

Advancing Informal STEM Learning (AISL)

PROGRAM SOLICITATION

NSF 22-626

REPLACES DOCUMENT(S):

NSF 21-599



National Science Foundation
Directorate for STEM Education
Research on Learning in Formal and Informal Settings

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

January 11, 2023

Second Wednesday in January, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

1. NEW: AISL Goals for Proposals
2. NEW: Changes to project types, their required components, funding amounts and estimated number of proposals to be funded.
3. NEW: Added new requirements for all proposals: 5 keywords in Project Summary; Goals to be addressed; List of Proposal Personnel
4. REVISED: Solicitation-Specific Criteria
5. REMINDER: All proposals must articulate a clear rationale describing how the project fits within the informal STEM learning literature and practice as well as how it advances our understanding of/contributes knowledge to the informal STEM learning community.
6. REMINDER: The AISL Program prefers collaborative proposals to be submitted using the single-entity option (submitted by one organization with subawards). For collaborative proposals uploaded as separate linked submissions from multiple organizations, the minimum one-year budget amount is \$75,000 for each organization for each project year.
7. Conference proposals may be submitted at any time, generally a year in advance of the scheduled date

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:

Advancing Informal STEM Learning (AISL)

Synopsis of Program:

The **Advancing Informal STEM Learning** (AISL) Program is committed to funding research and practice, with continued focus on investigating a range of informal STEM learning (ISL) experiences and environments that make lifelong learning a reality. This Program seeks proposals that center equity and belonging, and further the well-being of individuals and communities who have historically been and continue to be excluded, under-served, or underrepresented, due to gender, race, ethnicity, sexual orientation, disability status, neurodiversity, geographic location, and economic status, among others, as well as their intersections. The current solicitation encourages proposals from institutions and organizations that serve public audiences, and specifically focus on public engagement with and understanding of STEM, including community STEM; public participation in scientific research (PPSR); science communication; intergenerational STEM engagement; and STEM media.

Projects funded by AISL should contribute to research and practice that further illuminates informal STEM learning's role in equity and belonging in STEM; personal and educational success in STEM; advancing public engagement in scientific discovery; fostering

interest in STEM careers; creating and enhancing the theoretical and empirical foundations for effective informal STEM learning; improving community vibrancy; and/or enhancing science communication and the public's engagement in and understanding of STEM and STEM processes.

The AISL Program funds five types of projects: (1) Synthesis; (2) Conference; (3) Partnership Development and Planning; (4) Integrating Research and Practice; and (5) Research in Support of Wide-reaching Public Engagement with STEM.

NOTE: Activities primarily focused on formal educational systems or outcomes are outside the scope of work supported by this program. AISL does not fund formal elementary, middle, or high school, or undergraduate or graduate education, whether in-person or online. Similarly, AISL does not fund formal workforce training (e.g., professional certifications and degree-earning programs) that is not aimed directly at informal STEM learning professionals.

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.

- Address Questions to the Program, telephone: (703) 292-8616, email: DRLAISL@nsf.gov

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

- 47.076 --- STEM Education

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 48 to 77

Pending availability of funds, it is anticipated that about 6-8 Synthesis awards, 10-15 Conference awards, 10-15 Partnership Development and Planning awards, 12-16 Integrating Research and Practice awards and 5-8 Research in Support of Wide-reaching Public Engagement with STEM Project awards will be made. AISL will also fund 1-3 awards made through the Research Coordination Networks (RCN) mechanism and 4-12 CAREER awards and REU supplements.

Anticipated Funding Amount: \$28,382,000 to \$41,000,000

Limits for funding requests and duration of AISL proposals under this solicitation are as follows: (1) Synthesis projects: \$100,000 to \$500,000 with a duration up to three years; (2) Conference projects: \$75,000 to \$250,000 with a duration up to two years; (3) Partnership Development and Planning projects: \$50,000 to \$150,000 with a duration of one to one and one-half years; (4) Integrating Research and Practice projects: \$250,000 to \$2,000,000 with a duration of two to five years; and (5) Research in Support of Wide-reaching Public Engagement with STEM projects: \$1,000,000 to \$3,500,000 with a duration of two to five years.

Eligibility Information

Who May Submit Proposals:

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

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required

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

B. Budgetary Information

- **Cost Sharing Requirements:**
Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**
Not Applicable
- **Other Budgetary Limitations:**
Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
January 11, 2023
Second Wednesday in January, Annually Thereafter

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:

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

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I. INTRODUCTION

About the Advancing Informal STEM Learning Program

The Advancing Informal STEM Learning (AISL) Program is the only NSF program that exclusively invests in research and practice on how people learn STEM outside of formal education. The AISL Program is committed to funding research and practice, with continued focus on investigating a range of informal STEM learning (ISL) experiences and environments that make lifelong learning a reality. This AISL solicitation specifically seeks proposals that center equity and belonging, and further the well-being of individuals and communities who have historically been and continue to be excluded, under-served, or underrepresented, due to gender, race, ethnicity, sexual orientation, disability status, neurodiversity, geographic location, and economic status, among others, as well as their intersections. The solicitation encourages proposals from institutions and organizations that serve public audiences, and specifically focus on public engagement with and understanding of STEM, including community STEM; public participation in scientific research (PPSR); science communication; intergenerational STEM engagement; and STEM media.

AISL funded projects should contribute to: (a) research and practice that illuminates informal STEM learning's role in equity and belonging in STEM; (b) personal and educational success in STEM; (c) advancing public engagement in scientific discovery; (d) fostering interest in STEM careers; (e) creating and enhancing the theoretical and empirical foundations for effective informal STEM learning; (f) improving community vibrancy; and/or (g) enhancing science communication and the public's engagement in and understanding of STEM and STEM processes.

The AISL Program does not support activities primarily focused on formal educational systems or outcomes. Therefore, the Program does not fund elementary school, middle school, high school, undergraduate, or graduate education, whether in-person or online. Similarly, AISL does not fund formal workforce training (e.g., professional certifications and degree-earning programs) that is not aimed directly at informal STEM learning professionals. Proposals with these foci will be returned without review.

The AISL Program will fund proposals across five project types (described below in Section II.B.). The AISL Program also encourages teams to consider the EAGER funding mechanism, which supports work in its early stages on untested, but potentially transformative, research ideas or approaches.

II. PROGRAM DESCRIPTION

The informal STEM learning field comprises a broad community of STEM education researchers, practitioners, learning organizations, associations, and communities who seek to understand the theoretical and empirical foundations for effective informal experiences and environments. Almost any environment can support the self-directed nature of informal STEM learning. This vast array of learning environments creates an opportunity to understand how learners can be supported to develop interest and learning, and to bridge across interest areas and settings. The contexts of AISL investments may include everyday activities, such as cooking (chemistry) or tracking personal health and screen time data (data visualization); or self-directed experiences such as stargazing (astronomy), creating mini games (computer science), or birdwatching (ornithology). Informal STEM learning can also happen in intentionally designed experiences and environments, such as, but not limited to:

- exhibitions and programs in museums, zoos, aquaria, botanic gardens/arboreta, planetariums, nature centers, parks, libraries, homes, community centers, and other environments;
- science communication;
- traditional or intergenerational knowledge sharing, such as Story Circles;
- community and participatory science;
- radio, television, film, media programs or series, or podcasts;
- Do-It-Yourself (DIY) or maker initiatives;
- opportunities for the public to engage in research, including crowdsourcing and Public Participation in Scientific Research (PPSR); and
- online and other digital experiences (e.g., games, simulations, social media).

A proposal funded by the AISL Program should be of interest and utility to public audiences, such as individuals and communities; informal STEM practitioners (AISL Goal #4 below provides a broad definition of practitioners); educational, scientific, and/or community-based researchers; and other stakeholders, such as STEM education leaders, community leaders (communities may include local, tribal, shared identities, common interests), decision-makers, and policymakers.

A. AISL GOALS FOR PROPOSALS

This section describes six goals that the AISL Program views as essential across its funding portfolio. PIs are encouraged to consider these goals to help guide their proposed work. Note that all proposals must explicitly address the first three goals: (1) Learning in Informal Experiences and Environments, (2) Advancing the Knowledge Base of Informal STEM Learning, and (3) Equity, Belonging, and Broadening Participation. Certain

project types (described below) may require addressing additional goals. Unless specified, submitters can use their judgment and determine the extent to which AISL Goals #4-6 apply to their project.

Goal #1: Learning STEM in Informal Experiences and Environments (required of all proposals)

All AISL proposals must be clear with respect to (1) how *learning* relates to the proposed work and (2) how the proposed project is specifically *informal*. Proposals not specifically or clearly related to learning in *informal* experiences and environments are not appropriate for submission to this solicitation. Competitive proposals will clearly explain how and why the proposed project fits as "learning STEM in informal experiences and environments," as well as how it advances and adds value to the collective understanding of learning STEM in informal experiences and environments.

Informal STEM learning (ISL) broadly encompasses:

- Awareness, knowledge or understanding of STEM concepts, skills, and processes;
- Engagement or interest in multiple ways of learning and knowing STEM, STEM education, and STEM careers;
- STEM identity development and belonging;
- Discerning among evidence, opinion, misinformation, and disinformation; and
- Enacting behaviors and agency around STEM and related societal issues.

Area of STEM. STEM is an acronym for science, technology, engineering, and mathematics; STEM includes the social, behavioral, and economic sciences. Content may focus on any area of STEM that NSF supports, including emerging topics in science and technology, interdisciplinary learning, and learning that positions STEM within meaningful personal, cultural, or societal frameworks. Proposals must indicate the area(s) of STEM that the proposal focuses on in sufficient depth to provide a clear understanding of concepts, topics, processes, and associated skills developed for the focal audience.

Audiences for AISL projects. All AISL proposals must be clear about their audience(s) and how the project's design and informal STEM learning component(s) are relevant and appropriate for the proposed audiences and their age levels (see also, Solicitation-Specific Review Criteria below). Proposals may focus on public audiences, professional audiences, or both. The AISL Program is keenly interested in public and professional audiences and teams that include individuals and communities from groups that have been historically excluded, under-served, or underrepresented in STEM and informal STEM (see Goal #3 below).

Public audiences may include learners of any age, from early childhood to adults across the lifespan, as well as intergenerational, family, and community groups. **Professional audiences** are individuals involved in any aspect of research or development of informal STEM learning experiences or environments. Professional audiences could include informal STEM practitioners, researchers, evaluators, or STEM professionals doing outreach in informal settings. Graduate students and post-docs pursuing work connected to informal STEM learning environments and experiences may also be included as professional audiences.

Goal #2: Advancing the Knowledge Base of Informal STEM Learning (required of all proposals)

All AISL proposals should detail a high-quality plan to generate knowledge through research, evaluation, and practice. To advance the knowledge base, the work must be situated in the existing practice, literature, research, and theory in informal STEM contexts, and address questions of importance to those who learn and/or work in informal STEM experiences and environments. Methods (e.g., quantitative, qualitative, others) and analyses should be described and thoughtfully aligned with the people and places where informal STEM learning is occurring. Iterative, design-based research and community-based and participatory research approaches are encouraged, when appropriate, and should be grounded in relevant methodological approaches (e.g., Jason, et al., 2004). **Coherence among the proposal goals, hypotheses, and knowledge building should be illustrated by including a table or diagram that aligns questions, data, analyses, and potential claims to the proposed activities.** An explicit theoretical framework as well as either a logic model or theory of action should guide proposed projects. Proposals should generate products that are useful to practitioners (see AISL Goal #4) and/or researchers and should include targeted communication strategies for different audiences to ensure broad impact.

While all AISL proposals require *project evaluation* (see the instructions for section D of the Project Description, Section V.A., below), in some instances evaluation takes on an additional role and responsibility in service of advancing the knowledge base. In instances where advancement of the knowledge base is proposed via evaluation and practice rather than research, the work must go beyond immediate iterative improvement and accountability to address broader questions of importance to the informal STEM learning field. Plans to build knowledge through evaluation and practice should be clear about how the work advances understanding of learning STEM in informal environments and should culminate in a summative evaluation report or similar product. In such cases, the summative evaluation component must be of sufficient quality to generate evidence of the impact of the proposed project with respect to broader field-informing outcomes.

Areas for advancing the knowledge base of informal STEM learning include but are not limited to:

- Prioritizing the interests, needs, questions, and experiences of learners and practitioners (see also AISL Goal #4);
- Exploring what works, for whom, why, and in what contexts;
- Understanding affective, behavioral, cultural, social components, and implications of learning STEM through informal experiences and environments;

- Creating and enhancing the theoretical and empirical foundations for informal STEM learning research and practice;
- Studying specific innovative models, productions, programs, technologies, resources, or systems areas of informal STEM learning;
- Investigating innovative methods or practices for assessing learning in these distinctive learning experiences and environments;
- Testing the reproducibility of important findings; and/or
- Conducting syntheses, meta-syntheses, meta-analyses, systematic literature reviews, and conferences.

Goal #3: Equity, Belonging, and Broadening Participation (required of all proposals)

AISL is an NSF Broadening Participation Focused Program, which recognizes that all people belong in the STEM enterprise. There are groups who have historically been and continue to be excluded, under-served, or underrepresented in STEM and informal STEM learning. In this solicitation, excluded, underrepresented, and under-served groups in STEM include, but are not limited to, African American/Black, Alaska Native, Hispanic and Latino/a, Native American, Native Hawaiian, and Native Pacific Islander individuals, persons with disabilities, neurodivergent individuals, persons from economically disadvantaged backgrounds, persons from rural areas, women and girls, and individuals who identify as lesbian, gay, bisexual, transgender or queer (LGBTQ+). Individuals may identify with multiple groups. All AISL proposals should reflect a well-rounded understanding of the focal learners and their communities, public and professional, and include specific plans or strategies for integrating that understanding throughout the proposed work (e.g., team composition and management, research and development processes and activities, budget allocations, etc.). See Solicitation-Specific Review Criteria for further details.

Proposals should clearly describe how equity-oriented approaches are centered in the conception, design, development, leadership, budget allocation, implementation, assessment, evaluation, and communication of findings of AISL projects. Proposals should describe equitable collaborations and partnerships that form the basis of the work, identify potential inequities within the proposed work, and describe the team's processes for recognizing and working through such challenges to hold the team accountable. This may include working to create organizational or systemic change.

Goal #4: Intentionally Community/Practitioner Driven

One way to achieve AISL Goals #1-3 **and** strengthen the potential for broader impacts is to include those most impacted by the work up front. Depending on the focal audience, learners or members of their communities (public audiences) and/or practitioners (professional audiences) can be important contributors in shaping projects to ensure relevance to their lives and practices.

Competitive proposals clearly identify and define the practitioners, learners, and/or community partners involved, describe how they will meaningfully lead or contribute to proposed activities, and discuss how the project is relevant to them.

For purposes of this solicitation:

- **Practitioners** are defined as the people engaged in designing, offering, and/or supporting informal learning experiences, and who have a deep familiarity with the settings and culture of informal STEM (e.g., educators, developers, producers, community partners, and science communicators engaged with informal STEM).
- **Communities** are defined rather broadly going beyond the traditional characterization that communities represent a group of individuals sharing a local, physical location. Communities can also represent any collection of individuals who are unified along certain common dimensions including but not limited to: objectives; professional practices; interests, identities; and/or informal STEM learning priorities.

Goal #5: Professional Capacity Building & Informal STEM Infrastructure

Building capacity, whether for ISL professionals or organizations, is one way to advance the field of informal STEM learning. Capacity building may take the form of professional development opportunities, supporting collaborations and connections within and across sectors of informal STEM learning and beyond, or both. Attention may also be on the infrastructure of ISL (e.g., design of learning spaces, policies and practices, tools, networks). Work focused on understanding systems-level drivers is encouraged.

Goal #6: Support Learners' Participation in and Understanding of STEM practices

Learners' participation in and understanding of science, technology, engineering, and mathematics in informal environments and experiences is key to the future success of the nation. As such, proposals should consider and elaborate on strategies to engage learners in STEM advancements, such as emerging areas of technology, and the practices of STEM professionals. AISL is particularly interested in proposals that foster critical appraisal of connections between STEM and society, and support learners in making informed judgments as STEM intersects with their daily lives. This includes bold approaches to understanding and addressing misinformation and disinformation about the STEM enterprise.

B. AISL PROJECT TYPES

The AISL Program supports five types of projects. Figure 1 provides a summary of the purpose of each project type to help proposers determine the best fit for their work. Note that **each project type has explicit requirements** for proposals, and all submissions, no matter the project type, **must address AISL Goals #1, 2, and 3** and **must include project evaluation plans** that support iterative improvement and/or promote accountability. This is different from evaluation for the purpose of advancing the knowledge base (described in AISL Goal #2).

Figure 1. Brief overview of each project type.



Project Type 1: Synthesis

Budget: Range from \$100,000 to \$500,000

Number of years: Range from 2 to 3 years in duration

Anticipated number of proposals funded: 6-8 per year

Purpose: AISL supports various types of syntheses, such as systematic literature reviews, meta-syntheses, meta-analyses, and other approaches to understanding questions, issues, or topics of central or emerging importance to the informal STEM learning field that align with AISL goals for proposals.

Required components: AISL Goals 1-3 are central to proposals submitted to this project type. Synthesis proposals should make a case for the value of this knowledge to inform future informal STEM learning research and practice. They should detail the amount, type, and relevance of available literature to conduct the synthesis work. Literature selection processes (e.g., methods, search criteria, etc.), quality and inclusion criteria (e.g., peer review, conference proceedings, reports, evaluations, etc.), and the analytical approach should be discussed.

Recommended components: Proposers interested in Synthesis proposals are strongly encouraged to contact a program officer (DRLAISL@nsf.gov) prior to submission to discuss proposal idea(s).

Project Type 2: Conferences

Budget: Range from \$75,000 to \$250,000

Number of years: Range from 1 to 2 years in duration

Anticipated number of proposals funded: 10-15 per year

Due date: May be submitted any time; Per the PAPPG, a conference proposal should generally be submitted at least a year in advance of the scheduled date.

Purpose: Conferences are an important way for the AISL Program to support capacity building (AISL Goal #5) for informal STEM learning professionals. To do that work, conferences bring combinations of researchers, practitioners (see AISL Goal #4), policymakers, and/or learners together to share and discuss recent research, practice, and/or experiences to inform current and future informal STEM learning efforts.

Required components: AISL Goals 1-3 and 5 are central to proposals submitted to this project type. For general guidance about conferences, follow the PAPPG guidance for preparing Conference Proposals ([PAPPG Chapter II](#)). Proposals in this category should address the need for the work, why it is timely, and the expected contributions to understanding or advancing the focal question, issue, or topic. They should include a conceptual framework for the conference, draft agenda, proposed activities, and possible participant lists (including their expertise and selection criteria). Of note, evaluation for the purpose of advancing the knowledge base as required by AISL Goal #2 may look different for proposals to this project type, as efforts may more often focus on reflecting and documenting efforts and next steps.

Recommended components: Consider the degree to which development and implementation include practitioners or community members who will be most impacted by the outcomes of the conference (AISL Goal #4). Proposers interested in Conference proposals are strongly encouraged to contact a program officer (DRLAISL@nsf.gov) prior to submission to discuss proposal idea(s).

Project Type 3: Partnership Development and Planning

Budget: Range from \$50,000 to \$150,000

Number of years: Range from 1 to 1.5 years in duration

Anticipated number of proposals funded: 10-15 per year

NOTES:

- Please note that the Project Type 3 proposals described in this solicitation are a solicitation-specific project category and are separate and distinct from the type of proposal described in Chapter II.E of the PAPPG. When preparing a Project Type 3 proposal in response to this solicitation, the "Research" type of proposal should be selected. AISL will **not accept Planning Proposals**.
- The Project Description is limited to 8 pages. Submissions that exceed this limit will be returned.
- Funding of partnering organizations must be requested via subawards. Separately submitted collaborative proposals will not be accepted.

Purpose: Proposals submitted under this category are intended to foster strong partnerships among practitioners, researchers, learners or members of their community and support effective integration of their varied epistemologies, lived experiences, perspectives, requirements, goals, and expectations. Partnerships should work toward a research and development project or agenda responsive to the AISL solicitation. Activities within the scope include, but are not limited to, multidisciplinary workshops, stakeholder meetings, project planning and explorations

regarding the positioning and capacity of the team to work together to advance informal STEM learning.

Required components: AISL Goals #1-4 are central to proposals submitted to this project type. These proposals should intentionally build new, or expand existing, collaborations among various stakeholders. Proposals should provide a clear plan and/or framework for fostering relationship development, power sharing, respectful decision-making, and identifying future proposed projects that ensure reciprocal benefits. Of note, evaluation for the purpose of advancing the knowledge base as required by AISL Goal #2 may look different for proposals to this project type, as efforts may more often focus on reflecting, acknowledging, re-imagining, and documenting those efforts.

Recommended components: When feasible, consider how partner organizations that are new to the NSF might take the lead role in the project. As appropriate, describe how activities would support capacity building among informal STEM learning professionals (AISL Goal #5), as appropriate. Proposers are encouraged to contact a program officer (DRLAISL@nsf.gov) prior to the submission deadline.

Project Type 4: Integrating Research and Practice

Budget: Range from \$250,000 to \$2 million

Number of years: Range from 2 to 5 years in duration

Anticipated number of proposals funded: 12-16 per year

Purpose: This project type fosters research-practice integration by addressing questions from practice through research to advance the field. Research-practice integration may include studying research findings applied to practice or innovations of informal STEM learning experiences and environments. AISL Goal #4, Intentionally Community/Practitioner Driven, provides a broad definition of practitioners. Proposals submitted to this category should conduct work through collaborative approaches that involve genuine and reciprocal partnerships among researchers and practitioners. This project type offers opportunities for diverse teams to study emergent issues, promising ideas, and innovative approaches that may potentially transform informal STEM learning as we know it. While the range for funding is broad, PIs are encouraged to consider small- and medium-scale investigations as commensurate with the nature of the research questions and design components.

Required components: AISL Goals #1-4 are central to proposals submitted to this project type. If appropriate to the research-practice integration, proposals should articulate plans and processes connected to design, iterative development, and implementation.

Recommended components: Where appropriate, proposals should describe how the work supports the development of STEM-informed and STEM-engaged individuals and communities (AISL Goal #6). Strong proposals make a case for how existing concepts, framings, or approaches may be limiting the field, and how they are designed to expand what may become possible.

Project Type 5: Research in Support of Wide-reaching Public Engagement with STEM

Budget: Range from \$1 million to \$3.5 million

Number of years: Range from 2 to 5 years in duration

Anticipated number of proposals funded: 5-8 per year

Purpose: This project type seeks proposals that reach upwards of hundreds of thousands of informal STEM learners. It supports genuine partnerships between researchers and practitioners. It is up to the team to determine the balance between the proposal's focus on research, development, and implementation. Examples of this project type may include large-scale public engagement proposals, such as broadcast/streaming video, giant screen films, and exhibitions. They may also include scale-up research proposals designed to expand the reach of informal STEM learning approaches that have established evidence of success at a smaller scale.

Required components: AISL Goals #1-4 and 6 are central to proposals submitted to this project type. In addition, proposals should articulate plans for the design, iterative/formative development, implementation, and evaluation. Proposals should include detailed outreach plans and strategies for reaching hundreds of thousands of target audience members.

Recommended components: Proposals are strengthened by describing processes for collaborations between researchers and exhibit and media practitioners, such as specific team communication processes, strategies and defined timelines for iterative design and improvement of products being developed or scaled.

As a reminder, refer to Figure 1 for a summary of the proposal types. Of the project types available, Synthesis and Conference proposals are encouraged as opportunities for supporting ISL professionals.

C. ABOUT EDU and DRL

The Advancing Informal STEM Learning (AISL) Program is one of several programs in the Division of Research on Learning in Formal and Informal Settings (DRL) in the Directorate for STEM Education (EDU). Information about each program can be accessed from the [DRL Web Page](#)

EDU supports excellence in U.S. STEM education at all levels, in all settings for the development of a diverse and well-prepared workforce of

scientists, technicians, engineers, mathematicians and educators and a well-informed citizenry.

DRL invests in the improvement of STEM learning for people of all ages by promoting innovative research, development, and evaluation of learning and teaching across all STEM disciplines in formal and informal learning settings.

For more information on EDU see: <https://www.nsf.gov/dir/index.jsp?org=EDU>

Other Funding Opportunities

Faculty Early Career Development (CAREER) Program https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214

Research Coordination Networks (RCN) Program https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11691

In addition, there are several programs across EDU and NSF that offer funding opportunities for informal STEM learning across the lifespan. Visit the NSF.gov website for information.

D. RESOURCES

The following are a range of resources for prospective PIs:

- Informalscience.org is a digital platform of resources and information for the AISL program. Search the site items about proposal submission tips, list of active awards, and more at (<https://www.informalscience.org/nsf-aisl>).
- The Center for Integrative Research in Computing and Learning Sciences (CIRCLS) supports research on emerging technologies for teaching and learning at NSF. See <https://circls.org> for more information.
- The Community for Advancing Discovery Research in Education (CADRE) is the resource network for the NSF DRK-12 program. CADRE's mission is to support and connect researchers and developers in K-12 STEM education. To explore the resources of CADRE see <https://cadrek12.org/>
- The STEM Learning and Research Center (STELAR) is supported by the ITEST program. STELAR's mission is to build capacity and magnify the results of ITEST projects in order to deepen the impact of the ITEST program. For more information see <https://stelar.edc.org/>
- NSF INCLUDES has several hubs. For more information, see the NSF INCLUDES Coordination Hub and National Network: <https://www.includesnetwork.org/home>
- National Academies of Sciences, Engineering, and Medicine. (2017). *Communicating Science Effectively: A Research Agenda*. Washington, DC: The National Academies Press. <https://nap.nationalacademies.org/23674>
- National Research Council (2009). *Learning Science in Informal Environments: People, Places, and Pursuits* Washington, D. C.: The National Academies Press. https://nap.nationalacademies.org/openbook.php?record_id=12190
- National Research Council (2012). *Education for Life and Work: Developing transferable knowledge and skills in the 21st century*. Washington, D.C.: The National Academies Press. <https://nap.nationalacademies.org/read/13398/chapter/1>

E. REFERENCES

- Center for Advancement of informal Science Education. (2011). Principal investigator's Guide: Managing Evaluation in informal STEM Education Projects. Washington, DC: Author. Retrieved from <https://www.informalscience.org/evaluation/evaluation-resources/pi-guide>.
- Jason, L. A., Keys, C. B., Suarez-Balcazar, Y., Taylor, R. R., & Davis, M. I. (Eds.). (2004). *Participatory community research: Theories and methods in action*. American Psychological Association. <https://psycnet.apa.org/doiLanding?doi=10.1037%2F10726-000>
- NSF 13-126 (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126) Common Guidelines for Education Research and Development.
- NSF 13-127 (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13127) Frequently Asked Questions (FAQs) for NSF 13-126, Common Guidelines for Education Research and Development.

III. AWARD INFORMATION

Pending availability of funds, it is anticipated that about 6-8 Synthesis awards, 10-15 Conference awards, 10-15 Partnership Development and Planning awards, 12-16 Integrating Research and Practice awards and 5-8 Research in Support of Wide-reaching Public Engagement with STEM Project awards will be made. AISL will also fund 1-3 awards made through the Research Coordination Networks (RCN) mechanism and 4-12 CAREER awards and REU supplements.

Limits for funding requests and duration of AISL proposals under this solicitation are as follows: Limits for funding requests and duration of AISL proposals under this solicitation are as follows: (1) Synthesis projects: \$100,000 to \$500,000 with a duration up to three years; (2) Conference projects: \$75,000 to \$250,000 with a duration up to two years; (3) Partnership Development and Planning projects: \$50,000 to \$150,000 with a duration of one to one and one-half years; (4) Integrating Research and Practice projects: \$250,000 to \$2,000,000 with a duration of two to five years; and (5) Research in Support of Wide-reaching Public Engagement with STEM projects: \$1,000,000 to \$3,500,000 with a duration of two to five years.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

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

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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

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

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

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

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

REMINDERS:

- PIs may also benefit from the <https://www.informalscience.org/> tabs of "Develop Projects," "Discovery Research," and "Design Evaluation" when preparing proposals.
- For collaborative proposals uploaded as separate submissions from multiple organizations, the minimum budget amount is \$75,000 for each project year for each organization.

The following instructions supplement guidelines in the PAPPG and NSF Grants.gov Application Guide.

Proposal Set-Up: Select "Prepare New Full Proposal" in Research.gov. Search for and select this solicitation title in Step One of the Full Proposal wizard. When completing the Cover Sheet, proposers are asked to identify the nature and type of proposal being developed. ***This reference to proposal type is different from the AISL proposal types described above.*** For the AISL project type *Conferences*, select CONFERENCE as the NSF proposal type. **For all other AISL project types select RESEARCH as the NSF proposal type.**

1. Cover Sheet

It is assumed that proposals submitted to AISL have the potential for conducting research on human subjects. Thus, a box should be checked on the Cover Sheet with respect to the status of the project's IRB application. Proposers should refer to the NSF PAPPG for further information related to Human Subjects' research.

2. Project Summary

Each proposal must have a summary of the proposed project not more than one page in length. The Project Summary should be informative and understandable to a range of researchers, evaluators, practitioners, equity experts, and scientific experts working in the informal STEM learning field. The Project Summary should consist of the following three sections:

The Project Summary consists of three sections:

Overview: The first sentence of the project summary must indicate the AISL project type being submitted. The overview must describe the informal learning context or setting; the processes or approaches to be designed, implemented, and studied; the STEM content emphases; and the learners/communities/professionals that the project will most impact, including age ranges, and in what capacities they are involved in the project.

On a separate line at the end of the "Overview" section add the text "Keywords:" and provide up to five keywords related to the proposal (e.g., adults, climate science education, science communication).

Intellectual Merit: Describe how the informal STEM learning field will be advanced if the proposal is funded.

Broader Impacts: Describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.

3. Project Description (Narrative)

The project description should follow the requirements outlined in the NSF PAPPG and this solicitation. The narrative is limited to 15 single-spaced pages (*except for Partnership Development and Planning proposals which are limited to 8 single-spaced pages*).

Please note that per guidance in Chapter II of the NSF PAPPG, the Project Description must contain a separate section within the narrative labeled "Broader Impacts." This section should provide a discussion of the Broader Impacts of the proposed activities. Proposers may decide where to include this section within the Project Description.

All the following headings in bold should be included as section headers in the submitted Project Description. Although preferred, they do not need to be in this order:

A. Project Rationale

The project rationale must build a compelling case for the proposed work, its approaches, and how the work will advance knowledge in informal STEM learning. As stated above, all proposals must explicitly address AISL Goals #1-3, and — if they are required for the project type, or if they align with the proposal focus — Goals #4-6. The project rationale should also clearly describe alignment between the project type, purposes, and requirements.

Results from prior NSF support. If applicable, describe results of prior NSF support for projects in which the PI or co-PI have been involved. Refer to the PAPPG for specifics about what must be included. Please highlight whether this proposal is based on previous AISL-funded work. If not applicable, please include the section header with N/A.

B. Project Design

The project design section should detail how the proposed project will carry out the work and respond fully to the AISL Program Description (Section II) above. The narrative should contain sufficient information about the research focus, approaches, outputs/ outcomes, STEM content area(s), audience(s), and requirements of the project type proposed. Remember to make clear how the work addresses the required AISL goals.

C. Communication Plan

All AISL proposals must include a communication strategy for dissemination of findings of the research and learning activities to ISL professionals and other interested communities including, where appropriate, public audiences, scholars, and local, regional and national decision makers. While the potential results of the proposed research are expected to be of sufficient significance to merit peer-reviewed and wide publication, creative approaches that reach broader audiences are strongly encouraged. Proposals should identify the key elements of a communication plan, e.g., specific audiences and identification of the channels, media, and technologies appropriate for reaching these audiences. The proposal should also consider who is sharing the findings — and how capacity building is fostered in this process (per AISL Goal #5).

D. Evaluation

All AISL project proposals are required to specify the evaluative processes they would employ to achieve the following **two** goals:

- i. Support iterative improvement. Evaluative processes should ensure that a proposed work benefits from appropriate, rigorous, external input throughout the life of the project. Such input is essential for cultural relevance, equity, project monitoring, management, and continuous quality improvement. External feedback should enrich (and potentially challenge) the team's perspectives and processes. Some projects employ iterative cycles of evaluation (e.g., front end, formative, remedial) to inform work during the development and implementation of project activities.
- ii. Promote accountability. Evaluative processes should address questions such as: Is the project addressing its stated goals? What is the quality of the work? How has the work centered equity in the project design, implementation, and management?

These requirements are consistent with the External Feedback component of the Common Guidelines for Educational Research and Development (NSF 13-126 & NSF 13-127). The purpose of evaluation to support iterative improvement or accountability is different than evaluation as part of AISL's Advancing the Knowledge Base (AISL Goal #2), although they may be complementary or contributive.

All Evaluation sections should *specify*:

- the rationale for the evaluation approaches taken;
- how the approaches achieve the proposal's evaluation goals, ensure iterative improvement and accountability;
- the expertise of those serving in these roles and how that expertise relates to the goals and objectives of the proposal;
- which member(s) of the project team will be responsible for managing and implementing which evaluative activities; and
- how the PI will incorporate results of the project's external, critical review process into the ongoing management of the project.

For more information about evaluation, see the *Common Guidelines for Education Research and Developments* and the *Design Evaluation* section at <https://www.informalscience.org/>.

E. Project Management

All AISL proposals need to explicitly address project management in terms of how the team will collaborate and embody equitable practices for collaboration for everyone involved in the project.

- i. Describe the composition, experience, and expertise of the project's Leadership Team, which may include senior personnel, subawardees, consultants, and others, depending on the project, in addition to the PI and co-PIs. The description provided should enable reviewers to assess the alignment of the team's lived experiences and professional capabilities that are relevant to the proposed project.
- ii. In addition to the Leadership Team, describe additional contributors who, as appropriate for the project, may include STEM professionals, collaborators, researchers, advisory board members, evaluators, consultants, and contractors. The description provided should enable reviewers to assess the alignment of the contributors' lived experiences and professional capabilities that are relevant to their proposed contributions to the project.
- iii. Describe how the collaborations relevant to the project formed or evolved.
- iv. Describe the project's decision-making processes and how they align with the project's conceptualization of equity, belonging, and broadening participation.
- v. Delineate a schedule or work plan with major milestones for key project tasks.

4. Budgets

Budgets and budget justifications submitted to this solicitation should reflect an equitable distribution of funds based on the proposed scope and substantively value the range and types of expertise and participation in the project (in alignment with AISL Goal #3). All budget requests must be consistent with the proposed scope and duration and cannot exceed the maximum permitted for this competition.

For collaborative proposals uploaded as separate submissions from multiple organizations, the minimum budget amount is \$75,000 for each project year for each organization.

All budgets, both primary and subaward budgets, must be accompanied by budget justifications that include itemizations corresponding to each budget line item and provide sufficient detail to justify the expense and its relevance to achieving the proposal goals. Each subaward requires a complete set of proposal budgets accompanied by a budget justification that includes the basis for selecting the subawardee, as well as itemization of expenses and explanations.

Include under Travel the cost for the PI and one community member to attend a two-day meeting at or near NSF for all odd calendar years of the project.

Requested equipment must be essential components of proposal deliverables. **If personnel expenses are entered for postdoctoral scholars (section B of the budget), a one-page postdoctoral mentoring plan is required in the supplementary documents, or you will not be able to submit the proposal.**

NON-ALLOWABLE COSTS: Funding for the following is not supported by this program: capital or general operating expenses; purchase of major

office equipment, or vehicles; undergraduate tuition; paid advertising; admissions or similar fees; proposals whose primary focus is health or medicine, or proposals that are only about publishing books. In addition, funds for expenses related to field trips, camps, science festivals, science fairs or competitions may be requested only if they are integral to support research and development efforts aligned with AISL goals for proposals.

5. Other Sections of the Proposal

References Cited: Any literature cited should be specifically related to the proposal, and the Project Description should make clear how each reference has played a role in the motivation for, or design of, the project. The References section is distinct from, and in addition to, the Project Description section.

Data Management Plan: For more information on the Data Management Plans for proposals submitted to the Directorate for STEM Education (EDU) see: <https://www.nsf.gov/bfa/dias/policy/dmp.jsp>.

6. Supplementary Documents

Note: Supplementary Documents are distinct from Appendices, as stipulated in the PAPPG: *Appendices may not be included* unless a formal deviation has been authorized. See PAPPG Chapter II for more information about deviations.

Required Supplementary documents:

List of Proposal Personnel: Include current, accurate information for all personnel and organizations involved in the proposed project. NSF staff will use this information in the merit review process to manage reviewer selection. The list must include all PIs, co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, subawardees, postdocs, evaluators, project-level advisory committee members, and writers of letters of collaboration. This list should be numbered and include (in this order) Full name, Organization(s), and Role in the project, with each item separated by a semi-colon. Each person listed should start a new numbered line. For example:

1. [Name]; XYZ Museum; PI
2. [Name]; University of PQR; Senior Personnel
3. [Name]; XYZ University; Postdoc
4. [Name]; ABC Inc.; Paid Consultant
5. [Name]; Community Organization; Subawardee

Allowable Additional Supplementary Documents:

1. Letters of Collaboration from consultants, advisors, distributors, and organizational partners are encouraged. The requirements for the Letters of Collaboration are given in [Chapter II.C.2](#) of the PAPPG. **Proposals with other types of letters may be returned without review.**
2. For proposals with broadcast/streaming media, TV, film, radio, and exhibition products only, PIs may submit up to 15 additional pages maximum for scripts or treatments of media productions, exhibit sketches, or floor plans. This additional documentation cannot be used to increase the 15-page Project Description limit.
3. For proposals that involve media as a primary deliverable (e.g., broadcast/streaming media, film, radio, podcasts) that cannot solely be represented on the printed page, or submitted as in #2 (this section), PIs may provide a separate digital file. For instructions on how to submit such media files, notify the AISL program by sending a notice to DRLAISL@nsf.gov once you have submitted the proposal and have your official NSF proposal number. NOTE: All media files must be received within 5 business days following electronic submission of the proposal. Submissions must be in either .mp3 or .mp4 format and may not exceed 250MB in size or 5 minutes in length.

Note: The Project Description **must provide sufficient information** for reviewers to make reasoned judgments about the proposed work. Reviewers may opt to read or listen to/view these additional materials, but are not required to do so.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Funding for the following is not supported by this program: capital or general operating expenses; purchase of major or office equipment; vehicles; undergraduate tuition; paid advertising; admissions or similar fees; proposals whose primary focus is health or medicine, or proposals that are only about publishing books. In addition, funds for expenses related to school field trips, camps, science festivals, science fairs or competitions may be requested only if they are integral to support research and development efforts aligned with AISL goals for proposals.

C. Due Dates

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

January 11, 2023

Second Wednesday in January, Annually Thereafter

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-381-1532 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.

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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

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

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is

to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and

- b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

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

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

Additional Solicitation Specific Review Criteria

As AISL is an NSF Broadening Participation Focused Program, it is expected that proposed projects will enhance access to and participation in informal STEM learning and foster a sense of belonging in STEM. While everyone should be able to thrive, engage in, and contribute to informal STEM, if they choose, there are groups who have historically been and continue to be excluded, underserved, or underrepresented, due to gender, race, ethnicity, sexual orientation, disability status, neurodiversity, geographic location, and economic status, among others, as well as their intersections. Fostering a sense of belonging often builds on learners' interests, perspectives, strengths, cultural wealth, and life experiences, all of which align closely with the interest-driven, often voluntary nature of informal STEM learning.

In addition to considering the two general NSF Merit Review Criteria, all AISL proposals are required to address within the Project Description the Solicitation-Specific Review Criteria identified below. Reviewers will be asked to evaluate the proposal based on these criteria:

- In what ways does the proposal reflect a well-rounded understanding of the focal audience(s) — public and/or professional — such as assets brought to the project, interests, lived experiences, and age/development?
- To what extent is a well-rounded understanding of the focal audience(s) reflected throughout the proposed work (e.g., team composition and management, research and development processes and activities, budget allocations, etc.)?

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 be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

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

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

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

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

Administrative and National Policy Requirements

Build America, Buy America

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

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

C. Reporting Requirements

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

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

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

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

PIs are required to:

1. Submit the final summative evaluation or other knowledge-building product(s) from the project for posting to an AISL-designated repository as part of submission of the Final Report. Final reports will not be approved before the summative evaluation/knowledge-building products are posted for the project; and
2. Work with an NSF third-party evaluator for the purpose of program evaluation when requested to do so.

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:

- Address Question to the Program, telephone: (703) 292-8616, email: DRLAISL@nsf.gov

For questions related to the use NSF systems contact:

- NSF Help Desk: 1-800-381-1582
- 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 administrative question contact the Program by email at DRLAISL@nsf.gov

IX. OTHER INFORMATION

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

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

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

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

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

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

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

Suzanne H. Plimpton
Reports Clearance Officer
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314

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