

# Advancing Informal STEM Learning (AISL)

---

## PROGRAM SOLICITATION

NSF 15-593

---

**REPLACES DOCUMENT(S):**  
**NSF 14-555**

---



National Science Foundation

Directorate for Education & Human Resources  
Research on Learning in Formal and Informal Settings

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

November 04, 2015

November 08, 2016

## IMPORTANT INFORMATION AND REVISION NOTES

---

1. A new proposal type, Collaborative Planning, has been added.
2. The "Pathways" project type is renamed to "Exploratory Pathways" to strengthen the understanding that these are early stage, proof-of-concept projects.
3. The "Conferences, Symposia, & Workshops" is renamed to "Conferences" to align with the PAPPG;
4. Science Learning +, a type of Research in Service to Practice proposal, is described in a separate solicitation and is therefore no longer included here.
5. This solicitation clarifies research and evaluation for AISL projects.
6. The program will fund up to one Informal STEM Learning Resource Center in FY16.
7. For projects with a goal of broadening participation as a component of their Intellectual Merit and/or Broader Impacts, a new program-specific review criterion has been added.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) ([NSF 16-1](#)), which is effective for proposals submitted, or due, on or after January 25, 2016.

## SUMMARY OF PROGRAM REQUIREMENTS

---

### General Information

---

**Program Title:**

Advancing Informal STEM Learning (AISL)

**Synopsis of Program:**

The **Advancing Informal STEM Learning** (AISL) program seeks to advance new approaches to and evidence-based understanding of the design and development of STEM learning opportunities for the public in informal environments; provide multiple pathways for broadening access to and engagement in STEM learning experiences; and advance innovative research on and assessment of STEM learning in informal environments.

The AISL program supports seven types of projects: (1) Collaborative Planning, (2) Exploratory Pathways, (3) Research in Service to Practice, (4) Innovations in Development, (5) Broad Implementation, (6) Conferences, and (7) Informal STEM Learning Resource Center (FY 2016 only).

**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](mailto:DRLAISL@nsf.gov)

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

- 47.076 --- Education and Human Resources

### Award Information

---

**Anticipated Type of Award:** Standard Grant or Continuing Grant or Cooperative Agreement

**Estimated Number of Awards:** 49 to 71

Pending availability of funds, it is anticipated that about 10-12 Collaborative Planning awards, 10-12 Exploratory Pathways awards, 6-8 Research in Service To Practice awards, 8-10 Innovations in Development awards, 3-6 Broad Implementation awards, and 5-7 Conference awards will be made. AISL will also fund 5-7 awards made through the EAGER and RAPID mechanisms and 2-4 CAREER awards. Up to one (1) Informal STEM Learning Resource Center award is anticipated in FY 2016.

**Anticipated Funding Amount:** \$28,000,000 to \$38,000,000

Limits for funding requests of AISL proposals are as follows: (1) Collaborative Planning projects: up to \$150,000 with duration of one year; (2) Exploratory Pathways projects: up to \$300,000 with duration up to two years; (3) Research in Service to Practice projects: from \$300,000 to \$2,000,000 with a duration from two to five years; (4) Innovations in Development projects: \$500,000 to \$3,000,000 with duration from two to five years; (5) Broad Implementation projects from \$500,000 to \$3,000,000 with a duration from two to five years; (6) Conference projects up to \$250,000 with a duration of up to two years; and (7) up to one Informal STEM Learning Resource Center award up to \$5 million with a duration of five years. If the Resource Center is funded in 2016, there will not be a competition for a Resource Center in 2017.

## Eligibility Information

---

### Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

### 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 for Full Proposals.

## 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 FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - 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: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://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. proposer's local time):
  - November 04, 2015
  - November 08, 2016

## Proposal Review Information Criteria

---

**Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations 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.

## TABLE OF CONTENTS

---

### Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Award Information**
- IV. **Eligibility Information**
- V. **Proposal Preparation and Submission Instructions**
  - A. Proposal Preparation Instructions
  - B. Budgetary Information
  - C. Due Dates
  - D. FastLane/Grants.gov Requirements
- VI. **NSF Proposal Processing and Review Procedures**
  - A. Merit Review Principles and Criteria
  - B. Review and Selection Process
- VII. **Award Administration Information**
  - A. Notification of the Award
  - B. Award Conditions
  - C. Reporting Requirements
- VIII. **Agency Contacts**
- IX. **Other Information**

## I. INTRODUCTION

---

### About the Advancing Informal STEM Learning Program

Almost any environment can support informal science learning, such as a home, a museum, a library, a street, a virtual or augmented reality game. Information networks, mobile media, and social networks transform educational possibilities and create opportunities for seamless learning environments. Informal learning environments are, in principle, accessible to all learners, and evidence suggests they have particular potential for supporting learners from non-dominant groups (National Research Council, 2009). These settings offer learners direct access to compelling phenomena in the natural and designed world, and powerful representations of those phenomena. Ubiquity, digital networks, and lack of formal accreditation procedures mean that anyone with appropriate expertise can facilitate STEM learning in the informal world.

The **Advancing Informal STEM Learning (AISL)** program seeks to advance new approaches to and evidence-based understanding of the design and development of STEM learning in informal environments for public and professional audiences; provide multiple pathways for broadening access to and engagement in STEM learning experiences; advance innovative research on and assessment of STEM learning in informal environments; and develop understandings of deeper learning by participants (National Resource Council, 2012). To achieve the greatest return on its investments, the AISL program encourages projects that will "raise the bar" in the fields of informal STEM education. It invests in projects that advance the leading edge of the field and address its most critical challenges.

AISL proposals must articulate the value of the proposed work to the advancement of the informal STEM learning field beyond individual project impact. Thus, in making funding decisions, the program will place particular emphasis on the ability of projects to demonstrate the characteristics of knowledge-building, innovation, strategic impact, and collaboration.

## II. PROGRAM DESCRIPTION

---

AISL program investments should be of interest and utility to public audiences, informal STEM practitioners, and decision-makers. All proposals must articulate clear rationales describing why a project is primarily informal and how it adds value to the informal STEM learning community.

The products of AISL investments may include, but are not limited to, exhibitions and programs in museums, zoos, aquaria, planetariums, nature centers, parks, libraries, and other environments; science communication; after-school and out-of-school time (OST) programs; radio, television, film, or media programs or series; Do-It-Yourself (DIY)/maker initiatives, research-related experiences such as citizen science, and on-line experiences (e.g., games, simulations, social media, mobile computing, distributed networks, and massive online open courses); and research findings that articulate what works, why, and in what contexts.

Given that almost any environment can support informal science learning, an opportunity exists to understand how learners can be supported to make bridges between what they learn in one setting and what they learn in another setting. Thus projects may choose to include how informal learning practices connect with STEM-related frameworks and curricula, college and career readiness standards, or other educational settings, for example.

### Audiences for AISL Projects

AISL projects engage participants drawn from both public and professional audiences.

**Public audiences** may include learners of any age, educational level, geographic, or cultural background, including those from groups

underrepresented in STEM or underserved in STEM, including geographic regions and economically challenged communities. The AISL program is keenly interested in projects that support understanding issues of access to informal STEM learning opportunities for individuals/groups from populations typically underrepresented in STEM, people in rural as well as urban communities, adults across the lifespan, early childhood, and intergenerational and family groups.

**Professional audiences** are individuals involved in any aspect of research or development of STEM learning by the public in informal environments. Target audiences could include STEM educators, evaluators, education and learning researchers, technologists, media professionals, or STEM professionals doing outreach in informal settings.

Proposals may focus on public audiences, professional audiences or both. Proposals should be clear with respect to how the project design and STEM learning component are relevant and appropriate for the proposed target audiences and age levels.

### STEM content areas

Content may focus on any areas of STEM that NSF supports, including interdisciplinary learning and learning that positions STEM within meaningful personal, cultural or societal frameworks. The STEM content area(s) should be discussed in sufficient depth to provide a clear understanding of concepts, topics, processes, and associated skills that are conveyed to the target audience. Topics should be relevant to the age levels of proposed target audience(s). Projects may integrate STEM and art or the humanities, as long as the goal is to enhance STEM learning.

### Priorities

AISL proposals should be clear about how they address the priorities of knowledge-building, innovation, strategic impact, and collaboration. These four priorities should be addressed at the level appropriate to the proposal type and amount of funding requested.

1. **Knowledge-building.** AISL projects are expected to build knowledge with respect to informal STEM education. As such projects must describe and make a strong case for how a project advances the knowledge base of the informal STEM learning field through research, evaluation, or a combination of research and evaluation processes. The theoretical and empirical justification for the proposed project must be clearly articulated. Knowledge generation may focus on developing, testing, and implementing innovative research, models, resources, and tools for informal learning environments. Foci of investigations may include, for example, "what is happening," "to what extent," "why," "how," "what works for whom," and "under what circumstances."

Projects should consider building from or critiquing relevant research agendas or literatures about informal STEM learning that have been developed in recent years. This may be one way projects can contribute to the development of the field. Some current frameworks are available at <http://www.informalscience.org>.

Definitions of research and evaluation vary across the field of informal STEM education. It is not the goal of this solicitation to set definitions for these approaches. Instead, the AISL program seeks to advance the collective understanding of learning STEM in informal environments and to provide appropriate means for communicating what has been learned. Thus, each proposal should identify how it builds knowledge. It should make a case for the means by which it is doing so, using appropriate resources from research and evaluation (Friedman, 2008).

With respect to learning, proposals must describe measures of learning outcomes for the target audiences, including how the chosen measures are appropriate for the proposed work and of practical interest and utility to practitioners and decision makers. Recent reports encourage measuring learning outcomes in such terms as interest, engagement, attitude, motivation, behavior, identity, persistence and 21st century skills (National Research Council 2009, 2012, 2015). The AISL program recognizes the complexities of measuring STEM learning in informal environments. As such, the program welcomes innovative and exploratory assessment methods that draw from knowledge and practice of learning across environments.

2. **Innovation.** In a manner similar to NSF programs that fund the frontiers of STEM research, AISL seeks to fund projects at the frontiers of informal STEM learning that will advance the state-of-the-art. Depending on the discipline or sector, innovation may be framed in different ways and serve different purposes. Innovation may build on or extend current work or it might take that work in a totally different direction. In the informal education field, innovation might address immediate challenges and opportunities; anticipate different structures, functions, and purposes of informal STEM education; challenge existing assumptions about learning and learning environments; or envision the future needs of diverse learners, educators, and STEM professionals in the U.S. In addition, personalized learning options and participatory learning environments are expanding and broadening participation in STEM. The pervasiveness and accessibility of digital technologies raises interesting questions for understanding learning across contexts (e.g., home, work, school, etc.) and learning ecosystems.

Projects can demonstrate innovation in many ways, including new types or combinations of deliverables, improvements in the deliverables, or their deployment in a different manner. Research might help articulate the underlying processes of practice or build consensus in the field around a particular innovation. Since innovation often carries risk, the PI must be able to demonstrate an understanding of possible risks entailed and how they will be managed. It is important to specify the proposed project's innovation as determined by the PI team.

3. **Strategic Impact.** Strategic Impact refers to how the project addresses important areas for continued development and advances the informal STEM learning field overall (not simply project impact for the target audiences or communities). Strategic suggests planned intent or focus and should address the question: What strategy do these changes offer for advancing the field? Note that strategic impact can be achieved regardless of the size of the organization (or the population of the communities that they serve) or the size of the target audience.
4. **Collaboration.** AISL values projects that leverage resources of partners to achieve more significant outcomes than would otherwise be possible. Organizations should seek to extend project impacts by taking advantage of the synergies generated by the competencies and resources of carefully chosen partners.

Collaborations among practitioners, STEM researchers, and STEM education or learning researchers and evaluators should be an integral component of all projects. Projects are encouraged to include, when appropriate, collaborators who are not typically involved in informal STEM learning.

PIs must demonstrate an understanding of the challenges of collaboration and propose means for addressing them. Collaborators should be involved in the development of the proposed project and preparation of the proposal.

### AISL Project Types

The program supports seven types of projects: (1) Collaborative Planning, (2) Exploratory Pathways, (3) Research in Service to Practice, (4) Innovations in Development, (5) Broad Implementation, (6) Conferences, and (7) an Informal STEM Learning Resource Center in FY16.

The range of project types available serve different functions and support varied strategies for guiding proposed work. Types 1 and 2 are smaller-scale investments designed to provide teams with an opportunity to understand complex STEM learning issues and potential solutions, test methods, and reach beyond typical comfort zones or collaborations. Types 3, 4, and 5 provide opportunities to more fully explore questions and issues for which there is a significant literature or practice base. Proposal types 5 and 6 offer additional mechanisms for building capacity, advancing informal STEM learning, and synthesizing knowledge.

### 1. Collaborative Planning

Projects can be funded for up to \$150,000 total and one year in duration.

Collaborative Planning projects provide groups of people and organizations the support necessary to increase partnerships, understanding, and influence, so that they can develop ideas and strategies to address the most complex issues of the field. Successfully attacking these complex problems will likely require a range of expertise including informal STEM practitioners, education and learning researchers, STEM discipline researchers, and others. AISL welcomes high risk / high reward and unexpected approaches to informal STEM learning and practice.

Proposals must:

- o describe what is known about the complex issue to be investigated;
- o be unique in terms of contribution from partners, ambition, credibility and potential to impact the informal STEM learning sector;
- o involve collaborations with at least one researcher and at least one informal STEM practitioner;
- o describe the contributions of collaborators representing multiple perspectives;
- o identify the steps to build effective collaborations for achieving the project goals;
- o identify the steps and actions to further refine and develop the research question(s) and methods or design and development approaches, leveraging the expertise of the collaborators;
- o describe how the development of the collaboration will lead to future proposals or work that fits with this AISL solicitation.

Any subsequent proposals to AISL based on this work must describe the results of the planning effort.

Proposers are strongly encouraged to talk with an AISL Program Officer before submitting a Collaborative Planning proposal.

### 2. Exploratory Pathways

Projects can be funded for up to \$300,000 total and up to two years in duration.

Exploratory Pathways projects are opportunities for practitioners and researchers to investigate issues in and approaches to informal STEM learning and to establish the basis for future research, design, and development of innovations or approaches. Such exploratory development work or feasibility studies should produce evidence, findings, and/or prototype deliverables that help the team make critical decisions about future work.

The proposal needs to explicitly state how the project will inform future work of the PI and team and will lead to *Research in Service to Practice*, *Innovations in Development*, or *Broad Implementation* proposals. *Exploratory Pathways* should not be viewed as small-scale versions of these other proposal types.

*The AISL Exploratory Pathways proposals are consistent with the Early Stages and Exploratory type of research and development in the Common Guidelines for Educational Research and Development.*

### 3. Research in Service to Practice

Projects can be funded for \$300,000 to \$2 million and from two to five years in duration. AISL welcomes focused projects in the \$300k-\$750k range in addition to larger projects.

The Research in Service to Practice (RSP) project type focuses on research that advances knowledge and the evidence base for practices, assumptions, broadening participation, or emerging educational arrangements in STEM learning in informal environments. For these proposals it is important for practice to inform the research as well as having research inform practice.

Proposals submitted under this project type:

- o must include a review of the literature and the underlying theoretical framework that informs the research plan. Proposals should detail research methods, including qualitative, quantitative, or iterative design-based data collection and analysis plans, as appropriate.
- o may be qualitative or quantitative; involve methodological advances; develop or adapt assessment instruments or scales; use large databases; aggregate data across multiple or distributed settings; focus on post-hoc analyses of existing data; or conduct longitudinal studies that shed light on the impact of STEM learning activities on participants, institutions, or systems.
- o may include syntheses or meta-analytic studies which address important research, development, or implementation research findings in STEM learning. They might test the reproducibility of important findings. The products of syntheses and meta-analyses should be usable by multiple audiences. AISL particularly encourages projects that provide research findings and recommendations that are useful for informal STEM education practitioners, researchers, and decision-makers.

These types of projects often include a range of data to be collected and analyzed. To ensure clarity about the connections between the research questions, data, and analysis, consider including a table summarizing this information.

In addition to the opportunities offered by this solicitation, PIs are invited to consider Science Learning + (SL+), a strand within this category. SL+ is a partnership program with The Wellcome Trust and Economic and Social Research Council (ESRC) in the United Kingdom (UK) and NSF in the United States. Please check the [AISL program webpage](#) for the announcement of this opportunity.

*Research in Service to Practice proposals are consistent with the Design and Development type of research and development in the Common Guidelines for Educational Research and Development.*

### 4. Innovations in Development

Projects can be funded for \$500,000 to \$3 million and up to five years in duration. AISL welcomes focused projects in the

\$500k-\$750k range in addition to larger projects.

The Innovations in Development project type is expected to result in deliverables such as exhibits, media products, after-school programs, etc., and in innovative models, programs, technologies, assessments, resources, or systems for an area of STEM learning in informal environments. Projects should build on evidence from prior development and research efforts. It is understood that innovations take many forms and occur at different scales. Thus projects may put forward small, medium or larger scale innovations depending on the nature of what is being innovated.

An explicit theoretical framework as well as either a logic model or theory of action should guide projects. (See notes in Supplementary Documents.) In addition, proposals must articulate a plan and process for the design, development, implementation, and evidence-building components (based on research, evaluation, or both) of the proposed work. Iterative, design-based research approaches are encouraged, if appropriate.

*Innovations in Development proposals are consistent with the Design and Development type of research and development in the Common Guidelines for Educational Research and Development.*

**NOTE:** Research in Service to Practice proposals differ from Innovations in Development proposals in that *Research in Service to Practice* projects have at their core a compelling research question about practice, about how people learn and or about specific learning environments. For this project type the most of the focus and effort are centered on the research. If products are developed, there is no expectation that they will have a lifetime after the completion of the research. They may study on-going programming or other activities. On the other hand, *Innovations in Development* projects focus on and leverage the development of a product, model, tool, or resource in order to better understand and inform practice. It is expected that products will have a significant lifetime after the completion of the R&D.

## 5. Broad Implementation

Projects can be funded for \$1 million to \$3 million and from two to five years in duration.

The Broad Implementation project type supports the expansion or reach of models, programs, technologies, assessments, resources, research, or systems that have a documented record of success, innovation, or evidence-based knowledge building. Sources of evidence may include summative evaluation or research data that indicate readiness for distribution to a broader population or new setting(s) and should be summarized in the proposal narrative. (See notes in Supplementary Documents.)

When thinking about the focus for expansion, consider: geography, age, socio-economic status, cultural or linguistic group, race and ethnicity, gender, disability, learning setting, or another dimension. Where appropriate, investigators are encouraged to emphasize individuals from underrepresented or underserved groups as a target audience for a component or for the entire focus of the project.

Proposals must articulate a plan and process for the design, development, implementation, and evidence-building components of the proposed work. Project design may address innovative integration, incremental improvements, adaptations, or trials under typical conditions. Iterative, design-based, and improvement research approaches are encouraged. Proposals should discuss how evidence will be collected to understand the mechanisms enabling broad implementation.

*Broad Implementation proposals are consistent with the Design and Development type of research and development in the Common Guidelines for Educational Research and Development.*

## 6. Conferences (see [GPG, II.D.9.](#))

Projects can be funded for up to \$250,000 and are usually from one to two years in duration.

The "Conferences" category may be used for conferences, symposia, or workshops. These activities should be well-focused, relate to the goals of the AISL program, and generate product(s) usable by practitioners and researchers. The program is particularly interested in proposals that lead to, for example, the development of communities of practice, the formulation of field-advancing practice, assessments, and research agendas for the participating professional communities. Proposals should clearly indicate how convening and outcomes support expanded or new thinking about knowledge building, innovation, strategic impact, and collaboration.

**Note:** *Proposals for Conferences above \$50,000 are due on the solicitation deadline. Proposals under that threshold may continue to be submitted at any time. These submissions will be reviewed quarterly.*

## 7. Informal STEM Learning Resource Center

Up to 1 (one) center will be funded for up to \$5,000,000 and five years.

As a special emphasis for professional audiences under this solicitation, AISL seeks proposals that will result in a single award for the development and implementation of an Informal STEM Learning Resource Center (ISLRC). The ISLRC supports the informal STEM Learning field, NSF Principal Investigators, and Advancing Informal STEM Learning and other NSF programs.

The primary goal of the Center is to measurably advance R&D activities and findings that have the potential to improve innovation, knowledge building and networking and the fostering of a more cohesive field of informal STEM learning. The ISLRC should consider within its scope building the broad domain of research, practice, and professional community building related to informal STEM learning and science communications.

*Critical Center Activities:*

- Advance the scope and quality of R&D, specifically informal STEM learning research and evaluation. [Knowledge]
- Provide intellectual infrastructure for R&D collaborations. [Knowledge + Capacity]
- Help to identify synergistic approaches to complex STEM learning issues. [Knowledge + Capacity]
- Expand communities of professionals (including undergraduates, graduate students and post-doctoral fellows) who are engaged in R&D on informal STEM learning and science communication, including STEM researchers in academia and industry. [Capacity]
- Encourage broader participation by professionals from groups typically under-represented in the informal STEM learning and science communications workforce. [Capacity]
- Provide opportunities for the field to generate ideas that can potentially transform the nature of the field's work and impact. [Innovation]



*Audiences:* The ISLRC should serve the following primary audiences; activities need not be limited to those described.

- a. *Informal STEM Learning and Science Communications Fields.* The ISLRC should build knowledge and capacity across the field and support continued professionalization and innovation. At a minimum, it should:
  - Support access to knowledge and collaborations between researchers, evaluators, and practitioners. [Knowledge]
  - Foster communities of practice that bridge the many varied forms or sectors in which informal STEM learning experiences and science communications are developed and delivered for audiences of all ages. [Capacity]
- b. *Principal Investigators.* As a component of community-building the ISLRC should serve both existing PIs and prospective PIs to the AISL program as well as other NSF programs. It should help create a network among AISL and other awardees through meetings, communications, and other methods that encourage sharing of knowledge, deliverables, practices, and findings across projects.
- c. *AISL and other NSF Programs.* The ISLRC should assist AISL and other NSF programs in synthesizing evidence of impact across the entire NSF portfolio that supports informal science education.

*Lead Organization:* The lead organization must be able to demonstrate significant experience in managing or providing services similar to those proposed.

*Collaboration:* The ISLRC is intended to be synergistic with existing activities of professional associations and other resources offered through organizations and institutions engaged in informal STEM learning and science communications.

*Sustainability:* Proposals must include a discussion and plans for continuing efforts beyond the NSF funding period.

*Evaluation:* Proposals must include continuous and summative assessments of the quality and success of the ISLRC activities by an external evaluator.

## About EHR and DRL

The Advancing Informal STEM Learning (AISL) is one of six programs in the Division of Research on Learning in Formal and Informal Settings (DRL) in the Directorate for Education and Human Resources (EHR). The other five programs in EHR/DRL are:

- Advanced Technological Education (ATE)
- Discovery Research Pre-K-12 (DRK-12)
- Innovative Technology Experiences for Students and Teachers (ITEST)
- EHR Core Research (ECR)
- STEM + Computing Partnerships (STEM+C)

The contributions of AISL projects to advancing knowledge and the evidence base in STEM education differ from the EHR Core Research program (ECR). AISL's research and development investments focus on the *translation* of foundational and early stage research to research, design, development, and implementation of STEM learning in informal environments. As such, AISL contributes to the knowledge base that advances our understandings of or has ultimate use in informal settings.

Each program can be accessed from [the DRL Web Page](#).

Investments by EHR/DRL contribute to the three categories that together form the foundation for EHR's strategic framework toward the fulfillment of the EHR mission. Within each of these categories, EHR/DRL will continue to build and emphasize its research and development activities.

- **Learning and learning environments:** Investments in this category seek to develop understanding of the cognitive, affective, and non-cognitive foundations of STEM learning; to study emerging contexts and tools for learning STEM concepts and skills; and to build environments that promote new, high-impact learning opportunities for tomorrow's scientists and engineers, as well as the public and students living in an increasingly technology-oriented society.
- **Broadening participation and institutional capacity in STEM:** Programs in this category capitalize on the Nation's diversity in order to increase the scientific workforce by engaging and building capacity in all people in STEM learning and professional training, particularly those from groups that have been traditionally underrepresented in STEM fields.
- **STEM workforce:** Workforce investments are intended to improve the education and preparation of a STEM workforce that will be ready to capitalize on unprecedented advances in technology and science, and to address future global, social, and economic challenges. This framework positions the directorate to respond more readily to emerging opportunities created by new technologies, improvements in the STEM education evidence base, administration priorities, and other national or societal needs.

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

## Other Funding Opportunities

The NSF programs listed below may also be of interest; see individual solicitations for descriptions and due dates:

Faculty Early Career Development (CAREER)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503214](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214)

Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE)  
<http://www.nsf.gov/pubs/2014/nsf14106/nsf14106.jsp>

Cyberlearning and Future Learning Technologies (Cyberlearning)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504984](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504984)

## Resources

The following sites are potential resources for prospective PIs.

- The Center for Advancement of Informal Science Education (CAISE) provides resources for NSF principal investigators, ISE professionals, and STEM researchers. See <http://informalscience.org/nsf-aisl> for more information.
- The Center for Innovative Research in CyberLearning (CIRCL) supports the cyberlearning research community across all relevant programs at NSF. See <http://circlcenter.org> for more information.

- The Community for Advancing Discovery Research in Education (CADRE) is the resource network for the DRK-12 program. To explore the resources of CADRE see <http://cadrek12.org/>
- The STEM Learning and Research Center (STELAR) is supported by the ITEST program. For more information see <http://stelar.edc.org/>

## References

Friedman, A. (Ed.). (2008). *Framework for Evaluating Informal Science Education Projects*. Retrieved March 27, 2009, from [http://informalscience.org/documents/Eval\\_Framework.pdf](http://informalscience.org/documents/Eval_Framework.pdf).

Institute of Education Sciences, U.S. Department of Education, and the National Science Foundation (August, 2013). *Common Guidelines for Education Research and Development: A Report from the Institute of Education Sciences*, U.S. Department of Education, and the National Science Foundation.

NSF 13-126 ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf13126](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126))

FAQs: NSF 13-127 ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf13127](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13127))

National Research Council (2009). *Learning Science in Informal Environments: People, Places, and Pursuits* Washington, D. C.: The National Academies Press.

[http://www.nap.edu/openbook.php?record\\_id=12190](http://www.nap.edu/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.

[http://www.nap.edu/openbook.php?record\\_id=13398](http://www.nap.edu/openbook.php?record_id=13398)

National Research Council (2015). *Identifying and Supporting Productive STEM Programs in Out-of-School Settings*. Washington, D. C.: The National Academies Press.

[http://www.nap.edu/openbook.php?record\\_id=21740](http://www.nap.edu/openbook.php?record_id=21740)

## III. AWARD INFORMATION

---

Pending availability of funds, it is anticipated that about 10-12 Collaborative Planning awards, 10-12 Exploratory Pathways awards, 6-8 Research in Service To Practice awards, 8-10 Innovations in Development awards, 3-6 Broad Implementation awards, and 5-7 Conference awards will be made. AISL will also fund 5-7 awards made through the EAGER and RAPID mechanisms and 2-4 CAREER awards. Up to one (1) Informal STEM Learning Resource Center award is anticipated in FY 2016.

\$28 - \$38M in FY 2016 is anticipated to be available for new awards made under this solicitation, pending availability of funds. Limits for funding requests of AISL proposals are as follows: (1) Collaborative Planning projects: up to \$150,000 with duration of one year; (2) Exploratory Pathways projects: up to \$300,000 with duration up to two years; (3) Research in Service to Practice projects: from \$300,000 to \$2,000,000 with a duration from two to five years; (4) Innovations in Development projects: \$500,000 to \$3,000,000 with duration from two to five years; (5) Broad Implementation projects from \$500,000 to \$3,000,000 with a duration from two to five years; (6) Conference projects up to \$250,000 with a duration of up to two years; and (7) up to one Informal STEM Learning Resource Center award up to \$5 million with a duration of five years. If the Resource Center is funded in 2016, there will not be a competition for a Resource Center in 2017.

## IV. ELIGIBILITY INFORMATION

---

### Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

### 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 for Full Proposals.

## 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 Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail



from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov). Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- 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: ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://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) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto: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 the NSF FastLane system. Chapter II, Section D.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

See Chapter II.C.2 of the [GPG](#) 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 GPG instructions.

### 1. Cover Sheet

Proposers are reminded to include the number of this solicitation on the Cover Sheet. Failure to do so will delay processing of the proposal. (Grants.gov Users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page).

It is assumed that proposals submitted to AISL have the potential for conducting research on human subjects. Proposers should refer to the NSF Grant Proposal Guide for information related to Human Subjects' research.

### 2. Project Summary

Each proposal must submit a summary of the proposed project not more than one page in length. The Project Summary should be written in the third person, informative to other persons working in the same or related fields, and, insofar as possible, understandable to a scientifically or technically literate lay reader. It should not be an abstract of the proposal.

The Project Summary consists of three sections:

#### (1) Overview

- The first sentence must identify the AISL project type: Collaborative Planning, Exploratory Pathways, Research in Service to Practice, Innovations in Development, Broad Implementation, Conferences, or Informal STEM Learning Infrastructure Resource Center.
- The Overview includes a description of the activity that will result if the proposal is funded and a statement of objectives and methods to be employed.

#### (2) Intellectual Merit: a statement on the intellectual merit of the proposed activity

- The statement on intellectual merit should describe the potential of the proposed activity to advance knowledge-building.

#### (3) Broader Impacts: a statement on the broader impacts of the proposed activity.

- The statement on broader impacts should describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.

Strategic impact, innovation, and collaboration may be a part of either or both Intellectual Merit and Broader Impacts. It is expected that each be identified in one or both of these sections.

### 3. Project Description (Narrative)

In addition to the requirements outlined in the NSF Grant Proposal Guide (GPG) and this solicitation, the first sentence of the Project Description, like the Project Summary, must identify the AISL project type: (1) Collaborative Planning, (2) Exploratory Pathways, (3) Research in Service to Practice, (4) Innovations in Development, and (5) Broad Implementation, (6) Conferences, or (7) Informal STEM Learning Resource Center.

The narrative is limited to 15 single-spaced and should include the following information in section headings labeled A through E.

Please note that per guidance in the NSF Grant Proposal Guide GPG, the Project Description must contain, as a separate section within the narrative, a section 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 ([GPG, II C-2 d \(i\)](#)).

#### **A. Project Rationale**

Provide a rationale for the project with respect to **knowledge-building, innovation, strategic impact, and collaboration**, as appropriate and described above, such that the value of the proposed project is clear. Be sure to address the relevance of **informal STEM learning and learning environments** to the project, as described above.

Results from prior NSF support. Describe results of relevant prior NSF support (within the past five years) for projects in which the PI or co-PI have been involved, such that reviewers can judge the quality and impact of that work. Refer to the GPG for specifics about what must be included.

Please highlight if this proposal is based on a previous AISL *Pathways* project.

#### **B. Project Design**

Describe the research foci, methods and analyses, projects deliverables and plan for implementation, STEM content area(s), audience(s), and specific information relevant to the AISL project type. For Innovations in Development, Broad Implementation, and Conferences proposals include a discussion of a strategy for reaching a broad audience along with an estimate of the number of individuals to be served.

### C. Communication Plan

All AISL proposals must include a creative communication strategy for dissemination of findings to professional and other interested communities including, where appropriate, practitioners, 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, approaches that reach broader audiences are strongly encouraged. Proposals should identify the key elements of a communication plan, e.g., target audiences and identification of the channels, media, and, technologies appropriate for reaching specific audiences.

### D. Evaluation

**For all projects**, evaluation processes are required components to achieve the following goals:

1. Ensure that project gets appropriate, rigorous, external input throughout the life of the project such that the quality of the project's research and development components improve as a result.
2. Ensure accountability. Evaluation processes should address questions such as: Is the project addressing the goals of the proposed project? What was the quality of the work?

*These requirements are consistent with the External Feedback component of the Common Guidelines for Educational Research and Development.*

Evaluation processes may include an external review panel and a third-party evaluator, as appropriate to achieving the project's goals and given the project's size and scope. The processes should be sufficiently independent and rigorous to (1) influence the project's activities at appropriate junctures in order to improve the quality of its findings and (2) near the completion of the project, determine if the project addressed its intended goals and comment on the quality of the project's work. Proposals should describe the expertise of those serving in these roles; explain how that expertise relates to the goals and objectives of the proposal; and specify how the PI will incorporate results of the project's external, critical review process into the ongoing management of the project.

**For projects in which knowledge-building is considered by the PI to best be generated through evaluation processes**, a summative evaluation is required as part of the overall evaluation plan. The summative evaluation component must be sufficiently independent and rigorous to generate evidence of the impact of the project with respect to its intended outcomes. Proposals are encouraged to illustrate the coherence among the proposal goals or hypotheses of the project, the evaluation methods, and the knowledge the projects seek to build for the field. The evaluation plan may include front end, formative, remedial or iterative, and summative evaluation, as appropriate to achieving the project's goals. Note that a summative evaluation is not appropriate for the Research in Service to Practice proposal type.

NOTE: For Conference proposals, the products of these activities (i.e., report, research agenda, etc.) may be used in lieu of a summative evaluation or research study.

### E. Project Management

All AISL proposals need to explicitly address **collaboration**, as described above, and in terms of the numbered items below. It should be clear how the project maximizes the collaborative effort.

1. Describe the composition, experience, and expertise of the project's Leadership Team, which, as appropriate for the project, may include senior personnel, subawardees, consultants, and others, in addition to the PI and co-PIs. The information provided should enable reviewers to judge the quality and capabilities of the project team.
2. Describe the key personnel which, as appropriate for the project, may include STEM professionals, collaborators, advisory board members, consultants, and contractors. Provide information on each sufficient enough so that reviewers may assess their quality and contributions to the proposed work.
3. Explain the project's management plan and make clear how the project team and partners will work collaboratively to achieve project outcomes.
4. Provide information on collaborations with any of the following individuals or groups connected to the proposal: practitioners, research scientists, learning researchers, evaluators, community groups, industry, graduate and undergraduate students, content or context specialists, co-designers, advisors, or presenters who engage directly with public audiences.
5. Delineate a schedule or work plan with major milestones for key project tasks.

### 4. Budgets

All budget requests must be consistent with the project scope and duration. All budgets, both grantee and subaward budgets, must be accompanied by budget justifications that include itemizations corresponding to each FastLane or Grants.gov budget line items and provide sufficient detail as to justify the expense and its relevance to achieving the project goals. Requested equipment must be essential components of project 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 the proposal will not be accepted or will be returned without review (see GPG).**

Include under Travel (Line E on the FastLane budget and Field D on the Grants.gov budget) the cost for the PI to attend a two-day meeting every other year at, or near, NSF.

Each subaward on Line G.5 (FastLane) or Field F.5 (Grants.gov) requires a complete set of proposal budget forms accompanied by a budget justification that includes the basis for selecting the subawardee, as well as itemization of expenses and explanations.

### 5. Other Forms

Biographical Sketches: Sketches must be provided for the PI, Co-PIs, and other Senior Personnel and may not exceed two pages per person. These sketches may, but are not required to, follow the NSF prescribed format.

Current and Pending Support: Required for the PI, Co-PIs, and senior project personnel. The proposal being submitted should be listed first and identified as pending.

Facilities, Equipment & Other Resources: In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section (See the GPG Chapter II.C.2.i). The description should be narrative in nature and must not include any quantifiable financial information.

## 6. Supplementary Documents

**Note: Supplementary Documents are distinct from Appendices**, as stipulated in the Grant Proposal Guide:

*Appendices may not be included* unless a formal deviation has been authorized. See GPG Chapter II.A for more information about deviations.

**Required Supplementary documents:**

- Data Management Plan
- Postdoctoral Researcher Mentoring Plan (if applicable)

See the Grant Proposal Guide, Chapter II.C.2.j., for instructions for the preparation of these items. For more information and the instructions for proposals submitted to the Directorate for Education and Human Resources (EHR) see: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>.

**Allowable Additional Supplementary Documents:**

1. Letters of Collaboration from consultants, advisors, distributors, and organizational partners indicating their specific roles and duties in the project and their assurance to participate, if funded. Letters of Support or Endorsement, as opposed to letters that make a commitment to the project, are not allowed. **Proposals with Letters of Support or Endorsement will be returned without review.**
2. The executive summaries of relevant summative evaluation findings of prior work (2 pages maximum in total), if applicable.
3. For *Innovations in Development* and *Broad Implementation* proposals only: Logic model, theory of action, or additional details about the evaluation plan (5 pg. maximum in total).
4. In addition to the previous items, PIs may submit an additional 25 pages maximum of materials difficult to convey in textual language such as scripts of media productions, exhibit sketches, and floor plans. This additional documentation should not be used as a means to increase the 15-page Project Description limit.
5. Deliverables that involve media or technology that cannot solely be represented on the printed page. Only media that cannot be submitted in Supplementary Documents may be provided as DVD or CD; 12 copies labeled with proposal number, title, and PI, must be sent to: Advancing Informal STEM Learning, EHR/DRL, Room 885, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230. These materials, which will not be returned, must be received within 5 business days following electronic submission of the proposal; clearly mark the package re: *Supplementary Documents* and indicate the NSF proposal number.

**Note:** The 15-page Project Description must provide sufficient information for reviewers to make reasoned judgments about the proposed work. Reviewers may opt to read these additional documents, 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 are not supported by this program: capital or operating expenses; purchase of major or office equipment; vehicles; undergraduate tuition; paid advertising; admissions or similar fees; expenses for school field trips, camps, science festivals, science fairs or competitions that are not integral to the conduct of the research and development efforts of the project; the writing or publishing of books; or projects whose primary focus is health or medicine.

## C. Due Dates

---

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

November 04, 2015

November 08, 2016

## D. FastLane/Grants.gov Requirements

---

**For Proposals Submitted Via FastLane:**

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane 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: <http://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](mailto:support@grants.gov). The Grants.gov Contact Center answers

general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

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

Proposers that submitted via FastLane are strongly encouraged to use FastLane 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 the GPG as [Exhibit III-1](#).

A comprehensive description of the Foundation's merit review process is available on the NSF website at:

[http://www.nsf.gov/bfa/dias/policy/merit\\_review/](http://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 [Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018](#). 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. (GPG 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 GPG 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 underrepresented minorities 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

The AISL program is interested in broadening participation as a component of a proposal's Intellectual Merit and/or Broader Impacts. In addition to considering the two general NSF Merit Review Criteria, for those projects which include a goal of broadening participation reviewers will also be asked to evaluate the following:

- Does the proposal identify the characteristics and needs of the targeted underrepresented groups (public or professional) to be served?, and
- Does the proposal include specific plans or strategies for addressing or accommodating the particular needs of participants of the identified underrepresented groups?

## B. Review and Selection Process

---

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Reverse Site 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 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 a Grants Officer in the Division of Grants and Agreements.

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 [http://www.nsf.gov/awards/managing/award\\_conditions.jsp?org=NSF](http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto: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 Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

### 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 Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

#### **Additional Reporting Requirements:**

Applicants must file starting and termination certificates in addition to annual and final technical reports.

## 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 Questions to the Program, telephone: (703)292-8616, email: [DRLAISL@nsf.gov](mailto:DRLAISL@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@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](mailto:support@grants.gov).

For administrative questions contact the Program by e-mail at [DRLAISL@nsf.gov](mailto:DRLAISL@nsf.gov) or phone at (703)292-8616



## 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 at [https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic\\_id=USNSF\\_179](https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179).

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 <http://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* provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 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 <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **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](mailto:nsfpubs@nsf.gov)
  - or telephone: (703) 292-7827
- **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 Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). 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  
Office of the General Counsel  
National Science Foundation  
Arlington, VA 22230

Policies and Important Links		Privacy	FOIA	Help	Contact NSF	Contact Web Master	SiteMap
	The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA Tel: (703) 292-5111, FIRS: (800) 877-8339   TDD: (800) 281-8749						Last Updated: 11/07/06 <a href="#">Text Only</a>