commit to attend all 5 days of the event". If you cannot commit to attend all 5 days of the event, please explain.
- Provide a brief summary about your professional background (Limit: 200 words). Please include any relevant technical, R&D, technology development, translation, and commercialization experience related to the Ideas Lab topic. *Please note, 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 workshop.*
- How do you see your expertise and interests contributing to realizing the goal of this workshop? (Limit: 200 words)
- Briefly summarize your suggested approach or other contribution towards the challenges posed in this Ideas Lab. (limit: 200 words)

The total should not exceed one page.

Page Two:

Please spend some time considering your answers to the following questions. Your responses (no more than 150 words each) will help assess your suitability (unrelated to your research track record) for the innovative and collaborative setting of this intensive, interactive, fast-paced event.

- What is your approach to teamwork? What strengths do you bring to a team effort?

- How would you explain your area of interest to individuals with different expertise to your own?
- This workshop is especially suited to individuals who enjoy stepping outside their areas 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. How do you consider yourself suited to this type of environment?
- What do you hope to gain from participating in this workshop, personally and professionally?

The total should not exceed one page.

Applicants must include a **Biographical Sketch** and a **Current and Pending Support** document (prepared in accordance with standard NSF formatting guidelines) using SciENcv at <https://www.ncbi.nlm.nih.gov/sciencv/>. FAQs on using SciENcv can be found at <https://resources.research.gov/common/attachment/Desktop/SciENcv-FAQs.pdf>.

No appendices or supplementary documents may be submitted.

Selected participants will be notified, and logistics arranged for travel to, and participation in, the Ideas Lab. Following the conclusion of the Ideas Lab workshop, 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.E.3 provides additional information on collaborative proposals.

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

The disposition of rights to inventions made by small business firms, large business firms, and non-profit organizations, including universities, during NSF-assisted research is governed by Chapter 18 of Title 35 of the USC, commonly called the Bayh-Dole Act and EO12591, as amended by EO 12618. Additional information can be found in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG Chapter XI.D). Intellectual property (IP) developed with funds from this solicitation is subject to the Bayh-Dole Act and should be differentiated from IP developed separately and contributed by partners.

An Intellectual Property Management Plan is a required element of every proposal involving collaborations amongst multiple organizations (see supplementary documents below).

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: **CFIRE:**" followed by a descriptive title. Please note that if submitting via Research.gov, the system will automatically prepend the title with "Ideas Lab:".

Project Description:

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

Ideas Lab full proposals must clearly identify outcomes and deliverables from the proposed work and include a project schedule with milestones.

Additionally, where applicable, proposals should include a transition plan describing how the components funded by the proposed project will become organizationally and financially self-sustaining.

Facilities, Equipment, and Other Resources: As part of the effort described in the proposal, participants may contribute effort and/or resources, which should be discussed in the Facilities, Equipment, and Other Resources section of the proposal. See the PAPPG Chapter II.D.2.g for guidance on this required document.

Other Supplementary Documents: In addition to the requirements in the PAPPG, the following special information must be provided as a Supplementary Document. This information is not considered part of the 15-page project description limitation.

- **A Management Plan** (*up to five pages*) including: 1) list of project personnel including their affiliation, expertise and project roles; 2) plan for team coordination and project management; 3) detailed project schedule.
- **Intellectual Property (IP) Management Plan** (*up to three pages*): Proposals involving collaborations amongst multiple organizations must include an IP Management Plan. Both ownership and management of IP should be addressed.

The IP Management Plan should include:

- 1) IP contributed by partners included in this proposal,
- 2) IP that may be developed during the project, and
- 3) a plan for access to IP from (1) and (2) by potential future partners.

Current and future partners may include, but are not limited to, institutions of higher education, non-profit organizations such as foundations or community organizations, for-profit organizations such as companies or investment groups, local/state/federal government, and others. The Intellectual Property Management Plan is protected by the Privacy Act (as is the full proposal) and is the type of non-public information that NSF typically will not release beyond the closed, confidential review process, even under FOIA or other request.

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 up to two PI meetings per year in the Washington, DC, area during the award period.

C. Due Dates

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

May 17, 2024

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

September 20, 2024

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at:

https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationanc

For Research.gov user support, call the Research.gov Help Desk at 1-800-381-1532 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

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

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

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

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

Proposers that submitted via Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized

Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF Proposal Processing And Review Procedures

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

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

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

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

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

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

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

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

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

Additional Solicitation Specific Review Criteria

This activity, particularly the Ideas Lab approach, is designed to foster the development and implementation of creative and innovative projects. We anticipate that awards made through this solicitation will be high-risk/high-impact, as they represent new approaches to research translation and/or the creation (or rejuvenation) of industrial ecosystems. Projects that involve the application of novel, collaborative, or interdisciplinary approaches will therefore receive priority during the consideration process.

Full proposals must clearly address the following solicitation-specific review criteria through well-identified proposal elements:

1. If successful, how significantly will the proposed work accelerate the adoption of cell-free technologies and increase their use in applications of importance to the U.S. bioeconomy?
2. To what degree does the proposal contribute to achieving the specific goals set during the Ideas Lab workshop, including the specific sub-goals for infrastructure, applications and workforce components?
3. Does the proposed project have an appropriate mix of stakeholders to attain the use-inspired objectives of the solicitation?
4. Are the themes/objectives/approach in the proposal congruent with those determined at the Ideas Lab, and have any significant changes in project scope or resources from those presented at the Ideas Lab been justified?

B. Review and Selection Process

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

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

Preliminary Proposal Review: Preliminary proposals will be reviewed by a Selection Panel via a panel managed by the Program Officers. Up to 40 applicants will be selected for participation in the Ideas Lab.

Full Proposal Review: Invited full proposals will be reviewed internally by the cognizant NSF Program Officers, the Ideas Lab panelists, and other external reviewers, as appropriate.

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

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new recipients may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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

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

VII. Award Administration Information

A. Notification of the Award

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

B. Award Conditions

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

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

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

Administrative and National Policy Requirements

Build America, Buy America

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

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

Special Award Conditions for Cooperative Agreements:

Some or all CFIRE awards will be made as cooperative agreements. The cooperative agreement awards will include Special Conditions relating to the period of performance, statement of work, recipient responsibilities, NSF responsibilities, joint NSF-recipient responsibilities, funding and funding schedule, reporting requirements, Senior/Key Personnel, and other conditions. Within the first approximately 60 days of the Award, all Senior/Key Personnel will be required to participate in an approximately two-day meeting at NSF or virtually. In addition, some or all of the Senior/Key Personnel may be required to attend up to two meetings per year at NSF or virtually. The purpose of these meetings is to: provide project updates; coordinate efforts; and discuss Program Officer(s) feedback and suggestions for mid-course corrections.

Near the end of the first 18 months of the award, the NSF Program Officer(s) may convene an evaluation meeting to assess the progress that some or all of the recipients have made towards advancing project goals. As part of an evaluation meeting the recipient will submit briefing material (expected to be 10 pages or less) describing their accomplishments and make a short presentation which will be followed by questions and answers. The reviewers will evaluate the recipient's progress towards its stated goals and, in particular, progress towards creating deliverables. Taking into account reviewers' input, NSF will decide whether the recipient will receive funding for the remainder of the award.

No-cost extensions are **not** permitted except under clearly documented exceptional circumstances. Recipients must first contact the cognizant Program Officer prior to submitting a request.

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:

- Waleed Nasser, telephone: (703) 292-8172, email: wnasser@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-381-1532
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

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

IX. Other Information

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

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

About The National Science Foundation

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

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

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

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.F.7 for instructions regarding preparation of these types of proposals.

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

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

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

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

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

Privacy Act And Public Burden Statements

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

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

Suzanne H. Plimpton
Reports Clearance Officer
Policy Office, Division of Institution and Award Support

Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314

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