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Small Business Innovation Research Program Phase I Solicitation (SBIR)

June Submission 2015

PROGRAM SOLICITATION

NSF 15-546

REPLACES DOCUMENT(S):

NSF 14-603



National Science Foundation

Directorate for Engineering
Industrial Innovation and Partnerships

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

June 16, 2015

Proposals submitted outside the window of May 16, 2015 - June 16, 2015 will be returned without review. Proposer's time is defined as the time zone associated with the COMPANY'S ADDRESS AS REGISTERED WITH NSF at the time of proposal submission.

IMPORTANT INFORMATION AND REVISION NOTES

NSF's SBIR program provides non-dilutive funds for early-stage research and development (R&D) at small businesses. This R&D should be based on innovative, transformational technology with potential for substantial commercial and/or societal benefits. The program invites proposals from small businesses across a broad range of science and engineering disciplines. If you are successful, you will receive a grant of up to \$150,000 for a 6-month development/feasibility project. You can then compete for a second grant of up to \$750,000 over a 2 year period, with the aim of advancing the technology toward commercial deployment.

NSF encourages proposals from a diversity of entrepreneurs -- new and seasoned. What is most important is that you have a transformative idea or innovation and that your team's primary goal is the commercialization of the technology. Having no commercialization track record will not count against you -- for many companies, an NSF SBIR award is their first attempt at commercializing an innovation.

Small businesses that will be working with a research institution may also consider the Small Business Technology Transfer (STTR) program. STTR is similar to SBIR. In fact, the programs are discussed in tandem at several points throughout this solicitation and on the SBIR/STTR website. However STTR has a separate, concurrent Phase I solicitation with a similar due date. Several important differences between SBIR and STTR are outlined on the [SBIR/STTR website](#).

Video resources on the [SBIR/STTR website](#) provide a general program description, solicitation-specific information, and helpful proposal preparation advice. **A follow-up series of Q&A webinars** hosted by SBIR/STTR Program Directors will be held in the months leading up to the deadline date. The video link and webinar schedule can be found on the [SBIR/STTR webinar page](#).

Required Registrations. Start Now - These registrations take time, and if left to the last minute could jeopardize your proposal submission! Register the same information in the same way in each of these systems to avoid troubles later. See the [Additional Eligibility](#) section for more details.

- [Dun and Bradstreet Data Universal Numbering System \(DUNS\)](#)
- [System for Award Management \(SAM\)](#)
- [Small Business Administration \(SBA\) Company Registry](#)
- [NSF FastLane](#) - register company and Principal Investigator (PI)

Proposal Resubmission. New guidelines regarding [proposal resubmission](#) have been included.

Our Returned Without Review List shows the Do's and Dont's to ensure that your proposal is not rejected before review. Comply with this list to ensure that your proposal will be reviewed by technical and commercial experts in the field.

Important Information

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) ([NSF 15-1](#)), which is effective for proposals submitted, or due, on or after December 26, 2014. The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

Please note however, that this solicitation contains information that deviates from the standard NSF Proposal & Award Policies & Procedures Guide (PAPPG) ([NSF 15-1](#)), including Part I: Grant Proposal Guide (GPG) proposal preparation guidelines.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

This document has been archived and replaced by NSF 15-605.

Program Title:

Small Business Innovation Research Program (SBIR)

Synopsis of Program:

The Small Business Innovation Research (SBIR) Program is intended to stimulate technological innovation in the private sector by strengthening the role of small business concerns in meeting Federal research and development needs, increasing the commercial application of federally supported research results, and fostering and encouraging participation by socially and economically disadvantaged and women-owned small businesses.

The SBIR/STTR program solicits proposals from the small business sector consistent with NSF's mission. The program is governed by Public Law 112-81 (SBIR/STTR Reauthorization Act of 2011). SBIR/STTR policy is provided by the Small Business Administration (SBA) through the SBA Policy Directive. A main purpose of the legislation is to stimulate technological innovation and increase private sector commercialization. The NSF SBIR/STTR program is therefore in a unique position to meet both the goals of NSF and the purpose of the SBIR/STTR legislation by transforming scientific discovery into both social and economic benefit, and by emphasizing private sector commercialization.

Accordingly, NSF has formulated broad solicitation topics that conform to the high-technology investment sector's interests. The topics are detailed on the SBIR/STTR website.

Note: The submission of the same project idea to both this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation is strongly discouraged.

More information about the NSF SBIR/STTR Program can be found on the [Program Homepage](#).

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.

- Peter Atherton, Information Technologies (IT), telephone: (703) 292-8772, email: patherto@nsf.gov
- Prakash Balan, Chemical and Environmental Technologies (CT), telephone: (703) 292-5341, email: pbalan@nsf.gov
- Steven Konsek, Semiconductors (S) and Photonic (PH) Devices and Materials, and Internet of Things (I), telephone: (703) 292-7021, email: skonsek@nsf.gov
- Glenn H. Larsen, Educational Technologies and Applications (EA), telephone: (703) 292-4607, email: glarsen@nsf.gov
- Rajesh Mehta, Advanced Manufacturing and Nanotechnology (MN), telephone: (703) 292-2174, email: rmehta@nsf.gov
- Muralidharan S. Nair, Electronic Hardware, Robotics and Wireless Technologies (EW), telephone: (703) 292-7059, email: mnair@nsf.gov
- Benaiah Schrag, Advanced Materials and Instrumentation (MI), telephone: (703) 292-8323, email: bschrag@nsf.gov
- Ruth M. Shuman, Biological Technologies (BT), telephone: (703) 292-2160, email: rshuman@nsf.gov
- Jesus V. Soriano, Smart Health (SH) and Biomedical (BM) Technologies, telephone: (703) 292-7795, email: jsoriano@nsf.gov

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

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Fixed Award Amount

Estimated Number of Awards: 200

(pending the availability of funds)

Anticipated Funding Amount: \$30,000,000

(for SBIR Phase I pending the availability of funds)

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Only firms qualifying as a small business concern are eligible to participate in the SBIR/STTR program (see [Eligibility Guide](#) for more information). Please note that the size limit of 500 employees **includes affiliates**. The firm must be in compliance with the SBIR/STTR Policy Directive(s) and 13 CFR 121.>

Who May Serve as PI:

The primary employment of the Principal Investigator (PI) must be with the small business concern at the time of award and for the duration of the award, unless a new PI is named. Primary employment is defined as more than 50% employed by the small business. NSF normally considers a full time work week to be 40 hours and considers employment elsewhere of greater than 19.6 hours per week to be in conflict with this requirement. As such, the PI must have a legal right to work for the proposing company in the US, as evidenced by citizenship, permanent residency or an appropriate visa. The PI does not need to be associated with an academic institution. There are no PI degree requirements (i.e., the PI does not have to hold a Ph.D. or any other degree). A PI may be primarily employed at another organization at the time of *submission*, as long as he or she is primarily employed at the proposing small business at the time of *award*. A PI must devote a minimum of one calendar month to an SBIR Phase I project.

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Limit on Number of Proposals per Organization: 2

An organization may submit no more than two Phase I proposals in total during this cycle, which is defined as this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation. For example, an organization may submit one (1) SBIR Phase I and one (1) STTR Phase I proposal, two (2) SBIR Phase I proposals, or two (2) STTR Phase I proposals during this cycle. **These eligibility constraints will be strictly enforced.** In the event that an organization exceeds this limit, the first two proposals received will be accepted, and the remainder will be returned without review. No exceptions will be made. **The submission of the same project idea to both this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation is strongly discouraged.**

Limit on Number of Proposals per PI or Co-PI: 1

No person may participate as the principal investigator for more than one proposal during this cycle, which is defined as this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Indirect costs plus fringe benefits are limited to a maximum rate of 150% of direct salaries and wages. (See the [Budget Section](#)). This limitation may entail mandatory committed cost sharing by the organization. In such cases, it constitutes an exception to NSF's cost sharing policy.
- **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. proposer's local time):

June 16, 2015

Proposals submitted outside the window of May 16, 2015 - June 16, 2015 will be returned without review. Proposer's time is defined as the time zone associated with the COMPANY'S ADDRESS AS REGISTERED WITH NSF at the time of proposal submission.

Proposal Review Information Criteria

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

Award Administration Information

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

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

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I. INTRODUCTION

The National Science Foundation (NSF), an independent agency of the Federal Government, invites eligible small business concerns to submit Phase I proposals for its Small Business Innovation Research (SBIR) program. NSF will support high-quality projects on important scientific, engineering, or science and engineering education problems and opportunities that could lead to significant commercial and public benefit if the research is successful.

II. PROGRAM DESCRIPTION

By increasing the incentive and opportunity for small firms to undertake cutting-edge, high-risk, high-quality scientific, engineering, or science and engineering education research, the NSF SBIR/STTR program seeks to transform scientific discovery into both social and economic benefit by emphasizing private sector commercialization.

The fundamental mission of NSF is to promote discoveries and to advance education across the frontiers of knowledge in science and engineering. Consistent with that mission, the NSF SBIR/STTR Program encourages and supports a wide range of proposals. These proposals are reviewed under NSF's merit review criteria, which cover both the quality of research (intellectual or technical merit) and its potential impact on society (broader/commercial impacts). The following broad solicitation topics conform to the high-technology investment sector's interests. The topics, listed below, are detailed on the [SBIR/STTR website](#):

- **Educational Technologies and Applications (EA)**
- **Information Technologies (IT)**
- **Semiconductors (S) and Photonic (PH) Devices and Materials**
- **Internet of Things (I)**
- **Electronic Hardware, Robotics and Wireless Technologies (EW)**
- **Advanced Manufacturing and Nanotechnology (MN)**
- **Advanced Materials and Instrumentation (MI)**
- **Chemical and Environmental Technologies (CT)**
- **Biological Technologies (BT)**
- **Smart Health (SH) and Biomedical (BM) Technologies**

The topics and subtopics guide the logistics of the review process but do not affect award decisions. In fact, NSF recognizes that innovation often can't be categorized. Therefore, proposals are accepted in any areas of technology that show promise of high commercial and societal impact, not just those listed above.

Proposals should describe the development of an innovation that demonstrates the following characteristics:

- Involves a high degree of technical risk – for example:
 - Has never been attempted and/or successfully done before;
 - Is still facing technical hurdles (that the NSF-funded R&D work is intended to overcome).
- Has the potential for significant commercial impact and/or societal benefit, as evidenced by:
 - Having the potential to disrupt the targeted market segment;
 - Having good product-market fit (as validated by customers);
 - Presenting barriers to entry for competition;
 - Offering potential for societal benefit (through commercialization under a sustainable business model);

The aim of the Phase I project should be to demonstrate technical feasibility of the proposed innovation and thereby bring the innovation closer to commercialization.

For more in-depth program information please reference the [SBIR/STTR website](#).

III. AWARD INFORMATION

SBIR Phase I proposals may be submitted for funding up to \$150,000. SBIR Phase I projects run for six months. Award notification is typically four to six months from the proposal submission deadline date. Awards will have an effective date of January 1, 2016 for proposals submitted to this solicitation.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

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Proposals may only be submitted by the following:

- Only firms qualifying as a small business concern are eligible to participate in the SBIR/STTR program (see [Eligibility Guide](#) for more information). Please note that the size limit of 500 employees **includes affiliates**. The firm must be in compliance with the SBIR/STTR Policy Directive(s) and 13 CFR 121.

Who May Serve as PI:

The primary employment of the Principal Investigator (PI) must be with the small business concern at the time of award and for the duration of the award, unless a new PI is named. Primary employment is defined as more than 50% employed by the small business. NSF normally considers a full time work week to be 40 hours and considers employment elsewhere of greater than 19.6 hours per week to be in conflict with this requirement. As such, the PI must have a legal right to work for the proposing company in the US, as evidenced by citizenship, permanent residency or an appropriate visa. The PI does not need to be associated with an academic institution. There are no PI degree requirements (i.e., the PI does not have to hold a Ph.D. or any other degree). A PI may be primarily employed at another organization at the time of *submission*, as long as he or she is primarily employed at the proposing small business at the time of *award*. A PI must devote a minimum of one calendar month to an SBIR Phase I project.

Limit on Number of Proposals per Organization: 2

An organization may submit no more than two Phase I proposals in total during this cycle, which is defined as this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation. For example, an organization may submit one (1) SBIR Phase I and one (1) STTR Phase I proposal, two (2) SBIR Phase I proposals, or two (2) STTR Phase I proposals during this cycle. **These eligibility constraints will be strictly enforced.** In the event that an organization exceeds this limit, the first two proposals received will be accepted, and the remainder will be returned without review. No exceptions will be made. **The submission of the same project idea to both this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation is strongly discouraged.**

Limit on Number of Proposals per PI or Co-PI: 1

No person may participate as the principal investigator for more than one proposal during this cycle, which is defined as this SBIR Phase I solicitation and the concurrent STTR Phase I solicitation.

Additional Eligibility Info:

Partnering. Proposing firms are also encouraged to take advantage of research expertise and facilities that may be available to them at colleges, universities, national laboratories, and from other research providers. Such collaborations may include research subcontracts or consulting agreements. The **employment** of faculty as senior personnel and of graduate or undergraduate students as assistants by the small business may also occur, in which case the researchers (faculty and/or students) would be listed on the proposing company's budget Line A, B.2, or B.6, as appropriate, instead of on a subaward / sub-budget. However, note that for an SBIR Phase I Proposal, a minimum of two-thirds of the research, as measured by the budget, must be performed by the small business concern, and the balance may be outsourced to consultants or subcontractors or a combination thereof.

Ownership and Venture Capital, Joint Ventures. Please note that NSF has elected not to use the authority given under 15 U.S.C. § 638(dd)(1) (also §5107 of the SBIR/STTR Reauthorization Act). Hence, small businesses that are majority-owned by one or more venture capital operating companies (VCOCs), hedge funds or private equity firms are NOT eligible to submit proposals or receive awards from the NSF SBIR/STTR program. Proposals from joint ventures and partnerships are permitted, provided the proposing entity qualifies as a small business concern (see [Eligibility Guide](#) for more information).

Broad Participation. Socially and economically disadvantaged small business concerns and women-owned small business concerns are encouraged to participate.

REQUIRED REGISTRATIONS: The information provided for the 4 registrations below should match exactly to avoid processing complications.

- **Dun and Bradstreet Data Universal Numbering System (DUNS).** In accordance with the Office of Management and Budget policy directive 75 FR 22706, each proposer must have a DUNS number prior to submission of a proposal to NSF. Any subawardees named in the proposal must be registered in FastLane, which requires that they also obtain a DUNS number (<https://iupdate.dnb.com/iUpdate/getUserInfo.htm>).
- **System for Award Management (SAM) Registration.** Each proposer (excluding subawardees) must be registered in the SAM database prior to submission of the proposal. The SAM is the primary registrant database for the U.S. Government. This SAM registration must be maintained with current information at all times during which the organization has an active award or a proposal under consideration by NSF. Failure to comply with the SAM registration requirement prior to proposal submission may impact the processing of the proposal. To register in the SAM, go to <https://www.sam.gov/>. NSF is able to determine whether or not a firm has registered in SAM upon submission; no special documentation is required. During proposal submission in FastLane, you may receive a warning that your firm is either 1) not registered in SAM; or 2) the record in FastLane does not match the data in SAM. **If you have indeed registered with SAM but the data do not match those in FastLane, you may still successfully submit a proposal.** However, please work to resolve this mismatch after proposal submission because the mismatch must be resolved before a proposal can be awarded.
- **Small Business Administration (SBA) Company Registration.** Receipt of an SBC ID is required prior to submission of the proposal. SBA maintains and manages a Company Registry for proposing SBIR/STTR companies at <http://www.sbir.gov/registration/> to track ownership and affiliation requirements. The SBIR/STTR policy directive requires each small business concern (SBC) applying for a Phase I or Phase II award to register in the Company Registry prior to submitting an application. All SBCs must report and/or update ownership information to SBA prior to each SBIR/STTR application submission or if any information changes prior to award. *Please see the SBA registration documentation section of the Proposal Submission Instructions.*

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- **FastLane (NSF's electronic submission system).** (<https://www.fastlane.nsf.gov/n1/N1AddInst.html>)

BENCHMARKS (APPLIES TO PREVIOUS SBIR/STTR AWARD WINNERS)

- **Phase I to Phase II Transition Rate Benchmark.** The Phase I to Phase II Transition Rate benchmark required by the SBIR/STTR Reauthorization Act of 2011 is implemented. For Phase I applicants that have received more than 20 Phase I federal SBIR/STTR awards over the past 5 fiscal years, the minimum Phase I to Phase II Transition Rate is 0.25 over those 5 fiscal years. Small businesses who fail to meet this transition requirement will be notified by SBA and will not be eligible for an NSF Phase I award in this submission cycle. Further information: [Transition Rate Benchmark](#).
- **Commercialization Benchmark.** The commercialization benchmark required by the SBIR/STTR Reauthorization Act of 2011 only applies to Phase I applicants that have received more than 15 Phase II federal SBIR/STTR awards over the past 10 fiscal years, excluding the last two years. These companies must have achieved the minimum required commercialization activity in order to be eligible to receive a Phase I award, as determined by the information entered in the company registry at sbir.gov. Firms for which the commercialization benchmark applies should consult [SBIR.gov](http://sbir.gov) for more information: [Commercialization Benchmark](#).

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified 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-PUBS (7827) or by e-mail from nsfpubs@nsf.gov.

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

IMPORTANT GENERAL INFORMATION ABOUT PROPOSALS

This solicitation contains information that DEVIATES FROM THE STANDARD NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines.

Please note that proposals must be submitted in FastLane, NSF's electronic proposal submission system. Applications are NOT accepted through Grants.gov.

Soliciting Pre-Submission Feedback. Potential proposers may (but are NOT required to) email a 1-2 page executive summary to the cognizant SBIR/STTR Program Director to help gauge whether a project meets the program's intellectual merit and broader/commercial impact criteria. The summary should discuss: the company and team; the market opportunity, value proposition, and customers; the technology/innovation; and the competition. Program Director contact information can be found on the technology area pages below. Potential proposers are discouraged from submitting an executive summary to multiple Program Directors in parallel. *Please note that responsiveness of Program Directors will be limited in the 2 weeks leading up to the solicitation deadline.*

Phase I Proposal and Program Objectives. An SBIR/STTR Phase I proposal must describe the research effort needed to establish the feasibility of the proposed scientific or technical innovation. The primary objective of the Phase I effort is to determine whether the innovation has sufficient technical and broader/commercial impact merit for proceeding into a Phase II project. A secondary, but still important, objective is to assess potential commercial feasibility of the proposed work. The deliverable at the end of an SBIR/STTR Phase I grant is a technical report that summarizes the experimental and theoretical accomplishments of the research proposed. This report serves as the basis for a Phase II proposal.

Marking Proprietary Information. To the extent permitted by law, the Government will not release properly identified and marked technical and commercially sensitive data. If the proposal contains proprietary information, check the box at the bottom of the proposal cover page and identify proprietary technical data in the proposal by clearly marking the information and also providing a legend. Typically, proprietary information is marked in the text either with an asterisk at the beginning and end of the proprietary paragraph, underlining the proprietary sections, or choosing a different font type. An entire proposal should not be marked proprietary.

PROPOSALS RETURNED WITHOUT REVIEW

The following list shows the DO's and DONT's of proposal submission. Failure to comply with this list means that a proposal may be returned without review.

DO's of NSF SBIR Phase I Proposal Submission:

- **INCLUDE ALL REQUIRED ELEMENTS.** Submit a proposal that is complete. *Even if the FastLane system allows a proposal to be submitted without these items, ALL proposals must have each of the items listed below, WITHOUT EXCEPTION.*
 - [Project Summary](#)
 - [Project Description](#)
 - [References Cited](#)
 - [Biographical Sketches](#)
 - [Budget, Subaward budgets, and Budget Justification](#)
 - [Current and Pending Support](#)
 - [Facilities, Equipment and Other Resources](#)

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- [Supplementary Documents](#) (all that are applicable)
- **PROVIDE COMPANY COMMERCIALIZATION HISTORY (if applicable).** Submit a [Company Commercialization History form](#) (on the NSF template) if your company has received an SBIR/STTR Phase II proposal previously (from any agency). DO NOT modify the NSF Company Commercialization template to include additional narrative or information beyond what is required on the form.

DONT's of NSF SBIR Phase I Proposal Submission:

- **DO NOT SUBMIT LATE.** Submitting a proposal late means submitting after 5:00 p.m. on the deadline date, "proposer's time", which is determined by the time zone of the company's address as registered with NSF.
- **DO NOT VIOLATE THE FOLLOWING PROPOSAL CONTENT RULES:**
 - Do not submit a Project Description that is more than 15 pages long.
 - Do not submit a Budget exceeding \$150,000.
 - Do not submit a "Collaborative Proposal" (a special proposal type in FastLane). Collaboration with research institutions is encouraged; however, only one proposal, submitted by the company and with subawards to the research institution(s), should result.
 - Do not submit a proposal that lacks sufficient technical/commercial potential substance to justify review; does not contain research proposed in science, engineering, or education; or contains [unacceptable objectives](#).
- **DO NOT INCLUDE EXTRAS.**
 - Do not upload additional information, beyond what is specifically required and permitted, into the proposal (marketing materials, research results/academic papers, patent applications, etc.)
 - Do not upload any documents to the "**ADDITIONAL** Single Copy Documents" subsection under the "Single Copy Documents" section in FastLane. However, please note that you may complete the "List of Suggested Reviewers" section, if you wish.
 - Do not upload documents to the Supplementary Documents **except those described in "9. Supplementary Documents"**

STRUCTURE AND CONTENT OF THE PROPOSAL

Notes:

- **Sample Limitations.** Samples, videotapes, slides, appendices, or other ancillary items will not be accepted. Websites containing demonstrations, etc., may be cited in the proposal, but reviewers are not required to access them.
- **Page Format.** Multiple column formats are not accepted. Use the NSF required fonts; [reference the GPG - Chapter II Proposal Preparation Instructions](#) for instructions specific to formatting, but be aware that the instructions in this solicitation often deviate from the other sections of the GPG!
- For more detailed help in preparing and submitting a proposal via the NSF FastLane system, please see the [SBIR/STTR FastLane Submission Guide](#) on the [SBIR/STTR website](#).

Each NSF SBIR Phase I proposal shall have the following components.

1. Cover Sheet and Certification. Complete topic and subtopic fields must be included on the cover sheet. Designate one, and only one, topic and subtopic. All proposals must be electronically signed. **If a proposer fails to disclose on the proposal cover page whether another Federal Agency has received this proposal (or an equivalent or overlapping proposal), the proposer could be liable for administrative, civil or criminal sanctions.** NSF will not make awards that duplicate research funded or expected to be funded by other agencies, although in some cases NSF may fund portions of work described in an overlapping proposal provided that the budgets appropriately reduce costs and allocate costs among the various sponsors.

2. Project Summary. The Project Summary should be written in the third person, informative to other persons working in the same or related fields, and, insofar as possible, **understandable to a scientifically or technically literate lay reader**. It should not be an abstract of the proposal. Do not include proprietary information in the summary.

Proposals that do not contain a complete Project Summary will not be accepted by FastLane or will be returned without review. The Project Summary is completed in FastLane by entering information into 3 text boxes; the aggregate of the 3 text boxes cannot exceed 4,600 characters (including spaces):

Box 1: Overview, Key Words, and Subtopic Name:

- Describe the potential outcome(s) of the proposed activity in terms of a product, process, or service.
- Provide a list of key words or phrases that identify the areas of technical expertise to be invoked in reviewing the proposal; and the areas of application that are the initial target of the technology.
- Provide the subtopic name.

Box 2: Intellectual Merit: This section MUST begin with "*This Small Business Innovation Research Phase I project*". Address the intellectual merits of the proposed activity. Do not include proprietary information in the summary. Briefly describe the technical hurdle(s) that will be addressed by the proposed R&D (which should be crucial to successful commercialization of the innovation), the goals of the proposed R&D, and a high-level summary of the plan to reach those goals.

Box 3: Broader/Commercial Impact: In the short term, the proposed R&D activity is expected to bring the innovation closer to commercialization under a sustainable business model. In this box, describe the potential **impacts on society that would be created by the commercialization of the innovation**. Examples include generating larger economic impacts, meeting societal needs, and enabling further scientific / technological understanding.

3. Project Description. [Fifteen (15) pages MAXIMUM]. The project description is the core of the proposal document, where you convince the SBIR/STTR Program Director and the expert reviewers that your proposed R&D project meets the intellectual merit and broader/commercial impact criteria of the program. Present evidence that the proposed technology is innovative, that development of it entails high technical risk, and that you have a credible plan to establish technical feasibility during Phase I. Convince the reviewers that the company and the project team have the necessary expertise, resources, and support to carry out the project, and that they are committed to building a viable business around the product/service being developed. Finally, present a compelling case that the project objectives will significantly advance the readiness of the technology and strengthen and validate its commercial position. **Although guidance is given regarding page lengths for each subsection, please remember that this section must**

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be no more than 15 pages total!

Elevator Pitch (no more than one page)

- The Customer. Describe the expected customer for the innovation. What customer needs or market pain points are you addressing?
- The Value Proposition. What are the benefits to the customer of your proposed innovation? What is the key differentiator of your company or technology?
- The Innovation: Succinctly describe your innovation. This section can contain proprietary information that could not be discussed in the Project Summary. What aspects are original, unusual, novel, disruptive, or transformative compared to the current state of the art?

The Commercial Opportunity (recommended length: 2 to 4 pages)

- Is there a broader societal need you are trying to address with this commercial opportunity? Please describe.
- Describe the market and addressable market for the innovation. Discuss the business economics and market drivers in the target industry.
- How has the market opportunity been validated?
- Describe your customers and your basic business model.
- Describe the competition. How do you expect the competitive landscape may change by the time your product/service enters the market?
- What are the key risks in bringing your innovation to market?
- Describe your commercialization approach. Discuss the potential economic benefits associated with your innovation, and provide estimates of the revenue potential, detailing your underlying assumptions.
- Describe the resources you expect will be needed to implement your commercialization approach. Describe your plan and expected timeline to secure these resources.

The Innovation (recommended length: 1-3 pages)

- Briefly describe the innovation. At what stage of technical development is the innovation? (A more detailed description can be provided in the Technical Discussion and R&D Plan, as described below).
- Describe the key technical challenges and risks in bringing the innovation to market. Which of these will be your focus in the proposed 6-month Phase I project?
- Describe the status of the intellectual property associated with this project and how you plan to protect it.
- NSF Lineage: Does your project have roots in non-SBIR/STTR NSF funding, either to the company or other organizations/institutions? If possible, please list the NSF award number(s) and division(s).

The Company/Team (recommended length: 1-3 pages)

- Describe the company founders or key participants in this proposed project. What level of effort will these persons devote to the proposed Phase I activities? How does the background and experience of the team enhance the credibility of the effort; have they previously taken similar products/services to market? (You will be asked to upload resumes in the senior personnel section of the FastLane submission.)
- Describe your vision for the company and the company's expected impact over the next five years.
- If the company has existing operations, describe how the proposed effort would fit into these activities.
- Describe the revenue history, if any, for the past three years. Include government funding and private investment in this discussion.
- Will you have consultants or subawardees working on this project? If so, what is their expertise, affiliation, and contribution to the project? Please see the Budget Section for [important related information](#).

Technical Discussion and R&D Plan (minimum length: 5 pages, recommended length: 5 to 7 pages)

- Describe the innovation in sufficient technical depth for a knowledgeable reviewer to understand why it is innovative and how it can provide benefits in the target applications. Supplement this description with any necessary background information.
- Describe the key objectives to be accomplished during the Phase I research, including the questions that must be answered to determine the technical AND commercial feasibility of the proposed concept.
- Describe the critical technical milestones that must be met to get the product or service to market.
- Present an R&D plan, with timeline. What are the objectives, and what experiments, computations, etc. are planned to reach those objectives?

4. References Cited. Provide a comprehensive listing of relevant references, including patent numbers and other relevant intellectual property citations. A list of References Cited must be uploaded into the system. **If there are no references cited in the proposal**, please indicate this by putting the statement "No References Cited" into this module.

5. Biographical Sketches. Provide a resume for the Principal Investigator (PI) and Senior Personnel (Line A on the budget and, if applicable, on the subaward budget). Biographical sketches should not exceed two pages per person. Please follow the format described in the GPG (http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#lIC2f). Information regarding consultants should also be provided in this format but instead uploaded as part of the Budget Justification.

6. Budget, Subaward Budgets, and Budget Justification. Detailed documentation of all budget line items is required and **MUST** be documented on the Budget Justification page. The proposed budget should reflect the needs of the **proposed R&D project**. Line numbers below refer to the required budget format in FastLane, NSF's proposal submission system. **The total budget shall not exceed \$150,000 for the SBIR Phase I proposal. Budget line items must be shown in detail in the Budget Justification.**

Line A - Senior Personnel. List the Principal Investigator and Senior Personnel by name, their time commitments (in calendar months), and the dollar amount requested. Senior Personnel are individuals with critical expertise who are employed at the proposing company. The PI must be budgeted for a minimum of one month to the proposed project. Please note that a PI may be budgeted for more than two months (deviates from GPG- Chapter II.C.2g.(i)(a)). The best source in determining an appropriate salary request is the Bureau of Labor Statistics: <http://www.bls.gov/bls/blswage.htm>. In the Budget Justification provide the title; annual, monthly, or hourly salary rate; time commitment; a calculation of the total requested salary; and a description of responsibilities for the PI and each of the Senior Personnel.

Line B - Other Personnel. List the number of additional general personnel (technicians, programmers, etc.) and the total monetary and time commitment for these personnel. These personnel must be employed at the proposing

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company. The details of the individual commitments, roles, and requested funds should be provided in the Budget Justification. Do **NOT** list company employees under B.1, B.3, or B.4 in the main budget. Post-doctoral scholars and students (undergraduate and graduate) should be listed on a subaward budget to a research institution, unless they are employees of the company, in which case they may be listed under Lines A, B.2, or B.6, as appropriate.

Line C - Fringe Benefits. It is recommended that proposers allot funds for fringe benefits here ONLY if the proposer's usual (established) accounting practices provide that fringe benefits be treated as direct costs. Otherwise, fringe benefits should be included in Line I, Indirect costs. (Line I+ Line C) should not be more than 150% of (Line A + Line B).

Line D - Equipment. Equipment may NOT be purchased on an NSF SBIR/STTR Phase I grant. Equipment is defined as an item of property that has an acquisition cost of \$5,000 or more (unless the organization has established lower levels) and an expected service life of more than one year.

Line E.1 - Travel. One domestic travel trip for up to two persons (normally the PI and an individual associated with business operations) is required to attend a two-day Grantee Conference in the DC area. The intent of this workshop is to discuss the research program with a program director, learn about preparing a Phase II proposal, and learn what steps and skills will be needed to succeed in Phase I, II, and beyond. Therefore, this trip must be included in the Phase I budget. An explicit statement acknowledging attendance at the grantee workshop is required on the Budget Justification page. A good budget estimate is \$2,000 per person to cover the conference registration fees and travel expenses. All other budgeted travel must be necessary for the successful execution of the Phase I R&D. Travel for purposes other than the project R&D (e.g. marketing, customer engagements) is not permitted in the Phase I budget. Foreign travel expenses (**Line E.2**) are NOT permitted.

Line F - Participant Support Costs. Participant support costs are NOT permitted on a Phase I grant.

Line G.1 - Materials and Supplies. Materials and supplies are defined as tangible personal property, other than equipment, costing less than \$5,000, or other lower threshold consistent with the policy established by the proposing organization. The proposal Budget Justification should indicate the specifics of the materials and supplies required, including an estimated cost for each item.

Line G.2 - Publication Costs/Documentation Costs. Publication Costs/Documentation costs are NOT permitted on a Phase I proposal.

Line G.3 - Consultant Services.

- Consultant services include specialized work that will be performed by professionals that are not employees of the proposing small business. Purchases of analytical services, other services, or fabricated components from commercial sources should not be listed under consultant services and should instead be reported in the budget under Other Direct Costs/Other (Line G.6).
- An SBIR Phase I project requires a minimum of two-thirds of the research, as measured by the budget, to be performed by the small business concern. The remaining percentage, one-third of the budgeted funds, may be allocated as appropriate via consultants (Line G.3) and subawards (Line G.5).
- **Letters of Commitment.** Each consultant, whether paid or unpaid, must provide a signed statement that confirms availability, time commitment, role in the project, and the agreed consulting rate (not to exceed \$600 per day; see below). Provide this letter as part of the Budget Justification and NOT as a Supplementary Document.
- **Consultant Rate.** The reimbursement rates for consultants are a direct cost that cannot exceed the daily equivalent of the rate paid to an Executive Level IV Federal employee. As of January 2013, that amount is \$600 per day. *The consulting rate under this solicitation can be a maximum of \$600 per day* (NSF defines a day as 8 hours). Indicate the number of days proposed per consultant. Consultant travel should be shown under the domestic travel category, E-1, but counts as an outsourcing expense for the purpose of determining whether the small business concern will perform a minimum of two-thirds of the research, as measured by the budget.
- **Biographical Sketch.** Provide a biographical sketch for each consultant. Maximum of two pages per person. Please follow the format described in the GPG (http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#IIC2f). Provide this in the Budget Justification section, NOT in the Biographical Sketches section.
- No person who is an equity holder, employee, or officer of the proposing small business may be paid as a consultant.
- All research, including consultancies, must be carried out in the U.S. (See definition of [Place of Performance](#).)

Line G.4 - Computer Services. Funds may be allocated for computer services.

Line G.5 - Subawards.

- Subawards may be utilized when a significant portion of the work will be performed by another organization and is generally not commercially available, such as work performed by a university or research laboratory. Purchases of analytical services, other services, or fabricated components from commercial sources should not be listed under subawards and should instead be reported in the budget under Other Direct Costs/Other (Line G.6).
- An SBIR Phase I project requires a minimum of two-thirds of the research, as measured by the budget, to be performed by the small business concern. The remaining percentage, one-third of the budgeted funds, may be allocated as appropriate via consultants (Line G.3) and subawards (Line G.5).
- Subawards require a separate sub-budget and Sub-budget Justification in FastLane. The format for the sub-budget and Sub-budget Justification are the same as for the main budget.
- **Letters of Support.** Subawardees (the institution, not the individual PI or researcher) should also provide a letter of support. Provide this letter as part of the Budget Justification and NOT as a Supplementary Document.
- No person who is an equity holder, employee, or officer of the proposing small business may be paid through a subaward budget.
- All research, including subawards, must be carried out in the U.S. (See definition of [Place of Performance](#).)

Line G.6 - Other. This line includes the purchase of analytical services, other services, or fabricated components

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from commercial sources.

Line I - Indirect Costs. Indirect costs are defined as costs that are necessary and appropriate for the operation of the business, but which are not specifically allocated to the NSF SBIR/STTR project. Specify the base and rate. Indirect costs plus fringe benefits is limited to an effective rate of 150% of salaries and wages. That is, (Line I + Line C) should not be more than 150% of (Line A + Line B). Common indirect cost expenses include legal and accounting expenses, employee health insurance, fringe benefits, rent, and utilities. The following expenses will **NOT** be funded as part of the indirect cost pools, so any established indirect costs rates and calculations for a company should be reduced for the purposes of this proposal to exclude:

- Independent research and development
- Patent and patent related expenses will not be funded as either a direct or indirect cost
- Sales and marketing expenses
- Business development
- Manufacturing and production expenses

Line K - Small Business Fee. Also called reasonable fees or estimated profit. Up to seven percent (7%) of the total indirect and direct project costs may be requested as a fee. The fee is intended to be consistent with normal profit margins provided to profit-making firms for R&D work. The fee applies solely to the small business concern receiving the award and not to any other participant in the project. The fee is not a direct or indirect "cost" item and may be used by the small business concern for any purpose, including additional effort under the SBIR/STTR award (i.e., the "Prohibited Expenditures" list does not apply).

Prohibited Expenditures (including but not limited to Lines D, E.2, F, and G.2). Equipment, patent expenses, tuition costs, and foreign travel are not allowable expenditures. However, these expenses may be permitted if budgeted under Line K – Small Business Fee. (maximum 7% of the budget).

Budget Justification

The Budget Justification is uploaded in the Budget Module of FastLane. Provide details for each non-zero line item of the budget, including a description and cost estimates. Identify each line item by its letter and number (e.g., G.5 - Subawards). **Each non-zero line item should be described in the Budget Justification, but several sections also require more specific information and are listed below:**

- **Lines A and B - Personnel.** Provide the names and titles of all personnel and a concise description of their responsibilities on the project. Provide the actual annual salary information and calculation that justifies the amounts requested.
- **Line C - Fringe Benefits.** Describe what is included in fringe benefits and the calculations that were used to arrive at the amount requested.
- **Line E.1 - Domestic Travel.** Describe the purpose for domestic travel and acknowledge attendance at the grantee workshop. For trips other than the grantees conference, include the expected number of trips, number of persons travelling, length of each trip, purpose and destination of each trip, and a rough breakdown of the expected cost of each trip.
- **Line G.1 - Materials and Supplies.** Provide an itemized list of the materials and supplies, with the quantity, unit cost, and total cost for each item. Items with a total line item cost over \$5,000 should have quotes or pricing documentation included as separate pages in the Budget Justification.
- **Line G.3 - Consultant Services.** Include a copy of the signed Letter of Commitment. Include a biographical sketch for each consultant.
- **Line G.5 - Subawards.** Include a few sentences describing the scope and objective of the subaward.
- **Line G.6 - Other.** Any single cost of more than \$5,000 should be documented by inclusion of pricing info (e.g. a quote, past purchase order, link to online price list).
- **Line I - Indirect Costs.** Provide the calculations that were used to arrive at the amount requested.
- **Line K – Small Business Fee.** Provide the calculation that was used to arrive at the amount requested.

Please note that there is **no page limit** for the Budget and Sub-budget Justification. That is, the GPG restriction on page limits is not enforced for this solicitation, but all content in the Budget Justification must be related to the Budget.

You can find a sample Budget, Sub-budget, Budget Justification, and Sub-budget Justification here:
http://www.nsf.gov/eng/iip/sbir/documents/Phasel_Budget_Guide.pdf.

7. Current and Pending Support of Principal Investigator and Senior Personnel.

Information in this module is collected so that reviewers have visibility into the potential availability of company personnel during the period of performance, if awarded.

- **Types of Support / Activities.** For the PI and each of the Senior Personnel (Line A) on the main budget and any subaward budget, provide information regarding each of the following that could require effort during the proposed NSF SBIR/STTR Phase I performance period, regardless of whether the person will receive a salary from the activity:
 - All current and pending support for ongoing projects and proposals (from any source), including continuing grants funding.
 - Proposals submitted. Note that concurrent submission of a proposal to other organizations will not prejudice its review by NSF.
 - Upcoming submissions.
 - **The Phase I proposal being submitted – note that this is considered "pending" and therefore MUST appear in the Current and Pending Support module.**
- **Information Needed**
 - Name of sponsoring organization,
 - Total award amount (if already awarded) or expected award amount (if pending) for the entire award period covered (including indirect costs),
 - Title and performance period of the proposal, and
 - Annual person-months (calendar months) devoted to the project by the principal investigator and each of the senior personnel on the main budget and any subaward budget.

8. Facilities, Equipment and Other Resources. Specify the availability and location of significant equipment, instrumentation,

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computers, and physical facilities necessary to complete the portion of the research that is to be carried out by the proposing firm in Phase I. **Purchase of equipment (Budget Line D) is NOT permitted in a Phase I project.** If the equipment, instrumentation, computers, and facilities for this research are not the property (owned or leased) of the proposing firm, include a statement signed by the owner or lessor which affirms the availability of these facilities for use in the proposed research, reasonable lease or rental costs for their use, and any other associated costs. *Upload images of the scanned statements into this section.*

9. Supplementary Documents. The supplementary documents permitted in a Phase I proposal are limited to the following (if applicable):

9.a. Data Management Plan. Proposals *MUST* contain a supplementary document labeled "Data Management Plan", which should include the statement, "All data generated in this SBIR Phase I project is considered proprietary." See exceptions: http://nsf.gov/eng/general/ENG_DMP_Policy.pdf

9.b. Mentoring Plan (for Postdoctoral participants). If a proposal requests funding to support post-doctoral scholars on budget/subaward budget line B.1, a Postdoctoral Mentoring Plan *MUST* be uploaded to the system. Describe only the mentoring activities that will be provided to all postdoctoral researchers supported by the project. Please reference the GPG. A template can be obtained here: http://www.nsf.gov/eng/iip/sbir/Sample_Postdoc_Mentoring_Plan.doc

OTHER SUPPLEMENTARY DOCUMENTS

9.c. Letter(s) of Support for Technology (optional; no more than three letters). Letters of support act as an indication of market validation for the proposed innovation and add significant credibility to the proposed effort. Letters of support should demonstrate that the company has initiated dialogue with relevant stakeholders (potential customers, strategic partners or investors) for the proposed innovation and that a legitimate business opportunity may exist should the technology prove feasible. The letter(s) must contain affiliation and contact information for the signatory stakeholder. Letters and supporting documents from consultants and subcontractors (or any personnel identified in the budget) are NOT considered letters of support and are NOT to be included here. Letters and supporting documents from consultants and subcontractors should be included in the Budget Justification section.

9.d. Small Business Administration (SBA) Company Registry Documentation. Registration in the SBA Company Registry is required for all applicants: <http://www.sbir.gov/registration/>. Once registration is complete, log back in and click on "Company Profile" in the upper right corner. Once you click it, you see "Download SBC Registration" on the right-hand side next to "SBC Control ID". Download this PDF and upload it as a supplementary document to the proposal in FastLane. Proposers are expected to report and/or update ownership information to SBA prior to each SBIR/STTR application submission or if any information changes prior to award.

9.e. Company Commercialization History. A Company Commercialization History is required for all proposers certifying receipt of previous Phase II awards from any Federal agency on the third page of the Cover Page in question # 11. The NSF [Commercialization History Template](#) *MUST* be used. All items must be addressed in the format outlined in this template. Changes to the NSF template, additional narratives and/or commercialization history documents from other agencies are not permitted.

9.f. Human Subjects and Vertebrate Animals. If human subjects Institutional Review Board (IRB) approval is indicated, it must be in-hand at the time of submission or there must be a plan for such approval. A supporting letter regarding IRB approval should be provided under supplementary documents. The approval must be readily attainable within six weeks of informal notification of recommendation for award to ensure continued processing for funding. The small business has three basic options with regard to human subjects review: 1) Establish your own IRB (see Office of Human Rights Protection (OHRP) at Health and Human Services (HHS) <http://www.hhs.gov/ohrp/assurances/index.html#registernew>; 2) Use the review board of a (usually local) university or research institution, either via consultants to the project, a project subcontract, or directly through its own contacts; 3) Use a commercial company. Please refer to [Chapter II, Sections D.7 and D.8](#) of the GPG for information on the necessary supplementary documents. Note that in some cases, product testing involves human subjects. Look for federal-wide assurances under the Office of Human Research Protection website (<http://www.hhs.gov/ohrp/index.html>). Animal use in funded projects requires approval of the company or collaborating institutions' Institutional Animal Care and Use Committee (IACUC). Please refer to <http://www.aphis.usda.gov/> for additional information.

9.g. Resubmission Change Description (no more than one page). A declined proposal may be resubmitted, but only after it has undergone substantial revision. A resubmitted proposal that has not clearly taken into account the major comments or concerns resulting from the prior NSF review may be returned without review. The Foundation will treat the revised proposal as a new proposal, subject to the standard review procedures. If a Phase I proposing company indicates on the cover page that the proposal is a resubmission, the company must include a document detailing the substantial revisions that have been made in this Supplementary Document.

Unacceptable Objectives. Proposed efforts directed toward systems studies; market research; commercial development of existing products or proven concepts; straightforward engineering design for packaging; laboratory evaluations not associated with the research and development process; incremental product or process improvements; evolutionary optimization of existing products; and evolutionary modifications to broaden the scope of an existing product or application are examples of project objectives that are *not* acceptable for SBIR/STTR. Projects determined unacceptable will be returned without review to the proposer. Phase I proposals returned without review by NSF are NOT eligible for reconsideration under the same program solicitation; however, proposals may be resubmitted under a subsequent solicitation after substantial revisions have been made.

Debriefing on Unsuccessful Proposals. When a proposal is declined, verbatim copies of reviews, excluding the names of the reviewers, summaries of review panel deliberations, if any, and a description of the process by which the proposal was reviewed will be available electronically. Phase I proposals that have been declined or returned without review by NSF are NOT eligible for reconsideration under the same program solicitation; however, proposals may be resubmitted under a subsequent solicitation after substantial revisions have been made.

For more detailed help in preparing and submitting a proposal via the NSF FastLane system, please see the SBIR/STTR FastLane Submission Guide on the [SBIR/STTR website](#).

Proposers are reminded to identify the program solicitation number (NSF 15-546) 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.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Indirect Cost (F&A) Limitations:

Indirect costs plus fringe benefits are limited to a maximum rate of 150% of direct salaries and wages. (See the [Budget Section](#)). This limitation may entail mandatory committed cost sharing by the organization. In such cases, it constitutes an exception to NSF's cost sharing policy.

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. proposer's local time):

June 16, 2015

Proposals submitted outside the window of May 16, 2015 - June 16, 2015 will be returned without review. Proposer's time is defined as the time zone associated with the COMPANY'S ADDRESS AS REGISTERED WITH NSF at the time of proposal submission.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://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.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

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://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in [Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018](#). These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

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

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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

THE SBIR PROGRAM HAS ADDITIONAL CRITERIA THAT REFLECT THE LEGISLATIVE EMPHASIS OF THE PROGRAM AND COMPLEMENT THE STANDARD NSF REVIEW CRITERIA LISTED ABOVE.

"What is the intellectual merit of the proposed activity?"

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- Is the proposed plan a sound approach for establishing technical and commercial feasibility?
- To what extent does the proposal suggest and develop unique or ingenious concepts or applications?
- How well qualified is the technical team (Principal Investigator, key staff, consultants, and subawardees) to conduct the proposed activity?
- Is there sufficient access to resources (materials and supplies, analytical services, equipment, facilities, etc.)?
- Does the proposal reflect state-of-the-art in the major research activities proposed? (Are advancements in state-of-the-art likely?)

"What are the broader impacts of the proposed activity?"

- What may be the commercial and societal benefits of the proposed activity?
- Does the outcome of the proposed activity lead to a marketable product or process that warrants significant NSF support?
- Given the stage of the proposed effort, is the team well-balanced between technical and business skills?
- Has the proposing firm successfully commercialized SBIR/STTR-supported technology where prior awards have been made? (Or, has the firm been successful at commercializing technology that has not received SBIR/STTR support?)
- Has the proposer evaluated the competitive advantage of this technology vs. alternate technologies that can meet the same market needs?
- Does the proposal lead to enabling technologies (instrumentation, software, etc.) for further innovation?

How well is the proposed activity positioned to attract further funding from non-SBIR/STTR sources once the project ends?

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

This document has been archived and replaced by NSF 15-605.

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

SBIR/STTR Phase I and Phase II awards are subject to availability of funds. NSF has no obligation to make any specific number of Phase I or Phase II awards based on a solicitation and may elect to make several or no awards under any specific technical topic or subtopic. SBIR Phase I awards are six month, fixed-price grants and shall not exceed \$150,000. The SBIR/STTR Phase II fixed-priced grants typically will not exceed \$750,000 per award and normally will be made for a 24-month period of performance. A Phase II award is based on a Phase I award. A company awarded an STTR Phase I grant may elect to submit a Phase II proposal to the SBIR program. Unlike Phase I proposals, Phase II SBIR/STTR proposals may not be resubmitted. (For information on Phase II, reference Phase II proposal preparation found on the SBIR/STTR web site: [Phase II Award Information](#)).

SBIR/STTR Funding Agreement Certification:

SBIR/STTR prospective grantees will be notified by NSF to provide a signed SBIR/STTR Funding Agreement Certification. The federal government relies on the information provided by grantees to determine whether the business is eligible for a Small Technology Transfer (STTR) Program award. Certification will be used to ensure continued compliance during the life of the funding agreement. (http://www.nsf.gov/eng/iip/sbir/Forms/SBIR_STTR_Funding_Agreement.pdf)

Fraud, Waste, and Abuse (FWA) Notification:

If at any time you become aware of fraud or any kind of wrongdoing under any award, please contact the NSF Office of Inspector General.

Internet: http://www.nsf.gov/oig/hotline_form.jsp

E-mail: oig@nsf.gov

Phone: 703-292-7100 (during business hours) or 703-244-4443 (to speak to the duty officer)

Anonymous Hotline: 800-428-2189

Fax: 703-292-9158

Mail: 4201 Wilson Boulevard, Suite 1135

Arlington, VA 22230

ATTN: OIG HOTLINE

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.

The Phase I final report will be due to NSF **within 15 days of the expiration of the grant** and is limited to 15 pages in length. A Phase II proposal requires the approved Phase I Final Report to be uploaded as part of the Phase II proposal package in Fastlane.

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:

- Peter Atherton, Information Technologies (IT), telephone: (703) 292-8772, email: patherto@nsf.gov
- Prakash Balan, Chemical and Environmental Technologies (CT), telephone: (703) 292-5341, email: pbalan@nsf.gov
- Steven Konsek, Semiconductors (S) and Photonic (PH) Devices and Materials, and Internet of Things (I), telephone: (703) 292-7021, email: skonsek@nsf.gov
- Glenn H. Larsen, Educational Technologies and Applications (EA), telephone: (703) 292-4607, email: glarsen@nsf.gov
- Rajesh Mehta, Advanced Manufacturing and Nanotechnology (MN), telephone: (703) 292-2174, email: rmehta@nsf.gov
- Muralidharan S. Nair, Electronic Hardware, Robotics and Wireless Technologies (EW), telephone: (703) 292-7059, email: mnair@nsf.gov
- Benaiah Schrag, Advanced Materials and Instrumentation (MI), telephone: (703) 292-8323, email: bschrag@nsf.gov
- Ruth M. Shuman, Biological Technologies (BT), telephone: (703) 292-2160, email: rshuman@nsf.gov
- Jesus V. Soriano, Smart Health (SH) and Biomedical (BM) Technologies, telephone: (703) 292-7795, email: jsoriano@nsf.gov

For questions related to the use of FastLane, contact:

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 https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

Facilitation Awards for Scientists and Engineers with Disabilities 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** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS


The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to

This document has been archived and replaced by NSF 15-605.

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
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Arlington, VA 22230

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	The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA Tel: (703) 292-5111, FIRS: (800) 877-8339 TDD: (800) 281-8749					Last Updated: 11/07/06 Text Only