

Smart Health and Biomedical Research in the Era of Artificial Intelligence and Advanced Data Science (SCH)

PROGRAM SOLICITATION

NSF 21-530

REPLACES DOCUMENT(S):

NSF 18-541



National Science Foundation

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

Directorate for Engineering
Division of Civil, Mechanical and Manufacturing Innovation
Division of Electrical, Communications and Cyber Systems

Directorate for Mathematical and Physical Sciences
Division of Mathematical Sciences

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



National Institutes of Health

Office of Behavioral and Social Sciences Research
National Center for Complementary and Integrative Health
National Cancer Institute
National Eye Institute
National Human Genome Research Institute
National Institute on Aging
National Institute of Allergy and Infectious Diseases
National Institute of Arthritis and Musculoskeletal and Skin Disease
National Institute of Biomedical Imaging and Bioengineering
Eunice Kennedy Shriver National Institute of Child Health and Human Development
National Institute on Drug Abuse
National Institute on Deafness and Other Communication Disorders
National Institute of Dental and Craniofacial Research
National Institute of Diabetes and Digestive and Kidney Diseases
National Institute of Environmental Health Sciences
National Institute of General Medical Sciences
National Institute of Mental Health
National Institute of Neurological Disorders and Stroke
National Institute of Nursing Research
National Library of Medicine
National Heart, Lung, and Blood Institute

National Institute on Minority Health and Health Disparities

Office of Data Science Strategy

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

February 16, 2021

November 10, 2021

November 10, 2022

IMPORTANT INFORMATION AND REVISION NOTES

The Smart Health 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 Science Foundation Directorates and Divisions and National Institutes of Health Institutes and Centers;
- Focus areas have been revised.
- 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 Health and Biomedical Research in the Era of Artificial Intelligence and Advanced Data Science (SCH)

Synopsis of Program:

The purpose of this interagency program solicitation is to support the development of transformative high-risk, high-reward advances in computer and information science, engineering, mathematics, statistics, behavioral and/or cognitive research to address pressing questions in the biomedical and public health communities. Transformations hinge on scientific and engineering innovations by interdisciplinary teams that develop novel methods to intuitively and intelligently collect, sense, connect, analyze and interpret data from individuals, devices and systems to enable discovery and optimize health. Solutions to these complex biomedical or public health problems demand the formation of interdisciplinary teams that are ready to address these issues, while advancing fundamental science and engineering.

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.

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 - Erin Iturriaga, National Heart, Lung, and Blood Institute (NHLBI), NIH, telephone: (301) 435-0403, email: erin.iturriaga@nih.gov
 - Partha Bhattacharyya, National Institute on Aging (NIA), NIH, telephone: (301) 496-3131, email: bhattacharyyap@mail.nih.gov
 - Ishwar Chandramouliswaran, National Institute of Allergy and Infectious Disease (NIAID), NIH, telephone: (301) 761-7822, email: ishwar.chandramouliswaran@nih.gov
 - Anthony Kirilusha, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), NIH, telephone: (301) 451-7648, email: anthony.kirilusha@nih.gov
 - Qi Duan, National Institute of Biomedical Imaging and Bioengineering (NIBIB), NIH, telephone: (301) 827-4674, email: Qi.Duan@NIH.gov
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 - Susan Wright, National Institute on Drug Abuse (NIDA), NIH, telephone: (301) 402-6683, email: Susan.wright@nih.gov
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 - Emir Khatipov, National Institute of Dental and Craniofacial Research (NIDCR), NIH, telephone: (301) 534-3977, email: emir.khatipov@nih.gov
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 - Adam Haim, National Institute of Mental Health (NIMH), NIH, telephone: (301) 435-3593, email: haima@mail.nih.gov
 - Deborah Duran, National Institute on Minority Health and Health Disparities (NIMHD), NIH, telephone: (301) 594-9809, email: deborah.duran@nih.gov
 - Shana Kukke, National Institute of Neurological Disorders and Stroke (NINDS), NIH, telephone: (301) 496-1447, email: Shana.kukke@nih.gov
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 - Yanli Wang, National Library of Medicine (NLM), NIH, telephone: (301) 594-4882, email: yawang@mail.nih.gov

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.070 --- Computer and Information Science and Engineering
- 47.075 --- Social Behavioral and Economic Sciences
- 93.172 --- National Human Genome Research Institute
- 93.173 --- National Institute on Deafness and Other Communication Disorders
- 93.213 --- National Center for Complementary and Integrative Health
- 93.242 --- National Institute of Mental Health
- 93.279 --- National Institute on Drug Abuse
- 93.286 --- National Institute of Biomedical Imaging and Bioengineering
- 93.361 --- National Institute of Nursing Research
- 93.396 --- National Cancer Institute
- 93.846 --- National Institute of Arthritis and Musculoskeletal and Skin Disease
- 93.847 --- National Institute of Diabetes and Digestive and Kidney Diseases
- 93.853 --- National Institute of Neurological Disorders and Stroke
- 93.859 --- National Institute of General Medical Sciences
- 93.865 --- Eunice Kennedy Shriver National Institute of Child Health and Human Development
- 93.866 --- National Institute on Aging
- 93.867 --- National Eye Institute
- 93.879 --- National Library of Medicine

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant or other funding mechanism (depending on the needs of the particular awarding agency)

Estimated Number of Awards: 10 to 16 per year, subject to the availability of funds.

Projects will be funded for up to four years for a total of \$1,200,000 (\$300,000 per year).

Anticipated Funding Amount: \$16,000,000 to \$20,000,000 will be invested in proposals submitted to this solicitation in FY 2021, 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):
 - February 16, 2021
 - November 10, 2021
 - November 10, 2022

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, the Networking and Information Technology Research and Development (NITRD) program recently released the [Federal Health Information Technology Research and Development Strategic Framework](#) that pointed to an overwhelming need for the integration between the computing, informatics, engineering, mathematics and statistics, behavioral and social science disciplines, and the biomedical, and public health research communities to produce the innovation necessary to improve the health of the country. Recent developments in data science stemming from the significant advances in machine learning (ML), artificial intelligence (AI), deep learning, high performance and cloud computing, and availability of new datasets make such integration achievable, as documented in the [Summary of the Big Data and High End Computing Interagency Working Groups Joint Workshop on the Convergence of High Performance Computing, Big Data, and Machine Learning](#).

These transformations hinge on scientific and engineering innovations by interdisciplinary teams that utilize advanced data science and sensing methods to intuitively and intelligently collect, connect, analyze and interpret data from individuals, devices, and systems to enable discovery and optimize health. Technical challenges include a range of issues from data collection, harmonization, fusion, analysis and visualization of diverse data from sensor technologies, biomedical and nontraditional research platforms and databases, multi-modal imaging, electronic health records (EHRs), and medical and consumer devices. Underlying these challenges are many fundamentals issues, such as interoperability, integration and reuse of heterogenous and sparse data, feature selection, optimization, uncertainty quantification, robustness, missingness, subgroup identification, model validation and evaluation, dependent and stochastic data, dynamic quality controls, bias mitigation, data provenance, interpretability, data privacy and security. There is also a significant need for research efforts that address how predictive, rigorous and unambiguously interpretable models with uncertainty can be constructed from datasets, model validation and testing, and standardized workflows to improve reproducibility of model building and simulations. Multimodal sensor systems/platforms that can address multiple aspects of human biology, physiology and behavior simultaneously to create personalized predictive models are still lacking. Human perception, cognition, understanding and behavior are also key factors needed to increase understanding and improve outcomes in this technology and data-driven world. Socio-cultural, economic, legal, political, and ethical challenges can amplify or mitigate the technical challenges of achieving this vision.

II. PROGRAM DESCRIPTION

This interagency solicitation is a collaboration between NSF and the NIH. The SCH program supports innovative, high-risk/high-reward research with the promise of disruptive transformations in biomedical research, which can only be achieved by well-coordinated, convergent, inter-disciplinary approaches that draw from multiple domains of computer and information science, engineering, mathematical sciences and the biomedical, social, behavioral, and economic sciences. Therefore, **the work to be funded by this solicitation must make fundamental contributions to two or more disciplines**, such as computer or information sciences, engineering, mathematical sciences, social, behavioral, biomedical, cognitive or economic sciences to improve fundamental understanding of biomedical and health related processes and address a key health problem. The research teams must include members with appropriate and demonstrable expertise in the major areas involved in the work. Proposals may address computational, algorithmic, data fusion and systemic level issues in biomedical data science research. Proposals can also address human perceptual, cognitive, or behavioral factors that impact the effectiveness of technology and data science research in generating change. Traditional disease-centric medical, clinical, pharmacological, biological or physiological studies and evaluations are outside the scope of this solicitation.

Addressing the challenges will require fundamental research and development of new tools, workflows and methods across many dimensions; some of the themes are highlighted below:

- 1. Information Infrastructure:** This theme encourages pursuit of fundamental research in data management to enable interoperable, distributed, federated, and scalable digital infrastructure to optimize knowledge discovery. The theme also targets investigation of languages and tools for effective collection, storage/preservation, harmonization, automated curation, and FAIR (Findable, Accessible, Interoperable, Reusable) sharing and use of biomedical research data, data representation for such including semantic metadata, and networked applications that access such data. Researchers are also encouraged to develop novel ontological systems and knowledge representation approaches and advanced 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, financial, cultural and ethical issues associated with making data appropriately accessible by all relevant stakeholders.
- 2. Transformative Data Science:** This theme supports development of novel computational approaches for fusion and analysis of multi-level and multi-scale clinical, imaging, biomedical, personal, behavioral, social, contextual, environmental, and organizational data to maximize inferences that can be derived from the data. The theme also encourages research on novel robust knowledge representations, visualizations, reasoning algorithms, optimization, modeling and inference methods to support development of innovative predictive models with uncertainty for the study of health and disease including inferences based on individual and population health, non-traditional health data, such as community and contextual data, social media, as well as multiple sources of potentially conflicting information. This theme also targets development of novel methods to sense and reason about the visual world, including work in computational imaging to methods for high-level semantic understanding of images or videos. Innovative methods for the secondary use of data from around the world to support assisted and automated discovery of reliable health and medical knowledge from aggregated individual, system, or population health records are also encouraged. This theme also supports research on computational methods for behavior characterization, which utilize high resolution multidimensional behavioral data, including the bidirectional effects of behavior and its impacts on the organism's physical and contingency environment, as well as its physiology. Additionally, new data science methods and workflows for building robust and interpretable predictive models to address problems with critical societal impact, such as disease heterogeneity, disease prevention, drug response, clinical decision support, social and economic disparities are encouraged. Development of novel methods and inference tools for integrating multi-modal data and evidence of causality from diverse data sources is within the scope of this theme. Finally, this theme supports novel approaches for combining AI learning with mechanistic modeling for simulation of health and disease at multiple levels.
- 3. Novel multimodal sensor system hardware:** This theme addresses the need for new multimodal sensing systems/platforms and analytics to generate predictive and personalized models of health. This theme encourages the design and fabrication of multimodal sensor systems and analysis of the system's data through innovative research on novel functional materials, devices and circuits for sensing or active interrogation of system states, imaging, communications, and computing. Currently, existing sensor systems generally operate either in discrete formats or with limited interconnectivity, and are limited in accuracy, selectivity, reliability and data throughput. Hence, heterogeneous integration of diverse sensing modalities and field-adaptive reconfigurable sensor microsystems are of paramount importance for smart health applications. The next generation of sensor systems for smart health will need to have just-in-time monitoring of biomarkers from multiple types of sensors (e.g. electrochemical, electromagnetic, mechanical, optical, acoustic, etc.) interfaced with different platforms (e.g. mobile, wearable, and implantable). Areas of interest include miniaturized sensor microsystems with integrated signal processing and communication functionalities. Such integrated sensor systems would be capable of generating large amounts of just-in-time data, which is critical to machine learning, artificial intelligence, mathematical and/or statistical approaches for decision making and real-time optimal control. Another area of interest is multimodal sensor systems with dramatically reduced power consumption to extend battery lifetime and enable self-powered operation, making the sensor systems suitable for wearable and implantable applications. The chemistry of biorecognition and transduction in existing biosensing systems is currently not regenerable on-demand, which would be needed for real-time monitoring of analytes. Also of interest is the synthesis of new biorecognition elements that can be reconfigured to target different analytes on-demand, and reset a surface and detach targets bound to the biorecognition elements without complicated fluidic washing steps. This thrust also requires researchers to include innovative AI, machine learning, mathematical and statistical approaches to build predictive models for learning and decision making based on heterogeneous, dependent and stochastic data. This heterogeneous data should include data generated by the multimodal sensor systems, as well as data from other sources, such as laboratory generated data (e.g., genomics, proteomics, etc.), patient-reported outcomes, electronic health records, and existing data sources.
- 4. Effective Usability:** To generate technology that is usable and effective will require development of new approaches, taking into account ethical, behavioral and social considerations, to support individuals to effectively participate in their own health, diagnosis, and treatment, such as personalized information systems, personalized and dynamic treatment, accessing and visualizing health data and knowledge that support users across socio-economic status, digital and health literacy, technology and broadband access, geography, gender, and ethnicity. This theme will also support development of novel user-tailored and contextually dynamic interfaces to reduce user burden and increase autonomy for a variety of health-related tasks. Researchers are encouraged to develop new methods for context-dependent selection, presentation and use of data to improve health, while diminishing the negative influences of reminder fatigue, information overload, and informational conflict. Furthermore, this theme acknowledges that an in-depth understanding of the behavioral, psychological and social factors affecting the initiation of and adherence to health-enhancing devices and technologies is needed to promote their utilization and sustainability over time.
- 5. Automating Health:** Development and adoption of automation has lagged in the biomedical and public health communities. Thus, this theme supports work that enables interoperable, temporally synchronized, devices and systems to connect data and devices and create closed-loop or human-in-the-loop systems to assess, treat and reduce adverse health events. The theme also encourages development of novel simulation and modeling methods and software tools that aid in the design and evaluation of new assessments, treatments and medical devices. This can also include new methods for enhancing digital clinical trials (<https://www.nature.com/articles/s41746-019-0203-0>). Finally, development of technology platforms which can be utilized across a range of settings (e.g., home, primary care, schools, criminal justice system, child welfare agencies, community-based organizations) to optimize the delivery of effective health interventions is also within scope of the theme.

6. **Medical image interpretation.** This theme's goal is to determine how characteristics of human pattern recognition, visual search, perceptual learning, attentional biases, etc. can inform and improve use and development of presentation modalities (e.g., pathologists reading optical slides through a microscope vs. digital whole-slide imagery) and identify the sources of inter- and intra-observer variability in medical image interpretation. The theme encourages development of models of how non-visual contextual information (e.g., patient history) changes the perception of complex images. It also supports new methods to exploit experts' implicit knowledge to improve perceptual decision making (e.g., via rapid gist extraction, context-guided search, etc.). Research on optimal methods for conveying 3D (and 4D) information about anatomy and physiology to human observers is also welcome. Finally, researchers are encouraged to develop new models of how experts respond to changes in cognitive factors, such as interruptions, changes in sleep, or background distractions.
7. **Unpacking health disparities.** The National Academies of Sciences, Engineering, and Medicine report, *Communities in Action: Pathways to Health Equity* (2017), offers a broader context to understand health disparities. In this theme, proposals should seek to develop holistic, data-driven or mathematical models to address the structural and/or social determinants of health. Proposers can also develop novel and effective strategies to measure, reduce, and mitigate the effects and impacts of discrimination on health outcomes. The theme also supports new computational approaches in parallel with social and behavioral models to better understand culture, context and person-centered solutions with diverse communities. Finally, the theme supports development of novel methods of distinguishing the complex pathways between and/or among levels of influence and domains as outlined by the National Institute of Minority Health and Health Disparities Research Framework (2017).

The above listed themes are to provide examples for possible research activities that may be supported by this solicitation, but by no means should the proposed research activities be restricted to these themes. These research themes are clearly not mutually exclusive, and a given project may address multiple themes.

This solicitation aims to support research activities that complement rather than duplicate the core programs of the NSF Directorates and the NIH Institutes and Centers and the research efforts supported by other agencies such as the Agency for Healthcare Research and Quality.

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, [randomized control trials](#) are not appropriate for this solicitation and will not be funded. Research that has advanced to a stage that requires randomized control trials should be submitted to an agency whose mission is to improve health.

NIH supports research and discovery that improve human health and save lives. This joint program focuses on fundamental research of generalizable, disease-agnostic approaches with broadly applicable results that align with NIH's [Strategic Plan for Data Science](#) and [National Institute of Minority Health and Health Disparities Research Framework](#).

Integrative Innovation:

Proposals submitted to this solicitation must be integrative and undertake research addressing key application areas by solving problems in multiple scientific domains. The work must make **fundamental scientific or engineering contributions to two or more disciplines**, such as computer or information sciences, engineering, mathematical sciences, 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, engineering and mathematics, 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 students and postdocs. 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 this is not required. Because 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 ALL proposals**. 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 10 to 16 projects will be funded, subject to availability of funds. Up to \$16,000,000-20,000,000 of NSF funds 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 and the title of the project (i.e., **SCH: Title**). If you submit a proposal as part of a set of collaborative proposals, the title of the proposal should begin with **Collaborative Research** followed by a colon, then **SCH** followed by a colon, and the title. For example, if you are submitting a collaborative set of proposals, then the title of each would be Collaborative Research: **SCH: Title**.

Proposals from PIs in institutions that have Research in Undergraduate Institutions (RUI) eligibility should have a proposal title that begins with **Collaborative Research** (if applicable), followed by a colon, then **SCH** followed by a colon, then **RUI** followed by a colon, and then the title, for example, **Collaborative Research: SCH: RUI: 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. The Project Summary must include three labeled sections: Overview, Intellectual Merit and Broader Impacts. The overview includes a description of the SCH project. Intellectual Merit should describe the transformative research and the potential of the proposed activity to advance knowledge. Broader Impacts should describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes. The Broader Impacts can include 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 section labeled 'Evaluation Plan' that includes a description of how the team will evaluate the proposed science/engineering.** This could include results from applications of the research to specific outcomes in health domain, efficacy studies, assessments of learning and engagement, and other such evaluation. The proposed **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 by the 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 for at least one project PI.

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 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. **Human subjects plans must include the NIH enrollment table** (https://era.nih.gov/erahelp/assist/Content/ASSIST_Help_Topics/3_Form_Screens/PHS_HS_CT/Incl_Enroll_Rprt.htm).
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 and the section on Data Management Plans.

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 and the Collaboration Plan.

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 describe the nature of the collaboration and what the collaborator(s) brings to the project. 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, that 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 may not be submitted, and reviewers will be instructed not to consider these letters 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, NSF systems will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j of the PAPPG for further information about the implementation of this requirement.

8. **Other Specialized Information.**

RUI Proposals: PIs from predominantly undergraduate institutions should follow the instructions from [NSF 14-579](#) on submission from a RUI site https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf14579.

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 checklist is provided as a reminder of the items that should be verified 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 that includes three labeled sections: Overview, Intellectual Merit and Broader Impacts.
- (RWR) Within the Project Description, a section labeled "Broader Impacts" that describes the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.
- Within the Project Description, a section labeled Evaluation Plan that details how the project will be evaluated.
- (RWR) Within the Project Description, a description of "Results from 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.
- Proposals involving human subjects or animals, should include a Human Subjects Plan with an NIH Enrollment Table or Vertebrate Animals Plan 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):

February 16, 2021

November 10, 2021

November 10, 2022

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:

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 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/VASchecklist.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.

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.

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 submission process. 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.

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 four 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 Health and Biomedical Research in the Era of Artificial Intelligence and Advanced Data Science 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](https://www.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](https://www.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](https://www.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, Directorate for Computer and Information Science and Engineering, Division of Computing and Communication Foundations, telephone: (703) 292-8910, email: sacton@nsf.gov
- Balakrishnan Prabhakaran, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems,

- telephone: (703) 292-4847, email: bprabhak@nsf.gov
- Steven J. Breckler, Social, Behavioral and Economic Sciences Directorate, Division of Behavioral and Cognitive Sciences, telephone: (703) 292-7369, email: sbreckle@nsf.gov
 - Fay Cobb Payton, Directorate for Computer and Information Science and Engineering, Division of Computer and Network Systems, telephone: (703) 292-7939, email: fpayton@nsf.gov
 - Wei Ding, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, telephone: (703) 292-8017, email: weiding@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, 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
 - Betty K. Tuller, Social, Behavioral and Economic Sciences Directorate, Division of Behavioral and Cognitive Sciences, telephone: (703) 292-7238, email: btuller@nsf.gov
 - Huixia Wang, Mathematical and Physical Sciences Directorate, Division of Mathematical Sciences, telephone: (703) 292-2279, email: huiwang@nsf.gov
 - Albert Z. Wang, Engineering Directorate, Division of Electrical, Communications and Cyber Systems, telephone: (703) 292-7230, email: awang@nsf.gov
 - Xiaojing J. Zhang, Engineering Directorate, Division of Electrical, Communications and Cyber Systems, telephone: (703) 292-8339, email: jzhang@nsf.gov
 - Fenglou Mao, Office of Data Science Strategy (ODSS), NIH, telephone: (301) 451-9389, email: fenglou.mao@nih.gov
 - Dana Wolff-Hughes, Office of Behavioral and Social Sciences Research (OBSSR), NIH, telephone: (301) 496-0979, email: dana.wolff@nih.gov
 - Robin Vanderpool, National Cancer Institute (NCI), NIH, telephone: (240) 276-6558, email: vanderpoolrc@mail.nih.gov
 - James Gao, National Eye Institute (NEI), NIH, telephone: (301) 594-6074, email: james.gao@nih.gov
 - Heather Colley, National Human Genome Research Institute (NHGRI), NIH, telephone: (301) 480-2332, email: Heather.Colley@nih.gov
 - Erin Iturriaga, National Heart, Lung, and Blood Institute (NHLBI), NIH, telephone: (301) 435-0403, email: erin.iturriaga@nih.gov
 - Partha Bhattacharyya, National Institute on Aging (NIA), NIH, telephone: (301) 496-3131, email: bhattacharyyap@mail.nih.gov
 - Ishwar Chandramouliswaran, National Institute of Allergy and Infectious Disease (NIAID), NIH, telephone: (301) 761-7822, email: ishwar.chandramouliswaran@nih.gov
 - Anthony Kirilusha, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), NIH, telephone: (301) 451-7648, email: anthony.kirilusha@nih.gov
 - Qi Duan, National Institute of Biomedical Imaging and Bioengineering (NIBIB), NIH, telephone: (301) 827-4674, email: Qi.Duan@NIH.gov
 - Samantha Calabrese, Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), NIH, telephone: (301) 827-7568, email: samantha.calabrese@nih.gov
 - Susan Wright, National Institute on Drug Abuse (NIDA), NIH, telephone: (301) 402-6683, email: Susan.wright@nih.gov
 - Roger Miller, National Institute on Deafness and Other Communication Disorders (NIDCD), NIH, telephone: (301) 402-3458, email: miller@nidcd.nih.gov
 - Emir Khatipov, National Institute of Dental and Craniofacial Research (NIDCR), NIH, telephone: (301) 534-3977, email: emir.khatipov@nih.gov
 - Xujing Wang, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), NIH, telephone: (301) 451-2682, email: xujing.wang@nih.gov
 - Christopher Duncan, National Institute of Environmental Health Sciences (NIEHS), NIH, telephone: (984) 287-3256, email: christopher.duncan@NIH.gov
 - Paul Brazhnik, National Institute of General Medical Sciences (NIGMS), NIH, telephone: (301) 451-4317, email: brazhnik@nigms.nih.gov
 - Adam Haim, National Institute of Mental Health (NIMH), NIH, telephone: (301) 435-3593, email: haima@mail.nih.gov
 - Deborah Duran, National Institute on Minority Health and Health Disparities (NIMHD), NIH, telephone: (301) 594-9809, email: deborah.duran@nih.gov
 - Shana Kukke, National Institute of Neurological Disorders and Stroke (NINDS), NIH, telephone: (301) 496-1447, email: Shana.kukke@nih.gov
 - Kristopher Bough, National Institute of Nursing Research (NINR), NIH, telephone: (301) 496-2604, email: kristopher.bough@nih.gov
 - Yanli Wang, National Library of Medicine (NLM), NIH, telephone: (301) 594-4882, email: yawang@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
- Wendy Nilsen, Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, telephone: (703) 292-2568, email: wnilsen@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.

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) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a

party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See [System of Record Notices, NSF-50](#), "Principal Investigator/Proposal File and Associated Records," and [NSF-51](#), "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

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

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314

Policies and Important Links	Privacy	FOIA	Help	Contact NSF	Contact Web Master	SiteMap
	National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA Tel: (703) 292-5111, FIRS: (800) 877-8339 TDD: (703) 292-5090 or (800) 281-8749					Text Only