

Small Business Innovation Research Program Phase II (SBIR Phase II)

PROGRAM SOLICITATION NSF 20-545



National Science Foundation

Directorate for Engineering
Industrial Innovation and Partnerships

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

February 14, 2020 - March 05, 2020

March 06, 2020 - June 04, 2020

June 05, 2020 - September 03, 2020

September 04, 2020 - December 03, 2020

IMPORTANT INFORMATION AND REVISION NOTES

To extend flexibility to small businesses during the COVID-19 crisis, NSF is extending the Phase II submission deadline (typically 6-24 months from the start date of their award) for the eligible SBIR/STTR Phase I awardees:

- All Phase I companies that received their Phase I with an award start date **between March 15, 2018 and December 3, 2018** will have until December 3, 2020 to submit an SBIR/STTR Phase II proposal. (Phase I companies that received their Phase I award after December 3, 2018, are not eligible for this extension).
- Phase I companies that are eligible for the aforementioned deadline extension that SUBMITTED a Phase II proposal since March 6, 2020, can contact the Program Director who managed their Phase I award to discuss resubmission. With his or her approval, the Phase I company may be allowed to withdraw their Phase II proposal and resubmit an updated Phase II proposal by December 3, 2020.

Additional Information about this Program:

A small business may apply for a National Science Foundation (NSF) Phase II Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) award only if it has received a NSF Phase I award, and only for continued research toward commercialization of the technology developed under the Phase I award.

The Phase II funding amount has increased to a maximum of \$1,000,000 to better support the nation's startups and small businesses, as part of the recent federal adjustment for inflation. This amount includes up to \$50,000 to be used by the Phase II awardee for commercial assistance under the SBIR Technical and Business Assistance (TABAs) legislation. See section A.5, line G.6 of this document for details.

Small businesses are eligible to submit a Phase II proposal between six and 24 months after the start date of their relevant NSF SBIR/STTR Phase I award. Reference the Phase I award notice for the exact start date of the Phase I award. Proposals submitted outside of their eligible Phase II timeframe may be returned without review. *** Please see "Important Information and Revision Notes" section for a Phase II submission extension for eligible Phase I companies.*** The proposal submission system (Fastlane) will shut down at 5:00 pm "proposer's time" on the submission window closing date. See section V.A of this document for more details.

For NSF SBIR/STTR Phase II proposals submitted or due, or awards made, on or after February 27, 2020, the guidelines in this solicitation will apply.

The Authorized Organizational Representative (AOR) must sign the Cover Sheet at the time of proposal submission. Proposals cannot be accepted without the signature of the AOR.

For the purpose of this solicitation, "non-dilutive financing" refers to financing that does not involve equity, debt, or other financing instruments affecting the business current or future ownership or capital structure.

Any proposal submitted in response to this solicitation should be submitted in accordance with the [NSF Proposal & Award Policies & Procedures Guide](#) (PAPPG).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Small Business Innovation Research Program (SBIR) Phase II

Synopsis of Program:

Introduction to the Program:

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

The NSF SBIR Program funds advanced research and development. The program is designed to provide non-dilutive financing and entrepreneurial support at the earliest stages of company and technology development.

Synopsis of Program:

The SBIR 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 SBIR program 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 114-328](#) (SBIR/STTR Reauthorization Act of 2017). SBIR/STTR policy is provided by the Small Business Administration (SBA) through the [SBA Policy Directive](#). A main purpose of the legislation is to stimulate technological innovation and increase private sector commercialization. The NSF SBIR/STTR program is therefore in a unique position to meet both the goals of NSF and the purpose of the SBIR/STTR legislation by transforming scientific discovery and innovation into both social and economic benefit, and by emphasizing private-sector commercialization.

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.

- Contact Your NSF SBIR Phase I Program Officer, telephone: 703-292-8050, email: sbir@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 Amount Cooperative Agreement

Estimated Number of Awards: 100 to 120

(per year, pending the availability of funds)

Anticipated Funding Amount: \$110,000,000

For SBIR Phase II pending the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Only firms qualifying as a small business concern are eligible to participate in the SBIR/STTR program (see [Eligibility Guide](#) for more information). The size limit of 500 employees **includes affiliates**. The firm must be

in compliance with the SBIR/STTR Policy Directive(s) and [13 CFR 121](#).

- Proposers must have received a Phase I SBIR or STTR Award from NSF to be eligible to submit a Phase II proposal to the current windows. NSF Phase I awardees may submit their Phase II proposal six to twenty-four months from their Phase I award start date. Please reference your Phase I award notice for award start date. ***** Please see "Important Information and Revision Notes" section for a Phase II submission extension for eligible Phase I companies.*****
- Proposers may submit a Phase II SBIR proposal based on a Phase I STTR award, and vice-versa. Please contact your cognizant Phase I Program Officer for additional proposal submission instructions.

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% employment 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. 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. The PI must have a legal right to work for the proposing company in the US, as evidenced by citizenship, permanent residency or an appropriate visa. The PI does not need to be associated with an institution of higher education. There are no PI degree requirements (i.e., the PI is not required to hold a Ph.D. or any other degree). The PI for the Phase II project does not need to be the same person who served as PI for the associated Phase I award. A PI must devote a minimum of one calendar month of effort per each six months of award duration to an SBIR or STTR Phase II project.

Limit on Number of Proposals per Organization: 1

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

No person may be listed as the Principal Investigator for more than one proposal submitted to this solicitation. SBIR proposals submitted to NSF, by definition, do not have co-PIs.

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):
 - February 14, 2020 - March 05, 2020
 - March 06, 2020 - June 04, 2020
 - June 05, 2020 - September 03, 2020
 - September 04, 2020 - December 03, 2020

Proposal Review Information Criteria

Merit Review Criteria:

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

Award Administration Information

Award Conditions:

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

Reporting Requirements:

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

TABLE OF CONTENTS

Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Award Information**
- IV. **Eligibility Information**
- V. **Proposal Preparation and Submission Instructions**
 - A. **Proposal Preparation Instructions**
 - B. **Budgetary Information**
 - C. **Due Dates**
 - D. **FastLane Requirements**
- VI. **NSF Proposal Processing and Review Procedures**
 - A. **Merit Review Principles and Criteria**
 - B. **Review and Selection Process**
- VII. **Award Administration Information**
 - A. **Notification of the Award**
 - B. **Award Conditions**
 - C. **Reporting Requirements**
- VIII. **Agency Contacts**
- IX. **Other Information**

I. INTRODUCTION

The NSF SBIR/STTR programs provide startups and small businesses with non-dilutive financing to conduct research and development (R&D) work. The funding is intended to spur the creation of innovative new products and services, and to drive the commercial success of the small business.

The main purpose of these programs is to stimulate technological innovation and increase private sector commercialization. The programs at NSF have no specific topical or procurement focus. Generally, the topics included in NSF SBIR and STTR solicitations are broad to permit as many eligible science- and deep technology-based small businesses as possible to compete for funding. By doing so, NSF's programs meet 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.

SBIR/STTR awards are not traditional government contracts. They are not awarded in order to procure services or goods for the government. No tangible benefit is received by the government.

Project reports are required as an oversight mechanism to ensure that the awardee is properly spending the money received on the research that the company said it would do. NSF does not set out to purchase reports and does not benefit from or otherwise use these reports. NSF does not test, verify, or otherwise use the technology developed under its SBIR/STTR awards.

The SBIR/STTR programs are highly competitive. While success rates vary year-to-year, only a fraction of proposals submitted are selected for an award. Thus, there are many qualified businesses applying to the program each year that do not receive funding.

II. PROGRAM DESCRIPTION

Building upon the primary objectives of the NSF-funded Phase I effort to (i) determine whether the innovation has sufficient intellectual merit and broader/commercial impact for proceeding into a Phase II project and (ii) to assess commercial feasibility of the proposed innovation, the aim of the Phase II project is to continue the research and development (R&D) efforts initiated in Phase I and advance the technology and associated product or service aggressively toward commercial deployment.

The Phase II proposal requires a [report](#) describing the technical accomplishments of the SBIR/STTR Phase I award and how these results support the underlying commercial opportunity.

The small business concern must also include a Commercialization Plan that clearly outlines how it plans to generate profits from the innovation research conducted in Phase I and II. This document should represent a compelling vision that describes a business

opportunity that could be addressed, in part, with continued NSF support via Phase II funding. The depth and quality of the analysis within the Commercialization Plan is a critical element of the NSF SBIR proposal review.

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

III. AWARD INFORMATION

SBIR Phase II proposals may be submitted for funding up to \$1,000,000. SBIR Phase II projects typically run for 24 months, though deviations are possible depending on the circumstances of the proposer and the research project (potential proposers are encouraged to contact their cognizant Phase I Program Officer to discuss).

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Only firms qualifying as a small business concern are eligible to participate in the SBIR/STTR program (see [Eligibility Guide](#) for more information). The size limit of 500 employees **includes affiliates**. The firm must be in compliance with the SBIR/STTR Policy Directive(s) and [13 CFR 121](#).
- Proposers must have received a Phase I SBIR or STTR Award from NSF to be eligible to submit a Phase II proposal to the current windows. NSF Phase I awardees may submit their Phase II proposal six to twenty-four months from their Phase I award start date. Please reference your Phase I award notice for award start date. ***** Please see "Important Information and Revision Notes" section for a Phase II submission extension for eligible Phase I companies.*****
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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% employment 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. 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. The PI must have a legal right to work for the proposing company in the US, as evidenced by citizenship, permanent residency or an appropriate visa. The PI does not need to be associated with an institution of higher education. There are no PI degree requirements (i.e., the PI is not required to hold a Ph.D. or any other degree). The PI for the Phase II project does not need to be the same person who served as PI for the associated Phase I award. A PI must devote a minimum of one calendar month of effort per each six months of award duration to an SBIR or STTR Phase II project.

Limit on Number of Proposals per Organization:

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

1

No person may be listed as the Principal Investigator for more than one proposal submitted to this solicitation. SBIR proposals submitted to NSF, by definition, do not have co-PIs.

Additional Eligibility Info:

All Phase II proposal submissions must reference the corresponding NSF Phase I award number on the proposal Cover Sheet.

A company awarded an NSF *STTR* Phase I award may elect to submit a Phase II proposal to the NSF *SBIR* program and vice versa. See the relevant [Dear Colleague Letter](#) for details. Please also contact your cognizant Phase I Program Officer for additional proposal submission instructions.

Ownership and Venture Capital, Joint Ventures. 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 [Eligibility Guide](#) for more information).

Broad Participation. Socially and economically disadvantaged small business concerns and women-owned small

business concerns are encouraged to participate in the SBIR and STTR programs.

REQUIRED REGISTRATIONS: The information provided for the four registrations below should match exactly to avoid processing complications. All registrations need to be active during the lifecycle of the award. Please contact your cognizant NSF SBIR/STTR Phase I Program Officer if you are changing business name or transferring rights to another entity.

- Dun and Bradstreet Data Universal Numbering System (DUNS).
- System for Award Management (SAM) Registration.
- Small Business Administration (SBA) Company Registration.
- FastLane (NSF's electronic submission system). (<https://www.fastlane.nsf.gov/>)

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.

With regard to the guidance above, this solicitation DOES contain many instructions that DEVIATE FROM THE STANDARD NSF PAPPG proposal preparation instructions. Generally, this solicitation contains the information needed to prepare and submit a proposal and refers to specific sections of the PAPPG only when necessary. In the event of conflict, the instructions in this solicitation take precedence over instructions in the PAPPG.

Phase II Proposal and Program Objectives. An SBIR Phase II proposal must describe the research effort needed to continue the research and development efforts initiated in the Phase I award.

Unacceptable Objectives. Examples of project objectives that are not acceptable for SBIR/STTR Phase II proposals include non-technical work (such as market research, business development, or other activities disallowed for funding under SBIR/STTR awards) or efforts that do not directly support commercial development of the technologies or concepts demonstrated during Phase I, or which are unrelated to the Phase I project objectives. Proposers are encouraged to consult with their Phase I NSF Program Officer to discuss what objectives might be appropriate for the Phase II project.

Marking Proprietary Information. To the extent permitted by law, the Government will not release properly identified and marked technical and commercially sensitive data. If the proposal contains proprietary information, check the box at the bottom of the proposal Cover Sheet 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.

Debriefing on Unsuccessful Proposals. When a proposal is declined, verbatim copies of reviews (excluding identities 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. The cognizant NSF Program Director may be contacted for an oral debrief if there are additional questions regarding the review process or the outcome.

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. Please reference the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) for details on formatting and font size.

DO's and DON'Ts of NSF SBIR Phase II Proposal Submission:

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

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

- **Do include your NSF SBIR/STTR Phase I award number on the Cover Sheet**, under the "Show Previous Award" field.
- **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 address each of the items listed below, WITHOUT EXCEPTION.
 - [Project Summary](#)
 - [Project Description](#)
 - [References Cited](#)
 - [Biographical Sketches](#)
 - [Budget and Budget Justification](#)
 - [Current and Pending Support](#)
 - [Facilities, Equipment and Other Resources](#)

- o [Supplementary Documents](#) (all that are applicable)
 - o [Single Copy Documents](#) (including Collaborators and Other Affiliations)
- **DO NOT submit late.** The proposal submission system will not permit submissions after 5:00 pm "proposer's time" on the submission window closing date. **Proposer's time is determined by the time zone of the company's address as registered with NSF.** Late proposals will need to be submitted to a subsequent window.
 - **DO NOT** submit a Project Description that is more than 15 pages long.
 - **DO NOT** submit a Budget exceeding \$1,000,000.
 - **DO NOT** submit a "Collaborative Proposal" (a special proposal type in FastLane). Collaboration with institutions of higher education (IHEs) is encouraged; however, only one proposal submitted by the company and with subawards to the IHE(s), should result.
 - **DO NOT** submit a proposal that lacks sufficient technical/commercial potential substance to justify review; does not contain research and development proposed in science, engineering, or education; or contains unacceptable objectives as described above in the beginning of section V.A.
 - **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 documents to Supplementary Documents except those listed in the Supplementary Documents section below.

Detailed Instructions on Proposal Preparation :

Cover Sheet

The Cover Sheet is automatically generated by FastLane based on information entered into the "Cover Sheet" module and consists of the NSF Cover sheet, Certification, and SBIR Addendum pages. SBIR and STTR Phase II proposers must include their associated NSF Phase I award number on the Cover Sheet, under the "Show Previous Award" field.

Table of Contents

The table of contents is automatically generated by FastLane.

1. Project Summary [One (1) page MAXIMUM]

The Project Summary should be informative to other persons working in the same or related fields, and, insofar as possible, understandable to a broad audience within the scientific domain. It should not be an abstract of the proposal. Do not include proprietary information in the summary.

The SBIR Phase II Project Summary has three required sections:

- Overview
- Intellectual Merit
- Broader/Commercial Impact

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.

- **Box 1: Overview, Key Words, and Subtopic Name.**
 - o Provide a statement of objectives and methods to be employed.
 - o Provide a list of key words or phrases that identify the areas of technical expertise in science, engineering, or education to be invoked in reviewing the proposal; and the areas of application that are the initial target of the technology.
 - o State the topic name and subtopic letter(s) to which the Phase I proposal was submitted.
- **Box 2: Intellectual Merit.** A summary paragraph addressing the intellectual merits of the proposed activity. The first paragraph of the Intellectual Merit MUST begin with the name of the Program (i.e. "This Small Business Innovation Research Phase II project" or "This Small Business Technology Transfer Phase II project"), as appropriate. No proprietary information should be included in the summary. Include a brief identification of the problem or opportunity, the research objectives, a description of the research, and the anticipated results.
- **Box 3: Broader/Commercial Impact.** A summary paragraph addressing the broader impacts and commercial potential of the proposed activity. Include information on the potential commercial outcomes, and societal impact (if applicable).

2. Project Description

The Project Description cannot exceed 15 pages, and all parts must be labeled as presented below. Upload this section (Parts 1-4) as one file. Proposers must first create this file with an editor that generates Adobe-compatible PDF files. The Project Description should contain subsections labeled in the following manner:

Part 1. Results of the Phase I Project.

Briefly describe how Phase I has established the feasibility of the innovation, provided justification for NSF support and intended commercial applications, and demonstrated the ability of the proposer to conduct R/R&D. Recommended length for this section is 1-4

pages.

Part 2. Phase II Technical Objectives, Approach and Work Plan.

Define the specific technical objectives of the Phase II research and technical approach to meet these objectives; and provide a work plan defining specific tasks, performance schedules, milestones, and deliverables. Recommended length for this section is 5-10 pages.

Part 3. Consultants and Subawards.

Consultants. Discuss how the requested consultant effort will contribute to the project. Signed consultant agreements must be scanned into the proposal and placed under the Budget Justification. (See budget guidance for Consultants.) The consultant agreement should identify the number of days and its associated daily rate.

Subawards (a.k.a. Subcontracts). If subawards or consultants (including contracts, subcontracts and other arrangements) are budgeted for the proposed project, describe the tasks to be performed and how these are related to the overall project. No significant part of the research or substantive effort under an NSF award may be contracted or otherwise transferred to another organization without prior NSF authorization. The intent to enter into such arrangements should be disclosed in the proposal. (See budget guidance for Subawards.) Purchases of analytical or other routine services from commercial sources and the acquisition of fabricated components from commercial sources are not regarded as reportable subaward activity. Such items -- routine analytical or other routine services -- should be reported in the Budget under Other Direct Costs/Other (Item G.6). All research, including subaward and consultant activities, must be conducted in the U.S.

Part 4. Equivalent or Overlapping Proposals to Other Organizations.

A firm may elect to submit proposals for essentially equivalent or overlapping work to other Federal agencies, state or local governments, or non-governmental entities, or may have received or expect to receive other awards for essentially equivalent or overlapping work. In these cases, the proposer MUST inform NSF of related proposals and awards and must first certify on the Proposal Cover Sheet whether the proposer (a) has received awards for related work, or (b) has submitted currently active proposals for related work under other programs or intends to submit proposals for such work to other entities. For all such cases, the following information is required:

- The name, address, and telephone contact of the sponsoring agency to which the proposal was (or will be) submitted
- Date(s) of proposal submission(s)
- Title, number, and date of Solicitation under which the proposal was submitted or will be submitted
- Title and performance period of the proposal
- Name and Title of the Principal Investigator
- Level of effort (person-months (per year) devoted to the equivalent or overlapping project, by any personnel who are expected to work on this Phase II project.

If no equivalent or overlapping proposals are under consideration, state: NONE. NSF will not make awards that essentially 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 allocate costs among the various sponsors.

IT IS ILLEGAL TO ACCEPT DUPLICATE FUNDING FOR THE SAME WORK. IF A PROPOSER FAILS TO DISCLOSE EQUIVALENT OR OVERLAPPING PROPOSALS AS PROVIDED IN THIS SECTION, THE PROPOSER COULD BE LIABLE FOR ADMINISTRATIVE, CIVIL, AND/OR CRIMINAL SANCTIONS.

3. References Cited

Provide a comprehensive listing of relevant reference sources, including patent citations. If proposers wish, they may also include citations for other sections of the proposal (such as the commercialization plan) in this section. If there are no references to cite, please include a statement to that effect. Proposers MUST include something in this required module.

4. Biographical Sketches

Provide relevant biographical information for the Principal Investigator and key personnel from the company as well as consultant and key subawardee personnel. Include information on present and past employment, education (highest degree and year), and professional experience. Provide a listing of relevant publications and summarize other contributions to the technical literature not directly pertinent to this proposal.

5. Budget and Budget Justification

The NSF Summary Proposal Budget is generated in FastLane. Enter budget figures for each project year into Fastlane. The system will automatically generate a cumulative budget for the entire project.

SBIR Phase II awards are funded up to \$1,000,000 for up to 24 months.

Budgets for small businesses will be reviewed against the cost principles of FAR Part 31, as amended by the budget preparation instructions outlined below. Phase II SBIR proposals require that at least 50% of the budget be allocated to the small business. Funds committed to subawards and consultants are not considered funds allocated to the proposing small business.

The Budget Justification documents and justifies the amounts requested in each category of the Budget. 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 Justification. 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). Any letters of collaboration from organizations proposed as subawardees in the effort, or individuals proposed as consultants in the effort, should also be included as

part of the budget justification document. You can find a sample budget and subaward budget, with justifications, here: <https://seedfund.nsf.gov/fastlane/>.

The following is budget preparation guidance:

Lines A & B: Salaries and Wages.

Only salaries and wages for employees of the proposing organization should be included on Lines A & B. Consultants and subawardee salaries and wages should be budgeted on Lines G.3 and G.5 of the proposal budget, respectively. Research effort is to be estimated in calendar person-months and entered into the column headed by "CAL" (1 CAL = 173 hours) on the Summary Proposal Budget. CAL effort does not include paid time off and represents actual effort that will be dedicated to the project. **The commitment of the Principal Investigator must be at least 2 months (2 CAL) per year.** Small businesses do not have students or postdoctoral scholars and should not list funds or effort on Lines B.1, B.3 and B.4 of the small business budget. (These classifications can be used in subaward budgets to institutions of higher education.) Secretarial/clerical effort (Line B.5) is generally included as part of indirect costs. Salaries for secretarial/clerical should be budgeted as a direct cost only if this type of cost is consistently treated as a direct cost in like circumstances for all other project and cost objectives. The budget justification should state individual employee names and titles (to the extent known), expected role in the project, effort in person-months, monthly or annual salary for each person, and extended amounts.

Line C: Fringe Benefits. See Instructions for "Line I" Below.

Line D: Equipment.

Equipment is defined as nonexpendable, tangible personal property, having a useful life of more than one year and an acquisition cost of \$5,000 or more per unit. However, organizations may elect to establish their capitalization threshold as less than \$5,000. Equipment should be budgeted consistently with the proposing organization's capitalization policy. Requests should not be made for general purpose or routine equipment that a business conducting research in the field should be expected to have available. The budget justification must explain the need for any equipment and include the item identification/description, vendor identification, quantity, price, and extended amount. The budget justification should also include, as a separate document if needed, pricing documentation (e.g. quotes, invoices, links to online price lists, past purchase orders, etc.) for each budgeted piece of equipment.

Line E: Travel.

NSF requires that the PI budget travel (for the first year of the project) to attend the Phase II Awardee Workshop. A good estimate for the Awardee Workshop is \$2,000 per person and is limited to \$4,000 per year. Other than the Awardee Workshop and funds for technical and business assistance (see below), all budgeted travel must be directly related to the execution of the research effort. Only domestic travel will be considered. The budget justification must include, for each budgeted trip, the destination, purpose of travel, number of days, and the estimated costs for airfare, cab fare, car rental, per diem rates, hotel and other incidentals. No supporting detail is required for attendance at the Awardee Workshop at \$2,000 (or less) per person.

Line G.1: Materials and Supplies.

The budget justification must include an itemized listing of materials and supplies to include the item/description, vendor, quantity, price and extended amount. Any single materials or supplies item with a total cost of \$5,000 must be further itemized into smaller cost items, or supported by pricing documentation (e.g. quote, link to online pricing list, past purchase order) in the budget justification.

Line G.2: Publication Costs/Documentation/Dissemination.

Proposers should discuss possible publication charges with their cognizant NSF Program Director and should include funds on this line only if given permission by their Program Director.

Line G.3: Consultants.

The budget justification must include a signed agreement from each consultant confirming the services to be provided, primary organizational affiliation, number of days committed to the research effort, availability to provide services, and consulting daily rate. The agreement must clearly state the number of days on the project, the consulting daily rate (8 hours/day) and the total dollar amount of the consulting agreement. The consulting daily rate represents the total labor compensation for an 8-hour period and may not exceed \$1,000 per day. Any miscellaneous costs, such as travel or supplies, that are not included as part of the daily rate must be identified and justified.

Line G.4: Computer Services.

This line can include funds for fee-for-service computing activities or resources (such as supercomputer time, cloud services, etc.). Any extended line item should be accompanied with pricing documentation (e.g. quote, link to online price list, prior purchase order or invoice) in the budget justification.

Line G.5: Subawards (a.k.a. Subcontracts).

A separate Summary Proposal Budget with corresponding budget justification must be submitted by the proposing small business for each subaward proposed. Line G.5, Subawards, of the proposing organization's Summary Proposal Budget should indicate the combined total dollar amount of all proposed subawards for each year.

The proposing organization's budget justification must discuss any organizational relationships (e.g., common ownership or related parties) between the proposing organization and the subawardee, and the type of subaward contemplated (e.g., fixed price or cost reimbursement). **Subawardees are also not permitted to request profit (line K) as part of their budgets.** It is the responsibility of the proposing organization to confirm that submitted subaward budgets have been approved by an Authorized Organizational Representative at the subawardee organization. Subaward funds do not count as funds spent by the small business and therefore must be allocated subject to the requirement that 50% of the total budget be spent by the small business. Therefore, the total amount requested for the aggregated subawards and consultant funds cannot exceed 50% of the total project budget.

Line G.6: Other.

This budget line includes purchases from commercial sources for routine analytical or other services. The budget justification must explain the need for the services, provide a description of the services, and give a detailed cost itemization. Any single "other" item with a total cost of \$5,000 must be further itemized into smaller costs or supported by pricing documentation (e.g. quote, link to online pricing list, past purchase order) in the budget justification.

SBIR/STTR Technical and Business Assistance (TABA): Proposers may include up to \$50,000 to assist in technology commercialization efforts (as outlined in the current [SBIR/STTR Policy Directive](#) and the John S. McCain National Defense Authorization Act for Fiscal Year 2019). Specifically, this funding is for securing the services of one or more third-party service providers that will assist with one or more of the following commercialization activities:

- A. the identification and development of customers for the NSF-funded technology;
- B. providing advice on financing strategy and fundraising from the private sector;
- C. establishing strategic partnerships with relevant stakeholders; and/or
- D. the evaluation and protection of intellectual property.

If a proposer is not able to identify what commercial assistance may be required at the time of submission, the proposing small business may block up to \$50,000 for TABA activities on Line G.6 ("Other") with the understanding that prior to expending funds for these purposes, the awardee will be required to submit the following documentation for approval from their cognizant NSF Program Director:

- The proposed commercialization-related activities to be undertaken with support from the service provider. These activities should be consistent with the Phase II commercialization plan submitted in the Phase II proposal.
- The expected outcomes of the proposed activities.
- A brief profile of the service provider, including a discussion of the provider's qualifications and track record.
- Letter of commitment or statement of work from the service provider describing the services to be provided, cost for the services, and clearly defined, agreed-upon deliverables with measurable success metrics.

Lines I & C: Fringe and Indirect Costs.

Indirect costs are defined as costs that are necessary and appropriate for the operation of the business, but which are not specifically allocated to the NSF SBIR project. Common indirect cost expenses include legal and accounting expenses, employee health insurance, fringe benefits, rent, and utilities. If the proposing small business has a Federally-negotiated rate, please specify the base and rate and include a copy of the rate agreement. If the proposing business has a history of at least two years of stable operation that reflect the costs expected to occur during the execution of the SBIR/STTR award, please base the indirect rate estimate on this historical data (and provide an explanation if the rate is expected to deviate significantly from the rate used in recent years). Instructions in the submittal of an adequate and complete indirect cost rate (IDC) proposal can be found at: <https://www.nsf.gov/bfa/dias/caar/docs/idcsubmissions.pdf>.

Awardees without experience and knowledge of Federal indirect cost rate negotiation and Federal Acquisition Regulation (FAR) Part 31 Cost Principles may want to consider engaging professional services in preparing an IDC proposal.

If the proposing small business has no suitable history of financial data from which to extrapolate, it may claim (without requiring a justification) a total amount of indirect costs (inclusive of fringe benefits) equal to either 50% of total budgeted salary and wages on the project or 10% de minimis on MODIFIED total direct costs on the project. *Modified Total Direct Cost (MTDC): MTDC means all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel, and up to the first \$25,000 of each subaward (regardless of the period of performance of the subawards under the award). MTDC excludes equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each subaward in excess of \$25,000. Other items may only be excluded when necessary to avoid a serious inequity in the distribution of indirect costs, and with the approval of the cognizant agency for indirect costs.*

Note: NSF does not fund Independent Research and Development (IR&D) as part of an indirect cost rate under its awards. See the FAR 31.205-18(a) for more information.

Line K: Fee.

The fee, if requested, is limited to 10% of the total amount on line J. The fee is allowed only for the proposing small business (no fees are allowed in subaward budgets).

The total amount of the budget (including fee) cannot exceed \$1,000,000.

Budget Revisions.

Budget revisions may be requested by the NSF Program Director. Revised budgets must contain a revised and complete budget justification as described above. Revised budgets with budget impact statements that only address revisions are not acceptable for Phase II budget processing. (See [Budget Revision Instructions](#).)

Note: Should the proposing small business's proposal be considered for funding after it is competitively reviewed, the NSF Program Director will refer them to the Cost Analysis and Pre-Award Review (CAP) Web Site for Phase II Reviews. Proposing small businesses in this category will be given 10 calendar days to provide the underlying supporting documentation for their budget. The proposing organization should review and understand the CAP documentation requirements as it prepares its budget. **Once NSF requests the underlying supporting documentation for the CAP review, proposers will not be given an opportunity to re-budget unsupported costs.** Funding will be provided for only the dollar amount that is reasonable and adequately supported. The awarded Phase II budget will reflect the supported dollar amount for the proposed effort. **Organizations that accept awards at less than the proposed dollar amount may not reduce the effort to be provided; however, organizations may choose to decline award offers.**

6. Current and Pending Support

The proposal should provide information regarding all research to which the Principal Investigator, all other senior personnel (on the main budget or any subaward budget), or any budgeted consultants, either have committed time or have planned to commit time (in the event that other pending projects are supported during the SBIR Phase II period of performance), regardless of whether salary is allocated in the budgets of the various projects. If none, state NONE.

For all ongoing or proposed projects, the following information should be provided for the Principal Investigator and senior personnel:

- Name of sponsoring organization
- Title and performance period of the proposal
- Person-months (per year) devoted to the project

The Current and Pending Support statement should include the Phase II proposal being submitted, which is pending at the time of submission. Each proposal must include a Current and Pending Support statement.

7. Facilities, Equipment and Other Resources

Discuss the availability of equipment, instrumentation, and facilities required for the Phase II project. This equipment can be located at the proposing small business, or at a partner organization (which should provide a letter in the budget justification indicating that the small business has access to said equipment). If a proposer wants to arrange the use of unique or one-of-a-kind Government facilities, a waiver must be obtained from the Small Business Administration to approve such use. If no equipment, facilities or other resources are required for this project, a statement to that effect should be uploaded here. Every proposal must address Facilities, Equipment and Other Resources.

8. Supplementary Documents

A. Project Schedule (required)

A project schedule is a required component for all Phase II proposals and should be uploaded to [FastLane](#). We recommend downloading the template here and uploading a completed version of this form into Fastlane.

The Project Schedule must show the estimated duration and timing of major project tasks that are required to implement the research plan. This document should estimate the initiation and completion of tasks should appear clearly in the 24-month timeline and in relation to other tasks.

This schedule should also provide projected levels of effort for each key person during each reporting period of the project. Key personnel to be listed generally include any senior personnel listed on line A of the main project budget, any persons listed on line A of any subaward budgets, or any budgeted consultants. The schedule should also include estimates of total level of effort (for all project personnel) and total expenditures for each six-month project period.

Payment Schedule: NSF generally makes the Phase II SBIR award funds available for drawdown in tranches, with the first tranche upon award and subsequent tranches at six-month intervals thereafter. The standard schedule is as follows:

- an initial payment of 25% of the total budget with award
- a 2nd payment of 25% of the total at the six-month mark and based on approval of the first interim report
- a 3rd payment of 25% of the total at the twelve-month mark and based on approval of the second interim report
- a 4th payment of 25% of the total (less \$25,000) at the eighteen-month mark and based on approval of the third interim report
- a final payment of \$25,000 based on approval of the final report and submission of the Project Outcomes Report

A deviation from the standard payment schedule can be requested if the standard schedule would pose significant difficulties for the awardee or would negatively affect the execution of the project. If the standard payment schedule as described above is not appropriate, please request alternative amounts for each payment, and provide a brief justification for the departure from the standard schedule.

B. Commercialization Plan (required)

The Commercialization Plan cannot exceed 15 pages, EXCLUDING letters of support.

The Commercialization Plan is a critical section of the proposal. It is the primary opportunity to describe the strategy that the proposing small business will employ to generate revenue from the proposed innovation research. The Commercialization Plan is the company's roadmap and should convey how the company will generate profits from its innovation. It should represent a compelling vision of a unique business opportunity that could be addressed with continued support from Phase II funding. The depth and quality of the analysis within the Commercialization Plan is a critical element of the NSF SBIR proposal review. Assumptions within the plan should be clearly stated, and evidence of validation should be provided.

The plan must concisely convey:

- The business opportunity enabled by the innovation
- The compelling value proposition(s) for the intended customer(s)
- The key points of a plan appropriate for the company's stage of development
- The status of the effort to date and map out a strategy for the enterprise moving forward
- The current as well as the anticipated commercial landscape and the resources required to address the opportunity enabled by the innovation
- The company's vision for the enterprise and how the proposed innovation fits into the future market.

The outline **below** describes the points that should be covered in a well-developed Commercialization Plan. There are four sections required for an NSF Commercialization Plan: Market Opportunity; Company/Team; Product/Technology and Competition; and Finance and Revenue Model. Each section should be developed with careful analysis of the company's position within the industry and the

market opportunity that is enabled by the proposed innovation. The key points required for each section are also shown below.

This outline represents a standard NSF Commercialization Plan. The company's particular strategy may include additional components that are not represented below; please include other elements as appropriate.

The National Science Foundation recognizes that each innovation requires a specific strategy to generate strong outcomes and that no two businesses are exactly alike. Therefore, NSF supports a broad array of commercialization strategies. Each strategy requires a different emphasis on the plan's elements, depending on the specifics of the innovation and the market landscape. For instance, the strategy and mechanisms for leveraging and protecting intellectual property (IP) vary according to industry and innovation.

i. Market Opportunity

- Describe the target customer, with generally-known examples if possible.
- Describe which customer needs will be addressed with the product or service.
- How does the target customer currently meet the need; or does a significant unaddressed problem exist?
- Describe succinctly the product or service to be delivered based on the innovation.
- What is the business model the company envisions to generate revenue from the innovation?
- Is the target market domestic, international or both?
- Describe the communications and distribution channels the company will employ to reach the targeted customer.
- What is the current size of the broad market the company plans to enter and the "niche" market opportunity it is addressing in the short term?
- What are the growth trends for both the market and the industry that the company is targeting?
- What are the barriers to enter this market?
- Describe the technology/development objectives and critical milestones that must be met to address the market opportunity.
- List additional potential societal, educational or scientific benefits beyond commercial considerations.

ii. Company/Team

- Provide a short description of the origins of the company.
- What type of corporate structure is in place?
- What is the current capitalization?
- What is the current employee count?
- What is the company's financing and revenue history for the past three years?
- What are the sources of operating capital or revenue: product sales, consulting/services, license revenues, R&D grants/contracts and others?
- Give a brief description of the experience and credentials of the personnel responsible for taking the innovation to market.
- What specific experience does the team lack and how will this be addressed during the Phase II effort and beyond?
- How does the background and experience of the team enhance the credibility of the Commercialization Plan; have they previously taken similar products/services to market?
- From which additional resources will the company draw support or guidance (e.g., Board of Directors, Board of Advisors, technical advisors, legal counsel)? Provide details on the names, affiliations and expertise of these resources.

iii. Product/Technology and Competition

- Which features of the technology enable a compelling value proposition? How has the company validated the significance of these features?
- What is the customer willing to pay for the product or service? How has the company validated this assumption?
- What are the costs to produce the product or service? What are the assumptions that underlie the cost model(s)?
- How does the technology/innovation allow the team to compete and win in the marketplace?
- How does the product or service compare to that of the competition?
- Describe the anticipated competitive landscape when the company reaches product launch.
- Describe the intellectual property landscape.
- Do you have "freedom to operate"?
- How does the company plan to protect the intellectual property associated with the technology and/or company?
- Which other sources of intellectual property does the company need to address the market opportunity?

iv. Finance and Revenue Model

- Describe an appropriate staged finance plan given the market opportunity; enumerate the level of funding required for each stage along the path to commercialization.
- How will the company access the appropriate funds? Provide specific contacts, leads, previous relationships and agreements already in place.
- Which commitments does the company have for follow-on funding?
- Describe the projected revenue streams (licensing, product sales or other) associated with the company's commercialization plan. What is the expected timeline for first revenues and revenue ramp?
- When does the company anticipate initial revenues from each projected stream?
- When does the company expect to reach break-even operations?
- Provide annual pro formas for the next five years (2 years of the Phase II effort + 3 years post Phase II). Income Statements are *required*. Cash Flow and Balance Sheets *may* be included if they are considered critical for your strategy. If not included, Cash Flow and Balance Sheets should be available upon request from NSF.
- What are the assumptions in the company's models? How has it validated these assumptions?

Phase IIB: Small businesses with NSF SBIR/STTR Phase I awards should actively pursue follow-on funding and support from stakeholders in the market. If a Phase I award leads to a successful NSF Phase II award, an incentive to the Phase II awardees to pursue non-NSF third party funding is the opportunity to obtain supplemental Phase IIB funding. To qualify for the Phase IIB competition, the Phase II awardee must secure and receive third party (private or non-SBIR government) funding during Phase II. The main objective of the Phase IIB Supplement is to extend the R&D efforts beyond the Phase II award to meet the requirements of a third-party investor, to accelerate the Phase II project to the commercialization stage, and/or to enhance the overall strength of the commercial potential of the Phase II project. For more information, please refer to the [Phase IIB web page](#).

C. Company Commercialization History (required if the proposer has received any prior Phase II awards)

This section is a requirement for any proposer who has ever received a Phase II SBIR or STTR award (from any Federal agency). Please follow the format of the NSF-specific Commercialization History form, linked below.

A commercialization history is required for all proposers certifying receipt of Phase II awards on the proposal Cover Sheet. All items must be addressed in the format outlined below. Only firms that have received one or more SBIR/STTR Phase II awards from NSF or any other federal agency must submit a company commercialization history. The following are necessary components:

- Firm Name.
- Identify any name change the firm has executed within the past five years.
- List the parent company if the proposing small business is a subsidiary or a spin-off. List subsidiaries and spin-offs if the proposing small business is a parent company.
- Amount of financing and associated % of total company financing for each of the past three (3) fiscal years from federal SBIR/STTR funding (includes Phase I and Phase II awards).

List each Phase II SBIR/STTR award and fill out the requested information on the NSF-specific [Commercialization Form](#).

D. Phase I Technical Narrative (required)

Upload a complete copy of the most recent Phase I technical narrative. This is either the Final Report submitted to NSF via Research.gov at the conclusion of the Phase I effort, OR a technical narrative that covers all Phase I results and progress to date, in specific:

- A summary description of the research carried out, the results thus far and the activities to be carried out for the remainder of the Phase I project (if applicable).
- Problems encountered and methods of resolution used.
- Problems remaining or unfilled research objectives.
- Conclusion of the Phase I findings and how these conclusions support a Phase II proposal.

This report should not exceed 15 pages. It must be self-contained (i.e., not refer to other documents submitted to NSF in the original Phase I proposal nor to reports) because the Phase II reviewers do not have access to any documents submitted via Research.gov as part of the Phase I effort.

E. Postdoctoral Mentoring Plan (required if support for postdoctoral researchers is requested as part of a subaward)

If the proposal contains a subaward to an IHE or another institution requesting funding for postdoctoral researchers, a postdoctoral mentoring plan must be included as a supplementary document. *Note that employees of the small business or other for-profit companies DO NOT count as postdoctoral researchers for this requirement.* More information on this requirement can be found in the PAPPG Chapter II.C.2.j.

F. Data Management Plan (required)

Proposals must contain a supplementary document labeled "Data Management Plan" which should simply include the statement, "All data generated in this SBIR Phase II project is considered proprietary." FastLane will not permit submission of a proposal that is missing the Data Management Plan.

G. Letter(s) of Support (strongly recommended; no more than 5 letters)

Letters of support indicate market validation for the proposed innovation, market opportunity, or small business/team, and add significant credibility to the proposed effort. Letters of support should ideally demonstrate that the company has developed partnerships and/or a meaningful dialog with relevant stakeholders (potential customers, strategic partners or investors) for the proposed innovation and that a real business opportunity may exist. The letter(s) must contain affiliation and contact information for the signatory stakeholder. Letters and supporting documents from consultants and subcontractors are NOT considered letters of support and are NOT to be included here. Letters and supporting documents from consultants and subcontractors should be included in the Budget Justification section.

H. Human Subjects Protection Documentation (required if the proposed R&D involves human subjects)

If human subjects protection Institutional Review Board (IRB) approval is indicated but is not submitted with the proposal, there must be a plan for such approval; a supporting letter regarding IRB approval should be provided under supplementary documents. The approval must be readily attainable within six weeks of informal notification of recommendation for award to ensure continued processing for funding. The small business has three basic options with regard to human subjects review:

- Establish the company's own IRB (see Office for Human Research Protections (OHRP) at the Department of Health and Human Services (HHS), as per <http://www.hhs.gov/ohrp/assurances/index.html#registernew>;
- Use the review board of a (usually local) IHE, either via consultants to the project, a project subcontract, or directly through its own contacts; or
- Use a commercial company that provides IRB services.

For projects lacking definite plans for the use of human subjects, their data or their specimens, pursuant to 45 CFR § 690.118, NSF can accept a determination notice that establishes a limited time period under which the PI may conduct preliminary or conceptual work that does not involve human subjects. Please refer to the [NSF Proposal & Award Policies & Procedures Guide](#) for information on the necessary supplementary documents. Note that in some cases, product testing involves human subjects. Look for federal-wide assurances under the Office for Human Research Protections [website](#).

I. Vertebrate Animals Documentation (required if the proposed R&D involves vertebrate animals)

Animal use in funded projects requires approval of the company or collaborating institutions' Institutional Animal Care and Use Committee (IACUC). Please refer to Chapter II, Section D.4 of the NSF PAPPG and the USDA's [Animal and Plant Health Inspection](#)

[Service](#) for additional information.

9. Single Copy Documents (including Collaborators and Other Affiliations)

At their option, proposers can include suggested reviewers for their proposal (or the identities of reviewers that they prefer NOT be used) in the "List of Suggested Reviewers" module.

Collaborators and Other Affiliations information must be separately provided for each individual identified as senior personnel on the project, as required in PAPPG Chapter II.C.1.e. Proposers may also include an optional list of collaborators or other affiliations of company owners and/or officers in the "Collaborators and Other Affiliations" module.

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):

February 14, 2020 - March 05, 2020

March 06, 2020 - June 04, 2020

June 05, 2020 - September 03, 2020

September 04, 2020 - December 03, 2020

FastLane will not permit submission after 5:00 p.m. "proposer's time" on the submission window closing date. Proposer's time is determined by the time zone of the company's address as registered with NSF.

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.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see PAPPG Chapter II.C.1.d for a listing of the certifications). The AOR must provide the required electronic certifications at the time of proposal submission. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

For all Phase II SBIR/STTR proposals, the review process shall consider an additional criterion: commercial impact. The Commercial Impact criterion focuses on the potential of the activity to lead to significant outcomes in the commercial market.

The following criteria should be applied in the review of the Commercial Impact criterion:

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?
6. As a result of Phase I effort, did the firm succeed in providing a solid foundation for the proposed Phase II activity?

Should the proposing small business's proposal be considered for funding after it is competitively reviewed, the NSF Program Director will refer them to the [Cost Analysis and Pre-Award Review \(CAP\) Web Site for Phase II Reviews](#). These reviews are conducted to evaluate a prospective awardee's ability to effectively and efficiently manage a Federal award.

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=papppg.

Special Award Conditions:

SBIR Phase II awards are subject to availability of funds. NSF has no obligation to make any specific number of Phase II awards based on a solicitation and may elect to make several or no awards under any specific technical topic or subtopic. The SBIR Phase II fixed-priced cooperative agreements will not exceed \$1,000,000 per award and normally will be made for a 24-month period of performance. New terms and conditions for awards made under this solicitation were posted in Summer 2020 and are available on the Award Conditions page, under [SBIR/STTR Terms and Conditions](#).

The award notice specifies a pre-determined fixed amount of NSF support for the project described in the referenced proposal. This amount is based upon the budget approved by NSF for the referenced proposal, as amended.

Payment of the award amount is subject to compliance with the award terms and conditions and NSF's acceptance of the reports submitted by the awardee. On the basis of its review of these reports and/or other pertinent information, NSF reserves the right to modify the payment schedule or suspend or terminate the award, if NSF determines that such actions are appropriate. If estimated total expenditures are significantly less than the award amount, the awardee shall contact NSF to renegotiate the scope of this award. Similarly, if the awardee expects that the full scope of work will be completed at a total cost significantly lower than the award amount, it is the obligation of the awardee to promptly notify NSF.

SBIR/STTR Funding Agreement Certification:

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

Fraud, Waste, and Abuse (FWA) Notification:

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

- Internet: <https://www.nsf.gov/oig/report-fraud/form.jsp>
- E-mail: oig@nsf.gov
- Phone: 703-292-7100 (during business hours) or 703-244-4443 (to speak to the duty officer) Anonymous Hotline: 800-428-2189
- Fax: 703-292-9158
- Mail: 2415 Eisenhower Avenue, 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=pappp.

Additional Reporting Requirements:

This requirement is undergoing the information collection process and the clearance number will be included with the reporting requirements.

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:

- Contact Your NSF SBIR Phase I Program Officer, telephone: 703-292-8050, email: sbir@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

Since all Phase II SBIR proposers are already associated with an NSF SBIR/STTR Phase I award, Phase II proposers are strongly encouraged to use their cognizant Phase I Program Officer as the primary point of contact for any questions. The contact above can be used for other inquiries, or when proposers are not sure who to contact. Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

IX. OTHER INFORMATION

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

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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