

Secure and Trustworthy Cyberspace (SaTC)

PROGRAM SOLICITATION

NSF 13-578

REPLACES DOCUMENT(S):

NSF 12-596



National Science Foundation

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

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

Directorate for Mathematical & Physical Sciences
Division of Mathematical Sciences

Directorate for Engineering
Division of Electrical, Communications and Cyber Systems

Directorate for Education & Human Resources
Division of Undergraduate Education

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

September 24, 2013 - October 15, 2013

MEDIUM Projects

November 04, 2013 - November 19, 2013

November 4 - November 19, Annually Thereafter

FRONTIER Projects

December 04, 2013 - December 19, 2013

December 4 - December 19, Annually Thereafter

CYBERSECURITY EDUCATION Projects

January 02, 2014 - January 14, 2014

January 2 - January 14, Annually Thereafter

SMALL Projects

September 02, 2014 - September 19, 2014

September 2 - September 19, Annually Thereafter

MEDIUM Projects

IMPORTANT INFORMATION AND REVISION NOTES

This is a revision of [NSF 12-596](#), the solicitation for the Secure and Trustworthy Cyberspace (SaTC) program. The revisions include:

1. Slight revisions of the program description;
2. Revised descriptions of the Small, Medium, and Frontier projects that may be submitted to the program;
3. Removal of the Transition to Practice (TTP) perspective to focus on submissions of Trustworthy Computing Systems (TWC), Social, Behavioral and Economic Sciences (SBE), and Cybersecurity Education perspectives, along with a TTP supplemental option;
4. A section on embedding REU Supplement requests in the proposals;
5. A requirement that the collaboration plan for Medium and Frontier proposals with two or more PIs must now be submitted as a Supplementary Document and not as additional pages in the Project Summary; and
6. A requirement for a list of collaborators of all members of the project team to be submitted as a Supplementary Document.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Secure and Trustworthy Cyberspace (SaTC)

Synopsis of Program:

Cyberspace has transformed the daily lives of people for the better. The rush to adopt cyberspace, however, has exposed its fragility and vulnerabilities: corporations, agencies, national infrastructure and individuals have been victims of cyber-attacks. In December 2011, the National Science and Technology Council (NSTC) with the cooperation of NSF issued a [broad, coordinated federal strategic plan](#) for cybersecurity research and development to "change the game," minimize the misuses of cyber technology, bolster education and training in cybersecurity, establish a science of cybersecurity, and transition promising cybersecurity research into practice. This challenge requires a dedicated approach to research, development, and education that leverages the disciplines of mathematics and statistics, the social sciences, and engineering together with the computing, communications and information sciences.

The Secure and Trustworthy Cyberspace (SaTC) program welcomes proposals that address Cybersecurity from a Trustworthy Computing Systems (TWC) perspective and/or a Social, Behavioral and Economic Sciences (SBE) perspective (see "Perspectives"). In addition, we welcome proposals that integrate research addressing both of these perspectives as well as proposals focusing entirely on Cybersecurity Education (see below). Proposals may be submitted in one of the following three categories:

- Small projects: up to \$500,000 in total budget, with durations of up to three years
- Medium projects: \$500,001 to \$1,200,000 in total budget, with durations of up to four years
- Frontier projects: \$1,200,001 to \$10,000,000 in total budget, with durations of up to five years

Projects with Trustworthy Computing Systems and/or Social, Behavioral and Economic Sciences perspectives may include a Transition to Practice (TTP) option, described in a supplemental document of no more than five pages. This document should describe how successful research results are to be further developed, matured, and experimentally deployed in organizations or industries, including in networks and end systems used by members of the NSF science and engineering communities. Proposals with a TTP option may exceed the above-stated maxima by up to \$167,000 for Small projects, \$400,000 for Medium projects and \$750,000 for Frontier projects.

In addition, the SaTC program seeks proposals addressing Cybersecurity Education with total budgets limited to \$300,000 and durations of up to two years. Cybersecurity education projects may not include any of the three perspectives named above.

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.

- Jeremy Epstein, Program Director, CISE/CNS, 1175, telephone: (703) 292-8338, email: jepstein@nsf.gov
- Nina Amla, Program Director, CISE/CCF, 1115, telephone: (703) 292-8910, email: naml@nsf.gov
- Christopher Clifton, Program Director, CISE/IIS, 1125, telephone: (703) 292-8491, email: cbingham@nsf.gov
- Sol Greenspan, Program Director, CISE/CCF, 1115, telephone: (703) 292-8910, email: sgreensp@nsf.gov
- Angelos D. Keromytis, Program Director, CISE/CNS, 1175, telephone: (703) 292-8061, email: adkeromy@nsf.gov
- Victor P. Piotrowski, Program Director, EHR/DUE, 865, telephone: (703) 292-5141, email: vp Piotrow@nsf.gov
- Andrew D. Pollington, Program Director, MPS/DMS, 1025, telephone: (703) 292-4878, email: adpollin@nsf.gov
- Kevin Thompson, Program Director, CISE/ACI, 1145, telephone: (703) 292-4220, email: kthomps@nsf.gov
- Zhi (Gerry) Tian, Program Director, ENG/ECCS, 525, telephone: (703) 292-2210, email: ztian@nsf.gov
- Ralph Wachter, Program Director, CISE/CNS, 1175, telephone: (703) 292-8950, email: rwachter@nsf.gov
- Heng Xu, Program Director, SBE/SES, 995 N, telephone: (703) 292-8643, email: hxu@nsf.gov
- Rosanna Guadagno, Program Director, SBE/SES, 995, telephone: (703) 292-5145, email: rguadagn@nsf.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
- 47.076 --- Education and Human Resources

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 73

NSF anticipates approximately 8 Education awards, 51 Small awards, 12 Medium awards and 2 Frontier awards in FY14.

Anticipated Funding Amount: \$74,500,000

Up to \$74,500,000 in FY 14, subject to the availability of funds and receipt of sufficient meritorious proposals.

Eligibility Information

Who May Submit Proposals:

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

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 3

An individual can participate as a PI, co-PI or Senior Personnel on **no more than three proposals, of which no more than two can be for the TWC and/or SBE perspectives, and no more than one for the EDU perspective.**

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 for the TWC and/or SBE perspectives will be accepted and the remainder will be returned without review). **No exceptions will be made.**

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

September 24, 2013 - October 15, 2013

MEDIUM Projects

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SMALL Projects

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MEDIUM Projects

Proposal Review Information Criteria

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

Award Administration Information

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

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

Cyberspace -- a global "virtual" village enabled by hyper-connected digital infrastructures -- has transformed the daily lives of people for the better. Families and friends regardless of distance and location can see and talk with one another as if in the same room. Cyber economies create new opportunities. Every sector of the society and nearly every discipline has been transformed by cyberspace. Today it is no surprise that cyberspace is critical to our national priorities in commerce, education, energy, financial services, healthcare, manufacturing, and defense.

The rapidly increasing importance of cyberspace, however, has exposed its fragility. The risks of hyper-connectedness have become painfully obvious to all. The privacy of personally identifiable information is often violated on a massive scale by unknown persons. Our competitive advantage is eroded by the exfiltration of significant intellectual property. Law enforcement is hobbled by the difficulty of attribution, national boundaries, and uncertain legal and ethical frameworks. All these concerns now affect the public's trust of cyberspace and the ability of institutions to fulfill their mission.

In 2011, the National Science and Technology Council (NSTC) with the cooperation of NSF put forward a strategic plan titled [Trustworthy Cyberspace: Strategic Plan for the Federal Cybersecurity Research and Development Program](#). The plan identifies a broad, coordinated research agenda to make cyberspace secure and trustworthy. Research in cybersecurity must "change the game," minimize the misuses of cyber technology, bolster education and training in cybersecurity, establish a science of cybersecurity, and transition promising cybersecurity research into practice. The goal is to make cyberspace worthy of the public's trust.

This solicitation is supportive of the NSTC strategic plan for a trustworthy cyberspace. It recognizes that cyberspace will continue to grow and evolve, and that advances in science and engineering will create new "leap-ahead" opportunities expanding cyberspace. It further recognizes that cybersecurity must also grow and co-evolve, and that a secure and trustworthy cyberspace will ensure continued economic growth and future technological innovation.

II. PROGRAM DESCRIPTION

Cybersecurity is one of the most important challenges confronting society in the information age. No one -- whether governments,

businesses or individuals -- is exempt from the ravages of malicious cyber acts upon imperfect technologies. Posing cyber conflict solely in terms of classic attackers and defenders does not fully capture the diversity and subtlety of the motivations, incentives, ethics, asymmetries, and strategies of the constituent actors and players in cyberspace. The intelligent adversary, whether human or software, learns, evolves, and co-evolves to exploit, disrupt, and overpower existing protection mechanisms. Addressing this challenge requires a coordinated multi-disciplinary approach, contributing to the body of knowledge about cybersecurity in the respective disciplines, and leading to practical usable deployable technologies.

The Secure and Trustworthy Cyberspace (SaTC) program welcomes proposals that address Cybersecurity from a Trustworthy Computing Systems (TWC) perspective and/or a Social, Behavioral and Economic Sciences (SBE) perspective (see "Perspectives" below). In addition, we welcome proposals that integrate research addressing both of these perspectives as well as proposals focusing entirely on Cybersecurity Education (see below). Proposals may be submitted in one of the following three categories:

- Small projects: up to \$500,000 in total budget, with durations of up to three years;
- Medium projects: \$500,001 to \$1,200,000 in total budget, with durations of up to four years;
- Frontier projects: \$1,200,001 to \$10,000,000 in total budget, with durations of up to five years.

Projects with TWC and/or SBE perspectives may include a Transition to Practice (TTP) option, described in a supplemental document of no more than five pages. This document should describe how successful research results are to be further developed, matured, and experimentally deployed in organizations or industries, including in networks and end systems used by members of the NSF science and engineering communities. Proposals with a TTP option may exceed the above-stated maxima up to \$167,000 for Small projects, \$400,000 for Medium projects and \$750,000 for Frontier projects.

In addition, the SaTC program seeks proposals addressing Cybersecurity Education with total budgets limited to \$300,000 and durations of up to two years.

PROJECT CLASSES

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

• SMALL Projects:

Small Projects, with total budgets up to \$500,000 for durations of up to three years, are well suited to one or two investigators (PI and one co-PI or other Senior Personnel) and at least one student and/or postdoc.

• MEDIUM Projects:

Medium Projects, with total budgets ranging from \$500,001 to \$1,200,000 for durations up to four years, are well-suited to one or more investigators (PI, co-PI and/or other Senior Personnel) and several students and/or postdocs. Medium project descriptions must be comprehensive and well-integrated, and should make a convincing case that the collaborative contributions of the project team will be greater than the sum of each of their individual contributions. Rationale must be provided to explain why a budget of this size is required to carry out the proposed work. Since the success of collaborative research efforts are known to depend on thoughtful coordination mechanisms that regularly bring together the various participants of the project, a separate **Collaboration Plan is required for all Medium proposals with more than one investigator**. Up to 2 pages are allowed for Collaboration Plans. The length of and level of detail provided in the Collaboration Plan should be commensurate with the complexity of the proposed project. **If a Medium proposal with more than one investigator does not include a Collaboration Plan, that proposal will be returned without review.** Please see *Proposal Preparation Instructions* Section V.A for additional submission guidelines.

• FRONTIER Projects:

Frontier Projects, with total budgets ranging from \$1,200,001 to \$10,000,000 for durations of up to five years, are well suited to two or more investigators (PI, co-PI and/or other Senior Personnel), and a team of students and/or postdocs. NSF seeks to fund approximately two Frontiers in Cybersecurity projects this year. They should be large, multi-disciplinary, multi-organizational, and/or multi-institution projects that provide high-level visibility to grand challenge research areas in cybersecurity. Project descriptions must be comprehensive and well-integrated, and should make a convincing case that the collaborative contributions of the project team will be greater than the sum of each of their individual contributions. Rationale must be provided to explain why a budget of this size is required to carry out the proposed work. Since the success of collaborative research efforts are known to depend on thoughtful coordination mechanisms that regularly bring together the various participants of the project, a separate Collaboration Plan is required for all Frontier proposals. Up to 2 pages are allowed for Collaboration Plans. The length of and level of detail provided in the Collaboration Plan should be commensurate with the complexity of the proposed project. If a Frontier proposal does not include a Collaboration Plan, that proposal will be returned without review. Please see *Proposal Preparation Instructions* Section V.A for additional submission guidelines.

Frontier projects must be submitted to the Trustworthy Computing Systems perspective. They may also include as a secondary perspective the Social, Behavioral, and Economic Sciences perspective, but the Trustworthy Computing Systems perspective must be the primary perspective.

A Frontiers proposal should have a long-term vision, with objectives that could not be attained simply by a collection of small or medium proposals provided similar resources. Such research could be multidisciplinary, but does not need to be: a successful Frontier project could be a deep, intensively focused effort on a single cybersecurity problem in a single discipline. We encourage both single perspective and multi-perspective Frontier proposals.

Before submitting a Frontier proposal, PIs are strongly encouraged to contact SaTC Program Officer Jeremy Epstein in the Division of Computer and Network Systems (CNS) at jepstein@nsf.gov to discuss suitability of the proposal to the Frontier-scale competition.

PERSPECTIVES

Trustworthy Computing Systems (TWC) Perspective

Proposals addressing Cybersecurity with a Trustworthy Computing Systems perspective aim to provide the basis for designing, building, and operating a cyberinfrastructure with improved resistance and improved resilience to attack that can be tailored to meet a wide range of technical and policy requirements, including both privacy and accountability. Within its scope, the program supports all research approaches from theoretical to experimental, including participation by human subjects. Theories, models, cryptography, algorithms, methods, architectures, languages, software, tools, systems and evaluation frameworks are all of interest.

Of particular interest is research addressing how better to design into components and systems desired security and privacy properties. Methods for raising attacker costs by incorporating diversity and change into systems, while preserving system manageability, are also relevant. Approaches and methods for securing cyber-physical systems (CPS) are also welcome, including, but not limited to, critical infrastructure such as power and water, health care, transportation, and manufacturing. Submissions relating to CPS should be specific about the threat model, in particular addressing the sophistication of expected adversaries.

Research that studies the tradeoffs among trustworthy computing properties, e.g., security and usability, or accountability and privacy, as well as work that examines the tension between security and human values such as openness and transparency is also welcomed. Also, methods to assess, reason about, and predict system trustworthiness, including observable metrics, analytical methods, simulation, experimental deployment and, where possible, deployment on live testbeds for experimentation at scale are considered. Statistical, mathematical and computational methods in the area of cryptographic methods, new algorithms, risk assessments and statistical methods in cybersecurity are also welcome.

Social, Behavioral and Economic Sciences (SBE) Perspective

Proposals addressing the Social, Behavioral and Economic Sciences (SBE) perspective of Cybersecurity may include research at the individual, group, organizational, market, and societal levels, identifying cybersecurity risks and exploring the feasibility of potential solutions. All research approaches, including (but not limited to) theoretical, experimental, observational, statistical, survey, and simulation-based are of interest. A variety of methods can be used in research from the SBE perspective, including field data, laboratory experiments, observational studies, simulations, and theoretical development, among others.

Not all proposals that examine aspects involving people are from the SBE perspective. Proposals in which such aspects are not the primary focus of the proposal or that merely apply rather than make contributions to the SBE sciences might fit under "Trustworthy Computing Systems" as human factors research.

A proposal with SBE as its *primary* perspective must have SBE science as its main focus and must involve theoretical or methodological contributions to the SBE sciences. Contributions to the SBE sciences includes identifying generalizable theories and regularities and "pushing the boundaries" of our understanding of social, behavioral, or economic phenomena in cybersecurity and beyond. We seek research that is generalizable, identifies scope conditions, or provides an advance in SBE science methods. We seek research that holds the promise of constructing new SBE theories that would apply to a variety of domains, or new generalizations of existing theory which clarify the conditions under which such generalizations hold (scope conditions). More inductive or interpretative approaches may contribute to the SBE sciences as well, especially if they set the groundwork for generalizable research or reveal broad connections that forward SBE science understandings. SBE / SaTC proposals should clearly state and elaborate how the proposed research will contribute to SBE sciences. A proposal that involves SBE, *but not as its primary perspective*, must include at least an application of the SBE sciences, but need not involve a theoretical or methodological contribution.

All SBE primary or non-primary proposals must, like all SaTC proposals, also contribute toward the goal of creating a secure and trustworthy cyberspace. The SBE science contribution of any SBE / SaTC proposal must be related to bringing about that goal. It is not sufficient for a proposal submitted under SBE / SaTC to have an SBE science contribution alone or one that is not related to bringing about a secure and trustworthy cyberspace. Such proposals are perhaps best submitted to a standing (core) SBE program.

Strong proposals will demonstrate the capabilities of the research team to bring to bear state-of-the-art research in the human sciences. In particular, they will seek to understand, predict and explain prevention, attack and/or defense behaviors and contribute to developing strategies for remediation. Proposals that contribute to the design of incentives, markets or institutions to reduce either the likelihood of cyber attack or the negative consequences of cyber attack are especially welcome, as are proposals that examine incentives and motivations of individuals.

Proposals submitted with a Social, Behavioral & Economic Sciences perspective will be evaluated with careful attention to the following:

- The mutual application of, and contribution to, basic social, behavioral and economic sciences research;
- The generalizability of the research to multiple cyber security settings;
- The ultimate contribution to the construction of institutions that induce optimal behavior; and
- The value of the research toward creating a secure and trustworthy cyberspace.

Given the nascent state of SBE research in cybersecurity, we welcome proposals for workshops and other opportunities for intellectual engagements. Such proposals, however, should clarify how the efforts are likely to enable future SBE contributions, preferably from a range of social, behavioral and economic sciences. Infrastructure-oriented proposals should include components that go beyond merely providing a resource for other researchers and should contribute directly to research.

Proposals with a SBE perspective may be submitted to all funding categories. However, Frontier proposals may not have SBE as the sole or primary perspective; instead, they may include SBE as the secondary perspective only.

Transition to Practice (TTP) Option

Proposals for Small, Medium or Frontier projects may include a Transition to Practice (TTP) option. **Proposed activities under the TTP option MUST NOT be described in the project description, and instead MUST be described in a supplemental document of no more than five pages.** The TTP option is meant to support the leveraging of proposed research activities and ideas whose outcomes at the end of the award are capable of being implemented, matured, applied, experimentally useable, or demonstrated as a useable capability. This option should describe how successful research results are to be further developed, matured and experimentally deployed in organizations or industries, including in networks and end systems. Any software developed in this program area is required to be released under an open source license listed by the Open Source Initiative (<http://www.opensource.org/>) (this requirement is specific to the TTP option supplement). Proposals with a TTP option may exceed the above-stated maxima by up to \$167,000 for Small projects, \$400,000 for Medium projects, and \$750,000 for Frontier projects.

Proposals submitted with a TTP option will be evaluated with careful attention to the following:

- The expected impact on the deployed environment described in the supplemental document;
- The extent to which the value of the proposed cybersecurity research and development is described in the context of a needed capability and potential impact;
- The feasibility, utility, and interoperability of the capability in its proposed operational role;
- A plan that addresses in its goals and milestones the demonstration and evaluation of a working system in the target environment;
- Tangible metrics described to evaluate the success of the capabilities developed, and the steps necessary to take the system from prototype status to production use; and
- The appropriateness of the budget for the option. The supplemental document should explain how the additional budget will be used to execute the option.

Questions regarding the Transition to Practice (TTP) option should be addressed directly to SaTC Program Officer Kevin Thompson in the Division of Advanced Cyberinfrastructure (ACI) at kthompso@nsf.gov.

Cybersecurity Education (EDU) Perspective

On occasion, the results of SaTC funded research lead to widespread changes in our understanding of the fundamentals of cybersecurity that can, in turn, lead to fundamentally new ways to motivate and educate students about cybersecurity. Proposals submitted to this perspective leverage successful results from previous and current basic research in cybersecurity and research on student learning, both in terms of intellectual merit and broader impact, to address the challenge of expanding existing educational opportunities and resources in cybersecurity. This might include but is not limited to the following efforts:

- Based on the results of previous and current basic research in cybersecurity, define a cybersecurity body of knowledge and establish curricular recommendations for new courses (both traditional and online), degree programs, and educational pathways leading to wide adoption nationally;
- Evaluate the effects of these curricula on student learning;
- Encourage the participation of a broad and diverse student population in Cybersecurity Education;
- Develop virtual laboratories to promote collaboration and resource sharing in Cybersecurity Education;
- Develop partnerships between centers of research in cybersecurity and institutions of higher education that lead to improved models for the integration of research experiences into cybersecurity degree programs;
- Develop and evaluate the effectiveness of cybersecurity competitions, games, and other outreach and retention activities; and
- Conduct research that advances improvements in the teaching and student learning in cybersecurity.

Any software developed in this program area is required to be released under an open source license listed by the Open Source Initiative (<http://www.opensource.org/>).

Cybersecurity Education proposal budgets are limited to \$300,000 and their durations are limited to two years.

Questions about Cybersecurity Education proposals should be addressed directly to SaTC Program Officer Victor Piotrowski in the Directorate for Education and Human Resources (EHR) at vp Piotrow@nsf.gov.

SaTC PI MEETINGS

The SaTC program aims to further and expand its research community. In this spirit, the program plans to host PI meetings every other year with participation from all funded projects and other representatives from the research community, government and industry. Principal investigators from all perspectives are expected to participate in these meetings.

For Small, Medium and Education awards, one or more project representatives (PI/co-PI/senior researcher, or NSF-approved replacement) must attend the first PI meeting held after the beginning of the award. For Frontier awards, one or more project representatives (PI/co-PI/senior researcher, or NSF-approved replacement) must attend EVERY PI meeting held throughout the duration of the grant.

EMBEDDED REU SUPPLEMENTS

The Research Experiences for Undergraduates (REU) solicitation ([NSF 13-542](#)) gives instructions for embedding a request for a REU Supplement in a proposal. Proposers are invited to embed a request for a REU Supplement in the typical amount **for one year only** according to normal CISE guidelines (detailed below). The amounts of the REU Supplements **do not** count against the budget limitations described in this solicitation for the Small, Medium, and Frontier project categories.

For single investigator projects, CISE REU supplemental funding requests should typically be for no more than two students for one year. Research teams funded through multi-investigator projects may request support for a larger number of students, commensurate with the size and nature of their projects. For example, for projects involving four principal investigators, REU supplemental funding is typically requested for about four undergraduates for one year.

As a guide for budget development, CISE REU supplement support averages about \$8,000 per student per year; this guideline is neither a floor nor a ceiling. As described in the solicitation, indirect costs (F&A) are not allowed on Participant Support Costs in REU Site or REU Supplement budgets. Note that the REU solicitation's longstanding "administrative allowance" of 25% of the participant support stipend amount in lieu of indirect costs has been discontinued.

In these trying economic times, REU stipend support is one way to retain talented students in undergraduate education, while providing meaningful research experiences. The participation of students from groups underrepresented in computing -- underrepresented minorities, women and persons with disabilities -- is strongly encouraged. Other factors influencing the funding decision regarding the supplement include the number of REU requests submitted by any one principal investigator across all of her/his CISE grants.

Investigators are encouraged to refer to the program solicitation *Research Experiences for Undergraduates (REU): Sites and Supplements* ([NSF 13-542](#)) for more information concerning submission requirements. For questions, contact one of the Cognizant Program Officers listed in this solicitation.

III. AWARD INFORMATION

In FY 14, NSF anticipates approximately 8 Education awards, 51 Small awards, 12 Medium awards and 2 Frontier awards totaling up to \$74,500,000, subject to the availability of funds and receipt of sufficient meritorious proposals.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

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

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 3

An individual can participate as a PI, co-PI or Senior Personnel on **no more than three proposals, of which no more than two can be for the TWC and/or SBE perspectives, and no more than one for the EDU perspective.**

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 for the TWC and/or SBE perspectives will be accepted and the remainder will be returned without review). **No exceptions will be made.**

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

Important Proposal Preparation Information: FastLane will check for required sections of the full proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. Unless otherwise specified in this solicitation, you can decide where to include this section within the Project Description.

Additional Proposal Preparation and Submission Instructions

All proposals must be submitted to the CNS division, regardless of the proposal's perspective(s).

Proposal Titles: Proposal titles must begin with an acronym that indicates the most relevant perspective. Select an acronym from the following list:

- Trustworthy Computing Systems (TWC) perspective: TWC
- Social, Behavioral and Economic Science (SBE) perspective: SBE
- Cybersecurity Education (EDU) perspective: EDU

More than one acronym can be used, separated by spaces. The first acronym should indicate the primary focus of the proposal. The acronym(s) should be followed by a colon, then the project class (Small, Medium or Frontier) followed by a colon, then the title of your project. For example, if you are submitting a Small proposal to the Trustworthy Computing Systems (TWC) perspective, the title of your proposal would be **TWC: Small: Title**.

If you are submitting to multiple perspectives, put the primary perspective first, followed by the secondary perspective, followed by a

colon, then the project class, followed by a colon, then the title. For example, if you are submitting a Small proposal to the Trustworthy Computing Systems (TWC) perspective and the Social Behavioral and Economic Sciences (SBE) perspective, the title of your proposal would be **TWC SBE: Small: Title**.

If you submit a Transition to Practice (TTP) option, the title should begin with the acronym that indicates the relevant perspectives followed by a colon, then "TTP Option" followed by a colon, then the project class followed by a colon, and then the title. For example, if you are submitting a Medium Social, Behavioral and Economic Sciences (SBE) perspective with a Transition to Practice (TTP) option, the title of your proposal would be **SBE: TTP Option: Medium: Title**.

If you submit a proposal as part of a set of collaborative proposals, the title of the proposal should begin with the acronym that indicates the relevant perspectives followed by a colon, then the project class followed by a colon, then "Collaborative" followed by a colon, and then the title. For example, if you are submitting a collaborative set of proposals for a Medium project to the Trustworthy Computing Systems (TWC) perspective, the title of each proposal would be **TWC: Medium: Collaborative: Title**.

Finally, combinations of all the above are possible, with multiple perspectives, a TTP option, and collaboration. An example title would be **TWC SBE: TTP Option: Medium: Collaborative: Title**.

The titles of Cybersecurity Education proposals must contain a single acronym: EDU. They may **not** include a project class, a TTP option, or any other perspective. Thus, the only valid EDU-specific title styles are **EDU: Title** or **EDU: Collaborative: Title**.

Project Description: Describe the research and education activities to be undertaken in up to **15 pages for Small, Medium and Education proposals and up to 20 pages for Frontier proposals**.

Supplementary Documents: In the Supplementary Documents Section, upload the following:

(1) A 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 conflicts of interest. The list **must** include all PIs, Co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, project-level advisory committee members, and writers of letters of support. If the project includes a Transitions option, this list must include personnel and institutions involved in the option. 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

(2) A list of Collaborators (Note: In collaborative proposals, only the lead institution should provide this information):

Provide current, accurate information for all active or recent collaborators of personnel and institutions involved in the project. NSF staff will use this information in the merit review process to manage conflicts of interest. This list -- distinct from (1) above -- must include all active or recent Collaborators of all personnel involved with the proposed project. Collaborators include any individual with whom any member of the project team -- including PIs, Co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, and project-level advisory committee members -- has collaborated on a project, book, article, report, or paper within the preceding 48 months; or co-edited a journal, compendium, or conference proceedings within the preceding 24 months. This list should be numbered and include (in this order) Full name and Organization(s), with each item separated by a semi-colon. Each person listed should start a new numbered line.

1. Mary Smith; XYZ University
2. John Jones; University of PQR
3. Jane Brown; XYZ University
4. Bob Adams; ABC Inc.
5. Mary White; Welldone Institution
6. Tim Green; ZZZ University

(3) Collaboration Plans for Medium (if applicable) and Frontier Proposals:

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

(4) Transition to Practice (TTP) Option Proposals:

Projects with Trustworthy Computing Systems and/or Social, Behavioral and Economic Science perspectives (i.e., not a Cybersecurity Education perspective) may include a Transition to Practice (TTP) option. Proposals submitted with a TTP option **must** include a supplemental document of up to five pages in order for the option to be considered for funding. This document should describe how successful proposed research results are to be further developed, matured, and experimentally deployed in organizations, networks and end systems. It should also include an option budget that indicates what additional funds would be needed to carry out the TTP option. This budget for the TTP option may be no larger than \$167,000 for small projects, \$400,000 for medium projects, and up to \$750,000 for frontier projects.

Note that the TTP option budget should be specified in the five-page supplement and must not appear on the budget sheets for the proposal. Should a decision be made to fund the option, the PI(s) will be asked to submit a revised budget.

(5) Postdoctoral Researcher 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. In no more than one page, the mentoring plan must describe the mentoring that will be provided to all postdoctoral researchers supported by the project, irrespective of whether they reside at the submitting organization, any subawardee organization, or at any organization participating in a simultaneously submitted collaborative project. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j (http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_2.jsp#IIC2j) of the GPG for further information about the implementation of this requirement.

Proposals that include Postdoctoral Mentoring Plans exceeding one page in length will be returned without review.

(6) *Data Management Plan (required):*

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

See [Grant Proposal Guide \(GPG\) Chapter II.C.2.j](#) for full policy implementation.

For additional information see: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>.

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

Proposals that include Data Management Plans exceeding two pages in length will be returned without review.

Allowed Combinations of Perspectives and Option: Not all combinations of perspectives are allowed, and not all combinations may have the Transition to Practice (TTP) option. For example, proposals submitted for the SBE perspective only may be submitted to the Small and Medium categories. Proposals with an SBE perspective that also include a TWC perspective may be submitted to the Frontiers category (if the TWC perspective is the primary one), as well as to the Small or Medium categories.

The following table is a synopsis of the above.

Size	Single Perspectives Allowed	Double Perspectives Allowed	Base Max	Option Max	Project Description Page Limit	Collaboration Plan
Education without option	EDU	None	\$300K	N/A	15	Permitted but not required
Small without option	TWC SBE	TWC SBE or SBE TWC	\$500K	N/A	15	Permitted but not required
Small with TTP option	TWC SBE	TWC SBE or SBE TWC	\$500K	\$167K	15 + 5-page Supplemental Doc for Option	Not required
Medium without option	TWC SBE	TWC SBE or SBE TWC	\$1.2M	N/A	15	Required for proposals with > 1 PI
Medium with TTP option	TWC SBE	TWC SBE or SBE TWC	\$1.2M	\$400K	15 + 5-page Supplemental Doc for Option	Required for proposals with > 1 PI
Frontier without option	TWC	TWC SBE only	\$10M	N/A	20	Required
Frontier with TTP option	TWC	TWC SBE only	\$10M	\$750K	20 + 5-page Supplemental Doc for Option	Required

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Budgets for Education, Small, and Medium projects must include funding for one or more project representatives (PI/co-PI/senior researcher or NSF-approved replacement) to attend the first SaTC PI meeting held after the beginning of the award. Budgets for Frontier projects must include funding for one or more project representatives (PI/co-PI/senior researcher or NSF-approved replacement) to attend a SaTC PI meeting to be held every other year for the duration of the project. The first PI meeting for awards made under this solicitation is expected in 2014.

C. Due Dates

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

September 24, 2013 - October 15, 2013

MEDIUM Projects

November 04, 2013 - November 19, 2013

November 4 - November 19, Annually Thereafter

FRONTIER Projects

December 04, 2013 - December 19, 2013

December 4 - December 19, Annually Thereafter

CYBERSECURITY EDUCATION Projects

January 02, 2014 - January 14, 2014

January 2 - January 14, Annually Thereafter

SMALL Projects

September 02, 2014 - September 19, 2014

September 2 - September 19, Annually Thereafter

MEDIUM Projects

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

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

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://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 *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. 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 core strategies 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 provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students, and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. ([GPG Chapter II.C.2.d.i.](#) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including [GPG Chapter II.C.2.d.i.](#), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

Proposals may be submitted with one or more of the following perspectives: Trustworthy Computing and Systems; and/or Social, Behavioral and Economic Sciences (SBE). Proposals can also include an optional Transition to Practice (TTP) phase.

Proposals submitted with a **Social, Behavioral and Economic Sciences (SBE) perspective** will be evaluated with careful attention

to the following:

- The mutual application of, and contribution to, basic social, behavioral and economic sciences research;
- The generalizability of the research to multiple cyber security settings;
- The ultimate contribution to the construction of institutions that induce optimal behavior; and
- The value of the research toward creating a secure and trustworthy cyberspace.

Proposals submitted with a **Transitions to Practice (TTP) option** will be evaluated with careful attention to the following:

- The expected impact on the deployed environment described in the supplemental document;
- The extent to which the value of the proposed cybersecurity research and development is described in the context of a needed capability and potential impact;
- The feasibility, utility, and interoperability of the capability in its proposed operational role;
- An option plan that addresses in its goals and milestones the demonstration and evaluation of a working system in the target environment;
- Tangible metrics described to evaluate the success of the capabilities developed, and the steps necessary to take the system from prototype status to production use; and
- The appropriateness of the budget for the option plan. The supplemental document should explain how the additional budget will be used to execute the option plan.

B. Review and Selection Process

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

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

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process).

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

For Education, Small, and Medium awards, special award conditions will require that at least one representative (PI/co-PI/senior researchers or NSF-approved replacement) from each SaTC project attend the first SaTC PI meeting held after the beginning of the award. For Frontier awards, special award conditions will require that at least one representative (PI/co-PI/senior researchers or NSF-approved replacement) from each SaTC project attend a SaTC PI meeting to be held every other year, for the duration of the project. The first PI meeting for awards made under this solicitation is expected in 2014.

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 at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

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

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

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

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:

- Jeremy Epstein, Program Director, CISE/CNS, 1175, telephone: (703) 292-8338, email: jepstein@nsf.gov
- Nina Amla, Program Director, CISE/CCF, 1115, telephone: (703) 292-8910, email: namla@nsf.gov
- Christopher Clifton, Program Director, CISE/IIS, 1125, telephone: (703) 292-8491, email: cbingham@nsf.gov
- Sol Greenspan, Program Director, CISE/CCF, 1115, telephone: (703) 292-8910, email: sgreensp@nsf.gov
- Angelos D. Keromytis, Program Director, CISE/CNS, 1175, telephone: (703) 292-8061, email: adkeromy@nsf.gov
- Victor P. Piotrowski, Program Director, EHR/DUE, 865, telephone: (703) 292-5141, email: vp Piotrow@nsf.gov
- Andrew D. Pollington, Program Director, MPS/DMS, 1025, telephone: (703) 292-4878, email: adpollin@nsf.gov
- Kevin Thompson, Program Director, CISE/ACI, 1145, telephone: (703) 292-4220, email: kthompso@nsf.gov
- Zhi (Gerry) Tian, Program Director, ENG/ECCS, 525, telephone: (703) 292-2210, email: ztian@nsf.gov
- Ralph Wachter, Program Director, CISE/CNS, 1175, telephone: (703) 292-8950, email: rwachter@nsf.gov
- Heng Xu, Program Director, SBE/SES, 995 N, telephone: (703) 292-8643, email: hxu@nsf.gov
- Rosanna Guadagno, Program Director, SBE/SES, 995, telephone: (703) 292-5145, email: rguadagn@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

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

SaTC Questions: satc@nsf.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 at

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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

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

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

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

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information**
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 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111


PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

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

suggestions for reducing this burden, to:

Suzanne H. Plimpton
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