

NSF 24-556: Global Centers

Use-Inspired Research Addressing Global Challenges through the Bioeconomy

Program Solicitation

Document Information

Document History

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National Science Foundation

Office of International Science and Engineering
Office of Integrative Activities
Directorate for Biological Sciences
Directorate for Computer and Information Science and Engineering
Directorate for Engineering
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Directorate for Social, Behavioral and Economic Sciences
Directorate for STEM Education
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National Endowment for the Humanities



Natural Sciences and Engineering Research Council of Canada



Social Sciences and Humanities Research Council of Canada



Innovation Funding Agency Business Finland



Research Council of Finland



Japan Science and Technology Agency



National Research Foundation of Korea (NRF), Korea



Republic of Korea - Ministry of Science and ICT



United Kingdom Research and Innovation

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

June 11, 2024



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Important Information And Revision Notes

The Global Centers program is an NSF-led effort, implemented in partnership with other international funding agencies, to encourage and support large-scale collaborative use-inspired research to address global challenges through the bioeconomy and may include research from any combination of scientific disciplines supported by NSF. The program will expect proposals for holistic, multidisciplinary projects that demonstrate integration of all international teams as well as the relevant scientific disciplines, including educational and social sciences necessary to achieve use-inspired outcomes.

The Office of International Science and Engineering (OISE) welcomes submission of proposals to this funding opportunity that includes participation of the full spectrum of diverse talent in STEM (e.g., as PI, co-PI, senior/key personnel, postdoctoral scholars, graduate or undergraduate students, or trainees). This includes historically under-represented or under-served populations, diverse institutions including Minority Serving Institutions (MSIs), Primarily Undergraduate Institutions (PUIs), and two-year colleges, as well as major research institutions. Proposals from EPSCoR jurisdictions are especially encouraged.

The specific subtopics within the solicitation are based on NSF's areas of strength and unique contributions to the [Bioeconomy Executive Order](#) and the [Bold Goals For U.S. Biotechnology And Biomanufacturing](#). Priority bold goals for NSF include, but are not limited to, Leveraging Biodiversity Across the Tree of Life to Power the Bioeconomy, and Biofoundries (also called the Design-Build-Test-Learn process). All proposals are expected to integrate two crosscutting themes into their plans for a center: public engagement and co-generation of research activities to strengthen the global science and technology enterprise, and workforce development and education, including clear statements regarding the impact on the communities that the research serves.

The use-inspired nature of the research, defined here as project outcomes leading to foreseeable benefits to society, requires early involvement and integration of stakeholder groups. Bioeconomy research resulting from funded proposals should produce actionable and/or policy-relevant outcomes that address one or more global challenges as identified by the scientific community. Partner countries in 2024 Global Centers competition are Canada, Finland, Japan, Republic of Korea, United Kingdom and the United States. Partner funding organizations, hereafter called funding partner agencies, are as follows:

PARTNER AGENCIES

United States

National Science Foundation (NSF)
National Endowment for the Humanities (NEH)

Canada

Natural Sciences and Engineering Research Council (NSERC)
Social Sciences and Humanities Research Council (SSHRC)

Finland

Research Council of Finland
Innovation Funding Agency Business Finland

Japan

Japan Science and Technology Agency (JST)

Republic of Korea

National Research Foundation of Korea (NRF), Korea
Republic of Korea - Ministry of Science and ICT

United Kingdom

UK Research and Innovation (UKRI)

NOTE: in this document, unless marked otherwise, reference to principal investigators (PIs) refers by default to U.S.-based researchers working in U.S. organizations (i.e., PIs of NSF proposals; see the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter II Exhibit II-3.A, for the NSF definition of a Principal Investigator). The proposal preparation instructions and eligibility criteria sections mostly apply to U.S. PIs and organizations. Please see Section II.D.2 for additional specific requirements from funding partner agencies for non-U.S.-based scientists, when applicable. Also, Science, Technology, Engineering, and Mathematics (STEM) here refers to all disciplinary fields relevant to NSF, including education and the social, behavioral and economic sciences which are important to the Global Centers Program and are expected to be integrated into the framework of the Global Centers proposals.

NSF will coordinate and manage the review of proposals in consultation with NEH and the participating international funding organizations listed in this solicitation, according to the respective arrangements with NSF (see Section II.D.2 below). Relevant information about proposals and reviews of proposals will be shared with the partner funding organizations as appropriate, according to the respective arrangements with NSF.

REVISION NOTES

- Solicitation specific proposal preparation instructions and review criteria have changed.
- Design proposals will not be accepted. Only Implementation proposals will be accepted.
- The number and identity of funding partner agencies have changed.

In the framework of the Global Centers call, proposals that include off-campus or off-site research as part of their project must submit, as supplementary documentation, a Safe and Inclusive Fieldwork (SAIF) Plan. For this solicitation, this document replaces the required plan associated with the certification in Chapter II.E.9 of the PAPPG. Instructions for inclusion of the SAIF Plan can be found in the additional proposal preparation instructions in this solicitation.

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:

Global Centers (GC)
Use-Inspired Research Addressing Global Challenges through the Bioeconomy

Synopsis of Program:

This solicitation describes an ambitious program to fund international, interdisciplinary collaborative research centers that will apply best practices of broadening participation and community engagement to develop use-inspired bioeconomy research to address one or more global challenges identified by the scientific community. Here, the "used-inspired" nature of the research refers to project outcomes leading to foreseeable benefits to society. This program will prioritize research collaborations that foster team science and community-engaged research, use knowledge-to-action frameworks whose rationale, conceptualization, and research directions are driven by the potential use of the results as illustrated by Pasteur's Quadrant (see Stokes, Donald E. (1997), "Pasteur's Quadrant - Basic Science and Technological Innovation," Brookings Institution Press, p.196. ISBN 9780815781776). Proposals should also indicate how research will be co-generated with communities and stakeholders identified in the proposal. The proposed research should maximize the benefits of international, interdisciplinary collaborations, and describe the roles and responsibilities of each national team in achieving the goals of the proposed Global Center. Global Centers projects involving partnership between the U.S. and two or more partner countries are strongly encouraged. Global challenges must be addressed through international collaboration and researchers are encouraged to develop international teams to address research questions that can only be addressed through multilateral efforts.

The topic for the 2024 competition of the Global Centers program is Addressing Global Challenges through the Bioeconomy and may include research from any combination of research disciplines supported by NSF. The Bioeconomy is the share of the economy based on products, services, and processes derived from living systems. Research investments to advance the bioeconomy serve to accelerate scientific discovery and to enable the harnessing, engineering, and rational modulation of biological systems to create goods and services that contribute to the agriculture, health, security, manufacturing, energy, and environmental sectors of the global economy; or that provide access to unique systems that help us understand the processes and issues that we can use biotechnology to solve. Bioeconomy is built on the foundation of biotechnology and biomanufacturing, and in addition to biological science and engineering includes contributions from fields such as chemistry, materials science, geosciences, mathematics, data sciences, humanities, and the social sciences.

The world is facing many serious challenges, including, but not limited to, adapting to or mitigating the effect of climate change, developing clean energy approaches, identifying and advancing sustainable food systems, addressing water insecurity, exploring solutions to emerging infectious diseases, creating resource efficiency, sustaining biodiversity, addressing inequalities in access to biotechnologies, and developing a circular bioeconomy. For example, bio-based materials offer heightened biodegradability and biosafety as compared to reusable plastic materials that shed micro-plastics during use and washing and affect water security and human health.

This Global Centers solicitation in Bioeconomy offers a unique opportunity for interdisciplinary teams of scientists, educators, and practitioners to use knowledge of the bioeconomy to co-develop and execute a research plan for an international center that will address a global challenge facing humanity. The Global Centers program is meant to support multidisciplinary research that can only be achieved through international partnerships uniting complementary areas of expertise, and/or facilitating access to unique expertise or resources of the participating countries. The proposal should explain how the center will maximize the benefits of international collaborations and describe the unique contributions and the roles and responsibilities of each national team in achieving the goals of the proposed Global Center. Successful proposals will describe how the center will tackle a global challenge that can only be addressed through the diversity of knowledge, skills, and resources united in this center.

Addressing global challenges requires international engagement and must go beyond production of data to demonstrate how co-generation and co-production of research with stakeholder groups can maximize the chances of research outcomes being taken up by target groups and applied to address the global challenge. Because change requires human involvement, this process, described as the Knowledge to

Action framework explicitly recognizes the need to involve appropriate scientific experts and practitioners who study and work with humans in implementing the human action aspect of the framework. Examples of human action include (but are not limited to) studies in human and societal behavior, in policy, economics, psychology, anthropology, or education. Proposals are expected to describe a center that fully integrates human action elements with the knowledge generation portions of the center to produce a holistic, multi-disciplinary center that is greater than the sum of its parts. The center should offer a plan of research in which disciplines are integrated and complement and support each other to produce world class research, train the next generation of workforce, and use best practices to ensure that participant communities and stakeholder groups are involved in all stages of the research process so that outcomes are aligned with their needs and readily adoptable.

Within the general theme of Bioeconomy, proposals submitted in the framework of this call must be centered on either or both of the two subtopics: **Subtopic 1:** Leveraging Biodiversity Across the Tree of Life to Power the Bioeconomy; and **Subtopic 2:** Biofoundries, using the Design-Build-Test-Learn process in biology. All proposals must integrate both of the two crosscutting themes into the proposed work: **Crosscutting Theme A:** Public engagement and co-generation of research activities to strengthen the global science and technology enterprise; and **Crosscutting Theme B:** Workforce Development and Education. See Section II, Program Description for details.

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- STEM Education
- 47.079 --- Office of International Science and Engineering
- 47.083 --- Office of Integrative Activities (OIA)

- 47.084 --- NSF Technology, Innovation and Partnerships

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 5 to 7

Anticipated Funding Amount: \$25,000,000

The estimated number of awards and anticipated funding level 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.

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:

An individual may be listed as a PI or a co-PI on no more than one proposal submitted in response to this solicitation. Proposals exceeding this limit will be returned without review in the reverse order received.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

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

available on the Grants.gov website and on the NSF website at:
https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.

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

Not Applicable

- **Other Budgetary Limitations:**

Not Applicable

C. Due Dates

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

June 11, 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:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

I. Introduction

Recognizing the critical value of international partnerships to advance research that addresses global challenges, this competition will support cutting-edge, interdisciplinary, use-inspired research in the bioeconomy in collaboration with international partnerships to foster breakthroughs and encourage knowledge to action to address global challenges. Awards will promote the creation of prominent, enduring, international centers of research excellence that advance knowledge, empower communities, and co-generate discovery and innovative solutions at the regional and/or global scale.

Successful proposals will be driven by a bold vision for high-impact, use-inspired research centers along with a clear strategy to leverage funding to integrate diverse perspectives from different disciplines, international partners, and stakeholder groups into the research. The "used-inspired" nature of the research refers to project outcomes leading to foreseeable benefits to society. They are expected to demonstrate the potential to scale up and expand their research, while building a scientific and stakeholder community potentially able to carry out the work beyond the center funding period.

Awards will enable research at the leading edge of science and engineering by facilitating partnerships with others nationally and internationally, by educating and preparing a diverse, world-class research workforce, and by furthering

international collaboration. The partnerships should also foster participation of the full spectrum of diverse talent in STEM in both research and education plans.

Awards should maximize the benefits of international, interdisciplinary collaborations and indicate how these multilateral teams are uniquely positioned to address these global challenges even beyond what bilateral partnerships could accomplish. Proposals should also describe the roles and responsibilities of each national team in uniquely contributing to the goals of the proposed Global Center.

II. Program Description

A. PROGRAM OBJECTIVES

Program Objectives are to:

- create physical or virtual international research centers that advance innovative, interdisciplinary, use-inspired research and education on the bioeconomy to address societal challenges through international collaboration and multi-stakeholder engagement;
- promote international collaboration for advantages of scope, scale, flexibility, expertise, facilities, and/or access to specific geographic locations, to enable advances that could not occur otherwise;
- expand opportunities for students and early career researchers to gain education and training in world class research while enhancing the participation of the full spectrum of diverse talent in STEM. Where possible, provide opportunities for workforce training in bioeconomy that does not require advanced degrees but training of a competitive workforce; and
- integrate stakeholders and community members into the planning of the research so that centers reflect a co-designed and co-developed work plan that results in co-generation of results likely to be taken up by relevant user groups to solve urgent societal challenges at a regional or global scale to support the communities that they serve.

B. PROJECT CHARACTERISTICS

The research centers should involve multiple constituencies and institutions. Proposers should be tackling scientific challenges that are larger in scale than can be accomplished by a single institution, a single discipline, or a single country.

A center may be focused on a geographic region but should explain how that science is regionally or globally transferable. Proposed centers may involve collaboration with other international research partners beyond the initial bilateral or multilateral collaboration with partner funding agencies.

Centers will support use-inspired research directed by an ambitious research agenda to address a societal challenge of regional or global importance related to the bioeconomy that requires international collaboration, multi-stakeholder engagement, and full integration of one or more social science disciplines that ensure results will be of value to constituents.

The proposed center must have a clearly defined research focus and demonstrate how international collaboration will produce innovative use-inspired outcomes in research and education. The research should be fundamental, and the proposal should indicate how recipient stakeholders were involved in co-generation of the research plan and how likely outcomes would be used by those groups.

Centers must explain how they will fully integrate broadening participation activities into the scientific plan, recognizing that such activities not only help diversify the research workforce, but fundamentally impact how the science is conducted and who is involved and included in the development of scientific ideas.

Proposed centers must provide meaningful international research experiences for students from the U.S. and the international partners. Centers must have clear research and educational plans with identified milestones, potential

roadblocks, and ways to overcome them, as well as expected deliverables and outcomes with associated timelines within the funding period timeframe.

The proposal should describe the expected results that are associated with project milestones and projected growth of the center based on an explicit implementation strategy.

Teams proposing research to address societal challenges that disproportionately impact specific groups in the U.S. and/or abroad are strongly encouraged to engage those stakeholders as co-collaborators in designing their research endeavor and as recipients impacted by the center's outcomes.

Each center should identify relevant stakeholders and clearly explain how it will engage them in a manner that will drive the basic science research priorities. Stakeholders may be local communities, government (local, state and/or federal) agencies, nonprofit organizations, private sector businesses, and other entities.

Centers may exhibit diverse forms of organization, collaboration, and operation suited to support their priorities, approaches, and practice.

Centers must have plans in place for enabling research across disciplines and institutions and should identify and implement a structure that will enable interaction among the various institutions, stakeholders, and communities. The center may be completely virtual, or it may have a physical central location, although the GC program will not fund the building of a new physical infrastructure.

It is anticipated that over the lifespan of the center the research pursued and the activities it engages in may evolve. The proposal should explain how its leadership, approach, and structure can evolve to best serve all the participants and the evolving scientific focus. However, during the funding period, any change of scope would have to be justified and agreed upon by the funding agencies.

The proposed center should have a vision and strategy for potential growth, scaling up, and building a relevant community able to carry out the work beyond the funding period.

C. FUNDING TRACK

The Global Centers program will only fund Center Implementation awards this competition, subject to availability of appropriated funds. No Design awards will be funded in fiscal year 2024. Implementation proposals will include research Partnerships with Canada, Finland, Japan, Republic of Korea, and the United Kingdom. This track will support proposals to advance use-inspired research in the bioeconomy that involve U.S. teams supported by NSF, in collaboration with the U.S. National Endowment for the Humanities (NEH) and with foreign teams supported by funding partner agencies based in the FY2024-round partner countries, (i.e., Canada, Finland, Japan, Republic of Korea, and the United Kingdom). Proposals must be aligned with topics identified by NSF and the international funding partners. NSF anticipates making awards of up to \$5 million each, for up to 4 or 5 years with international funding agencies expected to support in parallel roughly comparable effort by their own researchers. Refer to Section II.D.2 for details on the specific documentation that needs to be submitted to the partner agencies to assess award eligibility. For the FY2024 competition, the funding partner agencies are NEH, NSERC, SSHRC, RCF, BF, JST, MSIT, NRF, and UKRI. Proposals must include at least one institution in the U.S. partnering with at least one institution or researcher eligible to receive funding from one of the five partner countries (refer to Section II.D.2) but may include as many as five of the partner countries. Proposals may also involve partnership with stakeholders in other non-partner countries but researchers from those countries must secure their own sources of funding. The official partner countries and number of funding partner agencies involved in future Global Centers competitions may change.

D. SUPPORTED RESEARCH THEMES AND COLLABORATIONS WITH INTERNATIONAL FUNDING PARTNER AGENCIES

Proposals are accepted in any field or combination of fields of science, engineering, or education research supported by NSF, or convergent fields that cut across NSF-supported disciplines (also known as transdisciplinary research; see the [NSF definition of convergence](#)). Proposals must focus on a clear research area within Bioeconomy, relating to either leveraging biodiversity across the tree of life to power the bioeconomy and/or research related to biofoundries (see Section

"Synopsis of Program" and below). Proposals may include one or both of the Subtopics, but must include elements that fulfill both Crosscutting themes.

D.1 Supported Research Themes

Within the general theme of Bioeconomy, the two identified subtopics, and the two crosscutting themes, proposals may address a wide range of research projects that may lead to novel directions, including but not limited to those mentioned in this solicitation. These research topics should remain broad enough in scope to allow for potential intersections with the priorities and interests of partnering funding agencies, and to maximize the potential for mutual interests to emerge.


Please see the "*Additional Solicitation Specific Review Criteria*" (Section VI.A) for further guidance.

D.1.a Subtopic 1: Leveraging Biodiversity Across the Tree of Life to Power the Bioeconomy

Unleashing the promise of the bioeconomy relies on using the diverse capabilities found in living organisms to produce new products and processes with the potential to diagnose and treat disease, develop resilient crops, create clean forms of energy, inspire novel materials and more. For example, many of the antibiotics and anticancer drugs we use today were found by exploring the chemicals produced by different microbes and plants. Many enzymes found in laundry detergents came from organisms that live at high temperatures. We are discovering how to make strong glues and even stronger fibers by mimicking processes in barnacles and spiders. We are identifying organisms capable of capturing greenhouse gases and leveraging the power of biotechnology to develop bio-based processes for fossil fuel replacements in the manufacture of textiles. These innovations and others like them have sprung out of knowledge of only a tiny fraction of the ways that life on Earth has evolved. Imagine what more could be revealed from the estimated millions of species of plants, animals, fungi, and potentially one trillion species of microbes on the planet.

Tapping into this huge reservoir of undiscovered and uncharacterized species will provide knowledge of new genes and how those genes create different physical and physiological traits, a connection known as genotype-to-phenotype. Moreover, research on all manner of organisms and how they interact — from microbes to plants to animals — and application of comparative genomics to identify similarities and differences can be harnessed in novel biotechnologies and biomanufacturing processes. Achieving the bold goals of characterizing diverse species and learning the functions of their genes will rely on new tools and methods of understanding gene function to accelerate the process, while accounting for a broad range of inherent uncertainties. Storing and analyzing huge amounts of genome and phenotype data will require innovations in computing, including artificial intelligence (AI) and mathematical foundations behind these AI approaches. Using those data to create new products for the bioeconomy will require innovations in bioengineering and bio-design as well as sustained support for needed infrastructure. Areas of particular interest include, but are not limited to, the following:

- **Put biodiversity to use in new applications for the bioeconomy.** Use biodiversity with the express purpose of finding ways it can advance bioeconomy research in reconstructing pathways, regulation, and scale-up. Create new and improved technologies to move genes from one organism to another. Use outcomes of functional discovery to expand the number of organisms that can be used as hosts (chassis) in engineered biological systems. Combine innovations from chemistry and materials science with outcomes of sequencing and functional analyses to expand the repository of "parts" for so-called "plug-and-play" design-build capabilities that incorporate biotic-abiotic interfaces as control elements. Leverage biodiversity to develop holistic approaches using clean technology to mitigate pathogens and diseases and provide more integrated solutions to promote greater biodiversity. Leverage learnings from biodiversity studies for bio-inspired design of new materials, devices, and products for the bioeconomy using novel mathematical and AI tools. Tailoring of biomass to bio-refining pathways, developing catalytic, thermo-chemical, and biochemical conversion processes. Promote the use of natural products in the food, biotechnology, cosmetics, and pharmaceutical industries.
- **Research to enhance discovery of novel function from diverse organisms across the tree of life.** Accelerate development of computational and experimental tools to enhance comparative discovery of sequence and functional elements (e.g., regulatory networks, metabolic pathways, and traits) that define genotype-to-phenotype relationships. Connect genomics, transcriptomics and proteomics data gathering capabilities with new and existing capacity to accelerate the transformation of data into knowledge, as well as reduce time and costs. Enable

a robust ecosystem of secured data infrastructure for the bioeconomy. Collaborate to enhance capacity for data handling and analysis, including cyberinfrastructure and bioinformatics, to enable equitable, wide-spread access to data from biodiversity studies and to ensure reproducibility of the proposed research approaches. Applicants should align their efforts in this area with existing open initiatives (e.g., [Building the Prototype Open Knowledge Network \(Proto-OKN\)](#)) to ensure biological data (and biological parts) are Findable, Accessible, Interoperable, and Reusable (FAIR), and to ensure sustained support for the data infrastructure. This alignment will also ensure that the proposed data infrastructure complies with current Data/AI ethics, standards, and guidelines. Moreover, it will support synthesis activities through substantial center-scale investments, enabling community-driven utilization and analysis of data, thereby catalyzing innovations in discovery across the tree of life. Proposals should balance the need for open data with respect for intellectual property rights to maintain innovation incentives and appropriate data protection and security measures for sensitive data and should follow CARE principles as described by the Global Indigenous data alliance (<https://www.gida-global.org/> ) when applicable. Proposals should address ethics of data infrastructure and management as pertains to bioeconomy and biodiversity, particularly relating to genomic data. Projects should sustain and enhance living and digitized collections to ensure they remain a resource for diverse downstream applications, and support synthesis activities that enable community-driven use and analysis of data.

- **Prepare for the bioeconomy's next digital leap in which data provides added value (e.g., as part of services or modeling tools).** Produce open data that respects the ownership of data, based on which new products and services can be designed based on digital modeling. Develop digital platforms suitable for bioeconomy cooperation networks to improve efficiency. Strengthen the connection to development programs and experiments in the digitalization of the circular economy. Build an operating method for linking data on carbon footprint and other sustainability aspects of food products and raw materials, which already have highly transparent monitoring. Need for digitalization of the bioeconomy at different levels. Systematically integrate bioinformatics with other data types, including multi-modal and multi-resolution information sources, to improve modeling. and predictive capabilities under uncertainties to increase robustness of the developed digital solutions with respect to threats, missing/irregular data records and latent biases, and to increase productivity in the agriculture and other sectors.
- **Socio-Economic Impact Assessment, Indigenous Knowledge, Historical and Cultural Ecology.** Social scientists and humanities scholars can conduct research into the bioeconomy. For example, social scientists can conduct studies to assess the socio-economic impacts of leveraging biodiversity for the bioeconomy, and examine factors such as job creation, economic inequalities, and community well-being to support societal benefit of the research. Projects that collaborate with indigenous communities to document and understand traditional knowledge related to biodiversity will contribute to developing a bioeconomy that respects and incorporates local practices. When research analyzes the effectiveness of existing policies and governance frameworks, it will contribute to regulating the sustainable use of biodiversity in the bioeconomy. Social scientists can study the impact of changing cultural attitudes toward biodiversity on contemporary bio-economic practices, informing sustainable approaches. Humanities scholars can, for example, contribute by exploring historical and cultural perspectives on the use of biodiversity in economic activities, and providing context for contemporary practices. They can explore the cultural narratives and values associated with biodiversity, contributing to a more nuanced understanding of the relationship between human societies and the diverse life forms they utilize. In addition, projects that examine ethical and cultural considerations have a greater chance to inform policy decisions related to biodiversity for fostering a holistic and inclusive approach to governance. These examples are non-exhaustive and demonstrate the broad range of possibilities and opportunities of projects to be submitted.

D.1.b Subtopic 2: Biofoundries, using the Design-Build-Test-Learn process in biology

Biofoundries play a crucial role in advancing biomanufacturing processes by promoting and enabling the beneficial use of automation and high-throughput equipment. This includes process scale-up, computer-aided design software, methods of optimal experimental design, and other innovative workflows and tools. Operating within the 'design-build-test-learn' cycle, biofoundries facilitate iterative biological engineering, allowing researchers to test large-scale genetic designs and incorporate the state-of-the-art approaches at the interface of artificial intelligence/machine learning, and statistical sciences to enhance the design process. Recognized as a critical emerging technology, synthetic biology is driving

innovation in biomanufacturing. The bio-foundry ecosystem involves translating engineered biological systems from conceptualization to reality, constructing systems from parts, and testing their performance. The challenge lies in the substantial bottleneck in testing, given the rapid pace of designing and building new systems. Addressing this bottleneck requires integrating advances from various fields to develop platforms for manipulating and assembling novel systems, ensuring both designed functions and efficient performance testing. Examples include expediting the rate of building and testing and creating engineered organisms like synthetic plant chassis for various applications in food, feedstock, chemicals, or pharmaceutical production. Areas of particular interest include, but are not limited to, the following:

- **Expand capabilities for building novel forms and functions.** Develop advanced technologies for precisely manipulating genomes, transcriptomes, proteomes, and metabolomes of organisms — from microbes to animals and plants — to enable highly predictable, spatial, and temporal control of complex phenotypes. This area could also include expanding biomaterial design by developing and deploying multi-faceted capabilities, including non-natural biopolymers and their building blocks, chemical functionality across the periodic table, living materials (e.g., combined biotic-abiotic systems) that can sense and respond to the environment, and bio-compatible materials for biomedical components. Build platforms for precise high-throughput chemical modification of biomolecules and cells by leveraging knowledge of diverse regulatory pathways and on-off controllers. Develop novel modalities for precise assembly of cells into organs, organisms, or ecosystems that incorporate abiotic components as key control or sensing elements.
- **Expand capabilities for measuring, sensing, actuating, and controlling biological systems.** Develop biological and non-biological sensors and transducers that do not interfere with cellular function and that take advantage of quantum, optical, magnetic, chemical and other sensing modalities which can receive exogenous signals and interface with biological systems. Develop platform technologies to read the expressed genome, proteome, and metabolome fully and rapidly, enabling high-throughput precision phenotyping of any organism. Develop platforms and tools for rapid, multimodal measurement of complex signals from cellular and multicellular systems in the context of their interconnected natural and in silico environments. Develop sensor/transducer systems which can both measure and transmit signals that actuate a calculated response, thus enabling open or closed loop control of biological systems. Develop new sensors for feedstock characterization, bio-process monitoring and control, using AI, machine learning and mathematical approaches to integrate characterization and process data into adaptive control strategies. Examples include conversion of undifferentiated cells into mature, functional cells or organoids; assembly of natural or synthetic communities of cells for environmental remediation; and engineering of whole organisms to signal and control a change in nutrient conditions at multiple scales.
- **Ethical Considerations, Governance, and Social Impact.** Social scientists and humanities scholars can explore the ethical, cultural, and philosophical impacts of Biofoundries. For example, social scientists and humanities scholars can study the ethical implications of using Biofoundries, such as the potential for unintended consequences, environmental impact, and societal concerns. They can study the development of policies and governance frameworks surrounding Biofoundries, assessing their effectiveness and addressing potential gaps. The dynamics of interdisciplinary collaboration within Biofoundries can also be studied, exploring how teams with diverse expertise can effectively work together. Humanities scholars can investigate the cultural and philosophical aspects of synthetic biology, examining how perceptions of nature, life, and design influence public attitudes. They can also contribute by analyzing how narratives, storytelling, and media representation shape public understanding and attitudes toward synthetic biology. Finally, they can contribute by exploring the historical and philosophical foundations of bioengineering regulations, shedding light on the cultural and societal dimensions of policy decisions. These examples are non-exhaustive.

D.1.c Crosscutting Theme A: Public engagement and co-generation of research activities to strengthen the global science and technology enterprise

New discoveries from across the tree of life and advancements throughout the design-build-test-learn cycle, will provide a wealth of foundational, technical, and practical know-how for advancing biotechnology and biomanufacturing. The promise of these advances to impact the bioeconomy positively will depend on public willingness to adopt and use these new innovations. Research suggests that many people and nations doubt the safety of genetically modified foods. To help

ensure that biotechnology advances that emerge from this program will be embraced and will reach under-served communities we must engage stakeholders and end users early and often as the technology is designed, implemented, and deployed. To engage the public in the Bioeconomy from the beginning will require adopting evidence-based, collaborative approaches and innovative engagement methods. Changes across the product lifecycle — from discovery, through design, to use and disposal — will need to be based on the science of team science, social and behavioral research, and economics. This integration can then inform best practices, ensuring the ethical, safe, and equitable translation of biotechnology products. Areas of particular interest include (but are not limited to):

- **Develop social, behavioral and economic drivers of a strong, sustainable and inclusive bioeconomy sector.** Understand and address drivers of biodiversity decline through insights from psychology, anthropology, and behavioral economics. Utilize knowledge to expand protected areas, incorporating traditional and Indigenous knowledge. Explore multi-directional human-ecology interactions, communicate the importance of biodiversity, and mainstream sustainable practices to support ecosystems. Enhance public awareness and engagement on issues like invasion of alien species through initiatives such as citizen science and circular economy innovation. Interconnect biodiversity research with policies supporting the bioeconomy, considering transition management and societally driven transitions. Improve territorial governance, explore tailored policy responses to place-based needs, and address economic, environmental, and social risks. Evaluate the economic impacts and financial models of ecosystem services. Develop biodiversity-friendly practices in agriculture, forestry, and aquaculture, integrating environmental, economic, and social outcomes. Promote social innovation for eco-friendly consumer products; enhance industrial sustainability, competitiveness, and resource independence. Develop innovative and sustainable value-chains in the bio-based sectors. Develop biotechnology foci within the social sciences. Develop new research within the social sciences with a focus on biotechnology and biomanufacturing. Advance the science of public engagement and public participation, as applied to biotechnology and biomanufacturing, to develop an evidentiary basis for meaningful public involvement in considerations of biotechnology. Invest in programs and efforts that incorporate social scientists within research teams working in fields related to biotechnology and biomanufacturing. Conduct research on ethical issues related to biotechnology and biomanufacturing to develop new understanding of how ethical concerns can inform public policies around biotechnology and biomanufacturing. Develop new methods and processes to incorporate ethical, societal, behavioral, decision-making, and economic research into decisions at all phases of biotechnology development.
- **Enhance the evidentiary basis of ensuring the safety of products and processes of the bioeconomy.** Develop new capabilities, including novel risk analytics tools, to assess the health and environmental risks of products and processes of the bioeconomy. Expand investments in research to enable science-based regulation of products and processes.

D.1.d Crosscutting Theme B: Workforce Development and Education

The Bioeconomy represents an enormous sector of opportunity for well-paid employment. It will be important to develop a skilled workforce to support the scale-up of biomanufacturing processes. Global Centers should provide training for this workforce, both for those requiring formal education and those needing specialized training. Successful Global Center proposals will include a well-developed research and education plan to build a diverse and inclusive workforce, increase capacity to perform STEM research and development, enhance innovation, and create new technologies that benefit a competitive society. Areas of interest include (but are not limited to):

- **Broaden participation in research and engage stakeholders in innovative and meaningful ways that benefit individuals, communities, society, and STEM disciplines by fostering participation of the full spectrum of diverse talent in STEM.** Successful proposals will embrace both broadening participation and stakeholder engagement as key values that are integrated into the design of the centers and the choice of science priorities to explore. Broadening participation, in this context, includes rethinking how one identifies, approaches, and prioritizes scientific questions to involve a diversity of individuals in the scientific enterprise. Diversifying the research workforce through a variety of approaches that support sustainable inclusion and retention in the workplace is an important component of broadening participation. It acknowledges that diversity is key to unleashing creativity and building a fully joined up system where problems can rapidly find solutions and solutions can rapidly find markets and informs the goal of advancing team science.

- **Enhance diversity and equity within biotechnology and biomanufacturing R&D.** Conduct research to advance equitable outcomes domestically and globally. Develop educational and training pathways to leverage the full spectrum of diverse talents that society has to offer and include the participation of groups underrepresented in STEM to ensure that diverse perspectives are included in future biotechnology and biomanufacturing R&D. Research accessibility to enable all individuals to participate in the bioeconomy and benefit from biotechnology and the bioeconomy regardless of disability. Stakeholder engagement through citizen science, partnerships, community engagement and many more types of activities that help drive research priorities will also support and facilitate broadening participation in STEM.
- **Developing educational and training materials and curricula.** Developing a range of training methodologies and techniques to develop appropriate bioeconomy education and training programs to support a transition towards a circular bioeconomy. Investigating effective methods of communicating complex biological concepts to diverse audiences, including policymakers, students, and the public.

D.2. Funding Partner-Agency Requirements and Specificities

FY2024 counterpart international funding organizations – Canada (Natural Sciences and Engineering Research Council (NSERC), Social Sciences and Humanities Research Council (SSHRC)); Finland (Research Council of Finland (RCF), Business Finland (BF)); Japan (Japan Science and Technology Agency (JST)); Republic of Korea (Ministry of Science and Information and Communication Technology (MSIT), National Research Foundation (NRF)); United Kingdom Research and Innovation (UKRI)) – are partnering with NSF and NEH to enhance opportunities for collaborative activities between U.S.-based investigators and their collaborators abroad. NSF will coordinate and manage the review of proposals in consultation with NEH and the participating international funding organizations, according to the respective arrangements with NSF. Relevant information about proposals and unattributed reviews of proposals may be shared between the participating organizations as appropriate, according to the respective arrangements with NSF (see Funding partner-agency specificities below).

For proposals that are reviewed as highly meritorious and ranked high among the proposals submitted to this funding opportunity, NSF will coordinate and manage the final decision of awards in consultation with the participating funding partner organizations, according to the respective arrangements with NSF.

NSF is committed to safeguarding the research enterprise while maintaining a research environment that is as open as possible and operates with the highest standards of integrity. To achieve these goals, proposals submitted to NSF in response to this solicitation are reviewed, apart from the merit review process, for possible research security concerns. If research security concerns are identified, partner agencies will work with the submitting organization to address them. Global Centers may require special measures be taken (e.g., additional training for the principal and co-principal investigators, a project research security point of contact) to ensure the research is adequately protected.

For more information as to what is required of the international collaborators to qualify and apply for funding from their respective funding agency to support their participation in the center, refer to Section II.D.2.a to e below. U.S. PIs must be in close communication with their international collaborators and ensure that all necessary eligibility requirements are satisfied. Prior to final NSF recommendations, PIs whose proposals are considered for Global Centers awards may be asked to submit additional information to NSF; their foreign collaborators may be asked to submit additional information to their respective funding partner organizations. It is important to note that, because this program is designed as being truly collaborative between NSF and the funding partner agencies listed above, NSF will consult with the relevant partner agencies according to their respective arrangements with NSF before making final award or decline decisions.

D.2.a Partnership with Canada


IMPORTANT NOTE: This section applies to proposals, awards, and requirements for Canada institutions and researchers only.

Collaborations with researchers in Canada will be supported by the Natural Sciences Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council of Canada (SSHRC). NSERC is allocating up to CAD\$7.5M over five years while SSHRC is allocating up to CAD\$2.5M over five years to support the activities of eligible


researchers across supported projects. The Canadian team may apply for funding from NSERC and/or SSHRC to support their activities on a proposal for 4 to 5 years. Please refer to the NSERC/SSHRC program literature for funding limits.

Canada is a global leader in many aspects of the bioeconomy, including the access to and use of biomass for advanced bio-products and innovative solutions; forestry and agriculture; food and cultural sovereignty; sustainable resource management, and a skilled workforce. Canada also represents 6.5 percent of the world's theoretical bioenergy potential. Shifting toward a bioeconomy will leverage these unique advantages including the cross-sectoral and cross-disciplinary nature of the bioeconomy; support the growth of related research and industry within the country; and help Canada meet its greenhouse gas emission reduction targets under the Paris Agreement. Research in the natural sciences, engineering, social and behavioural sciences and humanities, in collaboration with international expertise, will help Canada leverage these resources and grow these advantages.




NSERC and SSHRC encourage the full range of disciplinary, multi-disciplinary and transdisciplinary approaches that address research needs under the Bioeconomy themes, as well as the submission of multilateral proposals involving more than one partner funding agency. Partnerships may involve researchers who are in any field of the social sciences, humanities, natural sciences, or engineering.

NSERC and SSHRC encourages the involvement of Indigenous Peoples and their uniquely valuable connection to Canada's ecology as well as incorporation of traditional Indigenous knowledge in research. Applicants proposing research in cooperation with Indigenous groups are encouraged to consult tri-agency guidelines on working with Indigenous Peoples, available here: https://www.sshrc-crsh.gc.ca/society-societe/community-communite/indigenous_research-recherche_autochtone/index-eng.aspx .

Canadian researchers involved in the NSF proposal seeking support from NSERC and/or SSHRC must submit a separate application package to NSERC. The Canadian Applicant on the Global Center proposal is responsible for submitting the application package and related information on behalf of the Canadian team (co- applicants and collaborators) to NSERC.


Instructions and additional information on thematics and requirements for Canadian researchers are available here: https://www.nserc-crsng.gc.ca/Innovate-Innover/Joint_Calls-Appels_Collaborative_eng.asp .

Information on application and award processes for Canadians:

- The Canadian team partnering on a Global Centers proposal must appoint a Canadian researcher who works in a field supported by NSERC or SSHRC and is eligible to receive funds from either [NSERC](#)  or SSHRC to act as the Canadian principal investigator (the Applicant) on the Canadian portion of the grant. NSERC eligibility guidelines apply. Note that Canadian principal investigators can only be the Applicant on one proposal in this competition.
- Additional Canadian researchers who work in fields supported by NSERC or SSHRC and meet [NSERC eligibility requirements](#)  may be listed as Co-Applicants.
- Other participants may join as collaborators or partners as appropriate. Collaborators and partners will not have access to the grant funds, and they are expected to bring their own resources to the research project.
- NSF principal investigators and Canadian researchers are strongly encouraged to review the eligibility requirements for each agency and address the specific additional requirements requested by NSERC and/or SSHRC for Canadian researchers: [NSERC - Innovate - Joint research calls \(https://www.nserc-crsng.gc.ca/\)](https://www.nserc-crsng.gc.ca/) .
- Upon receipt of the Canadian application package at NSERC, NSERC and SSHRC will conduct an administrative and eligibility review of all proposals involving Canadian teams before the NSF merit review.
- Proposals that do not meet eligibility requirements will be rejected.

NSERC and SSHRC will review proposals recommended for funding that involve Canada-based researchers and allocate Canadian funding based on the NSF merit review. Where applicable, NSERC's funding decision will consider the potential risks for Canada's national security pursuant to the National Security Guidelines for Research Partnerships.

The Canadian application package is due at NSERC at the same time as the NSF application. For grants awarded by NSERC and/or SSHRC, standard NSERC and SSHRC terms and conditions of award, policies, and funding guidelines will apply the

[Tri-Agency Guide on Financial Administration](#) . Recipients of grants awarded by NSERC and/or SSHRC will also need to report to NSERC and/or SSHRC. Recipients must report regularly on how they use the funds from the grant, the activities they carry out and the outcomes of this project. Award letters will include information on reporting requirements.


D.2.b Partnership with Finland

IMPORTANT NOTE: This section applies to proposals, awards, and requirements for Finnish institutions and researchers only.

Collaborations with researchers and companies in Finland will be supported by the Research Council Finland (RCF) for research organizations and universities, together with Innovation Funding Agency Business Finland (BF). BF is able to fund companies and research organizations with project types presented in BF section (see below). BF is allocating up to 7 M€ of funding over a period of five years for collaboration in subtopics 1 and 2. RCF is allocating up to 3 M€ in one or divided to more than one subtopic together with BF. In the process of National funding decisions to consortium partners RCF and BF will operate separately.

1. Information specific to the Research Council of Finland (RCF)

These requirements relate only to applicants applying for funding from the RCF.

The Research Council of Finland (RCF) is allocating €3.0M EUR over five years to support the activities of eligible researchers across supported projects. It is expected that a single award will be issued for a consortium of investigators. Hence, the total funding applied from the RCF is not to exceed EUR 3.0 million. The prospective Finland applicants must comply with all of RCF's standard conditions, including eligible organisations, participants, and allowable costs, as detailed here: <https://www.aka.fi/en/research-funding/apply-for-funding/how-to-use-funding/> .

The Global Centers vision is well-aligned with Finland's *Bioeconomy Strategy 2022-2035 – Sustainability towards higher value added*, which aims to double the value added of bioeconomy in an ecologically, socially and economically sustainable manner and to make Finland climate neutral by 2035. The RCF is open to and encourages the full range of multi-disciplinary approaches that address research needs under topics and themes of this multilateral research funding opportunity in bioeconomy.

In this multilateral joint call, the application procedure differs from a typical RCF call. Applicants from Finland can participate in this funding opportunity via proposals submitted to the National Science Foundation (NSF) before the deadline of applications (see the Call Solicitation). Intention to submit must be submitted to the RCF at least four weeks before the proposal is planned to be submitted to the NSF. RCF funding will be granted only for proposals that receive a "Confirmation of Eligibility for Funding" letter from the RCF and are selected for funding by the Global Centers Program.

The National Science Foundation and the RCF collaborate in this call via a Lead Agency Opportunity, in which the NSF acts as the Lead Agency. In this approach, proposers from the participating countries will collaborate to write a single proposal. It is the responsibility of the US proposer to submit the proposal to the appropriate NSF programme for review. Researchers from Finland participating in the joint research project will apply for funding separately from the RCF in accordance with the RCF's guidelines and procedures.

The steps in the application procedure for researchers from Finland are as follows:

- a. Intention to Submit is emailed as early as possible to the RCF at flagship@aka.fi This submission should include: (A) Contact details of the PIs, (B) Proposal submission date and funding period, (C) Proposed topic, keywords, collaborations, (D) Description of how the proposed project contributes to the topics and goals of the RCF Flagship programme, € Costs to be requested from the RCF and indicative total budget figure to be requested.
- b. RCF assesses the eligibility of the project.

- c. If assessed eligible, the RCF issues "Confirmation of Eligibility for Funding" letter to the applicant.
- d. US proposer submits the proposal including the "Confirmation of Eligibility for Funding" letter to the NSF.
- e. The proposal is reviewed in accordance with the standard NSF review criteria.
- f. RCF will review proposals recommended for funding that involve Finland-based researchers and allocate RCF funding based on the NSF merit review.

Before Finnish researchers start preparing to apply for the funding, they should carefully read the call text and the [funding terms and conditions](#). If the call text and the funding terms and conditions conflict, the terms and conditions should always be considered primary. This call text is published only in English.

2. Information specific to the Innovation Funding Agency Business Finland

Innovation Funding Agency Business Finland is allocating up to 7 M€ of funding over a period of five years in Subtopic 1 and Subtopic 2.

1. Funding for Research and Development is funding of a single company or group of companies on ambitious industrial research, which in most cases would include research subcontracting from universities and/or research organizations and typically also subcontracting from companies such as research spin-off companies, deep-tech companies or AIR-companies. <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/research-and-development>.
2. Co-Innovation Funding for companies' and research organizations' joint actions that enable increased business competitiveness and significant new international business. Co-Innovation funding requires minimum three Finnish companies and one or several research organizations applying funding. The companies can be large enterprises, SME-companies or start-ups with credible competence and sufficient resources. <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/cooperation-between-companies-and-research-organizations/co-innovation>.
3. Co-Research Funding projects promote the building of significant new expertise for business needs. Co-Research funding of one or several research organizations with required company co-funding of minimum 10 %, company participation in steering and often also relevant in-kind contribution. Co-Research is particularly suitable for situations in which Finnish or international research has revealed significant new business potential, but companies still lack the capacity or vision to directly apply this knowledge to their product development or business. Co-Research projects may be used to build bridges between basic research and companies' industrial research and to focus research on topics that are relevant to Finnish export businesses. The funding is aimed at disruptive and strategic projects and projects developing strategic competence. The results of the research projects will serve as a basis for the companies' own development projects and potential Co-Innovation projects. <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/cooperation-between-companies-and-research-organizations/co-research>.

Business Finland funding criteria and national laws are applied for funding. Business Finland can finance Finnish participants in project consortia participating in the Global Centers application.

The Finnish applicants need to file their funding applications using the Business Finland [Online Service](#). To enable a smooth processing of the applications, all Finnish applicants need to contact Business Finland as early as possible.

D.2.c Partnership with Japan

IMPORTANT NOTE: This section applies to proposals, awards, and requirements for Japanese institutions and researchers only.

JST is allocating up to JPY 500 million (including 30% overhead expenses) over five years per project to support activities of eligible researchers across supported projects. The maximum number of projects that can be supported is 3. For further


details and eligibility please refer to the JST ASPIRE [website](#) .

JST's program ASPIRE (Adopting Sustainable Partnerships for Innovative Research Ecosystem) will support research activities on the Japan-side of the adopted project. ASPIRE is an initiative to develop and strengthen international joint research in scientific and technological fields of strategic priority with like-minded countries. Through this program in cooperation with partner national and regional funding agencies from these countries, JST aims to foster promising early career researchers who may be the future leaders of their fields by connecting top researchers and promoting researcher mobility.

Although any project with themes described in the Project Description is eligible for support, JST will prioritize projects that focus on activities that will promote international researcher mobility and fosters early career researchers to align with the objectives of ASPIRE.

A. Eligibility

Requirements for Japan-side research team: Researchers or research teams that are conducting research at a research institution (universities, independent administrative institutions, public experimental research institutions, public-interest corporations, and companies) in Japan are eligible to apply.

Researchers and research institutions applying must register with the "[Cross-Ministerial Research and Development Management System](#)  (e-Rad)" prior to application.

B. Organization of the Japan-side Team

The research team on the Japan-side will be comprised of the following members:

1. Principal Investigator (PI)

The PI is a researcher who will be directly supported by JST and is the representative of the research team(s) in Japan. They are responsible for directing and overseeing the whole project. The PI must be affiliated with a research institution in Japan.

2. Co-Principal Investigator (Co-PI) (if needed)

The Co-PI is a researcher who will be directly supported by JST and collaborates with the PI in conducting the research project. The Co-PI must be affiliated with a research institution in Japan. Including one or several Co-PIs is optional.

3. Research participants

Research participants are researchers, technicians, research assistants, students and others who are part of the research project under the direction of the PI or Co-PIs but are not directly supported by JST.

4. Outgoing researcher(s)

In principle, the researcher(s) going abroad should fall under either (i) or (ii) to be eligible. The outgoing researcher(s) will conduct research activities in the counterpart countries for about one year. There is no limit to the number of researchers who may go abroad, and they can be the PI, Co-PI or research participants of the project.

(i) Students enrolled in an advanced degree course (i.e., master's or doctoral course). Students who are enrolled in a master's course, doctoral course or transitioned to a postdoctoral researcher position upon completion of their doctoral course are required to obtain prior approval from the project PI or Co-PI and the research institution to which they belong to in order to use ASPIRE funds.

(ii) Researchers who have obtained their final degree less than 15 years ago and are conducting research activities at universities, public research institutions, etc.

C. Expenditure/costs eligible for funding

1. Direct Costs

Direct costs encompass expenditures that are directly essential for the completion of research, as outlined below:

a. Travel Expenses

Travel expenses, accommodation, and research expenses for researchers going abroad and for research participants described in the research plan.

b. Personnel costs

Personnel expenses for research participants described in the research plan (PI and Co-PI personnel expenses and teaching buyout policy may apply). Personnel expenses for administrative staff necessary to coordinate the researchers' travel and their personnel-related procedures.

c. Facilities, Equipment and Consumables

Costs of research equipment, purchase of books, reagents, materials and consumables, etc.

d. Miscellaneous

Necessary costs for the research and development (cost for organizing and hosting events for research dissemination, equipment leasing costs, transportation costs for equipment used for the research project).

2. Indirect Costs

Indirect costs refer to funds which go directly to the research institution for administrative overhead costs.

3. Points of Caution

70% of the total direct cost must be applied to the following activities: (1) building and expanding international research networks that foster cutting-edge research and development (2) laying the foundation for long-lasting relationships and continued involvement in the international research community by promoting international mobility of talent and providing research opportunities to early career researchers.

The above-mentioned research expenses reserved for promoting international networking and fostering future generations of researchers may cover expenses related but not limited to:

- holding workshops to develop and strengthen relationships among researchers
- travel expenses for the researchers going abroad to the partner country and expenses incurred during the stay
- personnel expenses for administrative staff to coordinate the travel of outgoing researchers and their personnel-related procedures.

Please note that employment, procurement of equipment, etc. purely for the purpose of conducting research will not be counted as a part of the 70%.

D.2.d Partnership with Republic of Korea

IMPORTANT NOTE: This section applies to proposals, awards, and requirements for Korean institutions and researchers only.

The Ministry of Science and ICT of the Republic of Korea plans to provide up to 5 billion KRW (including overhead expenses) for 5 years per project to support the activities of eligible researchers as part of the Bio and Medical Technology Development Program. The maximum number of projects that can be supported is 5. The amount of support per project and the number of projects may vary depending on the available budget size and the results of the proposal evaluation.

Detailed information about support eligibility and funding is available on the National Research Foundation of Korea (NRF) webpage (**Link to be determined**).

Information of application for Korea-based researchers

Korea-based researchers who will be conducting joint research with researchers from the US, UK, Canada, Finland, or Japan must check whether they are eligible to receive funding from MSIT of the Republic of Korea. Among Korea-based researchers, the principal Korea investigators (Korea PIs) are responsible for research grants supported by MSIT through NRF. Additionally, researchers from Korea-based institutions may join as co-researchers. Korean researchers are encouraged to review and address any specific additional requirements requested by the NRF.

Partnerships may include researchers in the natural sciences, engineering and physical sciences, biology and life sciences. Despite the composition of the research team, Korea researchers must submit only one Korean project proposal to NRF.

The Korea PI must submit a copy of the project proposal in Korean to NRF in accordance with Korean domestic regulations. The Korean application package is due at NRF at the same time as the NSF application. Instructions for this are provided on the NRF webpage (TBD).

Upon receipt of the Korean application package, NRF will conduct an administrative and eligibility review of all proposals involving Korean teams before the NSF merit review. Proposals that do not meet eligibility requirements will be rejected.

NRF will review proposals recommended for funding that involve Korean-based researchers and allocate Korean funding based on the NSF merit review.

Research funds supported by NRF are subject to relevant laws and regulations, such as the Korean government's National Research, Development, and Innovation Act, the MSIT regulations, and the 2024 Bio and Medical Technology Development Project Implementation Plan.


Projects funded by NRF must submit annual, interim (after 3 years), and final reports to NRF. Korean researchers must report regularly according to the guidance and requirements of the NRF.


D.2.e Partnership with the United Kingdom

Collaborations with partners in the United Kingdom will be through UK Research and Innovation.

IMPORTANT NOTE: This section applies to UKRI proposals and awards only. Applicants should check the UKRI website for full details of funding support available for this call which will be updated periodically to reflect confirmation of UKRI's budget for this activity.

The Global Centers call offers UK researchers a unique opportunity to participate in international multilateral projects. Working collaboratively to address important challenges not possible except through multidisciplinary international partnerships, projects should develop innovative solutions to accelerate the transition to use of sustainable bio-based solutions in the green economy by bringing together unique and synergistic teams, resources, technologies and expertise.

UKRI-Biotechnology and Biological Sciences Research Council is allocating up to GBP £8.5M to support activities of eligible researchers across supported projects. The UKRI-supported elements of Global Centers awards are expected to be up to five years in duration. The number of successful awards is subject to the availability of funds and applicants should consult the UKRI website for specific details with regards to costs and funding available for this activity. Details are available [here](#) .

For details of UKRI eligibility rules please see the [UKRI website](#) . Inclusion of other project partners (e.g., within industry) is strongly recommended to accelerate the translation and uptake of research outcomes within the UK bioeconomy.

Multidisciplinary applications involving bioscience researchers and also incorporating other disciplines are encouraged. UK components of the Global Centres must be focused primarily in the remits of the UKRI Councils participating in this call and address the requirements in the national annex, as well as responding to the overall scope of the NSF solicitation.

This call is aligned with UKRI's "National Engineering Biology Programme", aiming to:

- Deliver a step change in discovery and application-inspired engineering biology transformational research and innovation
- Harness the transformative potential of engineering biology by supporting knowledge exchange and translation for economic and public benefit
- Promote collaboration across disciplines and sectors
- Leverage and enhance the UK's national capabilities
- Address skills needs and develop talent

The call is also aligned with UKRI's Strategic Theme "Build a Green Future", an effort to:

- Accelerate the green economy
- Support research and innovation that unlock solutions essential to address the transition to a low-carbon economy.

UK contributions to the Global Centres are expected to directly contribute to delivering ambitious goals relevant to either or both of following areas:

Biodiversity


We will support research and technology development activities in biodiversity that can be used for the purposes of innovation and translation within bioeconomy. This may be through delivering:

- Significant advances in the discovery of novel functions across diverse organisms in the tree of life, accelerating genomic identification, phenotyping and high-throughput functional characterization, and (re)engineering, particularly where this will also support more rapid and reliable translation and scale-up within bio-based manufacturing.
- Novel approaches that leverage the diversity of innovation within nature by supporting the prediction and (re)design of regulatory, metabolic, signaling, and cellular production systems; for example, using bioinformatics, AI and engineering biology approaches to develop innovative systems that combine functions from diverse biological pathways or systems for production of sustainable chemicals, materials and other bio-based products.
- Applications that demonstrate the approaches developed could reduce greenhouse gas emissions contributing to realizing future Net Zero or provide bio-based alternatives that could help address other environmental factors contributing to biodiversity decline. Additionally, how ethical and sustainability criteria can be built into the data structures used to harness biodiversity genetic and genomic resources.


Biofoundries


We will support research and technology development activities relevant to engineering biology and other biotechnological approaches towards innovation in biomanufacturing, underpinning the future processes of bio-based manufacturing and remediation in the bioeconomy. Projects should enable and combine automation, high-throughput equipment including process scale-up, computer-aided design, workflows and tools in an iterative design-test-build-learn cycle for the development of engineered biological systems for the bioeconomy. Areas of interest include:

- Applications across a range of bioeconomy sectors, including food, health (animals/plants/humans), chemicals and pharmaceuticals, as well as other allied areas covering remediation and waste treatment, novel materials and construction where, for example, contributing to bio-refineries will help diversify how the bioeconomy can reduce our dependence on fossil-based feed-stocks.
- New or improved bio-based processes that can contribute to a circular economy through reuse and regeneration of materials or products, such as those involved in the recovery of technology relevant metals and minerals and the processing of textiles.
- Developing advanced technologies and platforms for precise engineering of diverse organisms, harnessing developments in technologies such as AI, measurement, and automation to improve and expand capabilities in biological design-test-build-learn cycles to progress from conceptualization to real-world application.




Further details on the activities which UKRI are keen to support through this activity can be found on the UKRI webpage which contains all relevant information in relation to this activity. Full details are available [here](#) .

Information of application for UK-based researchers


NSF PIs partnering with UK-based researchers must appoint a UK-based researcher who is eligible to receive funds from UKRI to act as the UK project lead on the UK portion of the grant. Additional UK researchers may join as project co-lead. NSF PIs and UK researchers are strongly encouraged to review and address the specific additional requirements requested by UKRI from their project leads, which will include eligibility criteria: <https://www.ukri.org/apply-for-funding/how-to-apply/> .

Proposals with UKRI as an agency partner must additionally submit an application package to UKRI. The UK project lead is responsible for submitting this information on behalf of the UK project co-leads. Instructions for doing so are provided [here](#) . The UK portion of the application package is due at the same time as the NSF package.

Notwithstanding the composition of the research team, the UK members of the team must submit only one package to UKRI. UKRI will review all proposals and assign UKRI funding to meritorious projects as appropriate.

Please note that additional information further to the joint application form will be requested via UKRI's Funding Service. Additional questions will include request for a detailed UK budget breakdown and [Ethical Considerations on Use of Animals in Research](#) , [Managing Risks of Research Misuse](#)  and [Trusted Research](#) . Please ensure you fill out the requested information on UKRI's Funding Service in parallel with completing the joint application form.

UKRI will review proposals recommended for funding that involve UK-based researchers and will allocate UK funding based on the NSF merit review and, where applicable, considering the potential risks for the UK's national security.

For grants awarded by UKRI, standard UKRI award conditions and funding guidelines (<https://www.ukri.org/apply-for-funding/how-to-apply/> ) apply.

Grants funded by UKRI will also need to report to UKRI. Recipients must report regularly according to the reporting requirements, which will be outlined in successful award letters.

D.2.f Multilateral Partnership with two or more Partners Countries

Global Centers projects involving partnership between the U.S. and two or more partner countries are strongly encouraged. Funding partners recognize that global challenges must be addressed through international collaboration and encourage researchers to tackle big questions that can only be addressed through multilateral efforts. Please refer to

the above sections regarding country-specific interests and topics and any potential restrictions involved in any bilateral collaboration, as those remain true in any proposed multilateral collaboration.

E. NSF PRINCIPAL INVESTIGATOR

The Principal Investigator (PI) will be the director of the project. The PI is expected to provide intellectual leadership and to be an essential participant in research and related educational activities. The PI will have overall responsibility for the administration of the award, for the management of the project, and for serving as the main point of contact with NSF.

F. VISAS AND PERMITS

PIs are responsible for obtaining any required visas for foreign travel and for providing documentation through the U.S. research institution in support of U.S. visas for foreign counterpart investigators. PIs are also responsible for obtaining research permits and import/export documents where necessary.

III. Award Information

IMPORTANT NOTE: This section applies to NSF awards to U.S. organizations only. Please see Section II.D.2 for international funding partner agency award information and requirements.

Anticipated Type of Awards: Standard and Continuing Grants

Estimated Number of Awards: 5 to 7 pending the availability of funds.

Anticipated Funding Amount: \$25,000,000

Award size is expected to be up to \$5 million in total over 4 or 5 years.

The estimated number of awards and anticipated funding level 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.

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:

An individual may be listed as a PI or a co-PI on no more than one proposal submitted in response to this solicitation. Proposals exceeding this limit will be returned without review in the reverse order received.

Additional Eligibility Info:

For all proposals the eligibility criteria of all partner agencies involved in a given proposal must be met for the proposal to be compliant. Please refer to the country specific partnership instructions (section II.D.2) for additional country-specific eligibility criteria.

V. Proposal Preparation And Submission Instructions

A. Proposal Preparation Instructions

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

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.

IMPORTANT NOTE: This section applies to NSF awards to U.S. organizations only. Please see section II.D.2 for partner-agency award information and requirements.

Proposals should include the components described below. Consider these important notes. Proposals that exceed the specified page limitations given below will be returned without review. No additional information may be provided by links to web pages in the Project Description.

The proposal must be submitted as a single integrated proposal by the lead U.S. organization, with proposed sub-awards to the other involved U.S. organizations. Separately submitted collaborative proposals from U.S.-based organizations are not allowed in this competition.

U.S. Principal Investigators that include foreign collaborators NOT supported by one of the partner countries listed in this solicitation are required to have their foreign collaborators secure their own funding, consult their funding agencies to determine whether they are eligible to submit a proposal, and account for the agency submission requirements. NSF policy on funding foreign organizations can be found in the PAPPG, Chapter I.E. See additional information in section II.D.1.e of this solicitation detailing specific requirements from partner funding agencies.

If the project involves human subjects, the Institutional Review Board (IRB) of the submitting organization must certify that the proposed project is in compliance with the Federal Government's Common Rule for the protection of human

subjects. IRB information will be required before an award can be made. For more information regarding the protection of human subjects, consult <https://www.nsf.gov/bfa/dias/policy/hsfaqs.jsp> and PAPPG Chapter II.E.5.

If the project involves the use of live vertebrate animals, the project must be approved by the submitting organization's Institutional Animal Care and Use Committee (IACUC) before an award can be made. For more detail, see PAPPG Chapter II.E.4.

PIs proposing work in the Arctic or Antarctic Polar Regions should contact the Office of Polar Programs program officer associated with the program most closely aligned with the proposed research for guidance on submission (<https://www.nsf.gov/div/index.jsp?div=OPP>).

PIs proposing research that requires access to research vessels are encouraged to check general information at https://www.nsf.gov/news/news_summ.jsp?cntn_id=191729&org=OCE.

1. COVER SHEET

The title of the proposal must be preceded by the words "Global Centers:".

Identify the proposed Project Director as the Principal Investigator (PI).

PIs are limited to the individuals listed on the cover page, and all must be U.S.-based participants affiliated with U.S. organizations.

Check the international cooperative activities box and select the primary countries involved in the center from the pull-down list.

2. PROJECT SUMMARY (1 page maximum)

The Project Summary must consist of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity (for additional instructions, see the PAPPG).

Provide a clear and concise description of the project, including the research vision and goals.

The summary should indicate the foreign countries involved and describe the unique opportunities the international partners bring to the project.

The summary should be written in a style that is informative to those working in the same or related fields and be understandable to a scientifically or technically literate lay reader.

3. PROJECT DESCRIPTION (20 pages maximum)

In addition to the requirements contained in the PAPPG, the guidelines below must be followed. Note that the 20-page maximum includes the PAPPG required section labeled "Broader Impacts", "Results of Prior NSF Support," and all tables, figures, and other graphical data. Program Objectives (section II.A. above) should be considered in items a) through e) below.

a. Research vision, goals, and approaches

Describe the vision and goals for the proposed center, the scientific and technical approaches, and the expected outcomes and milestones. Illustrate how the proposed use-inspired research represents important advances achievable only through multidisciplinary and international collaboration. Explain how the proposed center will foster participation of the full spectrum of diverse talent in STEM and promote foreseeable societal benefits.

b. International collaborators and other partners

Explain how international collaboration and multi-sector partnerships will be integrated into the overall research plan. In your description, clearly explain:

Why is international partnership required? What are partners' contributions and roles in the project?

Who are the international collaborators and why are they involved in the project? Highlight specific and unique contributions (e.g., expertise, facilities, sites, data, approaches/methods, opportunities, etc.) of each international partner. Explain how international researchers, students and their organizations are integrated in the project and emphasize the expected benefits for the US and international partners.

What different stakeholder partners are included in your proposal (including but not limited to academia, private sector, public sector, community groups, philanthropies, etc.) and what are their roles in the project?

Identify who the partners from different sectors are and explain why they are included. How will their involvement help you grow your research and transform it into a larger effort?

c. Educational Activities

Note that PIs must provide a Student Mentoring Plan for the U.S. undergraduate and graduate students involved in the project (see Section V.A.8 Supplementary Documentation).

What training and/or educational activities are required to address the identified scientific challenge(s) and train the next generation of a globally engaged workforce? How will the international partnership enrich the student training experience? Note that broadening participation of members of under-represented groups in STEM and empowering under-served communities is especially encouraged.

See Section II.D.2. for additional requirements from partner funding agencies. Note that UKRI does not fund student salary.

d. Other Considerations

As they are developing their proposals PIs should

- Identify a central theme that will advance the understanding of the bioeconomy, engage stakeholders, and broaden participation in international STEM research in an integrated fashion.
- Connect the center theme to overarching basic scientific questions in bioeconomy research in an international context.
- Present clear objectives and outcomes for the proposed center. These should be related to the basic science questions and be formulated so that progress and success can be assessed.
- Articulate a common agenda for the proposed center that reflects a collective understanding of research challenges, challenges to broadening participation, and challenges of integrating research and broadening participation of the full spectrum of diverse talent in STEM, which should be integrated in a research and education plan.
- Develop an overall framework of the proposed center structure necessary to conduct the proposed research and activities, including technical infrastructure, which facilitates collaborative activities and the implementation and accomplishment of specified activities and targeted outcomes.
- Explain the unique opportunity that an international, interdisciplinary, and integrated center will provide, as well as describe what will be achieved in the center mode that could not be achieved with group or individual support.
- Describe the potential legacy and international impact of the proposed center and its service to the community.
- Integration and Partnerships: Which organizations are proposed partners within the proposed center? What unique expertise, perspective, and talent does each partner bring to the center necessary to conduct the proposed science? What evidence is there that partnerships will be able to successfully work together towards the vision of the proposed center? How will activities be integrated across the partners?
- Describe the academic partners that will participate in the proposed center, articulating the unique contribution they bring, as well as how the theme of the center aligns with institutional priorities and strengths.

- Describe the non-academic partners that will participate in the proposed center. Articulate the extent of any existing relationships with non-academic partners. Provide a plan for how non-academic partnerships, especially with community groups and stakeholders, will be strengthened by center research and activities. For partnerships with federal agencies, articulate how research conducted by the center will be beneficial to the federal partners, but remain fundamental research in alignment with NSF's mission.
 - Describe any partnerships that build on existing NSF investments like major facilities, centers and center-like activities, or other Federal investments. Articulate how those previous/ongoing investments will be leveraged in new ways.
 - Describe partnerships that broaden participation. Articulate how any existing broadening participation efforts of partners will be leveraged and amplified by hub activities.
 - Articulate how the partnerships in the proposed center will be nurtured to build long lasting relationships, whose impact and integrated activities might continue beyond the award funding period.
 - Metrics of Success and Evaluation: What will constitute success for the proposed center? How will the multiple and integrative activities of a center be evaluated? How will the broadening participation efforts be assessed? What components of the proposed center will promote building a community potentially able to continue the effort beyond the center funding period?
 - Describe how progress will be measured and reported. Note that the cost of hiring external evaluators can be included in the requested budget. Detail an evaluation plan which may include benchmarks, indicators, logic models, road maps, or other evaluative methods to document progress towards objectives and outcomes.
 - Outline a process to develop appropriate ways to collect and analyze metrics data across the diverse and evolving activities of a center.
 - Present current demographic data related to broadening participation (when available). These data should be specific to the group(s) the center will work with to broaden participation and in a format that can be used for benchmarking and measuring progress on broadening participation.
 - PIs should budget within travel for a minimum of 2 PI/Co-PIs to travel to NSF 3 times over the award period for a PI meeting and/or to report to NSF on center progress.
- e. **Results from Prior NSF Support (3 pages maximum):** PI and co-PIs who have received prior NSF funding must provide information on the prior award(s), and a summary of the results of the completed work, including accomplishments. The results must be separately described under two distinct headings, Intellectual Merit and Broader Impacts. Individuals who have received more than one prior award (excluding amendments) must report on the award most closely related to this proposal. Required information is described in the PAPPG, and failure to include this section may result in the proposal being Returned without Review.

4. REFERENCES CITED: Cite references relevant to both the research and educational plans, using the standard NSF format as per the NSF PAPPG.

5. SENIOR/KEY PERSONNEL DOCUMENTS: In this section, include the following documents, in accordance with the guidance specified in the PAPPG, for all U.S.-based PIs, co-PIs, and other Senior/Key Personnel.

- **BIOGRAPHICAL SKETCHES:** Biosketches for Foreign Collaborators must be included, but as supplementary documentation (see below in section V.A.8). Biosketches for Foreign Collaborators should provide information regarding the strengths, qualifications, and specific impact the individual would bring to the proposed center.
- **CURRENT AND PENDING (Other) SUPPORT**
- **COLLABORATORS & OTHER AFFILIATIONS INFORMATION**
- **SYNERGISTIC ACTIVITIES**

6. FACILITIES, EQUIPMENT and OTHER RESOURCES: Describe facilities and major instruments available in the U.S. and abroad in sufficient detail to allow assessment of the adequacy of resources available to perform the effort proposed.

7. SUPPLEMENTARY DOCUMENTATION: Proposals that do not include the required supplementary documents, or that include non-required documents, will be returned without review.

- a. **Letters of Collaboration (2 pages maximum):** These documents are required for all collaborators involved in proposed work, except for foreign collaborators requesting funding from funding partner agencies listed in this solicitation (for these collaborators, see section V.A.8.e below). Include only official letters with specific commitments of resources from participating institutions, or organizations expected to receive subawards, or from unfunded collaborators or organizations that will provide resources to the project whether in the U.S. or abroad. Letters can be up to two pages long and must indicate 1) what roles the collaborators or institutions will play in the project; 2) what infrastructure, resources, expertise, etc., will be made available to the participant; 3) how collaborators and/or their organizations will benefit from participation in the project. This solicitation requires these descriptive letters of collaboration in lieu of the standard PAPPG language. Letters are limited to two pages each.
- b. **Data Management and Sharing Plan (2 page maximum):** Describe how data and information, including proprietary information or intellectual property, resulting from the proposed project will be managed, with details on how data will be shared among partnering researchers and institutions. Global Center proposals must also include in the Data Management and Sharing Plan a description of how data will be shared with project partners and affiliates, how access to the data will be managed, and how the sensitivity of various data sets will be assessed. See details below regarding NSF Data policy and specificity in the framework of the Global Centers program.

The Global Centers program is committed to the establishment, maintenance, validation, description, and distribution of high-quality data sets. Per the NSF policy on Dissemination and Sharing of Research Results, as stated in the Proposal & Award Policies & Procedures Guide (PAPPG), Principal Investigators (PIs) are expected to share with other researchers, at no more than incremental cost and within a reasonable time, the data, samples, physical collections, and other supporting materials created or gathered in the course of work under NSF grants.

The definition of "data" is expansive and includes (but is not limited to) the following: full data sets, derived data products (e.g., model results, output, and workflows), software, and physical collections. The proposal Data Management and Sharing Plan should clearly describe what data will be collected, what analyses will be done, when data collection is considered "final," and how and when the project will provide open and timely access to data during and after the project. PIs are strongly encouraged to identify long-lived disciplinary repositories most appropriate for the data types to be collected. PIs are required to provide updates on the status of data sharing and archiving in project reports. Furthermore, to the extent possible data should be made compliant with the [FAIR Principles](#) (Findable, Accessible, Interoperable, and Reusable) and CARE Principles (Collective Benefit, Authority to Control, Responsibility, Ethics) for Indigenous Data Governance. Final Reports for all awards should include a statement describing how the data policy requirements have been met.

- c. **Mentoring Plan (1 page maximum):** In accordance with the requirements contained in the PAPPG, if the project requests funding to support postdoctoral scholars or graduate students, the proposal must include a description of mentoring activities that will be provided for such individuals.
- d. **Undergraduate Student Mentoring Plan (2 pages maximum):** Proposals that request funding to support undergraduate students at any participating U.S. institution must upload as Supplementary Documentation a mentoring plan that describes any recruitment, training and/or other activities to be provided to the students and the mentors.


Clearly identify what training and/or educational approaches or methodologies are required for the project. Highlight innovative educational approaches, tools, or technologies. How will these approaches be suitable for training the next generation of a globally engaged workforce? How will the project and the international collaboration offer opportunities for enriched training experiences that will allow research trainees to develop

relevant technical skills, as well as professional skills such as leadership, communication, collaboration and entrepreneurship?

Broadening participation of members of groups under-represented in STEM, empowering under-served communities, and collaborating with organizations in EPSCoR jurisdictions, primarily undergraduate institutions (PUI), minority serving institutions (MSI), and non-research-intensive colleges and universities, is especially encouraged. Comment on how you will measure your success in teaching/learning and how the project will foster participation of the full spectrum of diverse talent in STEM.

- e. **Funded Foreign Collaborator, Organization, and Funding Information:** Proposals must provide as supplementary documentation the biographical sketches of all participating investigators affiliated with a foreign organization which, if the proposal is successful, will receive funding from the partners funding agencies listed in this solicitation. The biographical sketches must conform to the NSF format as specified in NSF PAPPG.

Proposals must provide a detailed budget for the funds requested by their foreign collaborators to partner funding agencies in partner countries as listed in section II.C. Proposals not providing the detailed budgets requested to funding partner agencies will be returned without review. These budgets may be provided in the relevant foreign currencies.

For proposals involving Canada-based researchers, the detailed budget for the funding requested from NSERC and/or SSHRC should only include NSERC or SSHRC eligible direct costs of research and should be expressed in Canadian dollars (if applicable, conversion rate is that at the time of application). All expenditures are subject to the principles and directives governing the appropriate use of grant funds outlined in [the Tri-Agency Guide on Financial Administration](#) . There should be no duplication in funding between items on budgets submitted to NSERC/SSHRC and budgets submitted to other funding partners.

When applicable and available to the PI(s), proposals should provide information on the support already available for foreign collaborators to carry out the proposed work, including the name of the counterpart agency or agencies.

- f. **Project Management Plan (PMP; 4 pages maximum):** The PMP is an important part of the proposal and a mandatory document to provide as supplementary documentation. Proposals failing to provide the PMP will be returned without review. This document must describe the management plan for coordinating activities and outline the personnel and resources involved across the domestic and international network of researchers and organizations which together form the proposed center. This description should include a governance model, plans for internal communication, and specific coordination mechanisms that will enable cross-network integration. You may include an organizational chart. For all organizations involved, define the specific roles and responsibilities of the PIs, co-PIs, other Senior/Key Personnel, and paid consultants, and unfunded collaborators who have roles in the leadership, coordination, training, dissemination, and assessment activities.

Specifically, the PMP should describe the overall structure of the partnership, including: (1) list the partners and stakeholders (lead individuals and institutions), (2) explain the organizational relationships and reporting structure related to the specific goals and objectives of the center, (3) describe the processes used to prioritize center activities, and (4) articulate the mechanisms in place to allow the center to evolve as science priorities evolves. The PMP should include a timeline that specifies milestones and expected completion dates with an anticipated mid-project review by NSF to assess progress toward the center's stated goals and objectives.

The PMP should also provide information on the communication plans; coordination of data and information flow; allocation of funds and personnel; and other specific issues relevant to the management of the proposed activities. Effective integration of all partners into the project effort is considered integral to success and ultimately to scalability of the project. The PMP should clearly answer the following questions:

What is the strategy to allow for effective management of the research and educational components of the project, including integration of all partners and stakeholders into a well-functioning team; relevant collaborative governance and management; procedures to phase research aspects in and out when needed?


What is the vision and strategy for potential growth, scaling up, bringing in new partners, scaling the research up, and building a relevant community potentially able to carry out the work beyond the center funding period?

- g. **Safe and Inclusive Fieldwork (SAIF) Plan (2 pages maximum):** All proposals submitted to this solicitation that include research that will be conducted off-campus or off-site must submit a plan for safe and inclusive fieldwork as a supplemental document that will be considered under the broader impacts review criterion. This supplemental document is in lieu of the required plan associated with the certification called for in Chapter II.E.9 of the PAPPG. More information regarding review of the plan is provided under Solicitation Specific Review Criteria.

It is NSF policy to foster safe and harassment-free environments wherever science is conducted. Work conducted off-campus or off-site should be an enriching experience for everyone and help draw researchers to STEM research. By requiring advanced planning and attention to maintaining an inclusive environment, NSF is working to ensure that off-campus or off-site research is safe and inclusive for all participants.

Off-campus or off-site research is defined as data/information/samples being collected off-campus or off-site, such as fieldwork and research activities on vessels and aircraft. The plan must be no longer than two pages.

The SAIF Plan must include:

- a brief description of the field setting and unique challenges for the team;
 - the steps the proposing organization will take to nurture an inclusive off-campus or off-site working environment, including processes to establish shared team definitions of roles, responsibilities, and culture, e.g., codes of conduct, trainings, mentor/mentee mechanisms and field support that might include regular check-ins, and/or developmental events;
 - communication processes within the off-site team and to the organization(s) that minimize singular points within the communication pathway (e.g., there should not be a single person overseeing access to a single satellite phone); and
 - the organizational mechanisms that will be used for reporting, responding to, and resolving issues of harassment if they arise.
- h. **Projects requiring access to restricted sites or resources:** Projects that require access to areas that have regulated or restricted entry, or require restricted data or samples, must include a letter of collaboration from the authority that controls access, samples, or data. Also, the treatment of such data and samples must be discussed in the data management plan.
- i. **Projects involving work on sovereign Native/Tribal/Indigenous lands:** Proposals that include research in U.S. Native/Tribal communities and/or on Tribal lands must attach a letter or email that confirms community collaboration, or at a minimum community awareness, and permission to work on associated lands from the relevant community organizations or tribal leadership (see [U.S. Department of Housing and Urban Development Tribal Directory Assessment tool](#) or [National Congress of American Indians tribal directory](#) ) as a Supplementary Document. Collaborations should be well justified, in that they represent true intellectual collaboration and utilize the expertise and specialized skills, facilities, and/or resources of the community.
- j. **Project requiring other permissions:** Prior to making a funding decision, additional steps may be required as part of NSF's compliance with applicable federal environmental authorities such as the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA). To support NSF's federal environmental review and compliance obligations, additional information may be requested from the PI. More information can be found in the PAPPG, and the [Checklist](#) (referenced in PAPPG Chapter II.D.2.i.v) may be helpful in evaluating impacts. Where relevant, arrangements to allocate and share samples and data with the relevant communities should be discussed in the proposal or in the Data Management plan.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Budget Justification:

A Budget Justification should be provided. A careful and realistic budget that is consistent with the proposed activities will add to the overall strength of a proposal.

Required Costs: Include costs of travel for a minimum of 2 PI/Co-PIs to travel to NSF 3 times over the award period for a PI meeting and/or to report to NSF on center progress. Include costs of travel for project participants for one trip to the Washington, D.C. area to participate in a one-day orientation meeting at the beginning of the project and a 1.5-day Awardee meeting in year 2 of the award.

Allowable Costs for NSF Budget:

Salaries, wages, and fringe benefits for postdoctoral scholars, other professionals, graduate students, secretarial-clerical, or administrative staff who will perform dedicated work on the GC project. A significant portion of direct costs should fund U.S. students conducting collaborative international research-related activities.

Participant Support Costs: Stipends, travel, subsistence, and other costs of participation for any undergraduate research participant or K-12 teacher included in project activities should be included under Participant Support Costs. Stipends for undergraduate students should be budgeted at rates comparable to those in the Research Experiences for Undergraduates (REU) program (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517) in addition to any travel and subsistence costs incurred while abroad. Travel, subsistence and other costs of participation in GC project meetings and workshops for faculty, researchers and students from non-grantee institutions (who are not included in subawards) should also be included under Participant Support Costs.

Travel: Research-related travel support (i.e., airfare, lodging, meals, and incidental expenses). For living expenses abroad, applicants are encouraged to work with international counterparts to develop realistic budget requests. For example, access to university guest housing or similar facilities should be explored. Cost-effective arrangements should be made for individuals residing at the international site for extended periods and for projects involving on-going exchanges of short-term visitors.

Expenses related to project assessment: Should include fees for internal or external evaluators. Costs should be limited to no more than 10% of total direct costs.

Other Direct Costs: May include GC-specific items, for example, research and education communication linkages between institutions, language training, non-travel costs associated with coordination meetings, and preparation/orientation of students for living abroad.

Equipment: This program is not intended to support the purchase, operation, or maintenance of moderate to large equipment. Only limited equipment costs can be included.

NSF awards normally support the U.S. portion of the collaboration. General NSF rules apply. Consult the PAPPG for details.

C. Due Dates

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

June 11, 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/ProposalPreparation 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 and Sharing Plan and the Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to NSF Merit Review criteria, proposals must address the following criteria specific to the Global Centers call.

- **International collaboration:** Why can this global challenge only be addressed through the complementary knowledge, skills, and resources of this group of international partners? What are the roles and responsibilities of the foreign collaborators in the proposed center?
- **Interdisciplinarity:** Why can this global challenge only be addressed through the complementary knowledge, skills, and resources of this multi-disciplinary team?
- **Use-inspired:** How will the proposed center utilize the Knowledge to Action Framework to produce results likely to contribute to addressing a societal challenge related to the Bioeconomy? What stakeholder groups will be involved in co-design and co-generation of the research to ensure that results are relevant and supportive of workforce development? Center proposals should address the ethical, legal and social aspects of the work.
- **Fostering participation:** How will the project foster the participation of the full spectrum of diverse talent in STEM (e.g., as PI, co-PI, senior/key personnel, postdoctoral scholars, graduate or undergraduate students, or trainees). This includes historically under-represented or under-served populations, diverse institutions including Minority Serving Institutions (MSIs), Primarily Undergraduate Institutions (PUIs), and two-year colleges, as well as major research institutions, including in EPSCoR jurisdictions.

NSF will also assess to what extent the proposed activities align with partner-agency priority topics and missions as described in Section II.D.1.c.

Reviewers will be instructed to evaluate the Safe and Inclusive Fieldwork (SAIF) Plan within the Broader Impacts review criterion, specifically:

- Is there a compelling plan (including the procedures, trainings, and communication processes) to establish, nurture, and maintain inclusive off-campus or off-site working environment(s)?
- Does the proposed plan identify and adequately address the unique challenges for the team and the specific off-campus or off-site setting(s)?
- Are the organizational mechanisms to be used for reporting, responding to, and resolving issues of harassment, should they occur, clearly outlined?

B. Review and Selection Process

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

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

Partner funding agencies in Canada, Finland, Japan, Republic of Korea, and the United Kingdom, will partner with NSF throughout Global Centers, including the merit review process. Partner agencies will be invited to nominate representatives to observe the review process.

Proposals and relevant information about proposals involving collaboration with Canada, United Kingdom, Finland, and Korea will be shared with their respective according to the respective arrangements with NSF. For these proposals, NSF will also invite suggestions for relevant reviewers from these agencies. Final decisions on reviewers will be made by NSF.

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.

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 annual project report, and a project outcomes report for the general public.

Failure to provide the required annual or final annual 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 annual 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:

- Karen R. Lips, OISE, telephone: (703) 292-5133, email: globalcenters@nsf.gov
- Paul Raterron, OISE, telephone: (703) 292-8565, email: globalcenters@nsf.gov
- Wenda Bauchspies, OISE, telephone: (703) 292-5034, email: globalcenters@nsf.gov
- Hannah Perry, OISE, telephone: (703) 292-7358, email: globalcenters@nsf.gov
- Clifford Weil, BIO, telephone: (703) 292-4668, email: cweil@nsf.gov
- Sorin Draghici, CISE, telephone: (703) 292-2232, email: sdraghic@nsf.gov
- Elsa Gonzalez, EDU, telephone: (703) 292-4690, email: elgonzal@nsf.gov
- Crystal Leach, ENG, telephone: (703) 292-2667, email: crleach@nsf.gov
- Lina C. Patino, GEO, telephone: (703) 292-5047, email: lpatino@nsf.gov
- Yulia Gel, MPS, telephone: (703) 292-7888, email: ygel@nsf.gov
- Jeremy Koster, SBE, telephone: (703) 292-8740, email: jkoster@nsf.gov

- Michael Reksulak, TIP, telephone: (703) 292-8329, email: mreksula@nsf.gov

For questions related to the use of NSF systems contact:

- 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 inquiries regarding Canadian involvement in this program, contact: RP-Initiatives-PR@nserc-crsng.gc.ca.

For questions related to Finland (RCF) involvement in this program, contact: risto.vilkko@aka.fi.

For enquiries related to UK involvement in this program, contact: Global.Centres.Bioeconomy@bbsrc.ukri.org.

IX. Other Information

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

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

Related Programs: Investigators may also wish to view the Programs and Funding Opportunities section of the OISE home page <https://www.nsf.gov/dir/index.jsp?org=OISE> to view the lists of OISE Managed Opportunities and other NSF Opportunities that Highlight International Collaboration.

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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