Smart and Connected Health (SCH)

Connecting Data, People and Systems

PROGRAM SOLICITATION
NSF 18-541

REPLACES DOCUMENT(S):
NSF 16-601

National Science Foundation

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

Directorate for Engineering

Directorate for Social, Behavioral & Economic Sciences

National Institutes of Health
- Office of Behavioral and Social Sciences Research
- National Cancer Institute
- National Center for Complementary and Integrative Health
- National Human Genome Research Institute
- National Institute of Biomedical Imaging and Bioengineering
- National Institute on Aging
- National Institute on Alcohol Abuse and Alcoholism
- National Institute of Mental Health
- National Institute of Neurological Disorders and Stroke
- National Library of Medicine

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

May 22, 2018

December 11, 2018

December 11, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

The Smart and Connected Health (SCH) program solicitation has been revised and prospective Principal Investigators (PIs) are encouraged to read the solicitation carefully. Among the changes are the following:

- Changes have been made in participating National institutes of Health Institutes and Centers;
- Focus areas have been revised: the program now includes a focus on connecting data, people and systems;
- Components have been modified: Survivability, Impact and Education (outside of Broader Impacts) are no longer targeted components, but remain inherent to SCH proposals;
- The total budget has been revised to up to $300,000 per year for up to four years;
- A Proposal Preparation Checklist has been added to aid in preparation of compliant proposals: this checklist provides a summary of key items, but does not replace the complete set of requirements in the NSF Proposal and Award Policies and Procedures Guide (PAPPG); and,
- Proposal deadlines have been revised.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 20-1), which is effective for proposals submitted, or due, on or after June 1, 2020.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Smart and Connected Health (SCH)
Connecting Data, People and Systems

Synopsis of Program:

The goal of the interagency Smart and Connected Health (SCH): Connecting Data, People and Systems program is to accelerate the development and integration of innovative computer and information science and engineering approaches to support the transformation of health and medicine. Approaches that partner technology-based solutions with biomedical and biobehavioral research are supported by multiple agencies of the federal government including the National Science Foundation (NSF) and the National Institutes of Health (NIH). The purpose of this program is to develop next-generation multidisciplinary science that encourages existing and new research communities to focus on breakthrough ideas in a variety of areas of value to health, such as networking, pervasive computing, advanced analytics, sensor integration, privacy and security, modeling of socio-behavioral and cognitive processes and system and process modeling. Effective solutions must satisfy a multitude of constraints arising from clinical/medical needs, barriers to change, heterogeneity of data, semantic mismatch and limitations of current cyber physical systems and an aging population. Such solutions demand multidisciplinary teams ready to address issues ranging from fundamental science and engineering to medical and public health practice.

The SCH program:

- takes a coordinated approach that balances theory with evidenced-based analysis and systematic advances with revolutionary breakthroughs;
- seeks cross-disciplinary collaborative research that will lead to new fundamental insights; and
- encourages empirical validation of new concepts through research prototypes, ranging from specific components to entire systems.

The purpose of this interagency program solicitation is to support the development of technologies, analytics and models supporting next generation health and medical research through high-risk, high-reward advances in computer and information science, engineering and technology, behavior and cognition. Collaborations between academic, industry, and other organizations are strongly encouraged to establish better linkages between fundamental science, medicine and healthcare practice and technology development, deployment and use. This solicitation is aligned with national reports calling for new partnerships to facilitate major changes in health and medicine, as well as healthcare delivery and is aimed at the fundamental research to enable these changes. Realizing the promise of disruptive transformation in health, medicine and/or healthcare will require well-coordinated, multi-disciplinary approaches that draw from the computer and information sciences, engineering, social, behavioral, cognitive and economic sciences, biomedical and health research. Only Integrative proposals (INT) spanning up to 4 years with multi-disciplinary teams will be considered in response to this 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.

- Wendy Nilsen, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, telephone: (703) 292-2568, email: wnilsen@nsf.gov
- Scott T. Acton, telephone: (703) 292-8910, email: sacton@nsf.gov
- Fay Cobb Payton, telephone: (703) 292-7939, email: fpayton@nsf.gov
- Georgia-Ann Klutke, Directorate for Engineering, Division of Civil, Mechanical and Manufacturing Innovation, telephone: (703) 292-2443, email: gaklutke@nsf.gov
- Tatiana Korelsky, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, 1125, telephone: (703) 292-8930, email: tkorelsk@nsf.gov
- Sylvia Spengler, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, telephone: (703) 292-8930, email: sspengle@nsf.gov
- Dana Wolff-Hughes, Office of Behavioral and Social Sciences Research (OBSSR), NIH, telephone: (301) 496-0979, email: dana.wolff@nih.gov
- Anita Bechtholt, National Institute on Alcohol Abuse and Alcoholism (NIAAA), NIH, telephone: (301) 443-9334, email: anita.bechtholt@nih.gov
- Partha Bhattacharyya, National Institute on Aging, NIH, telephone: (301) 496-3131, email: bhattacharyyap@mail.nih.gov
- Heather Colley, National Human Genome Research Institute (NHGRI), NIH, telephone: (301) 480-2332, email: Heather.Colley@nih.gov
- Adam Haim, National Institute of Mental Health (NIMH), NIH, telephone: (301) 435-3593, email: haima@mail.nih.gov
- Nick Langhals, National Institute of Neurological Disorders and Stroke (NINDS), NIH, telephone: (301) 496-1447, email: nick.langhals@nih.gov
- Tiffany Lash, National Institute of Biomedical Imaging and Bioengineering (NIBIB), NIH, telephone: (301) 451-4778, email: tiffany.lash@nih.gov

April Oh, National Cancer Institute (NCI), NIH, telephone: (240) 276-6709, email: ohay@mail.nih.gov

- Merav Sabri, National Center for Complementary and Integrative Health, NIH, telephone: (301) 496-2583, email: merav.sabri@nih.gov
- Hua-Chuan Sim, National Library of Medicine (NLM), NIH, telephone: (301) 496-4253, email: simh@mail.nih.gov

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

- 47.041 --- Engineering
- 47.070 --- Computer and Information Science and Engineering
- 47.075 --- Social Behavioral and Economic Sciences
- 93.172 --- National Human Genome Research Institute
- 93.213 --- National Center for Complementary and Integrative Health
- 93.242 --- National Institute of Mental Health
- 93.273 --- National Institute on Alcohol Abuse and Alcoholism
- 93.286 --- National Institute of Biomedical Imaging and Bioengineering
- 93.396 --- National Cancer Institute
- 93.853 --- National Institute of Neurological Disorders and Stroke
- 93.866 --- National Institute on Aging
- 93.879 --- National Library of Medicine

Award Information

Anticipated Type of Award:

Standard Grant or Continuing Grant or Cooperative Agreement or other funding mechanism (depending on the needs of the particular awarding agency)

Estimated Number of Awards: 8 to 16

per year, subject to the availability of funds.

Anticipated Funding Amount: $11,000,000 to $20,000,000

will be invested in proposals submitted to this solicitation in FY 2018, subject to the availability of funds and the quality of the proposals received.

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:

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: 2

An investigator may participate as Principal Investigator (PI), co-Principal Investigator (co-PI), Project Director (PD), Senior Personnel or Consultant in **no more than two** proposals submitted in response to this solicitation. **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.**

Proposals submitted in response to this solicitation may not duplicate or be substantially similar to other proposals concurrently under consideration by NSF or NIH programs or study sections. Duplicate or substantially similar proposals will be returned without review. NIH will not accept any application that is essentially the same as one already reviewed within the past 37 months (as described in the *NIH Grants Policy Statement*), except for submission:

- To an NIH Requests for Applications (RFA) of an application that was submitted previously as an investigator-initiated application but not paid;
- Of an NIH investigator-initiated application that was originally submitted to an RFA but not paid; or
- Of an NIH application with a changed grant activity code.

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

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

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

  For NSF, Proposal & Award Policies & Procedures Guide (PAPPG) Guidelines apply.

  Foreign organizations that do not have a current US Federally negotiated indirect cost rate(s) are limited to a *de minimis* indirect cost rate recovery of 10% of modified total direct costs. Foreign grantees that have a US Federally negotiated indirect cost rate(s) may recover indirect costs at the current negotiated rate

  For NIH, indirect costs on foreign subawards/subcontracts will be limited to eight (8) percent.

- **Other Budgetary Limitations:**

  Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

  May 22, 2018

  December 11, 2018

  December 11, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

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 need for a significant transformation in medical, public health and healthcare delivery approaches has been recognized by numerous organizations and captured in a number of reports. For example, Networking and Information Technology Research and Development (NITRD) program recently released the draft *Federal Health Information Technology Research and Development Strategic Framework* that pointed to an overwhelming need for the integration between the computing, informatics and engineering disciplines and the biobehavioral medical research community to produce the innovation necessary to improve the health of the country.

Another key component of this transformation of health involves how we support and care for aging populations. Similar to other groups, aging populations need methods for chronic disease management and prevention, but also support for physical and cognitive independence and systems to reduce caregiver burden. These issues may be addressed by intuitive and intelligent connection of data, devices and systems to relieve caregiver burden and improve quality of life, by allowing the affected individuals to age more independently.

These transformations hinge on technological innovations by multidisciplinary teams to enable discovery and optimize health. This includes collecting, analyzing and bringing all relevant evidence to the point of need anywhere and anytime and in a user-appropriate form for all members of the care team, including the patient. The technical challenges of connecting people, systems and data include normalization, harmonization and integration of data from electronic health records (EHRs) and other medical and consumer devices; extraction and representation of data, information, and knowledge from diverse unstructured sources; large-scale data collection; predictive modeling and decision support; networking the relevant stakeholders to optimize data and information flows; and new approaches for protecting privacy and security. Socio-cultural, economic, legal, political, and ethical challenges can amplify or mitigate technical challenges of achieving this vision.

II. PROGRAM DESCRIPTION

This solicitation supports fundamental research to realize the promise of disruptive transformations in public health, medicine and healthcare. These transformations will require well-coordinated, multi-disciplinary approaches that complements the long-standing disease and application-focused research efforts with fundamental, innovative, and high-risk research that draws from multiple domains of computer and information science, engineering, and the social, behavioral and economic sciences. Proposals can address computational, algorithmic, real-time and systemic level issues, as well as models of uptake, diffusion, and use of the resulting solutions amongst different demographic and social groups. Research can also explore advances in science in remote or unconventional settings, the role of appropriate incentives, the risk of potential disparities, and the associated legal and ethical considerations. Accordingly, this interagency solicitation represents the collaboration of NSF and the NIH.

The work to be funded by this solicitation must make fundamental contributions to two or more disciplines, such as computer or information sciences, engineering, social, behavioral, cognitive and/or economic sciences and address a key health problem. Traditional disease-centric medical, clinical, pharmacological, biological or physiological studies and evaluations are outside the scope of this solicitation. The research teams must include members with appropriate and demonstrable expertise in the major areas involved in the work.

Addressing the challenges will require fundamental research and the development of new tools and methods across many dimensions to effectively connect data, people and systems, some of which are highlighted below:

1. **Health Information Infrastructure:** Pursue fundamental research to enable interoperable, distributed, federated, and scalable digital infrastructure, as well as languages and tools for effective sharing and use of EHR data, data representation for such including semantic metadata and networked applications that access such data. Advance data methods for controlling and maintaining data integrity, provenance, security, privacy and reliability of original as well as aggregated data, providing trustworthy patient identification and authentication and access control protocols, while maintaining sensitivity to the legal, cultural and ethical issues associated with making digital health data appropriately accessible by all relevant stakeholders. Develop methods for secure and privacy-preserving data exchanges.
2. **Connecting Data:** Investigate methods and algorithms for aggregation of multi-level and multi-scale clinical, biomedical, personal, social, contextual, environmental and organizational data surrounding each patient. Integrate patient information with delivery systems performance and economic models to support operations management decisions. Develop robust knowledge representations and reasoning algorithms to support inferences based on individual and population health, community and contextual data, as well as multiple sources of potentially conflicting information. Develop innovative technology for the secondary use of data to support assisted and automated discovery of reliable health and medical knowledge from aggregated records, predictive modeling and simulation of health and disease at multiple levels including biological, intrapersonal, interpersonal, community, along with robust validation of the models.
3. **Connecting People:** Develop new approaches to support individuals to effectively participate in their own health and treatment, such as

personalized information systems, accessing and visualizing health data and knowledge that support users across socio-economic status, gender and ethnicity. Explore how delivery and presentation of data will contribute to better health care by teams, including patients, caregivers, and providers. Develop novel user-tailored and context-aware human-computer interfaces for a variety of tasks including patient, family and caregiver access to health data. Promote human and computer interaction around networked information technologies to support knowledge and awareness, while diminishing the negative influences of reminder fatigue, information overload, and informational conflict.

4. **Connecting Systems:** Investigate protocols and interface standards to enable interoperable, temporally-synchronized, devices and systems, as well as how those systems can be utilized for continuous capture, storage and transmission of biological, physiological, personal, social, contextual and environmental data. Develop and evaluate assistive technology and decision support systems and devices for improved health and healthcare. Investigate methods to connect devices to created closed-loop or human-in-the-loop systems to assess, treat and reduce adverse health events. Develop simulation and modeling methods and software tools that aid in the design and evaluation of sophisticated medical devices and system integration methods that can effectively communicate medical information in the clinic, home, and in and around the person.

These research areas are clearly not mutually exclusive and a given project may address multiple. Proposals of collaborative projects with partners outside of the U.S. are also encouraged. In those cases, NSF and the NIH may support the U.S. collaborator, including foreign travel to the collaborating partner(s).

This solicitation aims to support research activities that complement rather than duplicate the core programs of the NSF directorates and the NIH, and the research efforts supported by other agencies such as the Agency for Healthcare Research and Quality and National Institute of Standards and Technology.

NSF supports investigation of fundamental research questions with broadly applicable results. The SCH program supports research evaluation with humans. Because advancing fundamental science is early-stage research, clinical trials are not appropriate and will not be funded. Research that is advanced to a stage that requires clinical trials should be submitted to an agency whose mission is to improve health.

Project Class

Proposals submitted to this solicitation must be consistent with the project class defined below:

Integrative projects (INT) undertake research addressing key application areas by solving problems in multiple scientific domains. The work must make **fundamental contributions to two or more disciplines**, such as computer or information sciences, engineering, social, behavioral, cognitive and/or economic sciences and address a key health problem. For example, these projects are expected to advance understanding of how computing and engineering, combined with advances in behavioral and social science research, would support transformations in health, medicine and/or healthcare and improve the quality of life. Projects are expected to include several students and postdocs. INT 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. Collaborations with researchers in the health application domains are required. Such collaborations typically involve multiple institutions, but are not required. Since the successes of collaborative research efforts are known to depend on thoughtful collaboration mechanisms that regularly bring together the various participants of the project, a Collaboration Plan is **required** for each INT proposal. INT projects will be funded for up to a four-year period and for up to a total of $300,000 per year. The proposed budget should be commensurate with the corresponding scope of work. Rationale must be provided to explain why a budget of the requested size is required to carry out the proposed work.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. An estimated 8 to 16 projects will be funded, subject to availability of funds. Up to $20,000,000 will be invested in proposals submitted to this solicitation, subject to availability of funds.

All awards under this solicitation made by NSF will be as grants or cooperative agreements as determined by the supporting agency. All awards under this solicitation made by NIH will be as grants or cooperative agreements.

Scientists from all disciplines are encouraged to participate. Projects will be awarded depending on the availability of funds and with consideration for creating a balanced overall portfolio.

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:

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: 2

An investigator may participate as Principal Investigator (PI), co-Principal Investigator (co-PI), Project Director (PD), Senior Personnel or Consultant in **no more than two** proposals submitted in response to this solicitation. **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.**

Proposals submitted in response to this solicitation may not duplicate or be substantially similar to other proposals concurrently under consideration by NSF or NIH programs or study sections. Duplicate or substantially similar proposals will be returned without review. NIH will not accept any application that is essentially the same as one already reviewed within the past 37 months (as described in the *NIH Grants Policy Statement*), except for submission:

- To an NIH Requests for Applications (RFA) of an application that was submitted previously as an investigator-initiated application but not paid;
- Of an NIH investigator-initiated application that was originally submitted to an RFA but not paid; or
- Of an NIH application with a changed grant activity code.

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

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via FastLane or Research.gov. 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.

The following information SUPPLEMENTS (not replaces) the guidelines provided in the NSF Proposal & Award Policies & Procedures Guide (PAPPG).

Proposal Titles: Proposal titles must begin with **SCH**, followed by a colon, then **INT**, followed by a colon and the title of the project (i.e., **SCH: INT: Title**). If you submit a proposal as part of a set of collaborative proposals, the title of the proposal should begin with SCH followed by a colon, **INT** followed by a colon, then **Collaborative Research** followed by a colon, and the title. For example, if you are submitting a collaborative set of proposals for an INT project, then the title of each would be **SCH: INT: Collaborative Research: Title.**

Proposals from PIs in institutions that have Research in Undergraduate Institutions (RUI) eligibility should have a proposal title that begins with SCH, followed by a colon, then **INT** followed by a colon, then **RUI** followed by a colon, then **Collaborative Research** (if applicable) followed by a colon, and then the title, for example, **SCH: INT: RUI: Collaborative Research: Title.**

Project Summary (1 page limit): At the beginning of the Overview section of the Project Summary enter the title of the SCH project, the name of the PI and the lead institution. Provide a summary description of the SCH project, including its transformative research and education goals, and the community (communities) that will be impacted by its results.

Project Description: There is a 15 page limit for all proposals. Within the project description, include a plan to evaluate the technologies developed,

which could include results from applications of that technology to specific domains, efficacy studies, assessments of learning and engagement, and other such activities. The **Evaluation Plan** should be appropriate for the size and scope of the project.

Please note that the Collaboration Plan must be submitted as a Supplementary Document for this solicitation; see guidance below.

Proposal Budget: It is expected that the PIs, Co-PIs, and other team members funded project will attend a SCH PI meeting annually to present project research findings and capacity-building or community outreach activities. Requested budgets should include funds for travel to this annual event.

Supplementary Documents: Supplementary documents are limited to the specific types of documentation listed in the PAPPG, with the following exceptions:

1. ***Collaboration Plan.*** Proposals **must** include a Collaboration Plan. **The Collaboration Plan must be submitted as a supplementary document and cannot exceed two pages.** ***Proposals that do not include a properly-labeled and complete Collaboration Plan will be returned without review***. The Collaboration Plan must be labeled "Collaboration Plan" and must include: 1) the specific roles of the collaborating PIs, Co-PIs, other Senior Personnel and paid consultants at all organizations involved; 2) how the project will be managed across institutions and disciplines; 3) identification of the specific collaboration mechanisms that will enable cross-institution and/or cross-discipline scientific integration (e.g., workshops, graduate student exchange, project meetings at conferences, use of videoconferencing and other communication tools, software repositories, etc.); and 4) specific references to the budget line items that support these collaboration mechanisms.
2. ***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.
3. ***Vertebrate Animals.*** Proposals involving vertebrate animals should include a supplementary document of no more than two pages in length that addresses the following points:
    a. Detailed description and justification of the proposed use of the animals, including species, strains, ages, sex, and number to be used;
    b. Information on the veterinary care of the animals;
    c. Description of procedures for minimizing discomfort, distress, pain, and injury; and
    d. Method of euthanasia and the reasons for its selection.

4. ***Data Management Plan.*** All proposals must include a supplementary document no more than two pages in length 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 Chapter II.C.2.j of the PAPPG 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 NSF/CISE see: https://www.nsf.gov/cise/cise_dmp.jsp.

5. ***Documentation of Collaborative Arrangements of Significance to the Proposal through Letters of Collaboration.***

    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 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 institutions must be provided at the time of submission of the proposal. Such letters simply confirm the commitment to collaborate, as illustrated in the recommended format provided in the PAPPG. They must 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 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. **Reviewers will be instructed not to consider these letters of support in reviewing the merits of the proposal.**

6. ***List of Project Personnel and Partner Institutions (Note - In collaborative proposals, only the lead institution should provide this information).***

    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 reviewer selection. The list should 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:

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

7. ***Postdoctoral Mentoring Plan (if applicable).***

    Each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j (https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_2.jsp#IIC2j) of the PAPPG for further information about the implementation of this requirement.

8. ***Other Specialized Information.***

   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 as a supplementary document.

Single Copy Documents:

1. ***Collaborators and Other Affiliations Information.***

Proposers should follow the guidance specified in Chapter II.C.1.e of the NSF PAPPG. Grants.gov Users: The COA information must be provided through use of the COA template and uploaded as a PDF attachment.

Note the distinction to the list of Project Personnel and Partner Institutions specified above under 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.

SCH Proposal Preparation Checklist:

The following checklists are provided as reminders of the items that should be checked before submitting a proposal to this solicitation. These are a summary of the requirements described above and in the PAPPG. **This is a summary of key items, but does not replace the complete set of requirements in the PAPPG.** For the items marked with (RWR), the proposal will be returned without review if the required item is noncompliant at the submission deadline.

- (RWR) A two-page Collaboration Plan must be included as a Supplementary Document.
- Letters of Collaboration are permitted as Supplementary Documents.
- (RWR) Project Summary not to exceed one page and consists of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity.
- (RWR) Within the Project Description, a section labeled "Intellectual Merit" and a section labeled “Broader Impacts.”
- (RWR) Within the Project Description, a description of "Results from Prior NSF Support,” including intellectual merit and broader impacts (unless the PI has no prior NSF support).
- (RWR) If the budget includes postdoctoral researchers, a one-page Postdoctoral Researcher Plan must be included as a Supplementary Document.
- A list of Project Personnel and Partner Institutions is required as a Supplementary Document.
- (RWR) A Data Management Plan, not to exceed two pages, must be included as a Supplementary Document.
- Collaborators & Other Affiliations (COA) for each PI, co-PI, and Senior Personnel should be submitted using the spreadsheet template uploaded as Single Copy Documents.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Indirect Cost (F&A) Limitations:

For NSF, Proposal & Award Policies & Procedures Guide (PAPPG) Guidelines apply.

Foreign organizations that do not have a current US Federally negotiated indirect cost rate(s) are limited to a *de minimis* indirect cost rate recovery of 10% of modified total direct costs. Foreign grantees that have a US Federally negotiated indirect cost rate(s) may recover indirect costs at the current negotiated rate

For NIH, indirect costs on foreign subawards/subcontracts will be limited to eight (8) percent.

Other Budgetary Limitations:

Budgets should include travel funds to attend one SCH PI meeting annually for the project PIs, co-PIs and other team members as appropriate from all collaborating institutions.

C. Due Dates

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

  May 22, 2018

  December 11, 2018

  December 11, Annually Thereafter

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 and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

The proposals will also be evaluated based on:

Infrastructure planning and software sharing: Per NSF policy, the dissemination plan for using and sharing the technological products of this research, with appropriate timelines, will be assessed for its potential effectiveness and impact on other projects and the SCH overall. For NSF, reviewers will also be instructed to evaluate the proposed activities, their utility to the proposed research, and the SCH goals more broadly.

Collaboration and Management: The work to be funded by this solicitation must make fundamental contributions to two or more disciplines and address a key health problem. The collaboration plan should demonstrate active the participation of this multidisciplinary group, which includes, but is not limited to: fundamental science researchers; biomedical, health and/or clinical researchers; other necessary research expertise; client groups ;and, technology vendors/commercial enterprises. The collaboration plan should demonstrate the extent to which the group is integrated, has a common focus and the quality of the plan for management and collaboration.

Additional NIH Review Criteria:

The mission of the NIH is to support science in pursuit of knowledge about the biology and behavior of living systems and to apply that knowledge to extend healthy life and reduce the burdens of illness and disability. In their evaluations of scientific merit, reviewers will be asked to consider the following criteria that are used by NIH:

Overall Impact. Reviewers will provide an overall impact/priority score and criterion scores to reflect their assessment of the likelihood for the project to exert a sustained, powerful influence on the research field(s) involved, in consideration of the following five core review criteria, and additional review

criteria (as applicable for the project proposed).

Significance. Does the project address an important problem or a critical barrier to progress in the field? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?

Investigator(s). Are the PD/PIs, collaborators, and other researchers well suited to the project? If Early Stage Investigators or New Investigators, do they have appropriate experience and training? If established, have they demonstrated an ongoing record of accomplishments that have advanced their field(s)? If the project is collaborative or multi-PD/PI, do the investigators have complementary and integrated expertise; are their leadership approach, governance and organizational structure appropriate for the project?

Innovation. Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?

Approach. Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project? Are potential problems, alternative strategies, and benchmarks for success presented? If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed? If the project involves clinical research, are the plans for 1) protection of human subjects from research risks, and 2) inclusion of minorities and members of both sexes/genders, as well as the inclusion of children, justified in terms of the scientific goals and research strategy proposed?

Environment. Will the scientific environment in which the work will be done contribute to the probability of success? Are the institutional support, equipment and other physical resources available to the investigators adequate for the project proposed? Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements? Where applicable, the following items will also be considered:

Protections for Human Subjects. For research that involves human subjects but does not involve one of the six categories of research that are exempt under 45 CFR Part 46, the committee will evaluate the justification for involvement of human subjects and the proposed protections from research risk relating to their participation according to the following five review criteria: 1) risk to subjects, 2) adequacy of protection against risks, 3) potential benefits to the subjects and others, 4) importance of the knowledge to be gained, and 5) data and safety monitoring. For research that involves human subjects and meets the criteria for one or more of the six categories of research that are exempt under 45 CFR Part 46, the committee will evaluate: 1) the justification for the exemption, 2) human subjects involvement and characteristics, and 3) sources of materials. For additional information on review of the Human Subjects section, please refer to the Human Subjects Protection and Inclusion Guidelines.

Inclusion of Women, Minorities, and Children. When the proposed project involves clinical research, the committee will evaluate the proposed plans for inclusion of minorities and members of both genders, as well as the inclusion of children.

Vertebrate Animals. The committee will evaluate the involvement of live vertebrate animals as part of the scientific assessment according to the following five points: 1) proposed use of the animals, and species, strains, ages, sex, and numbers to be used; 2) justifications for the use of animals and for the appropriateness of the species and numbers proposed; 3) adequacy of veterinary care; 4) procedures for limiting discomfort, distress, pain and injury to that which is unavoidable in the conduct of scientifically sound research including the use of analgesic, anesthetic, and tranquilizing drugs and/or comfortable restraining devices; and 5) methods of euthanasia and reason for selection if not consistent with the AVMA Guidelines on Euthanasia. For additional information, see http://grants.nih.gov/grants/olaw/VAChecklist.pdf.

Biohazards. Reviewers will assess whether materials or procedures proposed are potentially hazardous to research personnel and/or the environment, and if needed, determine whether adequate protection is proposed.

Budget and Period of Support. Reviewers will consider whether the budget and the requested period of support are fully justified and reasonable in relation to the proposed research.

Funding Consideration by Participating NIH Institutes.

Subsequent to review panels, a process of selection by the supporting agencies will be conducted. When considering their funding choices appropriate to the interests and goals described in the solicitation, each agency may apply and prioritize the criteria to highlight the specific objectives of their programs and activities, although all of the following are considered by each of the supporting agencies when applicable.

For proposals that are selected for funding consideration by participating NIH Institutes, the NIH will ask the applicant(s) to resubmit the proposal in an NIH-approved format directly to the Center for Scientific Review (CSR) at the NIH. Each of these NIH applications will be accompanied by a cover letter that associates the application with SCH. Applicants will not be allowed to increase the proposed budget or change the scientific content of the application in the resubmission to the NIH. These NIH applications, along with the summary statements generated based on the review, will be entered into the NIH IMPAC-II system.

Additional Joint NSF and NIH Review Criteria:

NSF and NIH Plans for Data Management Plan.

Consistent with NSF policy, the required Data Management plan, including the Plan for Sharing Products of Research, that are described below will be evaluated as part of the proposal review process.

Data Management Plan. Per NSF policy, all SCH proposals must have a Data Management Plan. Proposals must include a supplementary document of no more than two pages labeled "Data Management Plan". This supplement should describe how the proposal will manage its data and share research results and may include:

1. the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;
2. the standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);
3. policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
4. policies and provisions for re-use, re-distribution, and the production of derivatives; and
5. plans for archiving data, samples, and other research products, and for preservation of access to them.

B. Review and Selection Process

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

Review Process and Deviations from the NSF PAPPG

This section provides agency-specific guidance for the SCH program.

NSF will take the lead in organizing and conducting the review process in compliance with the Federal Advisory Committee Act.

In addition to any conflict forms required by NSF, an NIH Post-Review Certification Form will be circulated at or near the end of the second day of the review meeting and collected by the NIH Scientific Review Officer (SRO). By signing the Post-Review Certification Form, panelists will certify for NIH that confidentiality and conflict-of-interest procedures have been followed. Conflicts of interest are handled in a manner similar to NSF procedures: those in conflict will be asked to step out of the room, or as appropriate, NSF's Designated Ethics Official or designee may recommend remedies to resolve specific conflicts on a case by case basis. Co-investigators and investigators that would directly benefit should the grant be awarded are ineligible to serve as reviewers.

Approximately seven to 10 review panels, equivalent to NIH study sections, will be organized each year, with the exact number and topical clustering of panels determined according to the number and topical areas of the proposals received. Panel management will be conducted by the three NSF directorates, with the majority conducted by CISE. Co-review across clusters, divisions and directorates will be performed where appropriate. SROs from the CSR at the NIH will be assigned to work cooperatively with NSF staff on each proposal panel. Together, they will have the responsibility to work out the details of the review process such that all agencies' needs are met. Before the review panel meetings, the representatives from the NIH SROs will work together with the NSF staff to prepare written instructions for the reviewers and to develop and implement an NIH-like scoring system (1-9) for NIH use on proposal panels. The representatives of all participating NIH Institutes and Centers will also be invited to attend the review meetings to ensure that this review is conducted in a manner that is consistent with the agreements between NSF and the NIH.

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.

NSF:

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, 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.

In all cases, 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 and 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.

NIH:

For those proposals that are selected for potential funding by participating NIH Institutes, the PI will be required to resubmit the proposal in an NIH-approved format directly to the Center for Scientific Review (http://www.csr.nih.gov/) of the NIH. PIs invited to resubmit to NIH will receive further information on resubmission procedures from NIH. An applicant will not be allowed to increase the proposed budget or change the scientific content of the proposal in the resubmission to the NIH as an NIH application. Indirect costs on any foreign subawards/subcontracts will be limited to eight (8) percent. NSF will process the proposals as "Withdrawn, funded elsewhere" reflecting transfer to another agency for those proposals. The CSR SRO staff will receive access to written reviews from the NSF reviewers and panelists and will use these critiques, along with the appropriate information to prepare a summary statement in the standard NIH format, and will enter the overall impact/priority and criterion scores and the human subject and vertebrate animals coding into the NIH IMPAC II system. A summary of the discussion will be prepared by the NIH SROs to be included in the NIH summary statement. Comments reflecting NSF-specific criteria will be included in the NIH summary statements. To fulfill NIH's need for a list of participating reviewers for Summary Statements without disclosing the specific reviewers of each proposal, NSF will provide an aggregated list of the full set of reviewers for the SCH program to the CSR. This list will be communicated to NIH PIs in the meeting roster and NIH Summary Statements. Since declinations will be handled by NSF, NIH Summary Statements will be going only to NIH award PIs. These NIH applications will be entered into the NIH IMPAC II system. The results of the review will be presented to the involved Institutes' National Advisory Councils for the second level of review. Subsequent grant administration procedures for NIH awardees, including those related to New and Early Stage Investigators (https://grants.nih.gov/policy/early-investigators/index.htm), will be in accordance with the policies of NIH. Applications selected for NIH funding will use the NIH funding mechanisms.

Proposals that are funded by NIH are expected to be renewed as competing continuing applications. PIs should contact their NIH Program Officer for additional information. For information purposes, NIH PIs may wish to consult the NIAID web site, "All about Grants," which provides excellent generic information about all aspects of NIH grantsmanship, including competitive renewals (https://grants.nih.gov/grants/grants_process.htm).

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:

Attribution of support in publications must acknowledge the joint program, as well as the funding organization and award number, by including the phrase, "as part of the NSF/NIH Smart and Connected Health Program."

NIH-Specific Award Conditions: Contact the cognizant NIH organization program officer for additional information.

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.

NSF:

Additional data may be required for NSF sponsored Cooperative Agreements.

Proposals which are initially funded by NSF at a level of $300,000 of total costs per year up to four years will be evaluated based on the proposed work plan by teams of experts periodically through the term of the project to determine performance levels. All publications, reports, data and other output from all awards must be prepared in digital format and meet general requirements for storage, indexing, searching and retrieval.

NIH:

Contact the cognizant organization program officer for additional information.

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:

- Wendy Nilsen, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, telephone: (703) 292-2568, email: wnilsen@nsf.gov
- Scott T. Acton, telephone: (703) 292-8910, email: sacton@nsf.gov
- Fay Cobb Payton, telephone: (703) 292-7939, email: fpayton@nsf.gov
- Georgia-Ann Klutke, Directorate for Engineering, Division of Civil, Mechanical and Manufacturing Innovation, telephone: (703) 292-2443, email: gaklutke@nsf.gov
- Tatiana Korelsky, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, 1125, telephone: (703) 292-8930, email: tkorelsk@nsf.gov
- Sylvia Spengler, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, telephone: (703) 292-8930, email: sspengle@nsf.gov
- Dana Wolff-Hughes, Office of Behavioral and Social Sciences Research (OBSSR), NIH, telephone: (301) 496-0979, email: dana.wolff@nih.gov
- Anita Bechtholt, National Institute on Alcohol Abuse and Alcoholism (NIAAA), NIH, telephone: (301) 443-9334, email: anita.bechtholt@nih.gov
- Partha Bhattacharyya, National Institute on Aging, NIH, telephone: (301) 496-3131, email: bhattacharyyap@mail.nih.gov
- Heather Colley, National Human Genome Research Institute (NHGRI), NIH, telephone: (301) 480-2332, email: Heather.Colley@nih.gov
- Adam Haim, National Institute of Mental Health (NIMH), NIH, telephone: (301) 435-3593, email: haima@mail.nih.gov
- Nick Langhals, National Institute of Neurological Disorders and Stroke (NINDS), NIH, telephone: (301) 496-1447, email: nick.langhals@nih.gov
- Tiffany Lash, National Institute of Biomedical Imaging and Bioengineering (NIBIB), NIH, telephone: (301) 451-4778, email: tiffany.lash@nih.gov
- April Oh, National Cancer Institute (NCI), NIH, telephone: (240) 276-6709, email: ohay@mail.nih.gov
- Merav Sabri, National Center for Complementary and Integrative Health, NIH, telephone: (301) 496-2583, email: merav.sabri@nih.gov
- Hua-Chuan Sim, National Library of Medicine (NLM), NIH, telephone: (301) 496-4253, email: simh@mail.nih.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.

Main Websites for the Participating Agencies:

NATIONAL SCIENCE FOUNDATION

https://www.nsf.gov

NATIONAL INSTITUTES OF HEALTH

http://nih.gov/

PUBLIC BRIEFINGS

One or more collaborative webinar briefings with question and answer functionality will be held prior to the first submission deadline date. Schedules will be posted on the sponsor solicitation web sites.

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

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

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

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

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

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

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

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

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (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

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

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

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel

National Science Foundation
Alexandria, VA 22314