

Small Business Technology Transfer Program Phase I (STTR)

PROGRAM SOLICITATION

NSF 19-555



National Science Foundation

Directorate for Engineering
Industrial Innovation and Partnerships

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

March 04, 2019 - June 13, 2019

Small businesses can submit a Project Pitch at any time. Small businesses that have been invited to submit a full proposal can submit at any time during a submission window.

June 14, 2019 - December 12, 2019

Small businesses can submit a Project Pitch at any time. Small businesses that have been invited to submit a full proposal can submit at any time during a submission window.

IMPORTANT INFORMATION AND REVISION NOTES

Effective March 2019: NSF Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Phase I proposers are now REQUIRED to submit a three-page "Project Pitch" that outlines the project objectives, technical innovation and associated technical risks. NSF is introducing a new process for the submission of SBIR/STTR Phase I proposed projects. The goals of this new process are (i) to provide specific feedback to potential applicants regarding whether or not their proposed project is a good fit for the program prior to initiating the full proposal submission process, and (ii) to allow greater agility and flexibility in receiving and evaluating full proposals, ensuring that proposers do not expend time or resources in the development of full proposals where the proposal goals are clearly not appropriate given the NSF SBIR/STTR program objectives. *Details regarding this new process as well as how to submit a Project Pitch can be found in section V.A of this document.*

To accommodate this new requirement and the subsequent submission of invited full proposals, the NSF SBIR/STTR Phase I program will also offer full proposal submission windows, as opposed to specific deadlines, in order to support a more flexible schedule for full proposal submission and review. Please refer to specific window dates listed at the top of this document.

The National Science Foundation's Small Business Technology Transfer (STTR) program- also known as America's Seed Fund powered by NSF - provides small businesses with equity-free funding to conduct research and development (R&D) work that will lead to the commercialization of innovative new products and services. **The NSF STTR program seeks innovative proposals that show promise of commercial and societal impact. We invite the submission of Project Pitches in almost any area of science and technology (more information on our technical topics is available [here](#)).**

To submit a full proposal for NSF STTR Phase I funding, the small business must be:

- **Submit a Project Pitch and receive an official invitation (via email) from the cognizant NSF SBIR/STTR Program Director. See section V.A for details.**
- **Register in the System for Award Management (SAM), Research.gov, and SBIR.gov. To register with SAM, the small business must have a valid DUNS number. These registrations take time, so we recommend starting several weeks or a month prior to the proposal deadline; see section V.A.B for details.**
- **Be eligible to participate in the SBIR/STTR program as outlined in section IV.**

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 19-1](#)).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Small Business Technology Transfer Program Phase I (STTR)

Synopsis of Program:

Introduction to the Program:

The NSF STTR program focuses on transforming scientific discovery into products and services with commercial potential and/or societal benefit. Unlike fundamental research, the NSF STTR program supports startups and small businesses in the creation of innovative, disruptive technologies, getting discoveries out of the lab and into the market.

The NSF STTR Program funds research and development. The program is designed to provide equity-free funding and entrepreneurial support at the earliest stages of company and technology development.

Synopsis of Program:

The STTR program is congressionally mandated and intended to support scientific excellence and technological innovation through the investment of federal research funds to build a strong national economy by stimulating technological innovation in the private sector; strengthening the role of small business 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 STTR program at NSF solicits proposals from the small business sector consistent with NSF's mission to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.

The program is governed by Public Law 112-81 (SBIR/STTR Reauthorization Act of 2011) and was reauthorized by Public Law 114-328. STTR policy is provided by the Small Business Administration (SBA) through the [STTR 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 and innovation into both social and economic benefit, and by emphasizing private sector commercialization.

Because the program has no topical or procurement focus, the NSF offers very broad solicitation topics that are intended to encourage as many eligible science- and technology-based small businesses as possible to compete for funding. The topics are detailed on the program [website](#). In many cases, the program is also open to proposals focusing on technical and market areas not explicitly noted in the aforementioned topics.

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.

- Henry Ahn, Biomedical (BM) Technologies and Medical Devices (MD), telephone: (703) 292-7069, email: hahn@nsf.gov
- Peter Atherton, Information Technologies (IT), Artificial Intelligence (AI), Quantum Information Technologies (QT), and Digital Health (DH), telephone: (703) 292-8772, email: patherto@nsf.gov
- Anna Brady-Estevez, Chemical Technologies (CT), Distributed Ledger (DL), and Environmental Technologies (ET), telephone: (703) 292-7077, email: abrady@nsf.gov
- Steven Konsek, Advanced Materials (AM) and Semiconductors (S), telephone: (703) 292-7021, email: skonsek@nsf.gov
- Rajesh Mehta, Educational Technologies and Applications (EA), telephone: (703) 292-2174, email: rmehta@nsf.gov
- Linda K. Molnar, Advanced Manufacturing (M) and Nanotechnology (N), telephone: (703) 292-8316, email: lmolnar@nsf.gov
- Muralidharan S. Nair, Energy and Power Systems (EP), Robotics (R), Sensors (SE), and Wireless Technologies (W), telephone: (703) 292-7059, email: mnair@nsf.gov
- Ben Schrag, Other Topics (OT), telephone: (703) 292-8323, email: bschrag@nsf.gov
- Rick Schwerdtfeger, Internet of Things (I), Photonics (PH), Instrumentation and Hardware Systems (IH), and Space (SP), telephone: (703) 292-8353, email: rschwerd@nsf.gov
- Ruth M. Shuman, Biological Technologies (BT), telephone: (703) 292-2160, email: rshuman@nsf.gov

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.079 --- Office of International Science and Engineering
- 47.083 --- Office of Integrative Activities (OIA)

Award Information

Anticipated Type of Award: Fixed Award Amount

Estimated Number of Awards: 40

(per submission window, pending the availability of funds)

Anticipated Funding Amount: \$9,000,000

For STTR Phase I per submission window, pending the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- 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 the Code of Federal Regulations ([13 CFR 121](#)). For STTR proposals, the applicant small business must also include a partner Research Institution (RI) in the project, see additional details below. **AND**
- Firms that have received an official invitation to submit a proposal from the cognizant NSF SBIR/STTR Program Director. To receive the invitation, proposers must submit a Project Pitch document and receive an official response (via email) from the cognizant Program Director. *Please see section V.A for details.*

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 at least 51 percent 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. The PI must have a legal right to work for the proposing company in the United States, 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 is not required 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 of effort per six months of performance to an STTR Phase I project.

Limit on Number of Proposals per Organization: 1

An organization may submit no more than ONE STTR Phase I proposal per full proposal submission window. Submission of an invited STTR Phase I full proposal to a given submission window precludes the same applicant to the concurrent SBIR Phase I solicitation. This eligibility constraint will be strictly enforced. In the event that an organization exceeds this limit, the first proposal received will be accepted and the remainder will be returned without review.

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

1 (PI), no limit (co-PI)

No person may be listed as the principal investigator for more than one proposal submitted to this solicitation. There is no limit as to the number of proposals for which a given person may act as the co-PI.

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 (PAPPG)* 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:**
Not Applicable
- **Other Budgetary Limitations:**
Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

March 04, 2019 - June 13, 2019

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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 Technology Transfer (STTR) program. The STTR program provides startups and small businesses with equity-free funding to conduct research and development (R&D) work. The funding is intended to spur the creation of innovative new products and services to market, and to drive the commercial success of the small business.

II. PROGRAM DESCRIPTION

The NSF STTR Program encourages small businesses to submit ideas across all areas of science and engineering (except drug development). Small businesses are required to submit a Project Pitch to determine whether their proposed project is a good fit for the program's objectives to support **(i) innovative technologies that show promise of commercial and/or societal impact and (ii) involve a level of technical risk.**

Once invited to submit a full proposal, a small business's Phase I proposal should be to demonstrate technical feasibility of the proposed innovation and thereby bring the innovation closer to commercialization. Similar to the Program Pitch, invited full 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).

Requirements:

In addition to the eligibility requirements outlined in Section IV, submission of a full proposal requires that the applicant:

- **Register in the System for Award Management (SAM), Research.gov, and SBIR.gov.** To register with SAM, the small business must have a valid DUNS number. These registrations take time, so we recommend starting several weeks or a month prior to the proposal deadline; see section V.A.B for details.

For more in-depth program information please reference the [program's website](#) and the solicitation-specific merit review criteria in section VI.

III. AWARD INFORMATION

Phase I proposals may be submitted for up to \$225,000 in R&D funding intended to support projects from 6-12 months in duration. Typically, small businesses will be notified of the award decision four to six months after the submission deadline.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- 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 the Code of Federal Regulations ([13 CFR 121](#)). For STTR proposals, the applicant small business must also include a partner Research Institution (RI) in the project, see additional details below. *AND*
- Firms that have received an official invitation to submit a proposal from the cognizant NSF SBIR/STTR Program Director. To receive the invitation, proposers must submit a Project Pitch document and receive an official response (via email) from the cognizant Program Director. *Please see section V.A for details.*

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 at least 51 percent 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. The PI must have a legal right to work for the proposing company in the United States, 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 is not required 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 of effort per six months of performance to an STTR Phase I project.

Limit on Number of Proposals per Organization: 1

An organization may submit no more than ONE STTR Phase I proposal per full proposal submission window. Submission of an invited STTR Phase I full proposal to a given submission window precludes the same applicant to the concurrent SBIR Phase I solicitation. This eligibility constraint will be strictly enforced. In the event that an organization exceeds this limit, the first proposal received will be accepted and the remainder will be returned without review.

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

1 (PI), no limit (co-PI)

No person may be listed as the principal investigator for more than one proposal submitted to this solicitation. There is no limit as to the number of proposals for which a given person may act as the co-PI.

Additional Eligibility Info:

Required Project Pitch submission: Potential proposers must receive an invitation to submit a full proposal to the NSF SBIR/STTR Phase I program. To start this process, proposers must first submit a "Project Pitch" document via the NSF SBIR/STTR Phase I Project Pitch [online form](#). The cognizant NSF SBIR/STTR Program Director will use the Project Pitch to determine whether the proposed project is a good fit for the program. *Please section V.A for details.*

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

STTR Research Institution. The [STTR Policy Directive](#) requires that the applicant small business include an eligible research institution as a subawardee on the project budget. The STTR partner is typically either a not-for-profit institution focused on scientific or educational goals (such as a college or university), or a Federally-funded research and development center (FFRDC). For an STTR Phase I Proposal, a minimum of 40% of the research, as measured by the budget, must be performed by the small business concern, and a minimum of 30% must be performed by the partner research institution, with the balance permitted to be allocated to either of these, or to other subawards or consultants.

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 and students by the small business may also occur. Please note that although partnering is encouraged, proposals submitted should NOT mark the proposal as "Collaborative" during submission.

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 (VCOs), 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 the [Eligibility Guide](#) for more information).

Government-Wide Required Benchmarks: (Applies to previous SBIR/STTR award winners ONLY)

Phase I to Phase II Transition Rate Benchmark. For Phase I proposers that have received more than 20 Phase I federal SBIR/STTR awards over the past five fiscal years, the minimum Phase I to Phase II Transition Rate is 0.25 over those five fiscal years. Small businesses who fail to meet this transition requirement will be notified by SBA and will not be eligible to submit a Phase I proposal to this submission cycle.

Commercialization Benchmark. The commercialization benchmark required by the SBIR/STTR Reauthorization Act of 2011 only applies to proposers 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 to be eligible to submit a Phase I proposal, as determined by the information entered in the company registry at [SBIR.gov](#). Firms for which the commercialization benchmark applies should consult [SBIR.gov](#) for more information.

More information on both of the above benchmarks can be found [here](#).

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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

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

This solicitation contains the information needed to prepare a proposal and refers to specific sections of the PAPPG only when necessary. The instructions in this solicitation take precedence over instructions in the PAPPG in the event of a conflict.

Required Project Pitch submission: Potential proposers must receive an invitation to submit a full proposal to the NSF SBIR/STTR Phase I program. To start this process, proposers must first submit a "Project Pitch" document via the NSF SBIR/STTR Phase I Project Pitch [online form](#). The cognizant NSF SBIR/STTR Program Director will use the Project Pitch to determine whether the proposed project is a good fit for the program's objectives to support **(i) innovative technologies that show promise of commercial and/or societal impact and (ii) involve a high level of technical risk**. Appropriate projects generally center on a new concept or innovation that could be developed into new products, processes, or services, and NSF funding is requested to conduct research and development that would significantly reduce the technical risk involved in bringing these new products, processes, or services to market.

- The small business will be asked to outline key technical and commercial aspects of the prospective Phase I project in the Project Pitch.
- The cognizant NSF SBIR/STTR Program Director (PD) will review the submitted Project Pitch and determine whether it is responsive to the objectives of the SBIR/STTR Phase I solicitation or request additional information to make a more informed decision. The PD's response (which may be a request for additional information, or an invitation to invite or not to invite the small business to submit a full proposal) will be delivered by email, and may take up to three weeks, depending on timing and staff workload.
- If the proposed project is determined to be a good fit for the program's objectives of supporting innovative technologies **that show promise of commercial and/or societal impact and involve a level of technical risk**, the small business representative who submitted the Project Pitch will receive an invitation via email from the cognizant NSF SBIR/STTR Program Director to submit a full proposal.
- If the proposed project is determined to be not responsive to the SBIR/STTR Phase I Program solicitation (please refer to the "**Objectives Not Responsive to the Solicitation**" section of this document as well as the listed eligibility criteria), the potential applicant will receive a notice stating that the small business is not invited to submit a proposal.
- Project Pitches that are not invited for a full proposal may be resubmitted (with revisions to address any deficiencies) in the next submission window.
- A given small business is permitted to submit up to two unique Project Pitches per solicitation window (please refer to submission window dates listed at the beginning of this solicitation document). However, a second Project Pitch can be submitted in a given window only if the first did not lead to a full proposal invite. Additional Project Pitch documents submitted during the same solicitation window will not be reviewed.
- Any small business with a pending Project Pitch must wait for a response before submitting another Project Pitch.
- Any small business that has received an invitation to submit a full proposal must wait for a resolution of the full proposal before submitting a new (or

revised) Project Pitch.

- Proposers are encouraged to submit the Project Pitch document as early as possible. The sooner a Project Pitch is received, the sooner an invited proposal may be submitted and considered for possible funding.
- Please note that potential proposers who do not receive an invitation to submit a proposal are not eligible to apply for Phase I funding. Proposals submitted without an invitation will be returned without review.
- Please note that responsiveness of NSF SBIR/STTR Program Directors will be limited as the full proposal submission window closing date approaches. Proposers are encouraged to submit the Project Pitch document well in advance of the end of a submission window. A Project Pitch submission within six weeks of the full proposal submission window closing date (see top of this document for exact dates) may not allow enough time for a final decision, required registrations, and sufficient time to prepare/submit a high-quality full proposal.
- Small Businesses that submit a Project Pitch within six weeks of the full proposal submission window closing date may not, even if invited to submit, have sufficient time to prepare a full proposal by the end of that same submission window. Submitting to the next submission window is permitted, but may adversely impact the full proposal review timeline.

Project Pitch Contents:

The [Project Pitch form](#) requests the following information about the proposed project and proposing company and/or team:

- Name, location, corporate website, and contact information for the proposing company (if already incorporated/organized).
- Name and contact information for the company official or technical lead who is submitting the Project Pitch.
- Up to 500 words describing the technical innovation that would be the focus of a Phase I project, including a brief discussion of the origins of the innovation as well as an explanation as to why it meets the program's mandate to focus on supporting research and development (R&D) of unproven, high-impact innovations. (See definition of R&D below).
- Up to 500 words describing the R&D or technical work to be done in a Phase I project, including a discussion of how and why the proposed work will help prove that the product or service is technically feasible and/or significantly reduce technical risk. Discuss how, ultimately, this work would make the new product, service, or process commercially viable and impactful. This section should also discuss why the proposed work meets the below definition of R&D, rather than straightforward engineering or incremental product development tasks.
- Up to 250 words describing the customer profile and pain point(s) that will be the near-term commercial focus related to this technical project.
- Up to 250 words describing the background and current status of the applicant small business, including team members who would be involved in the technical and/or commercial efforts discussed in the Project Pitch.

Phase I Proposal and Program Objectives. The NSF SBIR/STTR program funds costs related to research and development (R&D) tasks only. In this context, R&D is defined as:

1. A systematic, intensive study directed toward greater knowledge or understanding of the subject studied;
2. A systematic study directed specifically toward applying new knowledge to meet a recognized need; or
3. A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

An STTR Phase I project must be focused on using R&D to determine the scientific and technical feasibility of a new concept or innovation that could be developed into new products, processes, or services. A successful Phase I proposal demonstrates that the NSF-funded R&D will significantly reduce the technical risk involved in bringing these new products, processes, or services to market. The only required deliverable of an STTR Phase I grant is a report describing the technical accomplishments and outcomes of the Phase I project.

Objectives Not Responsive to the Solicitation.

- **Evolutionary development or incremental modification of established products or proven concepts;**
- **Straightforward engineering efforts with little technical risk;**
- **Evaluation or testing of existing products; and basic scientific research unconnected to any specific market opportunity or potential new product, process or service.**
- **Examples of project objectives that are not appropriate to include as part of an NSF STTR-funded effort are non-technical efforts (such as business development, market research, and sales and marketing) as well as manufacturing, indirect research and development, and patent costs. Note that NSF's Beat The Odds Boot Camp activity represents an exception to the aforementioned restrictions; see section V for more details.**

Proposers who submit Project Pitches that do not meet the program's objectives of supporting innovative technologies that show promise of commercial and/or societal impact and involve a level of technical risk will not be invited to submit a full proposal. Full proposals not responsive to the above considerations may be returned without review. 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.

Confidentiality and Proprietary Information. STTR data, including proposals, are protected from disclosure by the participating agencies for not less than four years from the delivery of the last report or proposal associated with the given project. 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. **Your proposal is confidential and will only be shared with a small reviewers and NSF staff (as appropriate).** Your proposal to NSF does not constitute a public disclosure. **If your company is chosen for a Phase I award, you will be prompted to write a project summary and description of intellectual merit and broader impact for the public. Your proposal WILL NOT be shared.**

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 resubmission under the same program solicitation; however, proposals may be resubmitted under a subsequent solicitation after substantial revisions have been made.

Proposal Format and 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. Multiple column formats are not accepted. Arial, Courier New, or Palatino Linotype at a font size of 10 points or larger or Times New Roman or Computer Modern fonts at a font size of 11 points or larger, should be used.

B. Registrations

Small businesses applying for NSF Phase I must be registered with the following systems in order to submit a proposal to NSF.

Note that some of the registrations below (in particular, SAM.gov) can take several weeks to complete, so please start early.

You must register your company name, physical address and all other identifying information *identically* in each of these systems. We recommend that you begin early and register your small business in the following order:

Small businesses applying for NSF Phase I must complete the required registrations outlined below, prior to submitting the proposal in the NSF FastLane system. You must register the company name, address and other information identically in each of these systems. We recommend that you register your small business in the following order:

1. **Dun and Bradstreet Data Universal Numbering System (DUNS).** In accordance with the Office of Management and Budget policy directive 75 FR 22706, each applicant must have a DUNS number prior to submission of a proposal to NSF. Any subawardees named in the proposal must also be registered in Research.gov, which also requires the organization's DUNS number (<https://iupdate.dnb.com/iUpdate/view/UpdateHome.htm>).
2. **System for Award Management (SAM) Registration.** Each applicant small business (excluding subawardees) must register the company with the System for Award Management (SAM) prior to registering their company in Research.gov. The SAM is the primary registrant database for entities to do business with 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. To register in SAM, go to <https://www.sam.gov/>.
3. **Small Business Administration (SBA) Company Registration.** Receipt of a Small Business Concern identification number (SBC ID) is required prior to submission of the proposal. SBA maintains and manages a Company Registry for SBIR/STTR proposers at <http://www.sbir.gov/registration/> to track ownership and affiliation requirements. 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.
4. **Research.gov:** For more information, consult the "About Account Management" page at <http://www.research.gov>.

C. DO's and DON'Ts of Proposal Preparation and Submission

For more detailed help in preparing and submitting an invited proposal via the NSF FastLane system, please see the SBIR/STTR FastLane Submission Guide on the [program website](#). Failure to comply with the below guidelines means that a proposal may be returned without review.

- **DO NOT** submit a proposal which has not yet received an invitation to submit from a cognizant NSF SBIR/STTR Program Director. Proposals without this invitation will be returned without review. *See section V.A for details.*
- **DO 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 and Subaward Budgets](#)
[Budget Justification](#)
[Current and Pending Support](#)
[Collaborators and Other Affiliations](#)
[Facilities, Equipment and Other Resources](#)
[Supplementary Documents \(all that are applicable\)](#)

- **DO provide a 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 award 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.
- **DO NOT submit late.** FastLane will not permit submission after 5:00 p.m. "proposer's time" on the full proposal submission window closing date. **Proposer's time zone is set by the company in the organization registration area of Research.gov.**
- **DO NOT** submit a Project Description that is more than 15 pages long.
- **DO NOT** submit a Budget exceeding \$225,000.
- **DO NOT** include any funds on Lines E2, F or G2 of the Budget. These are not allowable costs under a Phase I grant.
- **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 intellectual/technical or broader/commercial potential substance to justify review; does not contain research proposed in science, engineering, or education; or is not responsive to the solicitation objectives.
- **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 with the following exceptions: 1) you must complete the "[Collaborators and Other Affiliations](#)" section; and 2) at your option, you may also complete the "List of Suggested Reviewers" section.
- **DO NOT** upload documents to the Supplementary Documents except those described in [Supplementary Documents](#).

D. Detailed Instructions on Invited Proposal Preparation

1. **Cover Sheet and Certification.** Complete topic and subtopic fields should be included on the Cover Sheet. Designate one, and only one, topic and subtopic. If a proposer fails to disclose on the proposal Cover Sheet 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. *NOTE: To save your data, be sure to click the "OK" button at the bottom of the screen prior to navigating away from the Cover Sheet. If you receive any error messages when you click "OK", you must clear all errors and re-click "OK" to save the data.*
2. **Project Summary [One (1) page MAXIMUM].** 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 the three text boxes in the Project Summary module. **Information MUST be entered into all three text boxes, or the proposal will not be accepted. Do not upload your Project Summary as a PDF file.**

- o **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.
- o **Box 2: Intellectual Merit:** This section MUST begin with "This Small Business Technology Transfer 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.
- o **Box 3: Broader/Commercial Impact:** In this field, discuss the expected outcomes in terms of how the proposed project will bring the innovation closer to commercialization under a sustainable business model. In this box, also describe the potential commercial and market impacts that such a commercialization effort would have, if successful. As appropriate, also discuss potential broader societal impacts of the innovation (e.g. educational, environmental, scientific, societal, or other impacts on the nation and the world).

3. **Project Description. [Fifteen (15) pages MAXIMUM].** The project description is the core of the proposal document, where you convince the STTR Program Director and the expert reviewers that your proposed R&D project meets the NSF's criteria for intellectual merit and broader/commercial impact. 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. The below format is strongly suggested for the Project Description.

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? What is the potential societal value of your innovation?
- 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: 2-4 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 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?
- 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?

Technical Discussion and R&D Plan (minimum length: 5 pages, recommended length: 5-7 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 (individuals with critical expertise who will be working on the project and are employed at the proposing company or at a subaward institution). Information regarding consultants should also be provided in this format but instead uploaded as part of the Budget Justification. Biographical sketches should not exceed two pages per person. You are not required to use the NSF Biographical Sketch template. Do not include personal information such as home address in biographical sketches. Provide information in the following sections: **(I) Education:** Institution, Location, Major/Concentration, Degree, and Year. **(II) Relevant Experience:** Include technical and/or commercial experience. List in reverse chronological order beginning with the current position. **(III) Products:** Includes patents, publications, etc. Up to 5 may be listed that are related to the proposed work and up to 5 that are significant but not related to the proposed work. You are not required to use the NSF Biographical Sketch template.
6. **Budget and Subaward Budgets.** Detailed documentation of all budget line items is required and **MUST** be documented in detail on the Budget Justification page (see next section). 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 \$225,000 for the Phase I proposal. **NOTE: FastLane does not accept symbols or commas in the budget lines.**
- **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 and may be budgeted for more than two months (deviates from PAPPG- Chapter II.C.2g(i)(a)). The best source in determining an appropriate salary request is the [Bureau of Labor Statistics](#). 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 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 D - Equipment.** Equipment may NOT be purchased on an NSF 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 (the PI is required to attend, and we recommend also including an individual who leads the related business/commercial efforts, if not the PI) should be budgeted to attend a three-day Grantee Conference in the DC area. The intent of this workshop is to discuss the research program with the cognizant Program Director, learn about preparing a Phase II proposal, and hear from experts on various topics of interest to technical entrepreneurs. An explicit statement acknowledging attendance at the mandatory grantee workshop is required on the Budget Justification page. A reasonable budget estimate is \$2,000 per person to cover the conference registration fees and travel expenses. Outside of this event, 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. Travel for purposes other than the project R&D (e.g. marketing, customer engagements) is not permitted in the Phase I budget, EXCEPT as permitted for participation in the Beat The Odds Boot Camp, see discussion below for Line G.6.
 - **Line E.2 - 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. Items with a total cost exceeding \$5,000 should be accompanied by pricing documentation (e.g. quote, link to online price list, prior purchase order or invoice), to be included in the budget justification.
 - **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). No person who is an equity holder, employee, or officer of the proposing small business may be paid as a consultant unless an exception is recommended by the Program Director and approved by the Division Director for the Division of Industrial Innovation and Partnerships. All research on an STTR project, including that conducted by consultants, must be carried out in the U.S. (Place of Performance is defined as: For both Phases I and II, all research must be performed in the United States. "United States" means the 50 states, the territories and possessions of the U.S. Federal Government, the Commonwealth of Puerto Rico, the District of Columbia, the Republic of the Marshall Islands, the Federated States of Micronesia, and the Republic of Palau). Note these other guidelines around the use of consultants:
 - **Letters of Collaboration.** 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 \$1,000 per day; see below). Provide this letter as part of the Budget Justification and NOT as a Supplementary Document.
 - **Consultant Rate.** The consulting rate under this solicitation can be a maximum of \$1,000 per day (NSF defines a day as 8 hours). 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 meets the minimum level of effort for an STTR proposal.
 - **Biographical Sketch.** Provide a biographical sketch for each consultant. Maximum of two pages per person. Provide this in the Budget Justification section, NOT in the Biographical Sketches section.
 - **Line G.4 - Computer Services.** Funds may be allocated for computer services. Requested items with a total cost exceeding \$5,000 should be accompanied by pricing documentation (e.g. quote, link to online price list, prior purchase order or invoice), to be included in the budget justification.
 - **Line G.5 - Subawards.** Subawards may be utilized when a significant portion of the work will be performed by another organization and when the work to be done is not widely commercially available. Work performed by a university or research laboratory is one example of a common subaward. **A subawardee research institution (RI) partner is mandatory for STTR proposals. Explicitly list who the research partner will be and provide a brief description of the work they will perform. A minimum of 40% of the research, as measured by the budget, must be performed by the small business concern and a minimum of 30% of the research, as measured by the budget, must be performed by the subawardee research institution.** 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). No person who is an equity holder, employee, or officer

of the proposing small business may be paid under a subaward unless an exception is recommended by the Program Director and approved by the Division Director for the Division of Industrial Innovation and Partnerships. Subawards require a separate subaward budget and subaward budget justification, in the same format as the main budget. Subawardees (the institution, not the individual PI or researcher) should also provide a letter of collaboration that confirms the role of the subaward organization in the project and explicitly states the subaward amount. Provide this letter as part of the Budget Justification and NOT as a Supplementary Document.

- **Line G.6 - Other.** This line includes the purchase of analytical services, other services, or fabricated components from commercial sources. Requested items with a total cost exceeding \$5,000 should be accompanied by pricing documentation (e.g. quote, link to online price list, prior purchase order or invoice), to be included in the budget justification. In addition to the above, there are two other activities for which NSF permits the inclusion of additional funds on this budget line; see below. The funds noted below may **NOT** be spent for any other commercial or business purpose not explicitly permitted below.

Firstly, the proposer may budget up to \$10,000 as a direct charge on line G.6 to this Phase I award for the following specific purposes related to financials and accounting:

- Hiring a certified public accountant (CPA) to prepare audited, compiled, or reviewed financial statements
- Hiring a CPA to perform an initial financial viability assessment based on standard financial ratios so the awardee organization would have time to improve their financial position prior to submitting the Phase II proposal
- Hiring a CPA to review the adequacy of the awardee's project cost accounting system
- Purchasing a project cost accounting system

If the proposer elects to budget funds for one of the above purposes, the budget justification should include a brief description of the desired use of funds, and the use of funds must be approved by the cognizant Program Director, prior to award.

Second, the proposer may budget up to \$20,000 to cover costs related to NSF's "Beat-The-Odds Boot Camp" which is offered to all Phase I awardees. This program is based on the NSF's [Innovation Corps](#) program, and more information can be found [here](#). All Phase I awardees are strongly encouraged to participate in this activity. Costs that are allowable are limited to travel costs related to customer discovery (this could include costs associated with registration/attendance at events for the purpose of customer discovery) and salary/wages for team members who participated in the Boot Camp. All costs related to the Boot Camp must be in line with approved salary rates and other relevant Federal guidelines. International travel cannot be reimbursed, nor can any salary/wages for work done while outside of the United States. NSF recommends that, for the purposes of the proposal budget, proposers that plan to participate in this activity budget \$10,000 and simply list this as "Boot Camp" costs in the budget justification.

- **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 STTR project. Specify the base and rate. 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.** 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 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, and foreign travel are not allowable expenditures as either direct or indirect costs. However, these expenses may be purchased from the small business fee funds (line K).

7. **Budget Justification.** The Budget Justification is uploaded in the Budget Module of FastLane as a single PDF file. 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 as detailed below. **Please note that there is no page limit for the Budget and Subaward Budget Justifications. You will receive and should disregard a FastLane warning about exceeding the five-page limit when you submit the proposal.** In other words, the PAPPG restriction on page limits is not enforced for this solicitation (but all information included in this section must be related to the budget). You can find a sample budget and subaward budget, with justifications, here: <https://seedfund.nsf.gov/fastlane/>

- **Lines A and B - Personnel.** Provide the names and titles of all personnel and a concise description of their responsibilities on the project, including their budgeted time commitment. 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 Collaboration. 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. Please briefly indicate the major cost categories that are included as indirect costs.
- **Line K – Small Business Fee.** Provide the calculation that was used to arrive at the amount requested.

8. **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.

proposal is a resubmission, the proposal must include a one-page maximum document in the Other Supplementary Documents module detailing the substantial revisions that have been made to the original submission.

Proposers are reminded to identify the NSF publication number (located on the first page of this document) 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.

Other Budgetary Limitations:

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

C. Due Dates

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

March 04, 2019 - June 13, 2019

Small businesses can submit a Project Pitch at any time. Small businesses that have been invited to submit a full proposal can submit at any time during a submission window.

June 14, 2019 - December 12, 2019

Small businesses can submit a Project Pitch at any time. Small businesses that have been invited to submit a full proposal can submit at any time during a submission window.

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

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

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

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

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

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

Additional Solicitation Specific Review Criteria

The STTR program has additional criteria that reflect the legislative emphasis of the program and complement the standard NSF review criteria listed above. These criteria are in line with NSF's strong focus on commercialization success as the primary driver of impacts (both economic and otherwise) in the SBIR program.

1. Is there a significant market opportunity that could be addressed by the proposed product, process, or service?
2. Does the company possess a significant and durable competitive advantage, based on scientific or technical innovation, that would be difficult for competitors to neutralize or replicate?
3. Is there a compelling potential business model?
4. Does the proposing company/team have the essential elements, including expertise, structure, and experience, that would suggest the potential for strong commercial outcomes?
5. Will NSF support serve as a catalyst to improve substantially the technical and commercial impact of the underlying commercial endeavor?

B. Review and Selection Process

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

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

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

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

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

Special Award Conditions:

SBIR/STTR grants are subject to, the Small Business Innovation Research/Small Business Technology Transfer Phase I Grant General Conditions (SBIR-I) dated 01/30/17. These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/pubs/policydocs/sbir/sbir_117.pdf

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.

(https://seedfund.nsf.gov/assets/files/awardees/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 (OIG):
<http://www.nsf.gov/oig/report-fraud/>

Email: oig@nsf.gov

Anonymous hotline: 1-800-428-2189

Mail: 2415 Eisenhower Ave, Suite W 16100, Alexandria, VA 22314 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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

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

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

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

The Phase I final report will be due to NSF **within 15 days following the end date of the grant** and is limited to 15 pages in length. A Phase II proposal requires a Phase I technical report to be uploaded as part of the Phase II proposal package in FastLane. If the Phase II proposal is submitted prior to the completion of the Phase I award, an interim Phase I technical report may 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:

- Henry Ahn, Biomedical (BM) Technologies and Medical Devices (MD), telephone: (703) 292-7069, email: hahn@nsf.gov
- Peter Atherton, Information Technologies (IT), Artificial Intelligence (AI), Quantum Information Technologies (QT), and Digital Health (DH), telephone: (703) 292-8772, email: patherto@nsf.gov
- Anna Brady-Estevez, Chemical Technologies (CT), Distributed Ledger (DL), and Environmental Technologies (ET), telephone: (703) 292-7077, email: abrady@nsf.gov
- Steven Konsek, Advanced Materials (AM) and Semiconductors (S), telephone: (703) 292-7021, email: skonsek@nsf.gov
- Rajesh Mehta, Educational Technologies and Applications (EA), telephone: (703) 292-2174, email: rmehta@nsf.gov
- Linda K. Molnar, Advanced Manufacturing (M) and Nanotechnology (N), telephone: (703) 292-8316, email: lmolnar@nsf.gov
- Muralidharan S. Nair, Energy and Power Systems (EP), Robotics (R), Sensors (SE), and Wireless Technologies (W), telephone: (703) 292-7059, email: mnair@nsf.gov
- Ben Schrag, Other Topics (OT), telephone: (703) 292-8323, email: bschrag@nsf.gov
- Rick Schwerdtfeger, Internet of Things (I), Photonics (PH), Instrumentation and Hardware Systems (IH), and Space (SP), telephone: (703) 292-8353, email: rschwerd@nsf.gov
- Ruth M. Shuman, Biological Technologies (BT), telephone: (703) 292-2160, email: rshuman@nsf.gov

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

- FastLane and Research.gov Help Desk: 1-800-673-6188
FastLane Help Desk e-mail: fastlane@nsf.gov.
Research.gov Help Desk e-mail: rgov@nsf.gov

IX. OTHER INFORMATION

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

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

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

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

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

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

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

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

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