

Computer and Information Science and Engineering (CISE): Core Programs

PROGRAM SOLICITATION NSF 19-589

REPLACES DOCUMENT(S):
NSF 18-567, NSF 18-568, NSF 18-569, NSF 18-570



National Science Foundation

Directorate for Computer and Information Science and Engineering
Division of Computing and Communication Foundations
Division of Information and Intelligent Systems
Division of Computer and Network Systems
Office of Advanced Cyberinfrastructure

Submission Window Date(s) (due by 5 p.m. submitter's local time):

September 20, 2019 - September 30, 2019

LARGE projects

September 20, 2019 - September 30, 2019

MEDIUM projects

October 31, 2019 - November 14, 2019

SMALL projects

September 07, 2020 - September 14, 2020

MEDIUM projects

September 16, 2020 - September 23, 2020

LARGE projects

October 29, 2020 - November 12, 2020

SMALL projects

IMPORTANT INFORMATION AND REVISION NOTES

This is a revision of [NSF 18-567](#), [NSF 18-568](#), [NSF 18-569](#) and [NSF 18-570](#), the solicitations for the Directorate for Computer and Information Science and Engineering's Office of Advanced Cyberinfrastructure (OAC) Core Program, Computing and Communication Foundations (CCF) Core Programs, Computer and Network Systems (CNS) Core Program, and Information and Intelligent Systems (IIS) Core Programs, respectively. As part of this revision, proposers are encouraged to pay particular attention to the following:

- Eligibility requirements for principal investigators (PIs), co-PIs, and senior personnel are clarified.
- Program Description for the CISE core programs now point to individual NSF program webpages. See Section II. Program Description for additional information.
- Program-specific guidelines are specified in Section II. Program Description, along with program-specific review criteria in Section VI.A. Merit Review Principles and Criteria, Additional Solicitation Specific Review Criteria.
- Proposals must be submitted to the appropriate core program, as identified in Section II. Program Description and described in Section V.A. Proposal Preparation Instructions.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 19-1](#)), which is effective for proposals submitted, or due, on or after February 25, 2019.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Computer and Information Science and Engineering (CISE): Core Programs

Synopsis of Program:

The NSF CISE Directorate supports research and education projects that develop new knowledge in all aspects of computing, communications, and information science and engineering, as well as advanced cyberinfrastructure, through the following core programs:

Office of Advanced Cyberinfrastructure (OAC):

- OAC Core Research (OAC Core) program;

Division of Computing and Communication Foundations (CCF):

- Algorithmic Foundations (AF) program;
- Communications and Information Foundations (CIF) program;
- Foundations of Emerging Technologies (FET) program; and
- Software and Hardware Foundations (SHF) program;

Division of Computer and Network Systems (CNS):

- CNS Core (CNS Core) program;

Division of Information and Intelligent Systems (IIS):

- Cyber-Human Systems (CHS) program;
- Information Integration and Informatics (III) program; and
- Robust Intelligence (RI) program.

Proposers are invited to submit proposals in several project classes, which are defined as follows:

- Small Projects -- up to \$500,000 total budget with durations up to three years: projects in this class may be submitted to OAC, CCF, CNS, and IIS;
- Medium Projects -- \$500,001 to \$1,200,000 total budget with durations up to four years: projects in this class may be submitted to CCF, CNS, and IIS only; and
- Large Projects -- \$1,200,001 to \$3,000,000 total budget with durations up to five years: projects in this class may be submitted to CNS only.

A more complete description of these project classes can be found in Section II. *Program Description* of this document.

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.

- Alan Sussman, Point of Contact, OAC Core Research (OAC Core), telephone: (703) 292-7563, email: oac-core@nsf.gov
- Anindya Banerjee, Point of Contact, Software and Hardware Foundations (SHF), telephone: (703) 292-8910, email: ccf-shf@nsf.gov
- Mitra Basu, Point of Contact, Foundations of Emerging Technologies (FET), telephone: (703) 292-8910, email: ccf-fet@nsf.gov
- Tracy J. Kimbrel, Point of Contact, Algorithmic Foundations (AF), telephone: (703) 292-8910, email: ccf-af@nsf.gov
- Phillip A. Regalia, Point of Contact, Communications and Information Foundations (CIF), telephone: (703) 292-8910, email: ccf-cif@nsf.gov
- Ann C. Von Lehmen, Point of Contact, CNS Core (CNS Core), telephone: (703) 292-4756, email: cns-core@nsf.gov
- Samee U. Khan, Point of Contact, CNS Core (CNS Core), telephone: (703) 292-8950, email: cns-core@nsf.gov
- Ephraim P. Glinert, Point of Contact, Cyber-Human Systems (CHS), telephone: (703) 292-8930, email: iis-chs@nsf.gov
- Sylvia J. Spengler, Point of Contact, Information Integration and Informatics (III), telephone: (703) 292-8930, email: iis-iii@nsf.gov
- Jie Yang, Point of Contact, Robust Intelligence (RI), telephone: (703) 292-8930, email: iis-ri@nsf.gov

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 400 to 600

Anticipated Funding Amount: \$280,000,000

Dependent upon the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

By the submission deadline, any PI, co-PI, or other senior project personnel must hold either:

- a tenured or tenure-track position, *or*
- a primary, full-time, paid appointment in a research or teaching position

at a US-based campus of an organization eligible to submit to this solicitation (see above), with exceptions granted for family or medical leave, as determined by the submitting organization. Individuals with *primary* appointments at for-profit non-academic organizations or at overseas branch campuses of US IHEs are not eligible.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 2

In any contiguous September through November period, an individual may participate as PI, co-PI or Senior Personnel in **no more than two** proposals across all size classes submitted in response to this solicitation. For example, between September 2019 and November 2019, an individual may participate as PI, co-PI or Senior Personnel in one proposal submitted to a core program in CCF and in a second proposal submitted to the CNS Core program, or an individual may participate as PI, co-PI or Senior Personnel in two proposals submitted to an IIS core program.

These eligibility constraints will be strictly enforced in order to treat everyone fairly and consistently. In the event that an individual exceeds this limit, proposals received within the limit will be accepted based on earliest date and time of proposal submission (i.e., the first two proposals received will be accepted and the remainder will be returned without review). **No exceptions will be made.**

The limit on the number of proposals per PI, co-PI or Senior Personnel applies only to this solicitation.

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* (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

Submission Window Date(s) (due by 5 p.m. submitter's local time):

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LARGE projects

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MEDIUM projects

September 16, 2020 - September 23, 2020

LARGE projects

October 29, 2020 - November 12, 2020

SMALL projects

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:

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

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I. INTRODUCTION

The NSF Directorate for Computer and Information Science and Engineering (CISE) supports transformative research and education projects that develop new knowledge in all aspects of computing, communications, and information science and engineering, as well as advanced cyberinfrastructure, through multiple research programs across one office and three divisions:

The Office of Advanced Cyberinfrastructure (OAC) supports translational research and education activities in all aspects of advanced cyberinfrastructure that lead to systems capable of transforming science and engineering research.

The Division of Computing and Communication Foundations (CCF) studies the foundations of computing and communication.

The Division of Computer and Network Systems (CNS) studies novel or enhanced computing and networking technologies, or new ways to make use of existing technologies.

The Division of Information and Intelligent Systems (IIS) studies the inter-related roles of people, computers, and information.

II. PROGRAM DESCRIPTION

This solicitation covers submission to the following CISE core programs. Please see the individual program webpages below for more information on what is within scope for these programs:

OAC:

- OAC Core Research (OAC Core) program [[Program Webpage](#)];

CCF:

- Algorithmic Foundations (AF) program [[Program Webpage](#)];
- Communications and Information Foundations (CIF) program [[Program Webpage](#)];
- Foundations of Emerging Technologies (FET) program [[Program Webpage](#)]; and
- Software and Hardware Foundations (SHF) program [[Program Webpage](#)];

CNS:

- CNS Core (CNS Core) program [[Program Webpage](#)];

IIS:

- Cyber-Human Systems (CHS) program [[Program Webpage](#)];
- Information Integration and Informatics (III) program [[Program Webpage](#)]; and
- Robust Intelligence (RI) program [[Program Webpage](#)].

Projects currently supported by CISE programs can be found by using the NSF Awards Search engine at <https://www.nsf.gov/awardsearch/advancedSearch.jsp>.

PROJECT CLASSES

Proposals submitted to this solicitation must be consistent with one of three project classes defined below. Proposals will be considered for funding within their project classes.

- **SMALL Projects**

Small Projects, with total budgets up to \$500,000 for durations of up to three years, are well suited to one or two investigators (PI and one co-PI or other Senior Personnel) and at least one student and/or postdoctoral researcher. A Collaboration Plan (up to two pages) **may** be provided under Supplementary Documents. Please see *Proposal Preparation Instructions* Section V.A for additional submission guidelines.

- **MEDIUM Projects**

Medium projects are not accepted for the OAC Core Research program, and will be returned without review if submitted to OAC Core.

Medium Projects, with total budgets ranging from \$500,001 to \$1,200,000 for durations up to four years, are well suited to one or more investigators (PI, co-PI and/or other Senior Personnel) and several students and/or postdoctoral researchers. Medium project descriptions must be comprehensive and well-integrated, and should make a convincing case that the collaborative contributions of the project team will be greater than the sum of each of their individual contributions. Rationale must be provided to explain why a budget of this size is required to carry out the proposed work. Since the success of collaborative research efforts is known to depend on thoughtful coordination mechanisms that regularly bring together the various participants of the project, **a Collaboration Plan is required for any Medium project with more than one investigator**, even when the investigators are affiliated with the same institution. Up to two pages are allowed for Collaboration Plans and they must be submitted as a document under Supplementary Documents. The length and level of detail provided in the Collaboration Plan should be commensurate with the complexity of the proposed project. Collaboration Plans and proposed budgets should demonstrate that key personnel, and especially lead PIs, have allocated adequate time for both their individual technical contributions and the leadership of collaborative activities necessary to realize the synergistic effects of larger-scale research. **If a Medium project with more than one investigator does not include a Collaboration Plan, that proposal will be returned without review.** Please see *Proposal Preparation Instructions* Section V.A for additional submission guidelines.

- **LARGE Projects**

Large Projects are only accepted for the CNS Core program. Large Projects submitted to any other program will be returned without review. References to Large Projects in the rest of this document should be interpreted in the context of the CNS Core program only. Proposers should note that CNS intends to accept proposals for Large Projects only every other year.

Large Projects, with total budgets ranging from \$1,200,001 to \$3,000,000 for durations of up to five years, are well suited to two or more investigators (PI, co-PI(s), or other Senior Personnel), and a team of students and/or postdoctoral researchers. Large project descriptions must be comprehensive and well-integrated, and should make a convincing case that the collaborative contributions of the project team will be greater than the sum of each of their individual contributions. Large projects will typically integrate research from various areas or tackle ambitious goals not feasible with smaller projects. Rationale must be provided to explain why a budget of this size is required to carry out the proposed work. Since the success of collaborative research efforts is known to depend on thoughtful coordination mechanisms that regularly bring together the various participants of the project, **a Collaboration Plan is required for all Large projects,** regardless of the number of investigators. Up to two pages are allowed for Collaboration Plans and they must be submitted as a document under Supplementary Documents. The length and degree of detail provided in the Collaboration Plan should be commensurate with the complexity of the proposed project. Collaboration Plans and proposed budgets should demonstrate that key personnel, and especially lead PIs, have allocated adequate time for both their individual technical contributions and the leadership of collaborative activities necessary to realize the synergistic effects of larger-scale research. **If a Large project does not include a Collaboration Plan, that proposal will be returned without review.** Please see *Proposal Preparation Instructions* Section V.A for additional submission guidelines.

BROADENING PARTICIPATION IN COMPUTING

CISE has long been committed to Broadening Participation in Computing (BPC). The underrepresentation of many groups—including women, African Americans, Hispanics, American Indians, Alaska Natives, Native Hawaiians, Native Pacific Islanders, and persons with disabilities—in computing deprives large segments of the population of the opportunity to be creators of technology and not only consumers. Ending underrepresentation will require a range of measures, including institutional programs and activities as well as culture change across colleges, departments, classes, and research groups.

With this solicitation, CISE is continuing a pilot effort started in 2018 encouraging the research community to engage in meaningful BPC activities. This activity builds on many of the programs, research, and resources created through CISE's past and ongoing investments in BPC, and it aligns with the recommendations of the [Strategic Plan for Broadening Participation](#) produced by the CISE Advisory Committee in 2012. Specifically:

- Each Medium and Large project must, by the time of award, have in place an approved BPC plan. In this ongoing pilot phase, CISE will work with each PI team following merit review and prior to making an award to ensure that plans are meaningful and include concrete metrics for success. CISE will also provide opportunities for PIs to share BPC experiences and innovations through program PI meetings. PIs of Medium and Large proposals are therefore strongly encouraged consider this eventual requirement as they develop their proposals and include one- to three-page descriptions of their planned BPC activities under Supplementary Documents in their submissions. Feedback will be provided on such plans.
- PIs submitting to the Small size class should note that CISE intends to conduct an evaluation of the effectiveness of the above approach for Medium and Large projects and determine appropriate next steps, including potential further expansion of this effort in future years. PIs of Small projects are therefore strongly encouraged to include plans for BPC activities within the Project Description sections of their proposals. Feedback will be provided on these plans.

A strong BPC plan addresses at least the following five elements: (1) the context of the proposed activity, (2) intended target population(s), (3) plan of activities, (4) prior experience (if any) and/or intended preparation/training activities, and (5) plans for the measurement and dissemination of outcomes. All collaborators are expected to participate in BPC activities. More information, including metrics for BPC activities and examples, can be found at: <https://www.nsf.gov/cise/bpc/>.

PROPOSALS FOR CONSIDERATION BY MULTIPLE CISE PROGRAMS

Proposals that intersect more than one CISE research program are welcome. In such cases, PIs must identify the most relevant programs in the proposal submission process; for information about submission and how to identify such proposals, see *Proposal Preparation Instructions* later in this document. In these cases, PIs should also ensure that their proposals follow the program-specific guidelines for all research programs identified. CISE Program Officers will consider co-reviewing these proposals as appropriate.

REPRODUCIBILITY AND SHARING

In the interest of completeness and transparency, PIs must describe, as part of their Data Management Plans, how they will provide access to well-documented datasets, modeling and/or simulation tools, and codebases to support reproducibility/replicability of their methods and results for a reasonable time beyond the end of the project lifecycle. See the NSF PAPPG Chapter XI.D.4 as well as the Dear Colleague Letter "Encouraging Reproducibility in Computing and Communications Research" available at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf17022.

EVALUATION

PIs should include a plan to evaluate the approaches developed as part of the Project Description. Appropriate methods will depend on the research area, topic, size and scope of the proposed project. Examples include, but are not limited to, peer review of developed theories and proofs, controlled experiments on appropriate simulators/emulators/testbeds, user studies, or prototype deployments. The plan should be appropriate for the size and scope of the project.

Note: For proposers to the CNS Core program, a plan to evaluate the approaches developed as part of the Project Description is required. For proposers to the OAC Core Research program, consult the "Program-Specific Guidelines" section below; the guidance there replaces the instructions about Evaluation here. A proposal that responds to both the CNS Core and OAC Core Research programs should have a single plan that addresses both requirements.

FAIRNESS, ETHICS, ACCOUNTABILITY, AND TRANSPARENCY

CISE invites PIs to submit proposals that contribute to discovery in research and practice related to fairness, ethics, accountability, and transparency (FEAT) in computer and information science and engineering. In projects that generate artifacts ranging from analysis methods to algorithms to systems, or that perform studies involving human subjects, PIs are encouraged to consider the FEAT that may be embedded in their outputs or the approaches used to produce them. CISE is also interested in receiving proposals whose *primary* foci are on methods, techniques, tools, and evaluation practices as means to explore implications for FEAT. In explorations and use of FEAT, PIs are strongly encouraged to select and articulate their own disciplinary or interdisciplinary definitions consistent or aligned with these concepts.

START DATES

Organizations are discouraged from seeking project start dates between July 2 and September 30 of a given year to avoid overdue reports blocking award actions during the end of a fiscal year. Awardee organizations may incur allowable pre-award costs within the 90-day period immediately preceding the start date of the grant (see PAPPG Chapter X.A.2.b); this will allow support for students or other relevant activities to begin over this period.

PROGRAM-SPECIFIC GUIDELINES

OAC Core Research (OAC Core) program:

Validation or Transition-to-Practice Plan: OAC proposers are strongly encouraged to include either a validation or transition-to-practice plan for their proposed research in the Project Description. A validation plan may include setup, mechanisms, metrics, and exploration of leading-edge production systems (or equivalent simulated, emulated, or experimental systems). Transition-to-practice entails planning for incorporation of research results into production research cyberinfrastructure.

III. AWARD INFORMATION

Up to \$280 million each year will support up to 600 awards, pending the availability of funds.

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

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

By the submission deadline, any PI, co-PI, or other senior project personnel must hold either:

- a tenured or tenure-track position, *or*
- a primary, full-time, paid appointment in a research or teaching position

at a US-based campus of an organization eligible to submit to this solicitation (see above), with exceptions granted for family or medical leave, as determined by the submitting organization. Individuals with *primary* appointments at for-profit non-academic organizations or at overseas branch campuses of US IHEs are not eligible.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 2

In any contiguous September through November period, an individual may participate as PI, co-PI or Senior Personnel in **no more than two** proposals across all size classes submitted in response to this solicitation. For example, between September 2019 and November 2019, an individual may participate as PI, co-PI or Senior Personnel in one proposal submitted to a core program in CCF and in a second proposal submitted to the CNS Core program, or an individual may participate as PI, co-PI or Senior Personnel in two proposals submitted to an IIS core program.

These eligibility constraints will be strictly enforced in order to treat everyone fairly and consistently. In the event that an individual exceeds this limit, proposals received within the limit will be accepted based on earliest date and time of proposal submission (i.e., the first two proposals received will be accepted and the remainder will be returned without review). **No exceptions will be made.**

The limit on the number of proposals per PI, co-PI or Senior Personnel applies only to this solicitation.

Additional Eligibility Info:

For IHEs and non-profit, non-academic organizations with international branch campuses, this solicitation restricts eligibility to research activities using the facilities, equipment, and other resources of the campuses located in the US only.

Further, subawards are not permitted to international branch campuses of US-based proposing organizations eligible to submit to this solicitation.

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 FastLane or Grants.gov.

- 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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 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.

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. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

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

Proposal Titles:

Proposal titles should begin with an acronym that indicates the most relevant core program. Select a **bolded acronym** from the following list:

OAC:

- OAC Core Research (**OAC Core**) program;

CCF:

- Algorithmic Foundations (**AF**) program;
- Communications and Information Foundations (**CIF**) program;
- Foundations of Emerging Technologies (**FET**) program; and
- Software and Hardware Foundations (**SHF**) program;

CNS:

- CNS Core (**CNS Core**) program;

IIS:

- Cyber-Human Systems (**CHS**) program;
- Information Integration and Informatics (**III**) program; and
- Robust Intelligence (**RI**) program.

The acronym should be followed with a colon, then the project class followed by a colon, then the title of your project. For example, if you are submitting a Large proposal to the CNS Core program, then your title would be **CNS Core: Large: Title**.

If you submit a proposal as part of a set of collaborative proposals, the title of the proposal should begin with the words "Collaborative Research" followed by a colon, then the program acronym followed by a colon, then the project class followed by a colon and then the title of your project. For example, if you are submitting a collaborative set of proposals for a Medium project to the Robust Intelligence program, then the title of each would be **Collaborative Research: RI: Medium: Title**.

Proposals from PIs in institutions that have RUI (Research in Undergraduate Institutions) eligibility should have a proposal title that begins with the program acronym followed by a colon, then the project class followed by a colon, then "RUI" followed by a colon, and then the title, for example, **SHF: Small: RUI: Title**.

PIs submitting GOALI (Grant Opportunities for Academic Liaison with Industry) proposals should have a proposal title that begins with the program acronym followed by a colon, then the project class followed by a colon, then "GOALI" followed by a colon, and then the title, for example, **CHS: Small: GOALI: Title**. The "GOALI" type of proposal should be selected in the proposal preparation module in FastLane or Grants.gov. For additional information and guidance, see PAPPG Chapter II.E.4.

Proposals that extend beyond the scope of one CISE core program or area are welcome. In such cases, PIs should identify the acronym for the **most relevant**

core program or area, followed by any other relevant program acronym(s) separated by colons, for example, **CNS Core: AF: Medium: Title**. In this example, the proposal would be submitted to the CNS Core program and would be considered by both the CNS Core and AF programs. CISE Program Officers will work with their NSF colleagues to ensure that these proposals are appropriately reviewed and considered for funding.

Medium proposals may not be submitted to the OAC Core Research program. Medium proposals submitted simultaneously to the OAC Core Research program and any other programs named in this solicitation will be returned without review.

Large proposals may not be submitted to any Core programs within OAC, CCF, and IIS. Large proposals submitted simultaneously to the CNS Core program and any other programs named in this solicitation will be returned without review.

Project Summary:

The Project Summary consists of an overview, a statement on the intellectual merit of the proposed activity, a statement on the broader impacts of the proposed activity, and a set of keywords.

All proposals must include 3-6 keywords that describe the general area(s) of the investigation, to assist in identifying reviewers with appropriate knowledge and expertise to review the proposal. *The list of keywords should be the last paragraph of the Overview section of the Project Summary.*

The keywords should describe the main scientific/engineering areas explored in the proposal. Keywords should be prefaced with "Keywords" followed by a colon and each keyword set should be separated by semicolons. Keywords should be of the type used to describe research in a journal submission and may include technical areas of expertise necessary to review the proposal. For example, they might appear as, **Keywords: energy-aware computing; formal logic; graph theory; qubits; information visualization; privacy.**

Project Description:

Length of Project Description - Describe the research and education activities to be undertaken in **up to 15 pages for Small and Medium proposals, and in up to 20 pages for Large proposals. Proposals that exceed these limits will be returned without review.**

Supplementary Documents:

In the Supplementary Documents section, upload the following information where relevant:

- *A list of Project Personnel and Partner Organizations (required) (Note: In collaborative proposals, the lead organization should provide this information for all participants):*

Provide current, accurate information for all personnel and organizations involved in the project. NSF staff will use this information in the merit review process to manage reviewer selection. The list **must** include all PIs, co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, and project-level advisory committee members. 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:

- o Mary Smith; XYZ University; PI
- o John Jones; University of PQR; Senior Personnel
- o Jane Brown; XYZ University; Postdoctoral Researcher
- o Bob Adams; ABC Community College; Paid Consultant
- o Susan White; DEF Corporation; Unpaid Collaborator
- o Tim Green; ZZZ University; Subawardee

- *Data Management Plan (required):*

Proposals must include a Supplementary Document of no more than two pages labeled "Data Management Plan." This Supplementary Document should describe how the proposal will conform to NSF policy on the dissemination and sharing of research results.

See NSF PAPPG Chapter II.C.2.j for full policy implementation.

For additional information on the Dissemination and Sharing of Research Results, see: <https://www.nsf.gov/bfa/dias/policy/dmp.jsp>.

For specific guidance for Data Management Plans submitted to the Directorate for Computer and Information Science and Engineering (CISE) see: https://www.nsf.gov/cise/cise_dmp.jsp.

See also the guidance on Reproducibility and Sharing in the Program Description section above.

- *Collaboration Plans for Medium and Large projects (if applicable):*

Note: In collaborative proposals, the lead organization should provide this information for all participants.

Since the success of collaborative research efforts are known to depend on thoughtful coordination mechanisms that regularly bring together the various participants of the project, **all Medium proposals that include more than one investigator and all Large proposals must include a Collaboration Plan of up to two pages.** The length of and degree of detail provided in the Collaboration Plan should be commensurate with the complexity of the proposed project. Where appropriate, the Collaboration Plan might include: 1) the specific roles of the project participants in all organizations involved; 2) information on how the project will be managed across all the investigators, organizations, and/or disciplines; 3) identification of the specific coordination mechanisms that will enable cross-investigator, cross-organization, and/or cross-discipline scientific integration (e.g., yearly conferences, graduate student exchange, project meetings at conferences, use of the grid for videoconferences, software repositories, etc.); and 4) specific references to the budget line items that support collaboration and coordination mechanisms. **If a Large proposal, or a Medium proposal with more than one investigator, does not include a Collaboration Plan of up to two pages, that proposal will be returned without review.**

- *Broadening Participation in Computing (BPC) Plans:*

Each Medium and Large project must, by the time of award, have in place an approved BPC plan. Such a plan should begin with the heading "Broadening Participation in Computing (BPC) Plan" and address the following five elements: (1) the context of the proposed activity, (2) intended target population(s), (3) plan of activities, (4) prior experience (if any) and/or intended preparation/training activities, and (5) plans for measurement and

dissemination of outcomes. Collaborative proposals must have one BPC plan for the entire project.

PIs of Medium and Large proposals are therefore strongly encouraged to consider this eventual requirement as they develop their proposals and to include, at the time of submission, a BPC Plan Supplementary Document of one to three pages describing their planned BPC activities. Feedback will be provided on these plans.

- *Documentation of collaborative arrangements of significance to the proposal through Letters of Collaboration (if applicable):*

There are two types of collaboration, one involving individuals/organizations that are included in the budget, and the other involving individuals/organizations that are not included in the budget. Collaborations that are included in the budget should be described in the Project Description. Any substantial collaboration with individuals/organizations not included in the budget should be described in the Facilities, Equipment and Other Resources section of the proposal (see NSF PAPPG Chapter II.C.2.i). In either case, whether or not the collaborator is included in the budget, **a letter of collaboration from each named participating organization other than the submitting lead, non-lead, and/or subawardee organizations should be provided at the time of submission of the proposal. Such letters should explicitly state the nature of the collaboration, appear on the organization's letterhead and be signed by the appropriate organizational representative. These letters must not otherwise deviate from the restrictions and requirements set forth in the NSF PAPPG Chapter II.C.2.j.**

Please note that letters of support may not be submitted. Such letters do not document collaborative arrangements of significance to the project, but primarily convey a sense of enthusiasm for the project and/or highlight the qualifications of the PI or co-PI. **If submitted, reviewers will be instructed not to consider these letters of support in reviewing the merits of the proposal.**

- *Other specialized information (if applicable):*

RUI Proposals: PIs from predominantly undergraduate institutions should include a Research in Undergraduate Institutions (RUI) Impact Statement and Certification of RUI Eligibility in this section.

GOALI proposals: PIs submitting GOALI proposals should include industry-university agreement letters on intellectual property in this section.

No other Supplementary Documents, except as permitted by the NSF PAPPG, are allowed.

Single Copy Documents:

Collaborators and Other Affiliations Information (required):

Proposers should follow the guidance specified in Chapter II.C.1.e of the NSF PAPPG.

Note the distinction to the first item under Supplementary Documents above: 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 individual identified as Senior Personnel within each proposal and, as Single Copy Documents, are available only to NSF staff. Collaborators and Other Affiliations information for participants listed in the first item under Supplementary Documents above who are not PIs, co-PIs, or Senior Personnel can be uploaded under Additional Single Copy Documents using Transfer File.

Submission Checklist:

In an effort to assist proposal preparation, the following checklists are provided as a reminder of the items that should be checked before submitting a proposal to this solicitation. These are a summary of the requirements described above. For the items marked with (RWR), the proposal will be returned without review if the required item is noncompliant at the time of proposal submission. Note that there are four lists: (1) for all proposals, unique to this solicitation; (2) additional requirements for Small proposals; (3) additional requirements for Medium proposals; and (4) additional requirements for Large proposals.

- *For all proposals, regardless of size:*
 - The last line of the Overview section of the Project Summary must consist of the word "Keywords" followed by a colon and between 3-6 keyword sets, separated by semi-colons.
- *For Small proposals:*
 - The proposal title should comply with the requirements under Proposal Preparation Instructions above.
 - (RWR) The total budget **must** not exceed \$500,000, excluding funds for any embedded supplements [e.g., Research Experiences for Undergraduates (REU) supplements for the first year of the project]. For separately-submitted collaborative proposals, this is the total across all participating organizations.
 - (RWR) The Project Description is limited to no more than 15 pages.
 - For proposals submitted to the OAC Core Research program only, the Project Description should include a validation or transition-to-practice plan.
 - For proposals submitted to the CNS Core program only, the Project Description should include an evaluation plan.
 - A Collaboration Plan (up to two pages) **may** be provided as a Supplementary Document. If provided, the Collaboration Plan should include all organizations participating, not a separate plan for each organization.
- *For Medium proposals:*
 - The proposal title should comply with the requirements under Proposal Preparation Instructions above.
 - (RWR) The total budget **must** be \$500,001 to \$1,200,000, excluding funds for any embedded supplements (e.g., REU supplements for the first year of the project). For separately-submitted collaborative proposals, this is the total across all participating organizations.
 - (RWR) The Project Description is limited to no more than 15 pages.
 - For proposals submitted to the CNS Core program only, the Project Description should include an evaluation plan.
 - (RWR) If there is more than one investigator, a collaboration plan (up to two pages) **must** be provided as a Supplementary Document, even if all investigators are affiliated with the same organization. The Collaboration Plan should include all organizations participating, not a separate plan for each organization.
 - A BPC plan (of one to three pages) is strongly encouraged to be provided as a Supplementary Document with a title clearly identifying it as such. If provided, collaborative proposals should submit one BPC plan for the entire project.
- *For Large proposals:*
 - The proposal title should comply with the requirements under Proposal Preparation Instructions above.
 - (RWR) The total budget **must** be \$1,200,001 to \$3,000,000, excluding funds for any embedded supplements (e.g., REU supplements for the first year of the project). For separately-submitted collaborative proposals, this is the total across all participating organizations.
 - (RWR) The Project Description is limited to no more than 20 pages.

- o For proposals submitted to the CNS Core program only, the Project Description should include an evaluation plan.
- o (RWR) A Collaboration Plan (up to two pages) **must** be provided as a Supplementary Document, even if all investigators are affiliated with the same organization. The Collaboration Plan should include all organizations participating, not a separate plan for each organization.
- o A BPC Plan (of one to three pages) is strongly encouraged to be provided as a Supplementary Document with a title clearly identifying it as such. If provided, collaborative proposals should submit one BPC plan for the entire project.

Proposals that do not comply with the requirements marked as RWR will be returned without review.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

- **Submission Window Date(s)** (due by 5 p.m. submitter's local time):

September 20, 2019 - September 30, 2019

LARGE projects

September 20, 2019 - September 30, 2019

MEDIUM projects

October 31, 2019 - November 14, 2019

SMALL projects

September 07, 2020 - September 14, 2020

MEDIUM projects

September 16, 2020 - September 23, 2020

LARGE projects

October 29, 2020 - November 12, 2020

SMALL projects

D. FastLane/Research.gov/Grants.gov Requirements

For Proposals Submitted Via FastLane or Research.gov:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For FastLane or Research.gov user support, call the FastLane and Research.gov Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov or rgov@nsf.gov. The FastLane and Research.gov Help Desk answers general technical questions related to the use of the FastLane and Research.gov systems. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

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

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. 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, Postdoctoral Researcher Mentoring Plan, and the optional Broadening Participation in Computing Plan, as appropriate.

Additional Solicitation Specific Review Criteria

For Large and Medium proposals, reviewers will be asked to:

- Comment on the extent to which the project scope justifies the level of investment requested, and the degree to which the Collaboration Plan (if required) adequately demonstrates that the participating investigators will work synergistically to accomplish the project objectives.
- Comment on whether key personnel, and especially lead PIs, have allocated adequate time for both their individual technical contributions and the leadership of collaborative activities necessary to realize the synergistic effects of larger-scale research.

For all proposals reviewed by the CNS Core program, reviewers will be asked to consider:

1. To what extent does the proposal align with the topics, aspects, and methods laid out in the [Program Webpage](#)?
2. How well does the proposed work address and advance the following?
 - o Secure-by-design systems;
 - o Systems robustness;
 - o Manageability of the system under consideration; and/or
 - o Fundamental understanding of the system or system component.
3. How well does the proposal describe an evaluation plan that assesses and where appropriate quantifies the expected research outcomes?
4. How well does the proposal describe research dissemination plans to ensure that the research results can be validated independently?

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) 292-8134 or by e-mail from nsfpubs@nsf.gov.

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

Special Award Conditions:

Awardees will be required to attend any PI meetings and participate in a common evaluation where appropriate.

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.

Pursuant to BPC plans, Medium and Large projects must report BPC activities and outcomes in annual reports submitted to NSF.

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:

- Alan Sussman, Point of Contact, OAC Core Research (OAC Core), telephone: (703) 292-7563, email: oac-core@nsf.gov
- Anindya Banerjee, Point of Contact, Software and Hardware Foundations (SHF), telephone: (703) 292-8910, email: ccf-shf@nsf.gov
- Mitra Basu, Point of Contact, Foundations of Emerging Technologies (FET), telephone: (703) 292-8910, email: ccf-fet@nsf.gov
- Tracy J. Kimbrel, Point of Contact, Algorithmic Foundations (AF), telephone: (703) 292-8910, email: ccf-af@nsf.gov
- Phillip A. Regalia, Point of Contact, Communications and Information Foundations (CIF), telephone: (703) 292-8910, email: ccf-cif@nsf.gov
- Ann C. Von Lehmen, Point of Contact, CNS Core (CNS Core), telephone: (703) 292-4756, email: cns-core@nsf.gov
- Samee U. Khan, Point of Contact, CNS Core (CNS Core), telephone: (703) 292-8950, email: cns-core@nsf.gov
- Ephraim P. Glinert, Point of Contact, Cyber-Human Systems (CHS), telephone: (703) 292-8930, email: iis-chs@nsf.gov
- Sylvia J. Spengler, Point of Contact, Information Integration and Informatics (III), telephone: (703) 292-8930, email: iis-iii@nsf.gov

- Jie Yang, Point of Contact, Robust Intelligence (RI), telephone: (703) 292-8930, email: iis-ri@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188

FastLane Help Desk e-mail: fastlane@nsf.gov.

Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

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

IX. OTHER INFORMATION

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

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

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

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

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

Send an e-mail to: nsfpubs@nsf.gov

or telephone: (703) 292-7827

- To Locate NSF Employees:

(703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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