Small-Business/ ERC Collaborative Opportunity: (SECO)
Funded by the ERC Translational Research Fund and the SBIR Program

PROGRAM SOLICITATION
NSF 13-551

REPLACES DOCUMENT(S):
NSF 12-543

National Science Foundation

Directorate for Engineering
  Engineering Education and Centers
  Industrial Innovation and Partnerships

Letter of Intent Due Date(s) *(required)* (due by 5 p.m. proposer's local time)*:*

> May 06, 2013
>
>> Option 1 (full proposals) and Option 2 (requests for supplemental funding)

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

> July 02, 2013
>
>> Option 1 (full proposals) and Option 2 (requests for supplemental funding)

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG)*,* NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide*.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

> Small-Business/ ERC Collaborative Opportunity (SECO)
> Funded by the ERC Translational Research Fund and the SBIR Program

Synopsis of Program:

> This opportunity aims to facilitate the translation of NSF's technology investments in Engineering Research Centers (ERC) and in Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) projects into the market place. Furthermore, in instances where an ERC is funded with a mission to support the public good through the implementation of critical public engineering systems (the infrastructure), this includes facilitating implementations that realize the intended public benefit.
>
> The specific goals of this opportunity are to:
>
> 1. Speed the translation of ERC-generated research and technology advances to the marketplace or its implementation into critical public engineered systems and engage undergraduate and graduate students more directly in the innovation process through collaboration between an ERC and a small business concern, (OPTION 1) and
> 2. Strengthen the research capacity of active NSF SBIR/STTR Phase II awardees to speed the entry of their innovations into the marketplace and broaden its portfolio of marketable products through collaboration with an ERC (OPTION 2).

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.

- Deborah J. Jackson, telephone: (703) 292-7499, email: djackson@nsf.gov

- Muralidharan S. Nair, telephone: (703) 292-7059, email: mnair@nsf.gov

- Carmiña Londoño, telephone: (703) 292-7053, email: clondono@nsf.gov

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

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Option 1: Fixed Amount Award with special reporting requirements and Option 2: SBIR Supplement

Estimated Number of Awards: 15

Anticipated Funding Amount: $3,000,000

Each partnership consists of one small business lead collaborating with an active or self-sustaining, graduated ERC as a sub-contractor. The combined total award would be up to $200,000 with a duration of one or two years. Awards are subject to the availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- The following definitions are applicable in this section.

  A Small Business Concern (SBC) is a legally established entity that meets the the NSF SBIR program definition of a Small Business Concern http://www.nsf.gov/eng/iip/sbir/definitions.jsp#sbc and is also able to demonstrate financial viability during the award period, as per the Prospective New Awardee Guide (*http://www.nsf.gov/publications/pub_summ.jsp?ods_key=pnag*). This opportunity is only for fiscally viable SBCs.

  An active ERC awardee is defined as an awardee with an NSF ERC award which has not yet expired.

  A self-sustaining, graduated ERC is defined as an ERC whose 10-year award period has expired, but which is financially self-sustaining and still retain ERC key features. Self-sustaining ERCs are from the Classes of 1990 or later (see the Appendix in Section X).

  An active SBIR/STTR awardee is one with an NSF Phase II award, which has not yet expired.

  Given these definitions, proposals may only be submitted by the following:

  - **Option 1:** Any *Small Business Concern* proposing to either speed the translation of ERC generated technology into the marketplace or speed its implementation into a critical public service engineered system (the infrastructure). The firm may (or may not) be a current member of the ERC Industrial Advisory Board. (In Fastlane, submit the proposal to the EEC Division's ERC program). To be eligible for this award, the *Small Business Concern* must partner with either an *active ERC awardee* or a *self-sustaining, graduated ERC* that participates in the collaborative research project and is a subawardee. In addition, the proposing firm must have obtained a license from the appropriate university for the ERC intellectual property associated with the proposed project before an award can be made.
  - **Option 2:** Active NSF SBIR/STTR Phase II awardees proposing to leverage ERC developed technology or know-how to strengthen the research capacity of the small business partner in the collaboration. (**Submit the proposal, via FastLane, as a supplement to the original Phase II award).** The objective is to speed the entry of the SBIR/STTR's innovation into the marketplace. Only *active NSF SBIR/STTR* Phase II awardees are eligible to directly apply to this solicitation under Option 2. In addition, the company is only eligible to apply, when an *active or self-sustaining, graduated* ERC, participates in the collaborative research project and is a subawardee.

  A list of self-sustaining, graduated ERCs meeting these criteria is provided in the Appendix in Section X. Note that graduated ERCs operating on brief no-cost extensions of the original award are classified as self-sustaining. A potential list of active SBIR/STTR awardees can be viewed using the NSF award search tool at http://www.nsf.gov/awardsearch/tab.do?dispatch=4 and confining the search to Element Code 5373 or 1591 for awards. Details about the award and PI are viewable by clicking on the award number.

PI Limit:

None Specified

Limit on Number of Proposals per Organization: 3

Limit on Number of Proposals per PI: 1

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.

- **Preliminary Proposal Submission:** Not Applicable

- **Full Proposals:**
    - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
    - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

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

- **Indirect Cost (F&A) Limitations:**

  Option 2: Budgets for supplemental funding request must not exceed the hourly rate of salary/wage for each budgeted employee, the rate of fringe benefits, the rate of indirect costs and the rate of fee cannot exceed those in the final budget of the current Phase II award.

- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Letter of Intent Due Date(s)** *(required)* (due by 5 p.m. proposer's local time):

    May 06, 2013

        Option 1 (full proposals) and Option 2 (requests for supplemental funding)

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

    July 02, 2013

        Option 1 (full proposals) and Option 2 (requests for supplemental funding)

Proposal Review Information Criteria

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

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

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

TABLE OF CONTENTS

I. INTRODUCTION

This funding opportunity is aimed at enhancing the innovation impact of NSF's investments in Engineering Research Centers (ERCs). The first two generations of ERCs (1985-2009) were designed to function through sustained partnerships with their industry and government practitioner partners. These ERC member organizations brought knowledge of industrial and professional practices and needs to academe, and they streamlined the translation of academic research into useful products, processes, and services. However, there were still a large number of discoveries and inventions developed within the ERCs that never reached their full innovation or commercial potential, because the ERC member firms lacked the resources or the technology didn't overlap well with their long term business strategy.

As a result, the Generation Three (Gen-3) ERC Program construct was developed in 2008 to actively seek additional small business partnerships aimed specifically at spinning out center developed technology that was not licensed by the ERC member partners. This new mandate broadens the role of the ERC to include creating and nurturing an innovation ecosystem designed to more effectively impact the development of new products and services delivered into the U. S. economy. Generally, an innovation ecosystem includes the people, institutions, policies, and resources that promote the translation of new ideas into products and processes and services. Similarly, the innovation ecosystem of Gen-3 ERCs is achieved through a symbiotic relationship between the center researchers, small businesses, large industrial and practitioner partners, and other partner organizations devoted to stimulating entrepreneurship and innovation. As such, the Gen-3 ERCs will continue nurturing the sustained partnerships of the original ERC model, while also proactively seeking ways to translate ERC technology developments to the market that are not being developed with the resources of one of the partners. While not required, many Gen-2 and recently graduated ERCs have pursued translational research partnerships under the Gen-3 protocol to accelerate the entry of their technology into the marketplace.

Option 1: This funding option is aimed at developing generic hardware or software technologies that derive from ERC research discoveries and proof-of-concept testbeds by having the *active or self-sustaining ERCs* form collaborations with fiscally viable small firms. Beyond that, this solicitation seeks to maximize the leverage of NSF's earlier technology investments via technology translation by preferentially supporting the translation of ERC technologies that undergird strategically identified **platform technologies**. The identification of a platform technology is an option, not a requirement, in this solicitation.

Platform technologies are generically defined as a set of technologies that:

- Are related;
- Are common to different businesses and product families;
- Are distinctive and can provide competitive advantage;
- Enable and accelerate a broad range product development (tools, methods, etc.)

In the business world, platform technologies are important because they provide a framework for reusing an initial investment in technological know-how in different markets and businesses in order to gain a competitive advantage. "A platform may include physical components, tools and rules to facilitate development, a collection of technical standards to support interoperability, or any combination of these things. Serving as a stable nexus or foundation, a platform can organize the technical development of interchangeable, complementary components and permit them to interact with one another." See for example, http://kevinboudreau.com/PAPER%20Open%20Platform%20Complement%20Draft.pdf.

EXAMPLES OF PLATFORM TECHNOLOGIES: Computers are one of the most familiar examples of a technology platform that beautifully illustrates how physical components can be designed with hardware and software interface standards that make them interoperable.

An example of an ERC platform technology would be the image extraction techniques that were developed at the Center for SubSurface Imaging Systems (CenSSIS) to differentiate the target of interest from irrelevant clutter and scattered radiation. The CenSSIS image extraction framework have been successfully applied to a wide variety of problems in underwater imagery, underground imagery, medical imagery inside the body, and 3-D biological microscopy inside a cell or collection of cells.

Both Non-platform and Platform Technologies are eligible for an award. The solicitation encourages proposals for both non-platform and platform technologies that have high impact potential.

Option 2: This funding option is targeted to improve the competitiveness of small firms with *active NSF Phase II SBIR/STTR* awards by having them partner with active or self-sustaining graduated ERCs. *Active NSF Phase II SBIR/STTR* recipients are the elite subset of firms who have a demonstrated track record of successfully implementing innovative research. The Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs are designed to stimulate technological innovation in the private sector by strengthening the role of small business concerns in meeting federal research and development needs, increasing the commercial application of federally supported research results, and fostering and encouraging participation by socially and economically disadvantaged and women-owned small businesses.

II. PROGRAM DESCRIPTION

This program seeks to combine the innovations arising from NSF's investment in strategically planned, cross-disciplinary Engineering Research Center's (ERC) with the technology translation and business acumen of the small business sector, including that developed from NSF's investment in Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs and other fiscally viable small R&D firms.

The National Science Foundation-sponsored ERCs are cross-disciplinary, multi-university centers located at universities all across the United States, each operating in close partnership with industry; and, some also with additional government-agency or other service sector partners. Each ERC provides an environment in which academe and industry collaborate in pursuing strategic advances in complex engineered systems and enabling systems-level technologies that have the potential to spawn whole new industries or to radically transform the product lines, processing technologies, or service delivery methodologies of current industries. Activity within ERCs lies at the interface between the discovery-driven culture of science and the innovation-driven culture of engineering and industry. The centers provide the intellectual foundation for industry to collaborate with faculty and students in resolving long-range challenges, producing the knowledge needed for steady advances in technology and their speedy transition to the marketplace. More information can be found at: http://www.erc-assoc.org/.

The SBIR/STTR program stimulates entrepreneurship in this country through government support for research in small businesses. These small business concerns often need additional research to commercialize their products and/or services. One method of

providing this needed research is by enabling small businesses to collaborate with an ERC. More information can be found at: http://www.nsf.gov/eng/iip/sbir/.

Under Option 1, the proposed funding request must be centered on research that is mutually beneficial to the ERC and the proposing fiscally viable small business concern. In particular, the small business should define a role that will align with the ERC's technology translation goal.

Under Option 2, if the small business concern is an active NSF SBIR/STTR Phase II awardee, the proposed research may also be aimed at leveraging ERC technology to help improve the competitive position of the proposing SBIR/STTR firm.

Thus, the solicitation serves the following dual purposes:

1. Speed the translation of ERC-generated research and technology advances to the marketplace (or its implementation into critical public service infrastructure) and engage undergraduate and graduate students more directly in the innovation process though collaboration between an ERC and a fiscally viable small business concern;
2. Strengthen the research capacity of the proposing active NSF SBIR/STTR Phase II awardee to speed the entry of its innovation into the marketplace thereby improving the awardee's competitive position, and broadening its portfolio of marketable products through collaboration with an ERC.

In both instances, the intent is to facilitate the translation of the knowledge gained from NSF's earlier technology investments into useful applications. The awardees create a mutually beneficial research and commercialization platform that joins ERCs and small business companies in this effort and establishes a model upon which the ERC and the firm can collaborate in the future.

Prospective fiscally viable small R&D firms and active NSF SBIR/STTR Phase II awardees should contact an ERC of interest, defined in the Appendix in Section X, to learn more about that center's scope of research, its membership agreement, the members of its Industrial Advisory Board (IAB) and the research areas of interest of the center's researchers, and whether there is intellectual property available for translational research. Current information on ERCs can be found at http://www.erc-assoc.org.

III. AWARD INFORMATION

Anticipated Type of Award:

Option 1: Fixed Amount Award with special reporting requirements outlined in Section VII.c

Option 2: SBIR Supplement

Estimated Number of Awards: 15

Anticipated Funding Amount: $3,000,000, pending availability of funds

Each partnership consists of one small business lead collaborating with an active or self-sustaining, graduated ERC as a sub-contractor. The combined total award would be up to $200,000 with a duration of one or two years.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- The following definitions are applicable in this section.

    A Small Business Concern (SBC) is a legally established entity that meets the the NSF SBIR program definition of a Small Business Concern http://www.nsf.gov/eng/iip/sbir/definitions.jsp#sbc and is also able to demonstrate financial viability during the award period, as per the Prospective New Awardee Guide (*http://www.nsf.gov/publications/pub_summ.jsp?ods_key=pnag*). This opportunity is only for fiscally viable SBCs.

    An active ERC awardee is defined as an awardee with an NSF ERC award which has not yet expired.

    A self-sustaining, graduated ERC is defined as an ERC whose 10-year award period has expired, but which is financially self-sustaining and still retain ERC key features. Self-sustaining ERCs are from the Classes of 1990 or later (see the Appendix in Section X).

    An active SBIR/STTR awardee is one with an NSF Phase II award, which has not yet expired.

    Given these definitions, proposals may only be submitted by the following:

    - **Option 1:** Any *Small Business Concern* proposing to either speed the translation of ERC generated technology into the marketplace or speed its implementation into a critical public service engineered system (the infrastructure). The firm may (or may not) be a current member of the ERC Industrial Advisory Board. (In Fastlane, submit the proposal to the EEC Division's ERC program). To be eligible for this award, the *Small Business Concern* must partner with either an *active ERC awardee* or a *self-sustaining, graduated ERC* that participates in the collaborative research project and is a subawardee. In addition, the proposing firm must have obtained a license from the appropriate university for the ERC intellectual property associated with the proposed project before an award can be made.
    - **Option 2:** Active NSF SBIR/STTR Phase II awardees proposing to leverage ERC developed technology or know-how to strengthen the research capacity of the small business partner in the collaboration. (**Submit the proposal, via FastLane, as a supplement to the original Phase II award).** The objective is to speed the entry of the SBIR/STTR's innovation into the marketplace. Only *active NSF SBIR/STTR* Phase II awardees are eligible to directly apply to this solicitation under Option 2. In addition, the company is only eligible to apply, when an *active or self-sustaining, graduated* ERC, participates in the collaborative research project and is a

subawardee.

A list of self-sustaining, graduated ERCs meeting these criteria is provided in the Appendix in Section X. Note that graduated ERCs operating on brief no-cost extensions of the original award are classified as self-sustaining. A potential list of active SBIR/STTR awardees can be viewed using the NSF award search tool at http://www.nsf.gov/awardsearch/tab.do?dispatch=4 and confining the search to Element Code 5373 or 1591 for awards. Details about the award and PI are viewable by clicking on the award number.

PI Limit:

None Specified

Limit on Number of Proposals per Organization: 3

Limit on Number of Proposals per PI: 1

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent *(required):*

A Letter of Intent (LOI) is required to facilitate the NSF review process. The letter should be submitted via FastLane no later than the LOI deadline specified in this solicitation. The LOI allows NSF to screen the proposals with respect to eligibility requirements, to categorize the proposals, and to identify conflicts-of-interest to prepare for the proposal review processes. Follow these steps for the LOI preparation and submission:

Submit information for your LOI through Fast Lane under these categories **only (note the character limits, which include spaces, as stated below):**

- Project Title: The Project Title should begin with "OPTION 1: Small-Business ERC Collaborative Opportunity for the *technical title*..." or "OPTION 2: Small-Business ERC Collaborative Opportunity for the *technical title*..." to indicate which option the proposal will be directed to. The technical title and should then reflect the focus of the proposed collaboration.
- Synopsis: (maximum of 2,500 characters in this section): Provide brief statements of the vision and goals of the proposed collaboration at a sufficient level of detail to understand the proposed collaboration.
- Participants (maximum of 255 characters in this section); identify the:
  - Lead small business firm;
  - Collaborating ERC organization;
  - Small Business Project PI with contact information;
  - ERC Faculty subawardee with contact information (include institutional affiliation if different from ERC lead institution);
- Participating Organizations: Include names and addresses (city, state, country) for the small business firm, the ERC, and the institutional affiliation of the faculty PI if he/she is not at the ERC lead institution.

Special Letter of Intent Preparation Instruction:

- Submission of multiple Letters of Intent is allowed.
- Participants and Participating Organizations are required when submitting Letters of Intent.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Sponsored Projects Office (SPO) Submission is required when submitting Letters of Intent
- A Minimum of 0 and Maximum of 4 Other Senior Project Personnel are allowed
- A Minimum of 1 and Maximum of 5 Other Participating Organizations are allowed
- Submission of multiple Letters of Intent is allowed

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

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

Important Proposal Preparation Information for Option 1 (full proposals): FastLane will check for required sections of the proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a

required section is missing, **FastLane will not accept the proposal.**

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

Option 1: The fiscally viable small business, as the lead organization, must submit a single proposal that details the research responsibilities for both the small business and the ERC collaborator. (In Fastlane, submit the proposal to the EEC ERC program element 1480). The ERC collaborator must be designated as a subcontractor. The sub-awardee budget to the ERC collaborator must be a minimum of 30% or a maximum of 60% of the total award amount. The title of the proposal must start with "OPTION 1: Small-Business ERC Collaborative Opportunity for the *technical title*...". The proposal must state if the ERC partner is an active or graduated awardee.

1. *Project Summary:* The project summary consists of an overview and statements on the Intellectual Merit and Broader Impacts of the proposed activity (one page limit).

2. *Project Description (15 page limit)*:

    a. Vision and goals of the project: Provide information on the project's vision, goals, and deliverables. Justify the vision in the context of a submission to Option 1. If the proposed project is aimed at supporting the *optional* demonstration of a portion of a platform technology framework that aligns with the ERC's long term strategic plan, the stated goals should indicate how the project will accomplish this. Non-platform technology submissions do not need to show alignment with the ERC strategic plan, but should clearly delineate the value proposition to the intended market segment or the impact on the intended critical public engineering project.

    b. Justification of the proposed project: Indicate how the proposed project derives from research carried out under the umbrella of the ERC's strategic plan during its NSF-supported phase and also include how the project furthers the ERC's strategic plan through translational research toward commercialization. (Note that the research may have been supported by (i) direct funding provided through the ERC's budget to the PI or (ii) sponsored project funds directed through the ERC. However, the research may not derive from associated project funding.) Justify how the proposed project aligns with the small business' current project portfolio and also strengthens the capacity of the small business concern to broaden its portfolio of marketable products. If the proposed project is in support of a critical public service infrastructure program, the emphasis of the narrative should be on the potential for high impact improvements to societal benefits rather than the commercialization impact.

    c. Research plan: The research plan must address the barriers to commercialization and include a strategy for overcoming them. Given the identified barriers, the research plan should describe the translational research or other research needed to explore commercialization of the technology and describe the test-beds. This section should also indicate how the project will be structured and executed specifying clearly the roles of the small business and ERC participants. Expected deliverables at the completion of the project should be specified and a milestone chart should be included indicating the time frame for addressing the technical and commercialization barriers. Optional platform technology framework only: justification of how the proposed project fits within the ERC's long term strategic plans aligning with a platform technology. Non-platform technology concepts should provide a stronger justification for how the proposal will move the concept toward market implementation.

    d. Broader Impacts: Please note, per guidance of GPG, the Project Description must contain as a separate section within the narrative a discussion of the broader impacts.

    e. Student involvement: Discuss how this project will provide ERC students at the graduate and/or undergraduate levels with essential experience to succeed in a competitive engineering, high-technology startup environment.

    f. Management Plan: This section should justify the choice for team members based on their expertise and in relation to the goals of the project.

    g. Future Commercialization Plan: Address the commercialization potential but do not write a full business plan. If applicable include the expected impact of implementing the technology in support of critical public engine,ering projects (see the section on additional review criteria). Use this section to build a case for the expectation of success by benchmarking the proposed technology against the competition. Estimate the expected revenues over five years (include references that back up assumptions made in calculating revenue estimates). Estimate the timeline to commercialization, including how much it will cost to complete commercialization. For the latter, if more than $1 Million, describe a plan for developing the source of additional funding, and wherever possible, secure letters of support from strategic partners. It is important to include other useful information that helps the reviewers evaluate the viability of the small business collaborator such as: (i) the years of operation for the small business concern; (ii) any existing key revenue sources; (iii) any examples of prior commercialization successes; and (iv) the number of full time employees.

3. *Budget:* Each partner organization must submit its own detailed budget and *all* line items in the budget must be justified. The budget should include travel for the small firm's PI and the ERC collaborator to attend a one-day workshop to be held in the Arlington, VA area. Because this is a continuing grant increment and the funds are apportioned between two performance periods, A and B, each partner organization must submit a separate budget for each increment.

- Proposals with 24 month performance periods, A+B that sum to 24 months. Half of the award funding will be released initially to fund Period A, and the remainder will be released after the NSF program director receives a satisfactory report on the first period of performance (see Section VII.C Reporting Requirements) to fund Period B;
- Proposals with performance periods less than 24 months can be either 15 months or 18 months in duration. Awards for 12 month periods will not be allowed because the duration is too short to automatically trigger the second funding increment. In addition, the following rules also apply:
  - Period A is less than or equal to 12 months; Period B is less than or equal to 12 months;
  - The sum of the durations, A+B, equals either 15 or 18 months and will be indicated on the cover sheet;
  - Budget is prorated between the two performance periods;
  - The initial progress report is due one month before the end of performance period A. Performance period B will start as soon as the progress report is approved by both the ERC PI and the NSF PD.

4. Biographical Sketches: Per the Grant Proposal Guide, the biographical sketches must be submitted with two page maximum per person. A minimum of two biographical sketches must be submitted, one for the small firm Principal Investigator, and the other for the ERC subawardee.

5. *Supplementary Documents required for Option 1*: The following must be included with the proposal as supplementary documentation:

- Letter of endorsement from the company president or the CEO that indicates the value of the research partnership to the small business and also describes how the small business will contribute to the ERC.
- Letter of endorsement from the ERC Center Director that describes the value of the research partnership to the ERC and

    o *for general proposals:* indicates whether the partnership facilitates any part of the ERC's center developed technology;

    o *for the optional platform technology proposals only:* indicates how the proposed project fits within the ERCs strategic plan to develop a framework for a platform technology. The letter should also reference the pages in the ERC strategic plan that describes the platform framework.

- *Organization chart* of the small R&D firm;
- *Optional platform technology* proposals only should provide a copy of the referenced section of the ERC strategic plan linking the proposed innovation to the plan, including the ERC's 3-plane strategic plan chart;
- *ERC lineage:* Documentation establishing ERC lineage of proposed innovation by providing copies of the Estimated Budgets by Research Thrust and Cluster in Table 2 of the ERC Annual Report during the years when the proposed innovation was developed;
- *Financial Conflicts of Interest (FCOI) Declaration:* The subawardee PI on this proposal must be an **ERC participant** and must submit a conflicts declaration, indicating whether or not he/she has a conflict with the submitting firm (as defined below). The definition of an **ERC participant** includes the ERC's Director, Deputy Director, and other faculty from the lead and/or partner universities of the ERC who are carrying out research supported by the ERC's direct budget (core) funds, whether the ERC is currently funded by the NSF ERC Program or is self-sustaining. In addition, there are some members of the ERC Leadership Team who do not hold faculty appointments, but are nonetheless actively involved in the decision process for allocating ERC funds (e.g. Industrial Liaison Officers (ILO), ERC Executive Managers or Directors, Administrative Director, etc.). They are also considered **ERC participants** and as such must also disclose whether they have financial conflicts of interest with firms that are engaged with the ERC. Please note that Chapter IV, Section A.3 of the NSF Award Administration Guide (AAG) requires that "financial disclosures are updated during the period of the award, either on an annual basis, or as a new reportable significant financial interested". The following situations define **Financial Conflict of Interest** relationships that must be managed:

    o INCOME received by the ERC participant from the submitting firm, including, but not limited to, salary, consulting fees, honoraria, travel reimbursement, and income related to intellectual property rights and interests (patents, copyrights).

    o EQUITY in the submitting firm received by the ERC participant, including, but not limited to, stock, stock options, stock purchase plan, incentive stock options, phantom stock, and stock appreciation rights.

    o POSITIONS in the submitting firm or in other entities affected by the proposed project, including, but not limited to, employee, consultant, founder, partner, board of directors, officer, trustee, Chief Executive Officer, Chief Technology Officer, Scientific Advisory Board.

    o FINANCIAL interests in the submitting firm held by spouses and dependent children of the ERC participants.

- *Certification of FCOI Management Plan:* If the **ERC participant** in this project has significant financial conflict of interest in the submitting small business partner firm or other entities affected by the proposed project, the Authorized Organizational Representative (AOR) must certify that the university has on file a current copy of the FCOI management plan for the affected individual(s). For each of the ERC participants in the proposal who do not have a conflict of interest, the AOR should certify that there are no conflicts of interest.

6. *Single copy document required for Option 1:* Documentation establishing financial viability of the firm as follows:

    1. Up-to-date Balance Sheet and Balance Sheet for the most recently completed fiscal year.
    2. Indicate whether each Balance Sheet is audited, reviewed or compiled.
    3. Calculate and clearly specify the following for each Balance Sheet:
        - Acid Test Ratio (Quick Ratio) = (Current Assets - Inventories -Prepayments)/Current Liabilities
        - Current Ratio = Current Assets/Current Liabilities
        - Working Capital = Current Assets - Current Liabilities

After the calculation, if the ratios are low (less than 1.0), please provide additional documents such as funding commitments, letters of support or investor interest, statements showing deferment of repayment of current debts etc, which would show that the firm has enough financial resources to carry out the grant activities. Prepare the requested financial information into a single PDF document labeled "Financial Viability Information" and upload into Fastlane under "single copy document". DO NOT UPLOAD UNDER SUPPLEMENTARY DOCUMENTS.

After programmatic review, all prospective new awardees will undergo a comprehensive administrative and financial review as outlined in the Prospective New Awardee Guide (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=pnag).

Option 2: The active NSF SBIR/STTR Phase II company will submit a request for supplemental funding to the original Phase II award via FastLane. The ERC grantee will be a subcontractor. If the grantee is an active NSF STTR Phase II company, the sub-awardee budget to the ERC must be a minimum of 30% or a maximum of 60% of the total award amount. If the grantee is an active NSF SBIR Phase II company, the sub-awardee budget to the ERC must not exceed 50% of the total award amount. The title of the proposal must start with "ERC - Small Business:" The proposal must state if the ERC is an active or a graduated awardee.

1. *Summary of Proposed Work (15 page limit):*

    a. *Vision and goals of the project:* Provide information on the project's vision, goals, and deliverables. Justify the vision in the context of a submission to Option 2.

    b. *Research Plan:* Rationale for collaboration including tasks to be performed: Research plan should address barriers to commercialization and propose a strategy for overcoming them. Given the barriers, the research plan should describe the additional research needed to explore commercialization of the technology, indicate how the project will be structured and executed, and specify the roles of the small business and ERC participants. Expected deliverables at the completion of the project should be specified and a milestone chart should be included depicting the timing of how the technological barriers will be addressed.

    c. *Plan for student involvement:* Discuss how this project will provide ERC students at the graduate and/or undergraduate levels with essential experience to succeed in a competitive engineering, high-technology startup environment.

d. *Management Plan*: Provide a management plan, justify the team in relationship to the goals of the project and their expertise.

e. *Future Commercialization Plan:* Address the commercialization potential (do not write a full business plan). Use this section to build a case for the expectation of success by benchmarking your technology against the competition. Estimate the expected revenues over five years (include references that back up assumptions made in calculating revenue estimates). Estimate the timeline to commercialization, including how much it will cost to complete commercialization. For the latter, if more than $1 Million, please also supply a plan for developing the source of additional funding, and wherever possible, secure letters of support from strategic partners. Also provide the commercialization history, if any, of the company.

2. *Justification of the proposed project*: Description of the innovation and the objectives of the project, and how the partnership will achieve one or both of the outcomes defined above in the Project Summary under the Intellectual Merit and Broader Impact categories. Indicate how these objectives relate to the Phase I and current Phase II efforts. Provide a summary of the history of this technology development via Phase I and the current Phase II efforts. Summarize the technical and commercial results of all Phase II interim reports submitted and approved as of date. Justify how the proposed project also strengthens the capacity of the small business concern to broaden its portfolio of marketable products.

3. *Budget:* A detailed budget must be included for each partner organization and *all* line items in the budget must be justified. The budget should include travel for the small firm's PI and the ERC collaborator to attend a one-day workshop to be held in the Arlington, VA area. As in the case of all Phase II supplements, it is required that an interim report be submitted every six (6) months and approved by the Program Director before a supplement payment is released.

4. *Supplementary Documents required for Option 2:* The following must be included with the proposal as supplementary documentation:

- Letter of endorsement from the company president or the CEO that indicates the value of the research partnership to the small business and also describes how the small business will contribute to the ERC.
- Letter of endorsement from the ERC Center Director that describes the value of the research partnership to the ERC and indicates whether the partnership facilitates any part of the ERC's longer term strategic plan;
- Organization chart of the NSF SBIR/STTR firm;
- Biographical Sketches of Key Personnel: Biographical sketches, in the format specified in the GPG, must be submitted with two page maximum per person. A minimum of two biographical sketches must be submitted as supplementary documents, one for the NSF SBIR/STTR Principal Investigator, and the other for the ERC subawardee.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Indirect Cost (F&A) Limitations:

Option 2: Budgets for supplemental funding request must not exceed the hourly rate of salary/wage for each budgeted employee, the rate of fringe benefits, the rate of indirect costs and the rate of fee cannot exceed those in the final budget of the current Phase II award.

C. Due Dates

- **Letter of Intent Due Date(s)** *(required)* (due by 5 p.m. proposer's local time)**:**

    May 06, 2013

        Option 1 (full proposals) and Option 2 (requests for supplemental funding)

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

    July 02, 2013

        Option 1 (full proposals) and Option 2 (requests for supplemental funding)

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

    Detailed technical instructions regarding the technical aspects of 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 Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **For Proposals Submitted Via Grants.gov:**

    Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

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

VI. NSF Proposal Processing and Review Procedures

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

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

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the core strategies in support of NSF's mission is to foster integration of research and education through the programs, projects and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students, and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the variety of learning perspectives.

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply

both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

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

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

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

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

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

Additional Solicitation Specific Review Criteria

For Option 1 and Option 2 Proposals. Given the solicitation goals to help translate ERC generated advancements via the commercial marketplace, the implementation into public engineered systems, or speed the commercialization of NSF supported SBIR/STTR innovations to the marketplace, the additional review criteria emphasize those aspects of the standard NSF intellectual merit and broader impact criteria that are related to translation of knowledge rather than to scientific discovery. In addition to the standard NSF review criteria, the following review criteria will be used:
Option 1: Potential for Commercialization or for High Impact Improvement on the Performance of Public Service Delivery Systems

- The extent to which the proposer understands and has evaluated the potential market for the proposed technology to be transferred or the ability of the innovation to improve the benefit to society of public service infrastructure programs;
- The extent to which the proposer benchmarked the innovation versus existing products that meet the same market needs. This may include innovations aimed at implementing important infrastructure projects for the benefit of society;
- The degree to which the proposal demonstrates an effective strategy for translating/speeding the technology innovation to the marketplace. This may include innovations aimed at implementing important public infrastructure needs;
- The degree to which the innovation presents a compelling value proposition i.e. strong need or market-pull, breadth of potential commercial impact for the innovation or its compelling need in support of critical public infrastructure projects;
- The degree to which the intellectual property issues are effectively addressed vis-a-vis the firm and university involved and there is sufficient protection to move the product to market and attain at least a temporal competitive advantage; and
- For platform technology proposals only:
  - The degree to which the proposed project advances the ERC's strategic plan for implementing a platform technology;
  - The degree to which the platform technology supports a range of new processes or technologies;

Option 2: Commercialization Potential

- The extent to which the proposer understands and has evaluated the potential market for the proposed technology to be transferred;
- The extent to which the proposer benchmarked the innovation versus existing products that meet the same market needs;
- The extent to which the proposed activity positions the firm to attract further funding from SBIR and/or non-SBIR sources once the project ends;
- The degree to which the proposal demonstrates an effective strategy for translating/speeding the technology innovation to the marketplace;
- The degree to which the innovation presents a compelling value proposition i.e. strong need or market-pull and breadth of potential commercial impact for the innovation; and
- The degree to which the intellectual property issues are effectively addressed vis-a-vis the firm and university involved, and there is sufficient protection to move the product to market and attain at least a temporal competitive advantage.

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 formulate a recommendation to either support or decline each proposal. 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 is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the

Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

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 letter, 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 letter; (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 letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

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

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

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

Option 1. To ensure strong coordination between the small business concern and the ERC collaborator, the Option1 award will be set up as a fixed amount award with the funds are apportioned between two performance periods, A and B, which are defined as follows.

- Proposals with 24 month performance periods, A+B that sum to 24 months. Half of the award funding will be released initially to fund Period A, and the remainder will be released after the NSF program director receives a satisfactory report on the first period of performance (see Section VII.C Reporting Requirements) to fund Period B;
- Proposals with performance periods less than 24 months can be either 15 months or 18 months in duration. Awards for 12 month periods will not be allowed because the duration is too short to automatically trigger the second funding increment. In addition, the following rules also apply:
  - Period A is less than or equal to 12 months; Period B is less than or equal to 12 months;
  - The sum of the durations, A+B, equals either 15 or 18 months and will be indicated on the cover sheet;
  - Budget is prorated between the two performance periods;
  - The initial progress report is due one month before the end of performance period A. Performance period B will start as soon as the progress report is approved by both the ERC PI and the NSF PD.

  As the recipient of a continuing grant increment, to receive the remaining funds, the small business PI must submit an integrated progress report, limited to 10 pages, that encompasses contributions by both the small business concern and the ERC research collaborators

This report must be submitted, via email, to the ERC faculty collaborator and the NSF ERC Program Director. If the progress report

is satisfactory to both the ERC faculty collaborator and the NSF ERC PD, the remaining funds will be awarded. In addition, the ERC faculty collaborator will submit the reports received from the small business PI for inclusion in Volume II of the ERC's annual report. The small business PI should note that submission of this report is *in addition to, not in lieu of* the standard NSF requirement that an annual and final report be submitted into Fastlane.

The final report must summarize the contributions by both the small business and ERC researchers over the award period.

Option 2. Plans for monitoring and assessment may include such elements as:

- Semi-annual reports from NSF SBIR/STTR Phase II firms;
- Annual Grantee Conference
- Post-award monitoring through site visits to NSF PhaseII firms;
- External evaluation

The final report must summarize the contributions by both the small business and ERC researchers over the award period.

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:

- Deborah J. Jackson, telephone: (703) 292-7499, email: djackson@nsf.gov

- Muralidharan S. Nair, telephone: (703) 292-7059, email: mnair@nsf.gov

- Carmiña Londoño, telephone: (703) 292-7053, email: clondono@nsf.gov

For questions related to the use of FastLane, contact:

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

For questions relating to Grants.gov contact:

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

Please contact the above individuals only for further information about this opportunity.

When using FastLane, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov for user support. The FastLane Help Desk answers general technical questions related to the use of the FastLane system.

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, National Science Foundation Update is a free e-mail subscription service 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 Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

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

Please visit the Engineering Research Center Association at
http://www.erc-assoc.org/
for more information on Engineering Research Centers.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

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

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

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

- **Location:**   4201 Wilson Blvd. Arlington, VA 22230

- **For General Information**   (703) 292-5111
  (NSF Information Center)**:**

- **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

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Suzanne H. Plimpton
Reports Clearance Officer
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National Science Foundation
Arlington, VA 22230

X. APPENDIX

Manufacturing

Ongoing

- **Synthetic Biology ERC** - University of California, Berkeley with Harvard University, the Massachusetts Institute of Technology, Prairie View A&M University (HBCU), and the University of California, San Francisco (est. 2006)
- **ERC for Biorenewable Chemicals** - Iowa State University with Rice University, the University of California, Irvine, the University of New Mexico, the University of Virginia, and the University of Wisconsin-Madison (est. 2008)
- **ERC for Compact and Efficient Fluid Power** - University of Minnesota with Georgia Institute of Technology, Purdue University, the University of Illinois at Urbana-Champaign, and Vanderbilt University (est. 2006)
- **ERC for Structured Organic Particulate Systems** - Rutgers University with New Jersey Institute of Technology, Purdue University, and the University of Puerto Rico-Mayaguez (est. 2006)
- **Nanosystems ERC for Nanomanufacturing Systems for Mobile Computing and Energy Technologies** - the University of Texas at Austin with the University of New Mexico and the University of California, Berkeley (est. 2012)

Self-sustaining

- **Environmentally Benign Semiconductor Manufacturing**, University of Arizona **-** 1996 to 2006
- **Advanced Engineering of Fibers and Films**, Clemson University - 1998 to 2008
- **Particle Science and Technology**, University of Florida **-** 1994 to 2006
- **Systems Research**, University of Maryland - 1985 & 1994 to 1997
- **Reconfigurable Manufacturing Systems**, University of Michigan - 1996 to 2007

Biotechnology and Health Care

Ongoing

- **Quality of Life ERC** - Carnegie Mellon University with the University of Pittsburgh (est. 2006)
- **ERC for Revolutionizing Metallic Biomaterials** - North Carolina A&T State University with the University of Cincinnati and the University of Pittsburgh (est. 2008)
- **Nanosystems ERC for Advanced Self-Powered Systems of Integrated Sensors and Technologies -** North Carolina State University with Pennsylvania State University, Florida International University, and University of Virginia (est. 2012)
- **Biomimetic MicroElectronic Systems ERC** - University of Southern California with Caltech and the University of California, Santa Cruz (est. 2003)
- **NSF Engineering Research Center for Sensorimotor Neural Engineering** - University of Washington with the Massachusetts Institute of Technology and San Diego State University (est. 2011)

Self-sustaining

- **Engineering of Living Tissues**, Georgia Tech - 1998 to 2008
- **Computer-Integrated Surgical Systems and Technology**, Johns Hopkins University - 1998 to 2008
- **Biotechnology Process Engineering**, MIT - 1985; and 1995 to 2005
- **Biofilm Engineering**, Montana State University - 1990 to 2001
- **Bioengineering Educational Technologies,** Vanderbilt University - 1999 to 2007
- **Engineered Biomaterials**, University of Washington - 1996 to 2007

Energy, Sustainability, and Infrastructure

Ongoing

- **ERC for Quantum Energy and Sustainable Solar Technologies** - Arizona State University with the California Institute of Technology, the University of Delaware, the Massachusetts Institute of Technology, and the University of New Mexico (co-funded with DOE) (est. 2011)
- **ERC for Future Renewable Electric Energy Delivery and Management** - North Carolina State University with Arizona State University, Florida State University. Florida A&M University, and Missouri University of Science and Technology (est. 2008)
- **Smart Lighting ERC** - Rensselaer Polytechnic Institute with Boston University and the University of New Mexico (est. 2008)
- **ERC for Re-Inventing America's Urban Water Infrastructure** - Stanford University with the University of California, Berkeley, Colorado School of Mines, and New Mexico State University (est. 2011)
- **ERC for Ultra-wide Area Resilient Electric Energy Transmission Networks** - University of Tennessee with Northeastern University, Rensselaer Polytechnic Institute, and Tuskegee University (co-funded with DOE) (est. 2008)

Self-sustaining

- **Multidisciplinary Center for Earthquake Engineering Research**, The University at Buffalo - 1997 to 2007
- **Pacific Earthquake Engineering Research Center**, University of California at Berkeley - 1997 to 2007
- **Mid-America Earthquake Center**, University of Illinois at Urbana-Champaign - 1997 to 2007

MICROELECTRONICS, SENSING, AND INFORMATION TECHNOLOGY

Ongoing

- **NERC for Translational Applications of Nanoscale Multiferroic Systems (TANMS),** University of California, Los Angeles (UCLA) in partnership with Cornell University, the University of California at Berkeley, and California State University, Northridge
- **ERC for Integrated Access Networks,** University of Arizona in partnership with the California Institute of Technology, Norfolk State University (HBCU), Stanford University, Tuskegee University (HBCU), the Universities of California at Berkeley, San Diego, and Los Angeles, and the University of Southern California, Class of 2008
- **ERC for Extreme Ultraviolet Science and Technology,** Colorado State University in partnership with the University of Colorado, Boulder and the University of California, Berkeley, Class of 2003
- **ERC for Collaborative Adaptive Sensing of the Atmosphere**, the University of Massachusetts-Amherst in partnership with Colorado State University, the University of Oklahoma, and the University of Puerto Rico-Mayaguez (MSI), Class of 2003
- **ERC on Mid-Infrared Technologies for Health and the Environment,** Princeton University in partnership with the City University of New York, Johns Hopkins University, Rice University, Texas A & M University, and the University of Maryland - Baltimore County, Class of 2006

Self-sustaining

- **Data Storage Systems**, Carnegie Mellon - 1990 to 2001
- **Microelectronics Packaging**, Georgia Tech - 1995 to 2006
- **Wireless Integrated Microsystems,** University of Michigan - 2000 to 2010
- **Computational Field Simulation**, Mississippi State - 1990 to 2001
- **Subsurface Sensing & Imaging Systems,** Northeastern University - 2000 to 2010
- **Integrated Media Systems**, University of Southern California - 1996 to 2007
- **Power Electronics Systems**, Virginia Tech - 1998 to 2008 s

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