Smart and Connected Communities (S&CC)

PROGRAM SOLICITATION
NSF 16-610

National Science Foundation

Directorate for Computer & Information Science & Engineering
    Division of Computer and Network Systems
    Division of Information & Intelligent Systems
    Division of Computing and Communication Foundations

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

Directorate for Engineering
    Division of Chemical, Bioengineering, Environmental and Transport Systems
    Division of Civil, Mechanical and Manufacturing Innovation
    Division of Electrical, Communications and Cyber Systems

Directorate for Geosciences
    Division of Atmospheric and Geospace Sciences
    Division of Earth Sciences
    Division of Ocean Sciences
    Division of Polar Programs

Directorate for Social, Behavioral & Economic Sciences
    Division of Behavioral and Cognitive Sciences
    Division of Social and Economic Sciences

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

    November 30, 2016

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

    February 16, 2017

IMPORTANT INFORMATION AND REVISION NOTES

Note: Preliminary proposals are only required for Integrative Research Grants Track 1 and Track 2. Preliminary proposals are not required for Research Coordination Networks or Planning Grants.

Preliminary Proposals submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 16-1).

Full Proposals submitted in response to this solicitation should be submitted in accordance with the revised NSF PAPPG (NSF 17-1). NSF anticipates release of the revised PAPPG in the Fall of 2016 and it will be effective for proposals submitted, or due, on or after January 30, 2017.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

    Smart and Connected Communities (S&CC)

Synopsis of Program:

    Cities and communities in the U.S. and around the world are entering a new era of transformational change, in which their inhabitants and the surrounding built and natural environments are increasingly connected by smart technologies, leading to new opportunities for innovation, improved services, and enhanced quality of life. The goal of this Smart & Connected Communities (S&CC) solicitation is to support strongly interdisciplinary, integrative research and research capacity-building activities that will improve understanding of smart and connected communities and

lead to discoveries that enable sustainable change to enhance community functioning. Unless stated otherwise, for the purposes of this year's solicitation, communities are physical, geographically-defined entities, such as towns, cities, or incorporated rural areas, consisting of various populations, with a governance structure and the ability to engage in meaningful ways with the proposed research.

Successful S&CC projects are expected to pursue research and research capacity-building activities that integrate multiple disciplinary perspectives and undertake meaningful community engagement, and to include appropriate and robust evaluation plans for assessing activities and outcomes. To meet the multidisciplinary criterion, proposals must meaningfully integrate across both social and technological research dimensions. In this solicitation, the social dimensions reflect areas typically included in the portfolios of the NSF's Directorates for Social, Behavior, and Economic Sciences (SBE) and Education and Human Resources (EHR), while the technological dimensions reflect disciplinary areas typically included in the portfolios of the Directorates for Computer and Information Science and Engineering (CISE) and Engineering (ENG). Proposals may also pursue integration with other disciplines as needed, including but not limited to those typically encompassed in the portfolio of the NSF's Directorate for Geosciences (GEO). Successful proposals are also expected to include appropriate community engagement as defined further in the solicitation.

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.

- David Corman, Program Director, CISE/CNS, telephone: (703) 292-8754, email: dcorman@nsf.gov
- Nicholas Anderson, Program Director, GEO/AGS, telephone: (703) 292-4715, email: nanderso@nsf.gov
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- Sara Kiesler, Program Director, SBE/SES, telephone: (703) 292-8643, email: skiesler@nsf.gov
- Tatiana Korelsky, Program Director, CISE/IIS, telephone: (703) 292-8930, email: tkorelsk@nsf.gov
- David Mendonca, Program Director, ENG/CMMI, telephone: (703) 292-7081, email: mendonca@nsf.gov
- Sunil Narumalani, Program Director, SBE/BCS, telephone: (703) 292-4995, email: snarumal@nsf.gov
- Wendy Nilsen, Program Director, CISE/IIS, telephone: (703) 292-2568, email: wnilsen@nsf.gov
- Rahul T. Shah, Program Director, CISE/CCF, telephone: (703) 292-2709, email: rshah@nsf.gov

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

- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 18 to 29

Awards in the following four categories are anticipated for this solicitation:

- S&CC Integrative Research Grants (IRG) Track 1;
- S&CC Integrative Research Grants (IRG) Track 2;
- S&CC Research Coordination Networks (RCN); and
- S&CC Planning Grants.

The number of awards in each category will be dependent on the overall mix of proposals and the degree to which they meet the solicitation goals, Merit Review Criteria and Solicitation Specific Review Criteria. NSF anticipates up to approximately one to three IRG Track 1 awards, five to eight IRG Track 2 awards, two to three RCN awards, and 10 to 15 Planning Grants.

Anticipated Funding Amount: $18,500,000

Subject to the quality of proposals received and availability of funds.

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.

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: 4

The limit on number of proposals per PI, Co-PI, or other Senior Personnel is defined by award category as follows:

- Integrative Research Grants Track 1 or Track 2: 1;
- Research Coordination Networks: 2; and
- Planning Grants: 1.

An individual may appear as a PI, Co-PI, or other Senior Personnel on only one proposal submitted to either S&CC IRG Track 1 or Track 2 (not both), only two proposals submitted to the S&CC RCN category, and only one proposal submitted to S&CC Planning Grant category. This limitation includes proposals submitted by a lead organization and any sub-awards included as part of a collaborative proposal involving multiple institutions.

While allowable, it is not anticipated that an individual will appear as a PI, Co-PI, or other Senior Personnel on 4 proposals.

In the event that an individual exceeds these limits, the proposals received within the limits will be accepted based on the earliest date and time of proposal submission (i.e., the first one or two proposals received depending on project category will be accepted and the remainder within that project category **will be returned without review**). **No exceptions will be made**.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required

- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.

- **Full Proposals:**

  - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
  - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

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

  Not Applicable

- **Other Budgetary Limitations:**

  Not Applicable

C. Due Dates

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

  November 30, 2016

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

  February 16, 2017

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:

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

Reporting Requirements:

Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

Cities and communities in the U.S. and elsewhere around the world are entering a new era of transformational change, in which their inhabitants and the surrounding built and natural environments are increasingly connected by smart technologies. Concurrently, communities continue to undergo substantial changes. Some of those changes lead to new opportunities for innovation. Some are highly disruptive. There are unique opportunities to advance the frontiers of fundamental science as population demographics shift, new technologies and methods for delivering services come into being, and environmental changes continue.

The goal of this Smart & Connected Communities solicitation is to support interdisciplinary and integrative research and research capacity-building activities, while undertaking meaningful community engagement. The specific objectives of this solicitation are to: (1) enhance understanding and support the design of smart and connected communities, in ways that improve the quality of life within them; (2) foster the development of a robust, multidisciplinary and diverse research community that encompasses, integrates, and extends disciplinary perspectives in the social, behavioral, economic, and learning sciences and in computer and information sciences and engineering, and engineering research; and (3) support research capacity-building to address the challenges and opportunities of present and future smart and connected communities. The solicitation calls for activities that contribute to meaningful engagement with communities in accomplishing the above objectives.

NSF has long been a leader in supporting the basic research and education activities and partnerships that form the foundation for the Smart & Connected Communities program. Some basic research and education areas that form the foundations for this S&CC program solicitation include: (1) new methods and technologies for collecting, managing, and analyzing ever-finer and more diverse data and new algorithms that can leverage those data for a wide range of phenomena in urban, suburban, and rural settings; (2) new approaches

in the modeling and design of complex sociotechnical systems to inform the construction, instrumentation, and performance of smart and connected communities; (3) research on the dynamics, characteristics, and behaviors of individuals and communities; and (4) development of new methods and advanced technologies that support education and workforce development. Looking forward, NSF seeks research and research capacity-building efforts that span and integrate across multiple disciplines and that meaningfully engage with communities themselves.

This S&CC solicitation is part of NSF's multipronged strategy for investing in basic research on Smart & Connected Communities, and is aligned with the White House Smart Cities Initiative. Subject to the availability of funds, NSF envisions a multi-year S&CC program, with activities that evolve to support fundamental research, research community capacity-building, and community engagement.

II. PROGRAM DESCRIPTION

A. Overview

This solicitation calls for integrative research and research capacity-building that, when undertaken with meaningful community engagement, will secure far-reaching impacts in physical, geographically-defined communities often consisting of diverse, and varied populations. Generally, smart and connected communities are those that integrate people and information, communication, engineering and other technologies to improve the quality of life for those who live, travel, and work in them. Smart and connected communities can be considered systems of systems: physical, social, and technical. This solicitation seeks fundamental, multidisciplinary advances in understanding and designing smart and connected communities. To support the expansion and development of the S&CC research community, it also calls for projects that seek to build or leverage research capacity across a wide variety of disciplinary areas. As a third component of this solicitation, meaningful community engagement will help frame the research directions, provide access to input for such research, and provide means of understanding the results that emerge from such research efforts. Unless stated otherwise, for the purpose of this year's solicitation, **communities** are physical, geographically-defined entities, such as towns, cities, or incorporated rural areas, often consisting of various populations, with a governance structure and an ability to engage in meaningful ways with the proposed research.

B. Components

Integrative research encompasses innovation that addresses combined social and technological aspects of smart and connected communities. Among the social considerations that could result from pursuing an "integrative research" approach are improved understanding of the attitudes, behaviors, and other characteristics of community inhabitants, groups and organizations within the community, and relationships with other communities or the larger environment and institutions; processes of learning, adaptation, interaction, and collaboration; economic impacts on the community; and future opportunities for growth. Among the technological considerations that could result from taking an "integrative research" approach are data integration and management; new algorithms and modeling frameworks for understanding and exploiting high volumes of diverse and complex data; security and privacy; and innovations in the design and engineering of materials, sensors, structures, and systems in support of smart and connected communities, and improving quality of life therein. From an integrative perspective, these considerations must be explored in concert, taking into account opportunities, vulnerabilities, and possible unintended consequences of distributed, intelligent technologies embedded within communities. Illustrative integrative research topics include but are not limited to the following:

- Collection, analysis, and innovative uses of data and information from multiple heterogeneous sources to support communities in identifying economically viable and sustainable options to improve quality of life;
- Real-time adaptation of systems and infrastructure in response to changing needs and behaviors of the community by harnessing and autonomously handling data;
- Social, cultural, legal, and ethical drivers and consequences, including potential unintended consequences, of smart and connected technologies and infrastructures. For example, factors that affect technology adoption, which may include privacy and autonomy considerations;
- Infrastructure retrofit and design through advances in systems science and engineering, and in light of broader social changes in the attitudes, behaviors, and demographics of the community;
- New approaches and methods for data-driven and/or physics-based analysis and engineering of S&CC systems, while considering broader social and cultural perspectives;
- Novel methodologies, algorithms and representations for systems engineering as applied to the design, integration, operation, and maintenance of S&CC systems, considering how community inhabitants identify, evaluate, adapt to, and incorporate smart technologies;
- Novel computing technologies, and advances in theories of learning, that enable cyber-learning with consideration of distributed intelligence, knowledge-building communities, formal or informal educational environments, knowledge management, and communities of practice for a future diverse and innovative workforce;
- New technologies for improving public safety and security, including management of risks associated with highly complex infrastructures and systems, mindful of the needs and attitudes of inhabitants and legal and policy constraints;
- Fundamental research in sensing/estimation and information-theory, cooperative control, game theory applied to and influenced by smart and connected communities and their members;
- Improved understanding of interdependencies and the role of, automation and autonomy within complex, dynamic, S&CC systems; and
- Advances in machine learning and data analytics, emphasizing dynamic optimization under uncertainty for human-in-the-loop decision making in smart and connected communities.

Integrative research may cross a range of **application** domains, including but not limited to economic development, education and learning, energy, environmental quality, health and healthcare, safety, social services, telecommunications, and transportation. In addition, proposals may explore additional issues lying outside the identified integrative research topics and applications. For example, S&CC research may also involve integration with the physical and environmental sciences, urban planning, or other fields.

Research capacity-building refers to activities that further develop the interdisciplinary teams and team members that can contribute to research and applications for smart and connected communities, whether by developing plans for future research efforts and

directions or in the activation of collaborations or networks to link new and ongoing efforts in novel ways. The ultimate goal of research capacity-building is to develop and attract research talent to address S&CC integrative research challenges through training, collaborations, networks, seminars, or other approaches. Such activities should be organized around strongly multidisciplinary, integrative theme(s) such as those described above, and with close community engagement.

Community engagement is an essential component of both integrative research and research capacity-building. Here, community engagement refers to substantive interaction with individuals, institutions, and other organizations in target communities as defined above. Examples of community partner organizations and anchor institutions in the public, private and not-for profit sectors include but are not limited to governments, government departments, schools, libraries, health and social service providers, non-profits, cultural organizations, and businesses. Investigators and community partners are encouraged to work closely to develop and evaluate creative approaches to achieving meaningful engagement for mutual benefit. Examples of community engagement include but are not limited to the following:

- Refining the conceptual framework of the research or defining community member needs and concerns;
- Providing facilities, resources, and/or expertise that are instrumental to enhancing community functioning;
- Identifying or supplying data and enabling the interface of that data with the proposers' research ideas;
- Conceiving of or supporting research demonstrations, experimentation, proof of concepts and/or pilot projects by enabling use of infrastructure or community services;
- Participating in "living labs" where science, technology, and engineering advances are staged iteratively through pilot studies in communities;
- Assisting in the planning for or actual evaluation of proposed research, including helping to define or create metrics and support data collection and/or interpretation within the community context; and
- Engaging or helping to define, discover, or contact other potential stakeholders.

Note, the nature of the engagement will vary for the proposal mechanisms identified below: for Planning Grants and Research Coordination Networks (RCNs), community engagement should contribute to planning and establishing research direction setting, whereas for Integrative Research Grants (IRGs), the community engagement is expected to be more substantive as described below.

C. Proposal Categories

This S&CC solicitation will support research projects in four categories:

- **S&CC Integrative Research Grants (IRGs) Track 1.** Awards in this category will support the conduct of fundamental, multidisciplinary, integrative research and the building of research capacity. Track 1 awards will provide three to five years of support for projects at a level not to exceed $5,000,000 for the total budget.
- **S&CC Integrative Research Grants Track 2.** Awards in this category will support the conduct of fundamental, multidisciplinary, integrative research and the building of research capacity. Track 2 awards will provide three or four years of support for projects at a level not to exceed $1,000,000 for the total budget. It is anticipated that Track 1 and 2 proposals will be distinguished by the sizes of the teams, as well as, the scope and duration of the proposed activities.
- **S&CC Research Coordination Networks (RCNs).** Awards in this category support the establishment of a network of multidisciplinary researchers and others who will collectively and significantly advance S&CC research through active exchange of ideas, development of fundamental research directions, and other approaches. Each of these awards will provide four or five years of support for projects at a level not to exceed $500,000 for the total budget.
- **S&CC Planning Grants.** Awards in this category will provide one year of support to stimulate research capacity through multidisciplinary team-building and the development of high-impact, fundamental research concepts. Each of these awards will be at a level not to exceed $100,000 for the total budget.

In each of these categories, **successful proposals** will reflect integrative, multidisciplinary research, tangible research capacity-building, and meaningful community engagement, the nature of which will vary by the proposal category.

- **S&CC Integrative Research Grants (IRGs) Tracks 1 and 2:** S&CC IRGs should pursue a visionary and transformative research agenda addressing fundamental, integrative research challenges underpinning future S&CC. While projects may focus on advances across multiple application domains, all proposals should take a holistic and integrative approach to addressing research problems central to understanding, adapting to, and developing S&CC systems, both from social and technological perspectives. IRG projects must also describe activities directed at building research capacity, namely activities to develop or attract research talent to address S&CC integrative research challenges. IRG projects are expected to involve and demonstrate substantive community engagement. NSF anticipates having a project kickoff meeting within 90 days of the award issuance during which awardees will present their research plans, steps for community engagement, and overall integration and coordination strategies. **The ultimate goal of an S&CC IRG is to develop integrative research understanding in aspects of S&CC meaningful to communities, and by example point the broader research community toward S&CC research frontiers.**

- **S&CC Research Coordination Networks:** S&CC RCN awards are intended to significantly advance the S&CC field or create new directions in research by supporting groups of investigators to communicate and coordinate their research, training, and educational activities across disciplinary, organizational, and geographical boundaries. Although an S&CC RCN should support neither planning nor conduct of individual research projects, it should engage in activities that will facilitate future fundamental research across scientific communities. The activities S&CC RCN awards support are the means by which investigators foster synthesis and new collaborations, and communicate and share information and ideas, including advances in science, engineering, and education. S&CC RCN awards are not meant to support existing activities of established collaborations. Areas of interest may include, but are not limited to, novel participant networking strategies, collaborative technologies for interdisciplinary or distributed work, and research community standards for data and meta-data. **The ultimate goal of the S&CC RCN is to nurture and grow the S&CC research and education ecosystem, cultivate new research directions in this area and/or otherwise advance the field through communication and sharing of ideas.**

  More information about the RCN concept and mechanism can be found at NSF 15-527. Given the special nature of this S&CC program solicitation, please follow the instructions in this solicitation to prepare an S&CC RCN application. In particular, an S&CC RCN proposal will need to address how community engagement will inform the activities of the RCN (see discussion and examples above about Community Engagement). In addition, the S&CC RCN proposal needs to describe how it will build research capacity.

- **S&CC Planning Grants:** S&CC Planning Grants are supported in order to build multidisciplinary research teams that will engage community stakeholders to develop a holistically integrated fundamental S&CC research concept. Research concepts must align with the definition of Integrative Research outlined above in the Program Description. Proposals must present a description of the fundamental, integrative research concept along with a strategy for developing this concept. This strategy may include, but is not limited to, identifying academic collaborators, building partnerships with appropriate community stakeholders, planning regular interactions with the team or cross-training of students, and exploring the unique needs of the community. Planning grants must address how local community engagement will inform the planning activities (see discussion and examples above about community engagement). Planning grants are not meant to support research on the proposed concepts. **The ultimate goal of an S&CC Planning Grants is to stimulate and enable a future high-impact project that can contribute to the S&CC vision. Note that future program commitments will depend on the availability of funds.**

D. Principal Investigator Meetings

In order to accelerate the rate of dissemination of ideas among researchers, to build an intellectual research core to address S&CC challenges, and to enable enhanced research collaborations, the S&CC program plans to host principal investigator (PI) meetings every year with participation from all funded projects and other representatives from academia, industry, government, and community organizations. Principal investigators **must** participate in these PI meetings throughout the duration of the award. For multi-institution projects, investigators from each collaborating institution are expected to participate. A substitute project representative may be designated to attend a PI meeting, but only with prior approval from an NSF Program Officer. As noted in "Budget Preparation Instructions," budgets for all projects must include funding for one or more designated S&CC project representatives (PI/co-PI/senior personnel or NSF-approved replacement) to attend each S&CC PI meeting during the proposed lifetime of the award.

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 18 to 29

Awards in the following four categories are anticipated for this solicitation:

- S&CC Integrative Research Grants Track 1;
- S&CC Integrative Research Grants Track 2;
- S&CC Research Coordination Networks; and
- S&CC Planning Grants.

The number of awards in each category will be dependent on the overall mix of proposals and the degree to which they meet the solicitation goals, Merit Review Criteria and Solicitation Specific Review Criteria. NSF anticipates up to approximately one to three IRG Track 1 awards, five to eight IRG Track 2 awards, two to three RCN awards, and 10 to 15 Planning Grants.

Anticipated Funding Amount: $18,500,000

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and quality of proposals received.

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.

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: 4

The limit on number of proposals per PI, Co-PI, or other Senior Personnel is defined by award category as follows:

- Integrative Research Grants Track 1 or Track 2: 1;
- Research Coordination Networks: 2; and
- Planning Grants: 1.

An individual may appear as a PI, Co-PI, or other Senior Personnel on only one proposal submitted to either S&CC IRG Track 1 or Track 2 (not both), only two proposals submitted to the S&CC RCN category, and only one proposal

submitted to S&CC Planning Grant category. This limitation includes proposals submitted by a lead organization and any sub-awards included as part of a collaborative proposal involving multiple institutions.

While allowable, it is not anticipated that an individual will appear as a PI, Co-PI, or other Senior Personnel on 4 proposals.

In the event that an individual exceeds these limits, the proposals received within the limits will be accepted based on the earliest date and time of proposal submission (i.e., the first one or two proposals received depending on project category will be accepted and the remainder within that project category **will be returned without review**). **No exceptions will be made**.

Additional Eligibility Info:

For collaborative proposals involving multiple institutions, the proposal must be submitted by one lead institution with funding for all other participating institutions made through subawards. See the NSF PAPPG for additional information. **Proposals submitted as separately submitted collaborative proposals will be returned without review.**

For U.S. universities and two- and four-year colleges with overseas campuses, this solicitation restricts eligibility to research activities using the facilities, equipment, and other resources of the campus(es) located in the U.S. only.

Note: this restriction is directed at institutional eligibility only; it is not intended to restrict international collaborations or research activities by subsequent awardees.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals *(required)*: Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

Preliminary Proposal Preparation Instructions

Preliminary proposals are **required only** for **S&CC Integrative Research Grants (IRG) Tracks 1 and 2** and must be submitted in accordance with the instructions below. The NSF decision made on the preliminary proposal is advisory only and may include feedback on proposed activities, including anticipated budgets. Submission of a Preliminary Proposal is required in order to be eligible to submit a Full S&CC IRG Proposal.

Preliminary proposals are started in the same way as new full proposals.

- Proposers must be sure to check the box "If this is a preliminary proposal then check here" in the middle of the cover sheet. This box appears on the cover sheet template just under the section labeled "Previous NSF Award."

Required components of the preliminary proposal are given below. **Page limitations given here will be strictly enforced, and preliminary proposals that are not compliant with this solicitation will be returned without review.** It is the submitting organization's responsibility to ensure that the preliminary proposal is compliant with all applicable requirements. **If there are multiple institutions involved in a project, only the lead institution should submit a single preliminary proposal as described below.** Proposers should review the most current NSF PAPPG for specific information on signatures and format requirements for the required sections.

Preliminary proposals should consist of four elements as follows and **no other sections are permitted**:

1. Cover Sheet;
2. Project Summary;
3. Project Description; and
4. Project Personnel and Partner Institutions.

Cover Sheet: Select the S&CC program solicitation number from the pull down list. Check the box indicated for preliminary proposal. The Project Title on the Cover Sheet should begin with "S&CC-IRG Preliminary Proposal Track (1 or 2)", followed by a colon, followed by the project title. Entries on the cover sheet are limited to the principal investigator and a maximum of four co-principal investigators. Additional project leaders or senior personnel should be listed on the Project Personnel and Partner Institutions supplementary document and entered into FastLane.

Project Summary (1-page limit): The project summary may not exceed **one page in length** and must consist of the following three clearly labeled sections:

1. **Overview:** Include the title of the project, the name of the PI and lead institution, and a summary of how the project integrates social and technological research dimensions, research capacity-building, and community engagement;
2. **Intellectual Merit:** Provide a brief summary of the intellectual merit of the proposed project detailing the potential fundamental and integrative research advances; and
3. **Broader Impacts:** Provide a brief summary of the broader impacts of the proposed project, including potential impacts on the community defined and the field.

Project Description (4-page limit)**:** In preparing the Project Description, consider the Program Description for IRGs and the Additional Solicitation Specific Review Criteria because the preliminary proposal is used to assess suitability for submitting a full proposal. The Project Description of the preliminary proposal is **limited to four pages** and must consist of the following six clearly labeled sections:

1. **Vision and Goals**: Describe the vision and goals of the proposed research. Briefly describe how the project will contribute to our understanding of S&CC research, to research capacity-building, and to the engaged community.
2. **Integrative Research Approach**: Describe clearly the proposed research including its plan for *integrative research* and *community engagement*. Define the community, associated stakeholders, and how the community will engage in meaningful ways with the proposed research. Briefly describe the evaluation approach including initial metrics.
3. **Research Capacity-Building**: Describe activities towards building, developing, and engaging research talent to focus on S&CC integrative research challenges.
4. **Integration and Multi-Disciplinary Context**: Characterize the multidisciplinary, holistic nature of the approach by identifying the disciplines involved in the research, and how the proposed research elements are integrated.
5. **Management**: Describe the participating institution(s) and key personnel briefly (see Project Personnel and Partner Institutions section). Address the roles and responsibilities of the project's management, and how it will support integration of tasks at a high level and engagement with the community throughout the course of the planned research activities. Describe the approach to collaboration among project members.
6. **Budget and Subawardees**: Provide an estimated aggregate budget request with number of years of support requested. Provide a list of subawardee institutions.

Project Personnel and Partner Institutions (1-page limit): Provide current, accurate information for all personnel and institutions involved in the project. Follow the same format as described for Project Personnel and Partner Institutions in the Full Proposal Preparation Instructions below. **Submit as a supplementary document.**

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: https://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. 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: (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) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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.

Multi-Institutional Proposals: For collaborative proposals involving multiple institutions, the proposal must be submitted by one lead institution with funding for all other participating institutions made through subawards. See the NSF PAPPG for additional information. **Proposals submitted as separately submitted collaborative proposals will be returned without review.**

Cover Page

Proposal Title: The title of the proposal should begin with one of the following prefixes to designate the specific kind of proposal being submitted:

- SCC-IRG Track 1: (this prefix is used for an S&CC Integrative Research Grant Track 1);
- SCC-IRG Track 2: (this prefix is used for an S&CC Integrative Research Grant Track 2);
- SCC-RCN: (this prefix is used for an S&CC Research Coordination Network); or
- SCC-Planning: (this prefix is used for an S&CC Planning Grant).

The rest of the title of the proposal should describe the project in concise, informative language so that a scientifically- or technically-literate reader can understand what the project is about. The title should emphasize the scientific work to be undertaken, and be suitable for use in public press.

Personnel Listed on the Cover Sheet: Provide complete information requested on the cover sheet for the PI and for up to four co-PIs.

Note the following special requirement for S&CC IRG Track 1 and Track 2 proposals: enter the preliminary proposal number in the box labeled "Show Related Preliminary Proposal No."

Note the following special requirement for S&CC RCN proposals: the network coordinator should be listed as the PI and up to four members of the S&CC RCN steering committee may be listed as co-PIs. Any other members of the S&CC RCN steering committee should be entered as other senior personnel.

Project Description:

- **S&CC Integrative Research Grants Tracks 1 and 2:** Project descriptions for S&CC IRGs are **limited to 15 pages in length.** [Note: IRG full proposals may be submitted only if a preliminary proposal for the same topic by the same investigator team was received.]

- The project description must clearly address the proposed research problems and activities including *integrative research, research capacity-building*, and *community engagement*. It must provide details on the fundamental research plans outlining specific tasks, schedules, and activities (a Gantt chart may be used). The project description must also provide details defining who the community is, and in what activities the community will be engaged during the project, including any integration or other touch-points. The project description must include a discussion of the proposed approach to evaluation, e.g., potential metrics if appropriate, and describe appropriate means of data collection. The project description must also describe the vision of success for the proposal – specifically defining what are the project goals and what will define a successful outcome.
    - Please also note the requirement in IRG proposals for a supplementary document titled Integration and Management Plan, described below.
    - It is anticipated that Track 1 and 2 proposals will be distinguished by the size of the teams as well as the scope and duration of the proposed activities. For a given proposal, rationale should be included explaining why the corresponding budget is required to carry out the proposed work.
- **S&CC Research Coordination Networks:** Project descriptions for S&CC RCN proposals **are limited to 15 pages in length.**
    - In preparing an RCN proposal, consider proposal information found at NSF 15-527. Required elements are below.
    - The project description must clearly specify the major components of the proposed RCN and how significant advances and new directions of *integrative research and research capacity-building* with *community engagement* will be achieved through active communication and sharing of ideas among the network of researchers and community participants.
    - The project description must contain a focused section that begins with the title **S&CC RCN Management Plan.** This section should describe plans and procedures for the creation and assessment of the proposed S&CC RCN, including formal mechanisms to ensure fair and equitable allocation of network resources. This section should clearly define the responsibilities for network leadership including the role of the PI in coordinating and integrating activities of the network and the steering committee in the leadership and/or management of the project. The steering committee, which constitutes all the Co-PIs and senior personnel on the proposal, should be representative of the communities of participants that will be brought together by the network. The plan should also outline the procedures used for the selection of initial network participants as well as plans for maintaining an appropriate degree of openness and for encouraging the involvement of additional interested parties and provisions for flexibility to allow the structure of the participant group to change over time as membership and the network's foci evolve. The management plan should call out the community of interest, specifically addressing the roles of various community stakeholders in the RCN. The management plan should also identify how the S&CC RCN will evaluate progress toward the network goals.
- **S&CC Planning Grants:** Project descriptions for S&CC Planning Grants are **limited to 5 pages in length**.
    - The project description must include a research concept and the intended planning activities. The research concept and planning activities must clearly address and combine *integrative research* and *community engagement* and address how the work supports *research-capacity building*. The planning activities should describe proposed collaborators including academic researchers and community stakeholders and detail how the activities will help identify the research priorities and build progress toward a future research project. Details of past collaborations should also be included if relevant.

Single Copy Documents:

Collaborators and Other Affiliations Information:

For this solicitation, the *Collaborators & Other Affiliations* information specified in the PAPPG should be submitted using the spreadsheet template found at https://www.nsf.gov/cise/collab/. For each proposal, a completed spreadsheet for each PI, co-PI, or senior personnel must be uploaded directly into Fastlane in .xls or .xlsx format as a "Collaborator and Other Affiliations" Single Copy Document. NSF staff use this information in the merit review process to help manage reviewer selection; the spreadsheet will ensure the Collaborator and Other Affiliations information has a common, searchable format.

Note the distinction to (1) below for Supplementary Documents: the listing of all project participants is collected by the project lead and entered as a Supplementary Document, which is then automatically included with all proposals in a project. The Collaborators and Other Affiliations are entered for each participant within each proposal and, as Single Copy Documents, are available only to NSF staff. Collaborators and Other Affiliations due to participants listed on (1) that are not PIs, co-PIs, or senior personnel can be uploaded under Additional Single Copy Documents using Transfer File.

Supplementary Documents:

1. **Project Personnel and Partner Institutions** (required for all award categories)**:** Provide current, accurate information for all personnel and institutions involved in the project. NSF staff will use this information in the merit review process to manage conflicts of interest. The list must include all PIs, Co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, project-level advisory committee members, and writers of letters of support. 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:

    - Mary Smith; XYZ University; PI
    - John Jones; University of PQR; Senior Personnel
    - Jane Brown; XYZ University; Postdoc
    - Bob Adams; ABC Inc.; Paid Consultant
    - Mary White; Welldone Institution; Unpaid Collaborator
    - Tim Green; ZZZ University; Subawardee

2. **Integration and Management Plan** (for Integrative Research Grants Tracks 1 and 2 only): A **two-page** supplementary document containing the following two sections – titled as listed below - must accompany all S&CC IRG proposals **(proposals failing to include an Integration and Management Plan will be returned without review)**:

    1. **Integration and Multi-Disciplinary Context-** Characterize the multidisciplinary, holistic nature of the approach by identifying the disciplines involved in the research and how the proposed research elements, including social and technological dimensions, are integrated together. Summarize the community engagement including a clear

statement defining the community, who the community stakeholders are, and what the activities are that reflect meaningful engagement for the proposed research, as described in Section II of this program solicitation.

2. **Management:** The plan must address the roles and responsibilities of all named participants and should describe how tasks will be integrated over the course of the project. The plan should describe the management, communication and administrative structure for the team with sufficient detail to demonstrate the capability for successfully conducting the proposed work. For example, information on how the project will be managed across all the investigators, institutions, and/or disciplines; and identification of the specific coordination mechanisms that will enable cross-investigator, cross-institution, and/or cross-discipline efforts (e.g., yearly workshops, graduate student exchange, project meetings at conferences, use of the grid for videoconferences, software repositories, etc.).

3. **Letters of Collaboration:** Any substantial collaboration with individuals not included in the budget should be described in the Facilities, Equipment and Other Resources section of the proposal and documented in a letter of collaboration from each collaborator. Such letters should be provided in the supplementary documents section of the proposal and follow the format instructions specified in the NSF PAPPG. Collaborative activities that are identified in the budget should follow the instructions in the NSF PAPPG.

   Letters of collaboration should be limited to stating the intent to collaborate and should not contain endorsements or evaluation of the proposed project. The recommended format for letters of collaboration is as follows:

   "If the proposal submitted by Dr. [insert the full name of the Principal Investigator] entitled [insert the proposal title] is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment or Other Resources section of the proposal."

4. **Human Subjects Protection:** Proposals involving human subjects should include a supplementary document of no more than two pages in length summarizing potential risks to human subjects; plans for recruitment and informed consent; inclusion of women, minorities, and children; and planned procedures to protect against or minimize potential risks.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Budgets for all projects must include funding for one or more designated S&CC project representatives (PI/co-PI/senior personnel or NSF-approved replacement) to attend each S&CC PI meeting during the proposed lifetime of the award (see section II of this program solicitation). For budget preparation purposes, PIs should assume these meetings will be held in the fall of each year in the Washington, DC, area.

C. Due Dates

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

  November 30, 2016

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

  February 16, 2017

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. 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. 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 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 *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. (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 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

As appropriate to the category, how effectively does the proposal address *integrative research* and *research capacity-building* coupled with *community engagement?*

B. Review and Selection Process

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

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

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 https://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.

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.

Special Award Conditions:

For every S&CC award, one or more designated project representatives (PI/co-PI/senior personnel or NSF-approved replacement) must attend annual S&CC PI meetings throughout the duration of the grant.

As a condition of every S&CC award, the grantee agrees to submit requested project data for the purpose of program evaluation to an NSF third-party evaluator.

Attribution of support in publications must acknowledge the National Science Foundation, the award number, and the program, by including the phrase, "as part of the NSF Smart & Connected Communities Program."

C. Reporting Requirements

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

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

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

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- David Corman, Program Director, CISE/CNS, telephone: (703) 292-8754, email: dcorman@nsf.gov

- Nicholas Anderson, Program Director, GEO/AGS, telephone: (703) 292-4715, email: nanderso@nsf.gov

- Radhakishan Baheti, Program Director, ENG/ECCS, telephone: (703) 292-8339, email: rbaheti@nsf.gov

- John Cherniavsky, Program Director, EHR/DRL, telephone: (703) 292-5136, email: jchernia@nsf.gov

- Bruce Hamilton, Program Director, ENG/CBET, telephone: 7032929054, email: bhamilto@nsf.gov

- Sara Kiesler, Program Director, SBE/SES, telephone: (703) 292-8643, email: skiesler@nsf.gov

- Tatiana Korelsky, Program Director, CISE/IIS, telephone: (703) 292-8930, email: tkorelsk@nsf.gov

- David Mendonca, Program Director, ENG/CMMI, telephone: (703) 292-7081, email: mendonca@nsf.gov

- Sunil Narumalani, Program Director, SBE/BCS, telephone: (703) 292-4995, email: snarumal@nsf.gov

- Wendy Nilsen, Program Director, CISE/IIS, telephone: (703) 292-2568, email: wnilsen@nsf.gov

- Rahul T. Shah, Program Director, CISE/CCF, telephone: (703) 292-2709, email: rshah@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: 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.

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 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 (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:**   4201 Wilson Blvd. Arlington, VA 22230
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