

**THE DEPARTMENT OF HOMELAND SECURITY
SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM**

**PHASE I PROGRAM SOLICITATION FY 11.1
Science and Technology (S&T) Directorate**

Closing Date: January 6, 2011, 2:00 PM Eastern Standard Time (EST)

Important:

- **Solicitation Number: DHS SBIR-2011.1**
- **November 2, 2010:** Pre-release issued
- **November 18, 2010:** Full Solicitation issued
- **November 18, 2010 through January 6, 2011: Phase I Proposals Submitted and Accepted**
- **January 6, 2011: Deadline for Submission of Phase I Proposals is 2:00 PM Eastern Standard Time (EST)**
- Contract Specialist: Patrice Coleman
- **Contracting Officer: Cherita Thomas**
- **FAR Clauses 52.209-2 and 52.222-54 are incorporated into this Solicitation**
- Topic Revisions: Topic H-SB011.1-001 has been revised to clarify requirements. Topic H-SB011.1-002 has been revised to include Noncooperative Vessel Imaging and Tracking (NVIT) technologies.

Classified proposals are not accepted under the DHS S&T Directorate SBIR Program.

Direct Contact with Technical Points of Contact: Please note that direct contact with the Technical Points of Contact for each topic is limited to 15 days prior to issuance of the full solicitation. No direct contacts are permitted after November 17, 2010.

Deadline for Receipt. *Proposals must be completely submitted and electronically date stamped no later than 2:00 PM EST on January 6, 2011.*

Vendor Questions. Vendors may submit questions to STSBIR.PROPOSALS@dhs.gov no later than 3:00 PM EST, December 23, 2010. DHS will post replies no later than December 30, 2010 on <https://www.fbo.gov>.

No Printed Solicitation Books. Solicitations are available only in electronic format from the FedBizOpps website, www.fedbizopps.gov, in accordance with the Government Paperwork Elimination Act (GPEA). For convenience, the Solicitation will be available at <https://www.sbir.dhs.gov> after it is posted on the FedBizOpps website.

Information: If you have questions about the DHS SBIR Program, please submit your questions via email STSBIR.PROGRAM@dhs.gov. If you have questions or problems related to the electronic submission of your proposal, please contact the SBIR Help Desk at sbirhd@sainc.com or call 1-800-754-3043.

About this DHS S&T Directorate SBIR FY 11.1 Solicitation: There are six (6) topics in this Solicitation.

Notice: For administrative purposes only, submissions to this Solicitation will be handled by DHS Support Contractors.

CLOSED

TABLE OF CONTENTS

	Page
1.0 SBIR PROGRAM DESCRIPTION	5
1.1 SBIR Introduction	5
1.2 SBIR Three Phase Program	5
1.3 SBIR Proposer Eligibility and Limitations	6
1.4 SBIR Research and Analytical Work	7
1.5 SBIR Conflicts of Interest	7
1.6 Questions about the SBIR Solicitation Topics and Proposal Submission	7
1.7 Outreach Conferences and Events	9
2.0 DEFINITIONS	9
2.1 Research or Research and Development	9
2.2 Small Business Concern	9
2.3 Research Institution	10
2.4 Socially and Economically Disadvantaged Small Business Concern	10
2.5 Women-Owned Small Business Concern	10
2.6 Funding Agreement	10
2.7 Subcontract	11
2.8 Commercialization	11
2.9 Essentially Equivalent Work	11
2.10 Historically Black Colleges and Universities/Minority Institutions (HBCU/MI)	11
2.11 Historically Underutilized Business Zone (HUBZone) Small Business Concern	11
2.12 Service-Disabled Veteran	11
2.13 Small Business Concern Owned and Controlled by Service-Disabled Veterans	11
2.14 Small Business Concern Owned and Controlled by Veterans	11
2.15 United States	12
2.16 Manufacturing-related R&D as a Result of Executive Order 13329	12
2.17 Energy Independence and Security Act of 2007	12
2.18 Foreign National (Foreign Person) means any person who is not:	12
2.19 Research Involving Human Subjects	12
2.20 Research Involving Animal Subjects	13
3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS	13
3.1 Proposal Requirements	13
3.2 Administrative and Technical Checklist	13
3.3 Proprietary Information	14
3.4 Limitations on Length of Proposal	14
3.5 Phase I Proposal Format	14
3.6 Page Numbering	19
3.7 Phase II Proposal Invitation	19
3.8 Phase II Proposal Format	19
3.9 False Statements	21
3.10 SBIR Phase II Cost Match	21
4.0 METHOD OF SELECTION AND EVALUATION CRITERIA	24
4.1 Introduction	24
4.2 Evaluation Criteria - Phase I	26
4.3 Evaluation Criteria – Phase II	26

4.4	Assessing Commercial Potential of Proposals.....	27
5.0	CONTRACTUAL CONSIDERATIONS	28
5.1	Phase I Awards	28
5.2	Phase II Awards	28
5.3	Phase I Reports	29
5.4	Commercialization Updates in Phase II.....	29
5.5	Payment Schedule.....	30
5.6	Markings of Proprietary Proposal Information.....	30
5.7	Copyrights.....	31
5.8	Patents and Invention Reporting.....	32
5.9	Technical Data Rights.....	32
5.10	Contractor Commitments.....	32
5.11	Contractor Registration.....	33
5.12	Additional Information	34
6.0	SUBMISSION OF PROPOSALS.....	35
6.1	Electronic Proposal Submission	35
6.2	Proposal Deadline.....	35
6.3	Notification of Proposal Receipt.....	36
6.4	Information on Proposal Status.....	36
6.5	Evaluation Results and Debriefing of Unsuccessful Proposers.....	36
6.6	Correspondence Relating to Proposals.....	36
7.0	SCIENTIFIC AND TECHNICAL INFORMATION ASSISTANCE	36
7.1	SAFETY Act.....	36
7.2	Scientific and Technical Reference	37
7.3	State and Other Assistance Available.....	37
8.0	TECHNICAL TOPICS	37
8.1	SBIR TOPIC NUMBER: H-SB011.1-001	41
8.2	SBIR TOPIC NUMBER: H-SB011.1-002	45
8.3	SBIR TOPIC NUMBER: H-SB011.1-003	48
8.4	SBIR TOPIC NUMBER: H-SB011.1-004	50
8.5	SBIR TOPIC NUMBER: H-SB011.1-005	52
8.6	SBIR TOPIC NUMBER: H-SB011.1-006	54
9.0	DHS SBIR FY 11.1 Phase I SBIR Checklist.....	56

DHS S&T DIRECTORATE SOLICITATION FOR THE SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

1.0 SBIR PROGRAM DESCRIPTION

1.1 SBIR Introduction

The Department of Homeland Security (DHS) Science & Technology (S&T) Directorate, hereafter referred to as DHS S&T, invites small business concerns to submit proposals under this Solicitation for the Small Business Innovation Research (SBIR) Program. Small business concerns with the capability to conduct research or research and development (R/R&D) in any of the homeland security-related topic areas described in Section 8.0, and to commercialize the results of that R/R&D are encouraged to participate.

Objectives of the DHS S&T SBIR Program include stimulating technological innovation, strengthening the role of small business in meeting DHS research and development needs, fostering and encouraging participation of socially and economically disadvantaged persons and women-owned small business concerns in technological innovation, and increasing the commercial application of DHS supported research or R&D results.

The Federal SBIR Program is mandated by Public Laws PL 97-219, PL 99-443, PL 102-564, PL 106-554, PL 110-235, PL 111-10, PL 111-43, PL 111-66, PL 111-89, PL 111-136, PL 111-162, PL 111-214 and PL 111-251. The basic design of the DHS SBIR Program is in accordance with the Small Business Administration (SBA) SBIR Policy Directive, 2002. The DHS SBIR Program presented in this Solicitation encourages scientific and technical innovation in areas specifically identified by the Science and Technology (S&T) Directorate. The guidelines presented in this Solicitation incorporate and exploit the flexibility of the SBA Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to DHS and the private sector.

1.2 SBIR Three Phase Program

The DHS S&T FY11 SBIR Program Solicitation is issued pursuant to the Small Business Innovation Development Act of 1982, PL 97-219, PL 99-443, PL 102-564, and PL 106-554, including the following subsequent extensions: PL 110-235, PL 111-10, PL 111-43, PL 111-66, PL 111-89, PL 111-136, PL 111-162, PL 111-214, and PL 111-251. SBIR Policy is provided by the Small Business Administration through the SBA Policy Directive. The purpose of Phase I is to determine, insofar as possible, the scientific, technical, and commercial merit and feasibility of ideas submitted under the SBIR Program. Phase I (base) awards are up to \$100,000 in cost and up to a six-month period of performance for the research or research and development. Proposals must concentrate on that research or research and development (R/R&D) which will significantly contribute to proving the scientific, technical, and commercial feasibility of the proposed effort, the successful completion of which is a prerequisite for further DHS support in Phase II. Several different proposed solutions to a given topic may be funded. The measure of Phase I success includes evaluations of the extent to which Phase II results would have the potential to yield a product or process of continuing importance to DHS and/or the private sector. Proposers are encouraged to consider whether the research or research and development they are proposing to DHS also has private sector potential, either for the proposed application or as a base for other

applications. DHS encourages proposers to include, within the 25 page limit, an option which furthers the effort and will bridge the funding gap between Phase I and the Phase II start. Phase I options may be exercised upon the decision to fund the Phase II project. The option should not exceed \$50,000 and four (4) months. Further details are provided in Section 3.5 of this Solicitation.

Subsequent Phase II awards will be made to small business concerns on the basis of results of their Phase I efforts and the scientific, technical, and commercial merit of the Phase II Proposal. Phase II awards are up to \$750,000 in cost, and up to a 24-month period of performance. Phase II is the principal research or research and development effort and is expected to produce a well-defined deliverable prototype. A more comprehensive proposal will be required for Phase II. Further details are provided in Section 3.7 of this Solicitation.

SBIR Phase III refers to work that derives from, extends, or logically concludes effort(s) performed under prior SBIR funding agreements. Phase III is typically oriented towards commercialization of SBIR research or technology. SBIR awardees may seek contracts with the private sector or the Federal government (non-SBIR federal government resources) to further develop or supply goods or services related to the work performed under a concern's SBIR contract(s).

This Solicitation is for Phase I Proposals only. Only proposals submitted in response to this Solicitation will be considered for Phase I awards. Only proposals submitted in response to topics contained in this Solicitation will be accepted and considered for Phase I award. Proposers who were not awarded a contract in response to a prior SBIR solicitation may update or modify and re-submit the same or modified proposal if it is responsive to any of the topics listed in Section 8.0 of this Solicitation.

A separate solicitation will not be issued for Phase II of this SBIR FY 11.1 Program Solicitation. **Only those concerns that received Phase I awards are eligible to participate in Phases II and III.**

DHS will select and invite Phase I awardees to submit a Phase II Proposal to continue the research and maintain the momentum of the Phase I R/R&D. DHS uses the invitation process to accomplish an expeditious review leading to a Phase II award. Phase II Proposals shall be submitted online in accordance with Section 6.0 of this Solicitation.

DHS is not obligated to make any awards under either Phases I, II, or III, and all awards are subject to the availability of funds. DHS is not liable for any costs expended by the proposer before award of any contract.

1.3 ***SBIR Proposer Eligibility and Limitations***

Each proposer must qualify as a small business for research or research and development purposes as defined in Section 2.0 of this Solicitation and must certify to this on the Cover Sheet of its Proposal. For both SBIR Phases I and II, the primary employment of the principal investigator must be with the small business concern at the time of the award and during the conduct of the proposed effort. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Primary employment with a small business concern

precludes full-time employment at another organization. For both Phase I and Phase II, all research or research and development work shall be performed by the small business concern and its subcontractors in the United States. Deviations from the requirements in this paragraph must be approved in writing by the Contracting Officer (during contract negotiations).

Joint ventures and limited partnerships are permitted, provided that the entity created qualifies as a small business in accordance with the Small Business Act, 15 USC 631, and the definition included in Section 2.2 of this Solicitation.

1.4 *SBIR Research and Analytical Work*

a. **For Phase I**, a minimum of two-thirds of the research and/or analytical work shall be performed by the proposing small business concern. The percentage of work is usually measured by both direct and indirect costs for Phase I.

b. **For Phase II**, a minimum of one-half of the research and/or analytical work shall be performed by the proposing small business concern, unless otherwise approved in writing by the Contracting Officer. The percentage of work is usually measured by both direct and indirect costs for Phase II.

1.5 *SBIR Conflicts of Interest*

Awards made to small business concerns owned by or employing current or previous Federal Government employees could create conflicts of interest for those employees and could be in violation of federal law. Such proposers should contact the cognizant Ethics Counselor from the employee's Government agency for further guidance.

1.6 *Questions about the SBIR Solicitation Topics and Proposal Submission*

- a. **Where to Get Help.** All general questions about this Solicitation and other program-related areas, as well as proposal preparation, should be submitted via email to STSBIR.PROPOSALS@dhs.gov. Questions about the electronic submission of proposals should be submitted to the Help Desk toll free number: 1-800-754-0443, or via email to sbirhd@sainc.com. The Help Desk may be contacted from 8:30 a.m. to 5:00 p.m. EST.
- b. **The DHS SBIR Website.** The DHS SBIR website at <https://www.sbir.dhs.gov> offers electronic access to: SBIR solicitations, frequently asked questions (FAQs), answers to FAQs, abstracts of previously funded SBIR Phase I and Phase II projects, the latest updates on the SBIR Program, and hyperlinks to other useful information. Phase I award information is posted on the website generally four months after the close of the solicitation.
- c. **Electronic Proposal Submission.** All Phase I and Phase II Proposals shall be submitted via the electronic submission website at <https://www.sbir.dhs.gov>. Proposals received by any other means will not be evaluated or considered for award. In order to begin a DHS SBIR proposal submission, proposers must first register by completing the Company Registration process. After company registration, proposers must complete a four (4) step process before final submission is complete. Upon completion of the cover sheet (Step 1), technical

proposal (Step 2), and cost proposal (Step 3), proposers must finalize/submit their proposal (Step 4). The proposer must choose the proposal and click the “Choose Proposal to Finalize” button to proceed. In order to complete the process, the proposer must click the “Yes, Finalize” button. Once this has been completed, an email confirmation receipt will be sent to the registered email account. Upon successful completion of the steps outlined above, the proposer’s proposal will be electronically date stamped and officially received by the DHS SBIR Program Office.

- d. **General Questions about the DHS SBIR Program or the Science and Technology (S&T) Directorate.** General questions pertaining to the DHS SBIR Program or the S&T Directorate should be submitted to STSBIR.PROGRAM@dhs.gov or by calling the DHS SBIR Program contact: Ms. Elissa I. Sobolewski, DHS SBIR Program Director, 202-254-6768.
- e. **Technical Questions about Solicitation Topics.** From November 2, 2010 through November 17, 2010, this Solicitation is issued for pre-release on the Federal Business Opportunities (FedBizOpps) website (www.fedbizopps.gov) and the DHS SBIR website (<https://www.sbir.dhs.gov>) with the names, phone numbers and email addresses of the Technical Point of Contact for each technical topic. During this period, = proposers have an opportunity to contact Technical Points of Contact by telephone or by email to ask technical questions about specific technical topics contained in this Solicitation. Questions should be limited to specific information related to improving the understanding of a particular topic’s requirements. Proposers may not ask for advice or guidance on its solution approach, nor submit additional material to the Technical Points of Contact. If information given in response to a question is deemed necessary for the preparation of proposals, that information will be made available via an updated topic description(s).
- No further direct contact between proposers and Technical Points of Contact shall occur from November 18, 2010 through **January 6, 2011** for reasons of competitive fairness. However, proposers may submit written questions to STSBIR_PROPOSALS@dhs.gov. Questions must be limited to technical information related to improving the understanding of a particular topic’s requirements. Any other questions, such as those asking for advice or guidance on solution approach, will not receive a response.
- If information given in response to a question is deemed necessary for the preparation of proposals, that information will be made available to the public for general viewing on the FedBizOpps website at <http://fedbizopps.gov> and on the DHS website at <https://www.sbir.dhs.gov>. [Responses to the questions received after November 17, 2010, 2010 will be posted on FedBizOpps as an amendment to the Solicitation.](#)
- f. **All proposers are advised to monitor the <http://www.fedbizopps.gov> and <https://www.sbir.dhs.gov> websites during the solicitation period for questions and answers, and other information relevant to the topic under which they are proposing.**

1.7 *Outreach Conferences and Events*

The DHS S&T SBIR Program participates in the National SBIR Conferences and in many regional and state-organized conferences for small business. For information on these events, visit the website, <https://www.sbir.dhs.gov> located under “News and Events,” or refer to the <http://www.sbir.gov> website for upcoming SBIR outreach events. The DHS Program Office encourages small disadvantaged, women-owned, veteran-owned, service-disabled veteran-owned, and socially and economically disadvantaged small businesses to participate.

2.0 *DEFINITIONS*

The following definitions apply for the purposes of this Solicitation:

2.1 *Research or Research and Development*

Any activity that is:

- a. **Basic Research.** Scientific study and experimentation to provide fundamental knowledge required for the solution of problems.
- b. **Exploratory Development.** A study, investigation or minor development effort directed toward specific problem areas with a view toward developing and evaluating the feasibility and practicability of proposed solutions.
- c. **Advanced Development.** Proof of design efforts directed toward projects that have moved into the development of hardware for test.
- d. **Engineering Development.** Full-scale engineering development projects for DHS or first responder use but which have not yet received approval for production.
- e. **For the purposes of Human Research Protection, “research” is defined as a systematic investigation including RDT&E, designed to develop generalizable knowledge (32 CFR 219).**

2.2 *Small Business Concern*

A small business concern is one that, on the date of award for both Phase I and Phase II funding agreements, meets all of the following criteria:

- a. Is organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials, or labor;
- b. Is in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture, there can be no more than 49 percent participation by foreign business entities in the joint venture;
- c. Is (1) at least 51 percent owned and controlled by one or more individuals who are citizens of the United States or permanent resident aliens in the United States, (2) at least 51% owned and controlled by another business concern that is itself at least 51% owned and controlled by individuals who are citizens of, or permanent resident aliens in the United States; or (3) a joint venture in which each entity to the venture must meet the requirements of either (1) or (2) of this section; and

- d. Has, including its affiliates, not more than 500 employees.

Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliates" is defined in greater detail in 13 CFR 121.103. The term "number of employees" is defined in 13 CFR 121.106.

A business concern may be in the form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust, or cooperative. Further information may be obtained at <http://sba.gov/size>, or by contacting the Small Business Administration's Government Contracting Area Office or Office of Size Standards.

2.3 *Research Institution*

A Research Institution is any organization located in the United States that is:

- a. A university;
- b. A nonprofit institution as defined in section 4(5) of the Stevenson-Wydler Technology Innovation Act of 1980; or
- c. A contractor-operated federally funded research and development center (FFRDC), as identified by the National Science Foundation in accordance with the government-wide Federal Acquisition Regulation issued in accordance with section 35(c)(1) of the Office of Federal Procurement Policy Act. (See <http://www.nsf.gov/statistics/ffrdc/> for a list of eligible FFRDCs.)

2.4 *Socially and Economically Disadvantaged Small Business Concern*

A socially and economically disadvantaged small business concern is one that is at least 51% owned and controlled by one or more socially and economically disadvantaged individuals, or an Indian tribe, including Alaska Native Corporations (ANCs), a Native Hawaiian Organization (NHO), or a Community Development Corporation (CDC). Control includes both the strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations. See 13 CFR 124.109, 124.110, and 124.111 for special rules pertaining to concerns owned by Indian tribes (including ANCs), NHOs or CDCs, respectively.

2.5 *Women-Owned Small Business Concern*

A women-owned small business is one that is at least 51 percent owned and controlled by one or more women, or in the case of a publicly owned business, at least 51 percent of the stock of which is owned by women, and who also control and operate it. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day-to-day management of the business.

2.6 *Funding Agreement*

Any contract, or grant, or cooperative agreement entered into between any Federal Agency and any small business concern for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government.

2.7 ***Subcontract***

A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by an awardee of a funding agreement calling for supplies or services for the performance of the original funding agreement. This includes consultants. See Section 3.5.b (9) of this Solicitation.

2.8 ***Commercialization***

Commercialization is the process of developing marketable products or services and delivering products or services for sale (whether by the originating party or by others) to Government or commercial markets.

2.9 ***Essentially Equivalent Work***

This occurs when (1) substantially the same research is proposed for funding in more than one contract proposal or grant application submitted to the same Federal agency; (2) substantially the same research is submitted to two or more different Federal agencies for review and funding consideration; or (3) a specific research objective and the research design for accomplishing an objective are the same or closely related in two or more proposals or awards, regardless of the funding source.

2.10 ***Historically Black Colleges and Universities/Minority Institutions (HBCU/MI)***

Listings for the Historically Black Colleges and Universities (HBCU) and Minority Institutions (MI) are available through the Department of Education website, http://www.ed.gov/about/offices/list/ocr/edu_minorityinst.html.

2.11 ***Historically Underutilized Business Zone (HUBZone) Small Business Concern***

HUBZone small business concern means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration. See <http://www.sba.gov/hubzone> for more details.

2.12 ***Service-Disabled Veteran***

2.13 ***Small Business Concern Owned and Controlled by Service-Disabled Veterans***

A small business concern that:

- a. not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and
- b. the management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such a veteran.

2.14 ***Small Business Concern Owned and Controlled by Veterans***

A small business concern that:

- a. not less than 51 percent of which is owned by one or more veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more; and
- b. the management and daily business operations of which are controlled by one or more veterans.

2.15 *United States*

"United States" means the fifty states, the territories and possessions of the Federal Government, the Commonwealth of Puerto Rico, the Republic of the Marshall Islands, the Federated States of Micronesia, the Republic of Palau, and the District of Columbia.

2.16 *Manufacturing-related R&D as a Result of Executive Order 13329*

Manufacturing-related R&D as a result of Executive Order 13329 relates to: (i) manufacturing processes, equipment and systems; or (ii) manufacturing workforce skills and protection.

2.17 *Energy Independence and Security Act of 2007*

On December 19, 2007, the President signed into Law the "Energy Independence and Security Act of 2007" which allows preference to be given to proposals that address research for renewable energy or energy efficiency.

2.18 *Foreign National (Foreign Person) means any person who is not:*

- a. a citizen or national of the United States; or
- b. a lawful permanent resident; or
- c. a protected individual as defined by 8 U.S.C.1324b(a)(3).

"Lawful permanent resident" is a person having the status of having been lawfully accorded the privilege of residing permanently in the United States as an immigrant in accordance with the immigration laws and such status not having changed.

"Protected individual" is an alien who is lawfully admitted for permanent residence, is granted the status of an alien lawfully admitted for temporary residence under 8 U.S.C.1160(a) or 8 U.S.C.1255a(a)(1), is admitted as a refugee under 8 U.S.C.1157, or is granted asylum under section 8 U.S.C.1158; but does not include (i) an alien who fails to apply for naturalization within six months of the date the alien first becomes eligible (by virtue of period of lawful permanent residence) to apply for naturalization or, if later, within six months after November 6, 1986, and (ii) an alien who has applied on a timely basis, but has not been naturalized as a citizen within two (2) years after the date of the application, unless the alien can establish that the alien is actively pursuing naturalization, except that time consumed in the Service's processing the application shall not be counted toward the 2-year period.

2.19 *Research Involving Human Subjects*

DHS has adopted Department of Health and Human Services (HHS) policies governing human subjects research, as set forth in 45 C.F.R. Part 46 (Subparts A-D). Subpart A of 45 C.F.R. part 46 is HHS' codification of the Federal Policy for the Protection of Human Subjects (also known

as The Common Rule) which represents the basic foundation for the protection of human subjects in most research conduct or supported by U.S. Federal departments and agencies. All research involving human subjects shall be conducted in accordance with DHS Management Directive Number 026-04.

2.20 *Research Involving Animal Subjects*

DHS has adopted the principles of the U.S. Department of Agriculture (USDA) implementation of the Animal Welfare Act, the Public Health Service (PHS) implementation of the Health Care extension Act, and the other related federal principles and guidelines as they represent the ethical foundation for the care and use of animals in research. All research involving the care and use of animals in research shall be conducted in accordance with DHS Management Directive Number 026-01.

3.0 *PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS*

3.1 *Proposal Requirements*

A proposal to any topic under the DHS S&T SBIR Program must provide sufficient information to persuade the Science and Technology Directorate that the proposed work represents an innovative approach to the investigation of an important scientific or engineering problem and is worthy of support under the stated criteria. The proposed research or research and development must be responsive to the chosen topic, although need not use the exact approach specified in the topic (see Section 4.1 of this Solicitation). Any small business contemplating a proposal for work on any specific topic shall determine that (a) the technical approach has a reasonable chance of meeting the topic objective, (b) this approach is innovative, not routine, with commercial application, and (c) the company has the capability to implement the technical approach, i.e., has or can obtain people and equipment suitable for the task.

Classified proposals are not accepted under the DHS SBIR Program. Classified proposals will not be accepted under this DHS S&T SBIR Solicitation and will be appropriately destroyed upon receipt.

3.2 *Administrative and Technical Checklist*

Read and follow all instructions contained in this Solicitation.

- a. Submit your proposal electronically via the website (<https://www.sbir.dhs.gov>) and prepare your SBIR Proposal as instructed on the website. A complete Proposal consists of the Proposal Cover Sheets, Technical Proposal and Cost Proposal. Your Proposal is not a complete submission unless it has been finalized within the electronic submission system. You will receive email confirmation that your proposal has been submitted. If you do not receive an email, contact the Help Desk or the SBIR Program as instructed in Section 1.6 of this Solicitation.

- b. The Technical proposal adheres to the topic criteria and the Cost proposal adheres to the funding thresholds specified in this Solicitation. The cost on the cover sheets matches the cost on the Cost Proposal.
- c. The Project Summary on the cover sheets contains NO proprietary information. In the event of an award, this project summary will be posted at <https://www.sbir.dhs.gov>. Mark proprietary information within the Technical Proposal as instructed in Section 5.6 of this Solicitation.
- d. The content in the Technical Proposal, including supporting data (if applicable), must include all of the items in Section 3.5(b) of this Solicitation in the order specified.
- e. The header on each page of your Technical Proposal must contain your company name, topic number, and proposal number. (The header may be included in the one-inch margins.)
- f. Limit your proposal to the page limitations established for Phase I and/or Phase II proposals.
- g. Use a type size no smaller than a 12-point font on standard 8 1/2" X 11" paper with one (1) inch margins
- h. The Technical Proposal must not be in two-column or more format. The Technical Proposal must be submitted in Portable Document Format (PDF) format.

Note: Public access to the internet is available at most public libraries, local schools or a Small Business Development Center (SBDC) in your area.

3.3 *Proprietary Information*

If information is provided that the proposer believes constitutes a trade secret, proprietary commercial or financial information, or personal information or data, it will be treated in confidence to the extent permitted by law, provided that it is clearly marked in accordance with Section 5.6 of this Solicitation.

3.4 *Limitations on Length of Proposal*

This Solicitation is designed to reduce the investment of time and cost to small business concerns in preparing a formal proposal. Those who wish to respond must submit a direct, concise, and informative research or research and development proposal of no more than the page limitations established for Phase I and/or Phase II Proposals, including proposal cover sheets and cost proposal. Promotional and non-project related discussion is discouraged. The space allocated to each section will depend on the problem chosen and the principal investigator's approach. In the interest of fairness, pages in excess of the Phase I, 25-page limitation (and Phase II, 50-page limitation) (including attachments, appendices, or references) will not be considered for review or award.

3.5 *Phase I Proposal Format*

The Phase I Proposal length is limited to 25 pages.

- a. **Proposal Cover Sheets.** Prepare the Proposal Cover Sheets (as provided on the electronic submission website <https://www.sbir.dhs.gov>), including a brief technical abstract of the

proposed R&D project and a discussion of anticipated benefits and potential commercial applications. Once you save the cover sheets, the system will assign a proposal number. You may edit the cover sheets as often as necessary until the Solicitation closes. Your cover sheets will count as the first two pages of your proposal no matter how they print out. If your proposal is selected for award, the technical abstract and discussion of anticipated benefits will be publicly released on the DHS S&T SBIR website and the Small Business Administration's TechNet website; therefore, do not include proprietary or classified information in these sections.

- b. **Technical Proposal.** Create a single file that covers the following items in the order given below. Begin your Technical Proposal on Page 3 (since the cover sheets are pages 1 and 2) and put your company name, topic number, and proposal number in the header of each page. (The header may be included in the one-inch margins.) The Technical Proposal must not be longer than 24 pages, since the Cover Sheet counts as two pages and the Cost Proposal counts as one page (no matter how they print out). The Technical Proposal file must be in Portable Document Format (PDF) for evaluation purposes. You cannot upload the Technical Proposal to the DHS S&T submission website until you have created the cover sheets and have been assigned a proposal number. Perform a virus check before uploading the Technical Proposal file. If a virus is detected, it may cause rejection of the proposal. The Technical Proposal must be a single file, including graphics and attachments. **Do not lock, password protect, or encrypt the file you upload.**
- (1) **Identification and Significance of the Problem or Opportunity.** Define the specific technical problem or opportunity addressed and its importance. (Begin on Page 3 of your Proposal.)
 - (2) **Phase I Technical Objectives.** Enumerate the specific objectives of the Phase I work including the questions it will try to answer to determine the feasibility of the proposed approach.
 - (3) **Phase I Work Plan.** Provide an explicit, detailed description of the Phase I approach. The Plan must indicate what is planned, how, when, and where the work will be carried out, a schedule of major events, the final product to be delivered, and the completion date of the effort. The Phase I effort must determine the technical feasibility of the proposed concept. The methods to achieve each objective or task must be discussed explicitly and in detail. This section must be a substantial portion of the total proposal.
 - (4) **Related Work.** Describe significant activities directly related to the proposed effort, including any conducted by the principal investigator, the proposing firm, consultants, or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The proposal must persuade reviewers of the proposer's awareness of the state-of-the-art in the specific topic. Describe previous work not directly related to the proposed effort but similar. Provide the following: (a) short description, (b) client for which work was performed (including individual to be contacted and phone number), and (c) date of completion.
 - (5) **Relationship with Future Research or Research and Development.** (a) State the anticipated results of the proposed approach, assuming project success. (b) Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort.

- (6) **Commercialization Strategy.** Describe, in approximately two (2) pages, your company's strategy for commercializing this technology in the DHS, other Federal Agencies, and/or private sector markets. Provide specific information on the market need the technology will address and the size of the market. Also, include a schedule showing the quantitative commercialization results from this SBIR project that your company expects to achieve and when (i.e., amount of additional investment, sales revenue, etc.).
- (7) **Key Personnel.** Identify key personnel who will be involved in the Phase I effort including information on directly related education and experience. A concise resume of the principal investigator, including a list of relevant publications (if any), must be included (please do not include Privacy Act Information). All resumes will count toward the 25-page limitation. In addition to Key Personnel, identify any non-U.S. citizen(s) that you expect to be involved on this project (including subcontractors and consultants), their country of origin, and level of involvement.
- (8) **Facilities/Equipment.** Describe available instrumentation and physical facilities necessary to carry out the Phase I effort. Items of equipment to be purchased (as detailed in the Cost Proposal) must be justified under this section. Also state whether or not the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name), and local governments for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.
- (9) **Subcontractors/Consultants.** Involvement of a university or other subcontractors or consultants in the project may be appropriate (see Section 2.3 of this Solicitation). If such involvement is intended, it must be described in detail and identified in the Cost Proposal. A minimum of two-thirds of the research and/or analytical work in Phase I, as measured by direct and indirect costs, must be carried out by the proposing small business concern. No portion of an SBIR award may be subcontracted back to any Federal Government Agency or Federally Funded Research and Development Center (FFRDC). BA may issue a case-by-case waiver to this provision after review of the DHS written justification that includes the following information: (a) an explanation of why the SBIR research project requires the use of the Federal/FFRDC facility or personnel, including data that verifies the absence of non-federal facilities or personnel capable of supporting the research effort; (b) why the Agency will not and cannot fund the use of the Federal/FFRDC facility or personnel for the SBIR Project with non-SBIR money; and (c) the concurrence of the small business concern's chief business official to use the Federal/ FFRDC facility or personnel. Award is contingent on the Sponsoring Agency obtaining a waiver.
- (10) **Prior, Current, or Pending Support of Similar Proposals or Awards.** *Warning -* While it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work (see Section 2.9 of this Solicitation) for consideration under numerous federal program solicitations, it is unlawful to enter into contracts or grants requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.

If a proposal submitted in response to this Solicitation is substantially the same as another proposal that has been funded, is now being funded, or is pending with another Federal Agency, the proposer must so indicate on the Proposal Cover Sheet and provide the following information:

- (a) Name and address of the Federal Agency(s) to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
- (b) Date of proposal submission or date of award.
- (c) Title of proposal.
- (d) Name and title of principal investigator for each proposal submitted or award received.
- (e) Title, number, and date of Solicitation(s) under which the proposal was submitted, will be submitted, or under which award is expected or has been received.
- (f) If award was received, state contract number.
- (g) Specify the applicable topics for each SBIR proposal submitted or award received.

Note: If Section 3.5.b (10) of this Solicitation does not apply, state in the Proposal "No prior, current, or pending support for proposed work."

- (11) **Phase I Option.** DHS has implemented the use of a Phase I Option that may be exercised to bridge the funding gap between the Phase I and Phase II project. The Phase I Option, if exercised, will only be done so (at the Government's discretion and subject to the availability of funds) to fund interim Phase I activities for companies that are selected for Phase II while a Phase II contract is being negotiated. Proposers are encouraged to describe, within the 25 page limit, an option which furthers the research or research and development effort, and should describe appropriate initial Phase II activities that may lead to the successful demonstration of a product or technology. The Phase I Option covers activities over a period of up to four months. **The Phase I Option must be included as part of the Phase I proposal**, if the proposer would like to be considered for interim funding.

Note: If Section 3.5.b.(11) of this Solicitation does not apply, i.e., the offeror is not submitting the Phase I Option at the time of the Phase I proposal submission, state in the Proposal "Not submitting a Phase I Option for consideration, and therefore, not eligible for the interim funding, should the Phase I effort be selected for Phase II."

c. Cost Proposal.

Phase I Cost Proposal (base effort, \$100,000 maximum). Proposers that participate in this Solicitation must complete the Phase I Cost Proposal, not to exceed the maximum dollar amount of \$100,000 for the base Phase I effort, on line via the electronic submission website. **Note:** there is a 20-minute timeout limit for entering cost proposal data via the

electronic submission system. You may want to peruse the Cost Breakdown Guidance, <https://www.sbir.dhs.gov/reference/DHS%20SBIRSTTR%20COST%20PROPOSAL%20BREAKDOWN%20ITEMS%20GUIDANCE.pdf>, prior to initiating your Cost Proposal to become familiar with the information that you must provide. Please note that some items in the Cost Breakdown Guidance may not apply to the proposed project. If such is the case, there is no need to provide information on each and every item. What matters is that enough information be provided to allow DHS to understand how the proposer plans to use the requested funds if the contract is awarded.

- (1) List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
- (2) Special tooling and test equipment and material cost may be included under Phases I and II. The inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment must, in the opinion of the Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation and/or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with DHS unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by DHS.
- (3) Cost for travel funds must be justified and related to the needs of the project. DHS requests that you budget, as a minimum, travel to attend a one day meeting with Science & Technology Directorate program management personnel. Reasonable travel costs may include this one day meeting. This meeting may consist of a Phase I Kick-Off meeting or a presentation of your project findings to your Phase I Program Manager. Travel will typically be performed at the beginning of your Phase I award or at the conclusion of the Phase I effort, depending on the Science & Technology Directorate Program Manager's determination.
- (4) Cost sharing is permitted for proposals under this Solicitation; however, cost sharing will not be considered nor will it be an evaluation factor in the consideration of a Phase I proposal.
- (5) The Cost Proposal template on the electronic submission website is required to complete the Cost Proposal. If additional Cost Proposal information is required, it may be placed at the end of your Technical Proposal (and included in the page count limitation).

If applicable, a brief explanation of cost estimates for equipment, materials, and consultants or subcontractors can be included in the Cost Proposal. However, when a proposal is selected for award, the proposer must be prepared to submit further documentation to the Contracting Officer to substantiate costs (e.g., a detailed explanation of cost estimates for equipment, materials, and consultants or subcontractors).

If additional Cost Proposal information for the base Phase I effort is required, it may be placed at the end of your Technical Proposal (and included in the page count limitation). For more information about cost proposals and accounting standards, see the DCAA publication called "Information for Contractors" available at <http://www.dcaa.mil>.

Cost sharing is permitted for proposals under this Solicitation; however, cost sharing will not be considered nor will it be an evaluation factor in the consideration of a Phase I proposal.

3.6 *Page Numbering*

Number all pages of your proposal consecutively. The cover sheets are pages 1 and 2. The Technical Proposal begins on page 3 and continues through not more than page 24. The Cost Proposal is page 25 (no matter how it prints out). The Cost Proposal for the option effort is not included in the page count.

3.7 *Phase II Proposal Invitation*

This Solicitation is for Phase I only. A Phase II Proposal can be submitted only by a Phase I awardee and only in response to a request from the Contracting Officer. DHS S&T Program Managers for the applicable topic may recommend that Phase I participants be invited to submit Phase II Proposals based upon site visits, the monthly and/or final reports, and progress made towards the accomplishment of Phase I technical objectives and plans for Phase II. Not all Phase I participants will be invited to submit a Phase II Proposal. The number of Phase II Proposal invitations will depend upon the number of Phase I awards made on the topic, the availability of funding, and the quality of the Phase I research. DHS reserves the right to invite all, some, or none of the Phase I awardees in a topic to submit Phase II proposals.

The DHS S&T SBIR Program may recommend to a Contracting Officer that a Phase I contractor be invited to submit a Phase II Proposal, beginning no earlier than two thirds (2/3) into the Phase I period of performance (DHS S&T's SBIR Jump Start feature). (*Example: four months into a six month period of performance.*) While some Phase II invitations will be made prior to completion of the Phase I period of performance, other Phase II invitations will be extended at the end of the period of performance. DHS will evaluate each Phase II Proposal when received in accordance with the evaluation criteria provided in Section 4.3, and if the proposal is deemed to be highly rated, will enter into negotiations for award, subject to the availability of funds. The goal is to accelerate the technology development and reduce, or eliminate, the gap between the Phase I and Phase II efforts.

An invitation to submit a Phase II proposal is the onset of the Phase II review process and is not a commitment for award. An invitation to submit a Phase II proposal does not qualify as a Phase II award; each Phase II Proposal must meet the SBIR Phase II criteria in this Solicitation, as well as undergo the DHS evaluation and source selection process. Phase II Proposals must be received no later than the date specified in the Phase II invitation status notification.

3.8 *Phase II Proposal Format*

As stated previously, a separate solicitation will not be issued for Phase II. These proposals instructions are provided as information only for those organizations who may receive a Phase I award and may be invited to submit a Phase II proposal. Phase II proposal is limited to 50 pages, using a type size no smaller than a 12-point font on standard 8 ½ X 11" paper with one (1) inch margins. Two-column or more format is not allowed.

- a. **Each Phase II** base proposal, not to exceed \$750,000, must contain Proposal Cover Sheets, a Technical Proposal, a Cost Proposal and a Company Commercialization report, if

applicable. See Section 3.8 (d) of this Solicitation. In addition, each Phase II proposal must contain approximately two pages of a Commercialization Strategy in the Technical Proposal.

b. **Commercialization Strategy.** The Commercialization Strategy must address the following questions:

1. What is the first product that this technology will go into?
2. Who will be your customers, and what is your estimate of the market size?
3. How much money will you need to bring the technology to market, and how will you raise that money?
4. Does your company contain marketing expertise and, if not, how do you intend to bring that expertise into the company?
5. Who are your competitors, and what is your price and/or quality advantage over your competitors?

The Commercialization Strategy must also include a schedule showing the quantitative results from the Phase II project that your company expects to report in its Company Commercialization Report Updates one year after the start of the Phase II, at the completion of Phase II, and after the completion of Phase II (i.e., amount of additional investment, sales revenue, etc. – see Sections 4.4 and 5.4 of this Solicitation).

c. **Cost Match.** Proposers that request Phase II Cost Match funds have an opportunity in the Commercialization Strategy to present the compelling value of the proposed Phase II project. The Commercialization Strategy should provide qualitative and quantitative information directly related to the Cost Matching; explaining the improved time interval or acceleration between the completion of Phase II work and the of launching of the innovative products, processes, or services into the marketplace. Additional Phase II Cost Match guidance can be found in Section 3.10 of this Solicitation

d. **Company Commercialization Report.** For those concerns that have received prior SBIR Phase II funding, a succinct Commercialization Report must be included with the Proposal. The Company Commercialization Report is submitted online in accordance with Section 3.8 (a) of this Solicitation. The following are examples of company commercialization data expected in the Commercialization Report. Additional Commercialization Reporting requirements and Commercialization Update requirements can be found in Sections 4.4 and 5.4 of this Solicitation.

1. Any business concern or subsidiary established for the commercial application of a product or service for which an SBIR award is made.
2. Revenue from the sale of new products or services resulting from the research conducted under each Phase II award;
3. Additional investment from any source, other than Phase I or Phase II awards, to further the research and development and/or commercialization conducted under each Phase II award.

4. Whether the Phase II technology has been used in a fielded DHS system or acquisition program, and, if so, which system or program.
5. The number of patents resulting from the contractor's participation in the SBIR Program.
6. Whether the company has completed an initial public offering (IPO) of stock resulting, in part, from the Phase II Project.

Update the information in the Company Commercialization Report for any prior Phase II award received by the company. The company may apportion sales or additional investment information relating to more than one Phase II award among those awards, if it notes the apportionment for each award.

Phase II Option. DHS has implemented the use of a Phase II Option (not to exceed \$250,000) that may be exercised at the DHS' discretion to continue funding Phase II activities that will further mature the technology for insertion into a larger DHS Program or DHS Acquisition Program. The Phase II Option covers activities over a period of up to 24 months and should describe Phase II activities that may lead to the successful demonstration of a product or technology. The Phase II Option must be included within the 50-page limit for the Phase II proposal if the proposer would like to be considered for the additional Phase II funding. If a Phase II Option is proposed, it must not exceed the maximum dollar amount of \$250,000. The Phase II Option Cost Proposal (if applicable) must be placed at the end of the Technical Proposal and uploaded with the Technical Proposal. The Phase II Option Cost Proposal is not included in the 50 page count limitation. Phase II costs and Phase II Option costs must be shown separately. There is no specific format for the Phase II Option Cost Proposal, but it must include all applicable categories (see the Phase I Cost Proposal information to provide). For reference, see the [Cost Breakdown Guidance](https://www.sbir.dhs.gov/reference/DHS%20SBIRSTTR%20COST%20PROPOSAL%20BREAKDOWN%20ITEMS%20GUIDANCE.pdf) at <https://www.sbir.dhs.gov/reference/DHS%20SBIRSTTR%20COST%20PROPOSAL%20BREAKDOWN%20ITEMS%20GUIDANCE.pdf> for the type of information that may need to be provided. Please note that some items in the Cost Breakdown Guidance may not apply to the option effort. If such is the case, there is no need to provide information on each and every item. What matters is that enough information be provided to allow DHS to understand how the proposer plans to use the requested funds. If selected, the government may elect not to include the Phase II option in the negotiated contract.

3.9 *False Statements*

Knowingly and willfully making any false, fictitious, or fraudulent statements or representations, may be a felony under the False Statement Act (18 U.S.C. §1001), punishable by a fine of up to \$10,000, up to five years in prison, or both.

3.10 *SBIR Phase II Cost Match*

- a. **General Provisions of the DHS SBIR Cost Match Feature.** The DHS SBIR Program includes a Cost Match feature for SBIR projects that attract matching cash from an outside investor for the Phase II SBIR effort. The purpose is to focus SBIR funding on those projects that are most likely to be developed into viable new products that DHS and

others will buy and that will thereby make a major contribution to homeland security and/or economic capabilities. The cost match can occur at the time of award, or during the Phase II period of performance.

Outside investors may include such entities as another company, a venture capital firm, an individual investor, or a non-SBIR government program; they do not include the owners of the small business, their family members, and/or affiliates of the small business. In order to be considered for DHS S&T SBIR cost match, the outside investors must commit a minimum of \$100,000 up to a maximum of \$500,000. DHS will, at its option, match up to 50% of funds received. The SBIR Phase II basic awards will be made for a maximum of \$750,000 and the cost match award will be made for a maximum of \$250,000. The total cumulative SBIR funding for the Phase II award plus DHS cost match cannot exceed \$1,000,000 (or \$1,250,000 if the Phase II option is exercised). Outside investors may contribute funding above the \$500,000 cost match ceiling, however, DHS SBIR will only match 50% up to the \$250,000 maximum.

The additional work proposed should be an expansion of the technical work being performed in the Phase II project and must fall within the general scope of the present Phase II project.

- b. **How to Qualify for the SBIR Phase II Cost Match.** To qualify for the SBIR Cost Match feature, a company must be a Phase I awardee submitting a Phase II proposal or a Phase II awardee. The company is encouraged to discuss the application with their SBIR Program Manager and the DHS SBIR Program Director. The awardee is to follow Phase II Proposal instructions and guidance, and also provide the cost match documentation and request for matched funding.
1. A Phase II Proposal must be submitted electronically on the DHS Electronic Submission website (<https://www.sbir.dhs.gov>).
 2. The proposing company must:
 - a. State that the outside investor will match funding in the SBIR Phase II proposal, in cash, and state the amount of the outside investment, contingent on the company's selection for Phase II award.
 - b. Certify that the outside funding proposed in the application qualifies as a Cost Match investment, and the investor qualifies as an "outside investor," as defined above.
 - c. Provide a brief statement (less than one page) describing that portion of the effort that the investor will fund. The investor's funds may pay for additional research and development on the company's SBIR project or, alternatively, they may pay for other activities not included in the Phase II Statement of Work, provided these activities further the development and/or commercialization of the technology (e.g., marketing).

- d. Provide qualitative and quantitative information reflecting any additional Period of Performance to complete the new or expanded effort. Provide a concise Statement of Work for the Cost Match effort (less than four pages) and detailed Cost Proposal (less than one page).
3. The outside investor must provide:
 - a. A brief statement describing the investor's experience in evaluating companies' abilities to successfully commercialize technology, the investor's assessment of the market for this particular SBIR technology, and of the ability of the company to bring this technology to market.
 - b. A letter of commitment, signed by the investor(s), containing a commitment to provide a minimum of \$100,000 or up to \$500,000 Phase II Cost Match funding, in cash, contingent on the company's selection or performance of the Phase II award. An investor may contribute above the \$500,000 Phase II Cost Match; however Government matching funds will not exceed 50% up to the \$250,000 maximum.
 4. The Transfer of Investor Funding:

The company shall certify within 60 days that the entire amount of the matching funds from the outside investor has been transferred to the company. The Certification consists of a letter, signed by both the company and its outside investor, stating that "\$_____ in cash has been transferred to our company from our outside investor in accord with the SBIR Cost Match procedures." The letter must be sent to the DHS appointed Contracting Officer, along with a copy of the company's bank statement showing the funds have been deposited. The transfer of investor funds from another Government agency will be coordinated with the DHS SBIR designated Contracting Officer. **IMPORTANT:** If the Contracting Officer does not receive this certification showing the transfer of funds within 60 days, the company will be ineligible to compete for Phase II Cost Match funding, unless a specific written exception is granted by the DHS SBIR Program Director.

Failure to meet these conditions in their entirety and within the time frames indicated may disqualify a company from participation in the SBIR Cost Match. DHS maintains the right to award some, all, or none of the Phase II Cost Match requests. Phase II Cost Match funding is contingent upon the number of applications, availability of funds, and proper certification of investor funds.

c. Additional Reporting Requirement.

In the company's final Phase II Progress Report, a brief accounting must be included (in the company's own format or format that has been provided by the DHS PM) of how the investor's funds were expended to support the project.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

4.1 Introduction

SBIR Proposals will be processed and made available to the appropriate technical program manager within DHS for evaluation and action. DHS Program Managers may seek technical advice from Federal Government employees and/or from technical and business experts who may be non-Federal Government employees. Non-government personnel will not participate in the final rating or ranking of offerors' proposals. In all cases, evaluators and advisors will be required to sign Certificates of Non-Disclosure and Statements of Financial Interest and will receive training regarding Procurement Integrity and Conduct required during the Source Selection process. Non-Government personnel may be used to handle the administrative functions for the SBIR Program. The support contractors will be bound by appropriate non-disclosure agreements to protect proprietary and source-selection information. They will not be permitted to release any source selection information to third parties, including others in their organization. DHS will select proposals for funding based on technical merit and the evaluation criteria contained in this Solicitation document.

Phase I SBIR proposals will be evaluated on a competitive basis and will be considered to be binding for six (6) months from the date of closing of this Solicitation unless the proposer states otherwise. If selection has not been made prior to the proposal's expiration date, proposers may be asked to extend their proposal for an additional period of time. Proposals meeting stated Solicitation requirements will be evaluated by scientists and/or engineers knowledgeable in the topic area. A proposal that meets the goals of a solicitation topic but does not use the exact approach specified in the topic will be considered relevant. (Prospective proposers should contact the DHS SBIR Program as described in Section 1.6 of this Solicitation to determine whether submission of such a proposal would be useful.)

Proposals will be evaluated using the criteria listed in Section 4.2 of this Solicitation (and Section 4.3 of this Solicitation for Phase II). Final decisions will be made based upon these criteria and consideration of other factors including possible duplication of other work and program balance. In the evaluation and handling of proposals, every effort will be made to protect the confidentiality of the proposal and any evaluations. There is no commitment by DHS to make any awards on any topic, to make a specific number of awards, or, to be liable for any costs expended by the proposer prior to award of any contract.

For proposals that have been selected for contract award, a Contracting Officer will prepare a contract to be signed by both parties before work begins. Any negotiations that may be necessary will be conducted between the proposer and the Contracting Officer. It should be noted that only a duly appointed Contracting Officer has the authority to enter into a contract on behalf of the U.S. Government.

Prior to receiving a contract award, the proposer must be registered in the Central Contractor Registration (CCR) database. For information regarding registration, call 1-888-227-2423 or visit <http://www.ccr.gov>.

Phase II proposals will be subject to a technical review process similar to Phase I. Final decisions will be made by DHS based upon the scientific and technical evaluations and other factors, including a commitment for Phase III follow-on funding, the possible duplication with other research or research and development, program balance, budget limitations, and the potential of a successful Phase II effort leading to a product of continuing interest to DHS. DHS is not obligated to make any awards under Phase II, and all awards are subject to the availability of funds. DHS is not liable for any costs expended by the proposer prior to award of a contract.

Upon written request and after final award decisions have been announced, evaluation results (in the form of the consensus review) will be provided to unsuccessful proposers on their Phase I and Phase II Proposals (see Section 6.4 of this Solicitation).

Restrictive notices notwithstanding, Phase I and Phase II proposals may be handled, for administrative purposes only, by support contractors. All support contractors will be subject to the terms of their signed non-disclosure agreements.

Phase I and Phase II proposals will be evaluated for strengths, weaknesses, and deficiencies using the following definitions:

- a. Strength - An aspect of a proposal that benefits the Government in terms of the quality of the Proposer's performance, cost effectiveness, or reduced risk and is expected to contribute to successful contract performance.
- b. Weakness - A flaw in the proposal that increases the risk of unsuccessful contract performance. A "significant weakness" in the proposal is a flaw that appreciably increases the risk of unsuccessful contract performance.
- c. Deficiency - A material failure of a proposal to meet a Government requirement or a combination of significant weaknesses in a proposal that increases the risk of unsuccessful contract performance to an unacceptable level.

The following adjectival ratings will be used in the evaluation of Phase I and Phase II proposals:

Excellent: A convincing demonstration that all SBIR FY 11.1 requirements are met or exceeded by the proposer's display of the highest levels of innovation, technical competence, personnel expertise, and potential for commercialization. The proposal fully and completely meets the expectations and sets forth plans and approaches that show a high probability of meeting DHS' S&T Directorate requirements. Proposals in this category are strongly recommended for funding. Has strengths that will significantly benefit the Government.

Very Good: Approaches and planning considerations demonstrate that the proposer is able to interpret goals and project them clearly into concise plans. Proposer demonstrates an awareness of the subtle interactions influencing system design; technical and planning efforts show strong promise of meeting DHS' S&T Directorate requirements. Proposals in this category are recommended for funding. Has one or more strengths that will benefit the Government.

Good: Plans and approaches are provided to the extent requested, and key or pivotal points have been satisfactorily addressed in the proposal. The proposer has presented an orderly plan to meet the stated goals, but the proposal does not necessarily demonstrate any exceptional features, innovations, or originality. The technical analyses satisfactorily meet requirements and are

technically correct. Funding of proposals in this category is dependent on availability of funds. Few or no strengths.

Fair: The proposal indicates a shallow understanding of the problem. The technical analyses only marginally meets the goals, and the proposer fails to demonstrate a reasonable probability of successfully performing the desired task or commercializing the resulting product. Funding of proposals in this category is dependent on availability of funds.

Unacceptable: Does not meet the SBIR FY 11.1 criteria. Not recommended for funding.

4.2 *Evaluation Criteria - Phase I*

DHS plans to select for award those proposals offering the best value to the Government and the Nation considering the following factors in decreasing order of importance:

- a. The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.
- b. The qualifications of the proposed principal/key investigators, supporting staff, and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.
- c. The potential for commercial (Government or private sector) application and the benefits expected to accrue from this commercialization as assessed utilizing the criteria in Section 4.4 of this Solicitation.
- d. The cost realism and reasonableness of the Cost Proposal. The Cost Proposal will not be adjectively graded.

Members of the evaluation team may presume that the technical approach provided by the proposer serves as a rationale for the labor mix and labor hours used.

Technical reviewers will base their conclusions only on information contained in the proposal. It cannot be assumed that reviewers are acquainted with the proposer or key individuals or any referenced experiments. Relevant supporting data such as journal articles, literature, including Government publications, etc., should be contained or referenced in the proposal and will count towards the 25-page limit.

4.3 *Evaluation Criteria – Phase II*

The Phase II proposal will be reviewed for overall merit based upon the criteria below in decreasing order of importance:

- a. The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.
- b. The potential for commercial (Government or private sector) application and the benefits expected to accrue from this commercialization as assessed utilizing the criteria in Section 4.4 of this Solicitation.
- c. The qualifications of the proposed principal/key investigators, supporting staff, and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

- d. The cost realism and reasonableness of the cost proposal. The cost proposal will not be adjectively graded.

Members of the evaluation team may presume that the technical approach provided by the proposer serves as a rationale for the labor mix and labor hours used.

Phase II Proposal evaluations may include on-site evaluations of the Phase I effort by Government personnel.

4.4 Assessing Commercial Potential of Proposals

DHS is particularly interested in the potential transition of SBIR project results to the DHS operational components and homeland security enterprise, and expects explicit discussion of a transition vision in the commercialization strategy section of the proposal. That vision should include identification of the problem, need, or requirement in the Department of Homeland Security that the SBIR project results would address; a description of how wide-spread and significant the problem, need, or requirement is; identification of the potential end-users (e.g., specific DHS operational components or members of the homeland security enterprise) who would likely use the technology; and the operational environments and potential application area(s).

Technology commercialization and transition from research or research and development activities to fielded systems within DHS is challenging. Phase I is the time to plan for and begin to transition specific activities. The small business must convey an understanding of the transition path or paths to be established during the Phase I and Phase II projects. That plan should include the Technology Readiness Level (TRL) at the start and end of the Phase II. The plan should also include a description of targeted operational environments and priority application areas for initial Phase III transition; potential Phase III transition sources; anticipated business model and identified commercial and federal partners the SBIR company has identified to support transition activities. Also include key proposed milestones anticipated during Phases I, II, or beyond Phase II that include, but are not limited to: prototype development, laboratory and systems testing, integration, testing in operational environment, and demonstrations.

The commercial potential of a Phase I or Phase II proposal will be assessed using the following criteria:

- a. The proposer's commercialization strategy (see Section 3.5.b (6) of this Solicitation) and, as discussed in that strategy:
 - (1) any commitments of additional investment in the technology during Phase II from the private sector, prime contractors, non-SBIR programs, or other sources, and
 - (2) any Phase III follow-on funding commitments; and
- b. The proposer's record of commercializing its prior SBIR Projects.

A Company Commercialization Report showing that the proposing company has no prior Phase II awards will not affect its ability to receive an award. Such a company's proposal will be evaluated for commercial potential based on its commercialization strategy in item 4.4(a) of this Solicitation, above.

5.0 CONTRACTUAL CONSIDERATIONS

Note: Eligibility and Limitation Requirements (Section 1.3 of this Solicitation) will be enforced.

5.1 Phase I Awards

- a. **Number of Phase I Awards.** The number of Phase I awards will be consistent with the Science and Technology Directorate's budget and the number of anticipated Phase II contracts. No Phase I contracts will be awarded until all qualified proposals (received in accordance with Section 4.2 of this Solicitation) on a specific topic have been evaluated. Proposers will be notified of selection by a DHS designated Contracting Officer. After the Phase I awards are made, proposers will be notified of non-selection, generally within four months of the close of the Solicitation. Phase I awards are posted at <https://www.sbir.dhs.gov>.
- b. **Type of Funding Agreement.** Each Phase I proposal selected for funding will be funded under negotiated contracts and may include a reasonable fee or profit consistent with normal profit margins provided to profit-making concerns for R/R&D work. The firm-fixed-price type contract will be used for all Phase I awards.
- c. **Average Dollar Value of Awards.** Phase I awards made to small businesses as a result of this DHS SBIR solicitation will typically be for a period generally not to exceed six months and \$100,000 (subject to negotiation). The Phase I option, if exercised, will typically be for a period of up to four months and will not exceed \$50,000 (subject to negotiation). Public Law 102-564, as amended by the 25 March 2010 Federal Register publication in accordance with the Small Business Act 15 U.S.C. 638(j)(3), allows agencies to make Phase I awards up to \$ 150,000 without justification.
- d. **Timing of Phase I Awards.** The anticipated time between the date that this Solicitation closes and the award of the Phase I contract is approximately four (4) months.

5.2 Phase II Awards

- a. **Number of Phase II Awards.** The number of Phase II awards will depend upon the results of the Phase I efforts and the availability of funds. DHS anticipates that approximately 30 percent of its Phase I awards will result in Phase II projects. This is merely an advisory estimate and DHS reserves the right and discretion not to award any or to award less than or more than this percentage for each topic area.
- b. **Type of Funding Agreements.** Each Phase II proposal selected for an award will be funded under a negotiated contract and may include a reasonable fee or profit consistent with normal profit margins provided to profit-making concerns for R/R&D work. The firm-fixed price acquisition vehicle or the cost-plus-fixed-fee acquisition vehicle may be used for the Phase II awards.
- c. **Average Dollar Value of Awards.** Phase II awards will typically cover a period generally not to exceed \$750,000 and 24 months (subject to negotiation). The Phase II option, if exercised, will generally not exceed \$250,000. PL 102-564, as amended by the 25 March 2010 Federal Register publication in accordance with the Small Business Act 15 U.S.C. 638(j)(3), states that the Phase II awards may be up to \$1,000,000 each without justification.

- d. **Timing of Phase II Awards.** Phase II awards will be made incrementally, as quickly as possible, to maintain the momentum of the Phase I effort. The Phase II proposal invitation process is an attempt to identify expeditiously those Phase I awardees deserving of Phase II awards. DHS reserves the right to evaluate individual Phase II proposals when received and make Phase II proposal invitations incrementally, to some, all, or none of the Phase I participants. Phase II contracts are typically awarded within 90 – 120 days after selection, assuming the offeror has an adequate accounting system. (Reference Section 5.12(i).)

5.3 *Phase I Reports*

- a. **Content.** A Final Report is required for each Phase I project. An interim/draft final report is required if a Phase I option is exercised. The due date(s) will be stipulated in the contract. The Report must contain in detail the project objectives, work performed, results obtained, and estimates of technical feasibility. In addition, Monthly Status Reports and Progress Reports will be required by DHS. The format for these reports will be mutually agreed upon between DHS and the potential awardee prior to contract award. Please keep in mind that the Monthly Status and Progress Reports and/or Final Reports will be used as a basis to determine progress made towards the accomplishments of Phase I technical objectives when DHS is considering its invitation of contractors to submit Phase II proposals. Due dates for all reports will be stipulated in the contract.
- b. **Preparation.**
 - 1) If desirable, language used by the company in its Phase II proposal to report Phase I progress may also be used in the Final Report.
 - 2) For each unclassified report, the company submitting the Report shall specify one of the following statements it will use:
 - a) Approved for public release; distribution unlimited.
 - b) Distribution authorized to U.S. Government Agencies only; contains proprietary information (SBIR Data Rights).

Note: Data developed under SBIR contract is subject to SBIR Data Rights which allow for protection under FAR 51.227-20. DHS, after reviewing the company's recommended distribution statement, has final responsibility for assigning a distribution statement.

- c. **Submission.** The company shall submit an electronic copy of the monthly reports and final report on each Phase I project in accordance with the Phase I contract and negotiated delivery schedule via the DHS website: <https://www.sbir.dhs.gov>. Submission of the monthly reports are normally every 30 days after the project start date, and the final report submission schedule will normally be within 15 days after completion of the Phase I technical effort. Contractors shall include the company name, topic number, proposal number and contract number in each report. Submission instructions will be provided in the awarded contract.

5.4 *Commercialization Updates in Phase II*

If, after completion of Phase I, the contractor is awarded a Phase II contract, the contractor shall be required to periodically update the following commercialization results of the Phase II project through the website at <https://www.sbir.dhs.gov>. Updates shall include the following:

- a. Sales revenue from new products and non-R&D services resulting from the Phase II technology;
- b. Additional investment from sources other than the federal SBIR Program in activities that further the development and/or commercialization of the Phase II technology;
- c. Whether the Phase II technology has been used in a fielded DHS system or acquisition program and, if so, which system or program;
- d. The number of patents resulting from the contractor's participation in the SBIR Program;
- e. Growth in number of firm employees; and
- f. Whether the firm has completed an initial public offering of stock (IPO) resulting, in part, from the Phase II project.

These updates on the project will be required one year after the start of Phase II, at the completion of Phase II, and subsequently when the contractor submits a new SBIR proposal to DHS. Contractors that do not submit a new proposal to DHS will be asked to provide updates on an annual basis for five (5) years after the completion of Phase II.

5.5 *Payment Schedule*

The specific payment schedule (including payment amounts) for each contract will be incorporated into the contract upon completion of negotiations between the Government and the successful Phase I or Phase II proposer. Successful proposers may be paid periodically as work progresses in accordance with the negotiated price and payment schedule. Phase I contracts are primarily firm-fixed-price R&D contracts, under which monthly payments may be made. Final payment will follow completion of contract performance and acceptance of all work required under the contract. Phase II funding awards may be Cost Reimbursement type contracts. Interim payments will be permitted in accordance with the negotiated price and payment schedule. Provisions for payment of a fee or profit will be permitted. Final payment will follow completion of contract performance and acceptance of all work required under the contract. Milestone billing payments may be used by DHS in the Phase II contract awards.

5.6 *Markings of Proprietary Proposal Information*

The proposal submitted in response to this Solicitation may contain technical and other data that the proposer does not want disclosed to the public or used by the Government for any purpose other than proposal evaluation. Information contained in unsuccessful proposals will remain the property of the proposer except for the proposal cover sheet. The Government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements.

If proprietary information is provided by a proposer in a proposal that constitutes a trade secret, proprietary commercial or financial information, or personal information or data affecting homeland security, it will be treated in confidence, to the extent permitted by law, provided that

the "Proposal Contains Proprietary Information" checkbox on the Proposal Cover Sheet is checked and the information contained on each page is clearly marked by the proposer with the term "PROPRIETARY" (do not use "Company Confidential"), as discussed below. Note: the Cover Sheet cannot be marked as "Proprietary", as the abstract will be publically disclosed if the proposal results in contract award. By checking the "Proposal Contains Proprietary Information" check box on the Proposal Cover Sheet, the following legend is assumed:

"This data, except the proposal cover sheet, shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose other than to evaluate the proposal. If a contract is awarded to the proposer as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use or disclose the data to the extent provided in the contract. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction is contained on the pages of the proposal listed on the line below."

Use of any restrictive legend except that provided above will be unacceptable to the Government and may constitute grounds for removing the proposal from further consideration. The Government will limit dissemination of properly marked information to within official channels.

In addition to checking the "Proposal Contains Proprietary Information" box on the Cover Sheet, each page of the proposal containing proprietary data which the proposer wishes to restrict must be marked with the following legend:

"Use or disclosure of the proposal data on lines specifically identified by asterisk (*) are subject to the restriction on the Cover Sheet of this proposal."

If all of the information on a particular page is proprietary, the proposer should so note by including the word "PROPRIETARY" (do not use "Company Confidential") in both the header and footer on that page. The Government assumes no liability for disclosure or use of unmarked data and may use or disclose such data for any purpose.

In the event properly marked data contained in a proposal in response to this Solicitation is requested pursuant to the Freedom of Information Act, 5 USC §552, the proposer will be advised of such request and prior to such release of information will be requested to expeditiously submit to DHS a detailed listing of all information in the proposal which the proposer believes to be exempt from disclosure under the Act. Such action and cooperation on the part of the proposer will ensure that any information released by DHS pursuant to the Act is properly determined.

5.7 Copyrights

With prior written permission from the Contracting Officer, the awardee may copyright and publish (consistent with appropriate homeland security considerations, if any) material developed with DHS support. DHS receives a royalty-free license for the Federal Government and requires that each publication contain an appropriate acknowledgment and disclaimer statement.

5.8 *Patents and Invention Reporting*

Small business concerns normally may retain the principal worldwide patent rights to any invention developed with Government support. The Government receives a royalty-free license for its use, reserves the right to require the patent holder to license others in certain limited circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. SBIR awardees shall report inventions to the awarding agency within two months of the inventor's report to the awardee. Awardees may report inventions to DHS through the Edison Invention Reporting Systems at www.iedison.gov. Use of the Edison System satisfies all invention reporting requirements mandated by any award.

5.9 *Technical Data Rights*

Rights in technical data, including software, developed under the terms of any contract resulting from proposals submitted in response to this Solicitation generally remain with the contractor, except that the Government obtains a royalty-free license to use such technical data only for Government purposes during the period commencing with contract award and ending four years after completion of the project under which the data were generated. Upon expiration of the four-year restrictive license, the Government has unlimited rights in the SBIR data. During the license period, the Government may not release or disclose SBIR data to any person other than its support services contractor except: a) for evaluation purposes; b) as expressly permitted by the contractor; or c) a use, release, or disclosure that is necessary for emergency repair or overhaul of items operated by the Government. Please refer to FAR clause 52.227-20, "Rights in Data -- SBIR Program."

5.10 *Contractor Commitments*

Upon award of a contract, the contractor shall be required to make certain legal commitments through acceptance of Government contract clauses in the Phase I Contract. The outline that follows is illustrative of the types of provisions required by the Federal Acquisition Regulations that will be included in the Phase I contract. This is not a complete list of provisions to be included in Phase I contracts, nor does it contain specific wording of these clauses. Copies of complete general clauses and provisions will be made available prior to contract award.

- a. **Standards of Work.** Work performed under the contract must conform to high professional standards.
- b. **Inspection.** Work performed under the contract is subject to Government inspection and evaluation at all reasonable times.
- c. **Examination of Records.** The Comptroller General (or a fully authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.
- d. **Default.** The Government may terminate the contract if the contractor fails to perform the work contracted or fails to make progress during performance under the contract.
- e. **Termination for Convenience.** The contract may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.

- f. **Disputes.** Any dispute concerning the contract that cannot be resolved by agreement may be decided by the Contracting Officer with a right of appeal.
- g. **Contract Work Hours.** The contractor may not require an employee to work more than eight hours a day or forty hours a week unless the employee is compensated accordingly (that is, receives overtime pay).
- h. **Equal Opportunity.** The contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
- i. **Affirmative Action for Veterans.** The contractor shall not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.
- j. **Affirmative Action for Handicapped.** The contractor shall not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.
- k. **Officials Not to Benefit.** No member of, or delegate to Congress, shall benefit from the contract.
- l. **Covenant Against Contingent Fees.** No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bona fide employees or commercial agencies maintained by the contractor for the purpose of securing business.
- m. **Gratuities.** The contract may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the contract.
- n. **Patent Infringement.** The contractor shall report each notice or claim of patent infringement based on the performance of the contract.
- o. **Security Requirements.** The contractor shall safeguard any classified information associated with the contracted work in accordance with applicable regulations.
- p. **American-Made Equipment and Products.** When purchasing equipment or a product under the SBIR funding agreement, purchase only American-made items whenever possible.
- q. **Publications Approval.** Government review and approval will be required prior to any dissemination or publication, except within and between the contractor and any subcontractors, of information developed under this contract or contained in the reports to be furnished pursuant to this contract.

5.11 *Contractor Registration*

Before a contract can be awarded to a successful proposer under this Solicitation, the proposer must be registered in the Central Contractor Registration (CCR) database and the Online Representations and Certifications Application (ORCA). The CCR allows Federal Government contractors or concerns interested in conducting business with DHS to provide basic information on business capabilities and financial information. To register, visit <http://www.ccr.gov> or call 1-888-227-2423. Follow instructions found on the CCR website on how to obtain a Commercial and Government Entry (CAGE) code and DUNS number. ORCA is a web-based system that centralizes, standardizes, and moves the collection and storing of contractor representation and certifications online. To register in ORCA, visit <http://orca.bpn.gov/>.

5.12 *Additional Information*

- a. **General.** This Program Solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR Contract, the terms of the contract are controlling.
- b. **Small Business Data.** Before award of an SBIR contract, the Government may request the proposer to submit certain organizational, management, personnel, and financial information to confirm responsibility of the proposer in accordance with FAR Part 9.
- c. **Proposal Preparation Costs.** The Government is not liable for any costs expended by the proposer before award of any contract.
- d. **Government Obligations.** This Solicitation is not an offer by the Government and does not obligate the Government to make any specific number of awards. Also, awards under this program are contingent upon the availability of funds.
- e. **Duplication of Work.** If an award is made pursuant to a proposal submitted under this Solicitation, the contractor shall be required to certify that he or she has not previously been, nor is currently being, paid for essentially equivalent work by an agency of the Federal Government.
- f. **Unsolicited Proposals.** The SBIR Program is a competitive program. Unsolicited Proposals *will not* be accepted under the DHS SBIR Program in either Phase I or Phase II. Phase III awards can only be made to recipients of Phase I or Phase II awards.
- g. **Classified Proposals.** Classified proposals will not be accepted under this DHS SBIR Solicitation.
- h. **Human/Animal Testing.** Funds cannot be released or used for any portion of the project involving human/animal testing until all of the proper approvals have been obtained in accordance with applicable regulations (see Section 2.0 of this Solicitation).
- i. **Adequate Accounting System.** In order to reduce the risk to the small business and avoid potential contracting delays, it is suggested that companies interested in pursuing Phase II SBIR contracts and other contracts similar in size with DHS, have an adequate accounting system per General Accepted Accounting Principles (GAAP), Generally Accepted Government Auditing Standards (GAGAS), Federal Acquisition Regulation (FAR) and Cost Accounting Standards (CAS) in place. The accounting system will be audited by the Defense Contract Audit Agency (DCAA). DCAA's requirements and standards are available at the DCAA website www.dcaa.mil; click on "Publications" and then on "Information for Contractors". Certified cost and pricing data may be required in Phase II or Phase III awards over \$700,000.
- j. **Additional FAR Clauses.** **FAR Clause 52.209-2**, Prohibition on Contracting with Inverted Domestic Corporations – Representation, **and FAR Clause 52.222-54**, Employment Eligibility Verification, are incorporated into this Solicitation.

6.0 SUBMISSION OF PROPOSALS

Each Proposal must be submitted via the DHS electronic submission website at <https://www.sbir.dhs.gov> and contain a completed:

- Proposal Cover Sheet,
- Technical Proposal,
- Cost Proposal, and
- Commercialization Report (Phase II Proposals only).

6.1 *Electronic Proposal Submission*

For complete electronic proposal submission on the DHS electronic submission website, first prepare the Proposal Cover Sheets (select "Prepare/Edit Phase I Cover Sheet" from the Main Menu). The website will assign the Cover Sheet a Proposal Number, which will be used for tracking throughout the submission process. Prepare the Technical Proposal in a single Portable Document Format (PDF) file, check it for viruses, and upload it to the submission website, following instructions on the website. Do not lock, password protect, or encrypt your file. The Cost Proposal must be submitted on-line.

Technical Proposals must be a single file, including all graphics and attachments, should have the company name and proposal number (from the cover sheets) in the header, and must be in PDF. Proposers shall conduct a virus check on each Technical Proposal prior to uploading. Every uploaded file will be scanned for viruses by the DHS. If a virus is detected, the file will be deleted and may cause rejection of the proposal.

Once uploaded, the Technical Proposal file may be viewed or downloaded from the website by clicking on the Check Upload button. Proposers are responsible for verifying that the Technical Proposal was received and converted properly. Technical Proposals may be uploaded as often as necessary, each time overwriting the file previously submitted. Once a file is overwritten, the previous version is NOT retrievable. Proposers electing to modify their proposals in any way shall allow enough time to upload a complete updated proposal. Failure to provide a complete modification by the Solicitation closing will render the proposer's proposal as "late" regardless of whether the proposer had previously submitted a complete proposal. Proposals received after the deadline will not be accepted or evaluated.

Upon successful submission of your proposal, an email confirmation receipt will be forwarded to your email account. Signatures are not required on the Cover Sheets and Cost Proposal for electronic submission. If your proposal is selected for award, the DHS designated Contracting Officer will contact you for all appropriate signatures. Proposers are encouraged, but not required, to have a CAGE code and DUNS number at the time of proposal submission; however, companies must obtain these before a contract can be awarded to the company.

6.2 *Proposal Deadline*

Proposals will be accepted from *November 18, 2010 – January 6, 2011*. The Deadline for electronic receipt of proposals is 2:00 PM EST January 6, 2011. Proposals must be completely submitted to the DHS submission website by the specified closing time of 2:00 PM EST, on

January 6, 2011. Complete submission means that the entire proposal (including the following three (3) parts: Cover Sheets, Technical Proposal, and Cost Proposal) has been properly completed and fully transmitted to the DHS submission website and electronically date stamped. The Solicitation deadline is firm. Late proposals will not be accepted or evaluated. Proposals received via any other means except the DHS submission website will not be accepted or evaluated. As the close date draws near, heavy traffic on the web server may cause delays. Plan ahead and leave ample time to prepare and submit your proposal. Proposers bear the risk of website inaccessibility due to heavy usage in the final hours before the Solicitation closing time. **In accordance with FAR 52.215-1, proposers are responsible for submitting proposals, and any modification, or revisions, so as to reach the Government office designated in the solicitation by the time specified in the Solicitation.**

6.3 Notification of Proposal Receipt

Notification of receipt of each proposal will be provided via e-mail.

6.4 Information on Proposal Status

Evaluation of Phase I proposals and award of contracts will be expedited, but no information on proposal status will be available until the final selections are made. However, Contracting Officers may contact any and all qualified proposers prior to contract award. Selections will be posted on the DHS SBIR website when all selected proposals have been negotiated for award, generally within four months of the Solicitation closing date.

Evaluation of Phase II proposals will begin upon receipt of the proposals. DHS reserves the right to make Phase II awards incrementally as Phase II proposals are received and evaluated. Selections will be posted on the DHS SBIR website as awards are made.

6.5 Evaluation Results and Debriefing of Unsuccessful Proposers

Any proposer that submits a request within three (3) days of being notified of their proposal being selected or non-selected for award will be provided a copy of the evaluation results (i.e., the consensus review). The request must be emailed to STSBIR.PROPOSALS@dhs.gov. Be advised that a proposer that fails to submit a timely request is not entitled to a debriefing, although untimely debriefing requests may be accommodated at the Government's discretion.

6.6 Correspondence Relating to Proposals

All correspondence relating to proposals must cite the SBIR Solicitation Number, contractor's proposal number, and the specific Topic Number.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION ASSISTANCE

7.1 SAFETY Act

Congress enacted the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (the "SAFETY Act") as part of the Homeland Security Act of 2002. The SAFETY Act provides limitations on the potential liability of those concerns that develop and provide qualified anti-terrorism technologies. The DHS Science and Technology Directorate, acting through its Office of SAFETY Act Implementation, encourage the development and deployment of anti-terrorism

technologies by making available the SAFETY Act’s system of “risk management” and “liability management.”

Proposers submitting proposals in response to this Solicitation are encouraged to submit SAFETY Act applications on their existing technologies and are invited to contact the Office of SAFETY Act Implementation (OSAI) for more information at 1-866-788-9318 or visit OSAI’s website at www.safetyact.gov.

7.2 Scientific and Technical Reference

Scientific and technical reference information is provided with each individual topic provided in Section 8.0 of this Solicitation.

7.3 State and Other Assistance Available

Many states have established programs to provide services to those small concerns and individuals wishing to participate in the Federal SBIR Program. These services vary from state to state, but may include:

- Information and technical assistance.
- Matching funds to SBIR recipients.
- Assistance in obtaining Phase III funding.

Contact your State SBIR Support office at www.ec.gov/offices/OLRI/SBIR/statelink.html for further information.

Small businesses may seek general administrative guidance from small and disadvantaged business utilization specialists located in various activities throughout the continental United States.

8.0 TECHNICAL TOPICS

This Section contains detailed topic descriptions outlining the technical areas in which DHS requests proposals under this Solicitation for innovative R/R&D from small businesses. Topics are listed and numbered separately. A list of the topics currently eligible for proposal submission is included in this Section followed by full topic descriptions. These are the only topics for which proposals will be accepted at this time.

DHS invests in programs offering the potential for revolutionary changes in technologies that promote homeland security or accelerates the prototyping and deployment of technologies that reduce homeland vulnerabilities. Thus, the DHS SBIR goal is to pursue as many innovative research ideas and concepts that promote homeland security with the potential for commercialization.

The technical topics provided in this DHS S&T SBIR FY 11.1 Solicitation to which small businesses may respond are UNCLASSIFIED. Classified Phase I Proposals will **not be accepted**. Although the topics are unclassified, the subject matter may be considered to be a “critical technology.” If a contractor plans to employ non-U.S. citizens in the performance of a DHS SBIR Contract, the contractor shall identify these individuals (including subcontractors and consultants) in its proposal as specified in Section 3.5.b (7) of this Solicitation.

ELECTRONIC SUBMISSION of Cover Sheet, Technical and Cost Proposal **IS REQUIRED**. Only proposals submitted through the on-line submission website at <https://www.sbir.dhs.gov> will be accepted or considered for award by the DHS. Proposals must be prepared and submitted in accordance with the instructions below.

HELPFUL HINTS:

Consider the file size of the technical proposal to allow sufficient time for uploading.

- Perform a virus check.
- Signature is not required at the time of submission.
- If you encounter problems during electronic submission call toll free at 1-800-754-3043.
- Facsimile (fax) or e-mail proposals submissions will not be accepted or evaluated.
- Proposals received after the deadline will not be accepted or evaluated.

Phase I SBIR Proposals shall not exceed \$100,000 for the base effort and must be for a period of performance up to **six-months in duration**. The Phase I SBIR Option shall not exceed \$50,000 for up to an additional four months.

DHS Phase II Proposals may be recommended by the respective DHS S&T Phase I Program Manager and invited by the Contracting Officer. Phase II invitations will be based upon progress toward meeting the Phase I technical objectives, the technical results reflected in the monthly and/or final reports, site visits conducted by DHS, and plans for Phase II. Phase II SBIR Proposals shall not exceed \$750,000 for the base effort and must be for a period of performance up to 24 months in duration. The Phase II SBIR Option shall not exceed \$250,000.

Prior to receiving a contract award, the small business **MUST** be registered in the Central Contractor Registration (CCR) Program. You may obtain registration information by calling 1-888-227-2423 and pressing 3 or at <http://www.ccr.gov>.

As funding is limited, DHS reserves the right to select and fund only those proposals considered to be highly rated in overall technical quality and highly relevant to the DHS mission. As a result, DHS may fund more than one proposal in a specific topic area if the technical quality of the proposal(s) is highly rated, or it may not fund any proposals in a topic area.

Each proposal submitted to DHS must have a topic number and must be responsive to only one topic.

Cost proposals will be considered to be binding for 180 days from closing date of this Solicitation.

Successful proposers will be expected to begin work no later than 30 days after contract award.

For planning purposes, the Phase I contract award process is normally completed within 30 to 45 days from issuance of the selection notification letter to Phase I proposers. Unsuccessful proposers will be notified after all contracts are awarded. Phase I award information is posted on the website generally four months after the close of the solicitation.

DHS holds kick-offs meetings with all successful proposers approximately two weeks after contract award to discuss the SBIR Program and reporting, invoicing, technical objectives and other subjects.

CLOSED

**DHS S&T DIRECTORATE TOPICS -- DHS Small Business Innovation Research (SBIR)
Fiscal Year 11 Publication 1**

- H-SB011.1-001** **Small Vessel Cooperative Identification and Tracking (SVCT) and Noncooperative Vessel Imaging and Tracking (NVIT) Technologies**

- H-SB011.1-002** **Preparation of Environmental Samples for Biological Detection**

- H-SB011.1-003** **Public Safety Broadband Mobile Application for Mission Critical Voice**

- H-SB011.1-004** **Monolithic, Electronically and Widely Tunable Semiconductor-Based Infrared Laser Sources**

- H-SB011.1-005** **Mitigation of Contact Lens, Eye Surgery, Pupil Dilation, and Other Challenges on Iris Recognition**

- H-SB011.1-006** **Improved Firefighter Face Piece Lenses for Self-Contained Breathing Apparatus**

CLOSED

8.1 **SBIR TOPIC NUMBER: H-SB011.1-001**

TITLE: Small Vessel Cooperative Identification and Tracking (SVCT) and Noncooperative Vessel Imaging and Tracking (NVIT) Technologies

TECHNOLOGY AREAS: RFID, Radar, Surveillance, GPS, Reconnaissance Tracking Tagging Locating (TTL); Beacon; Transponder; Identification Friend-or-Foe (IFF); Electro-Optic (EO); Radar, Radio-Frequency (RF); Optics; RFID; Optical Taggants; Imaging, Tracking, Identification, Multispectral, Electro-Optic (EO), Optics, Thermal, Laser Range Gated Imaging, 3D Laser Radar, Laser Vibrometry

OBJECTIVE: Investigate technologies to identify and track small vessels and which enhance the ability to target, track and image potentially hostile vessels.

DESCRIPTION: Due to the unique dangers associated with smaller vessels and hostile agents, their density in busy waterways, and the limitations of existing sensors, a small vessel cooperative identification and tracking (SVCT) and Noncooperative Vessel Imaging and Tracking (NVIT) capability is critical to monitoring and securing the maritime domain. Specifically, a SVCT system will allow Department of Homeland Security (DHS) end users, such as the U.S. Coast Guard (USCG), to focus time and resources on a more limited number of non-identifiable and perhaps non-cooperative vessels and a NVIT system will allow DHS and USCG end users to obtain extended information about unidentified and non-cooperative vessels.

This topic area aims to develop new or existing SVCT and NVIT technologies into existing systems. Currently, vessels greater than 300 tons are voluntarily tagged with the Automatic Identification System (AIS); however, there is no analogous low-cost system to query, identify, or track smaller craft. A successful SVCT capability will allow DHS platforms to query and receive unique identifiers from cooperative vessels smaller than 300 tons (those with an installed SVCT device). This system would be used to augment traditional radar, electro-optic and infrared (EO/IR), and visual data with vessel identity, and to provide vessel location, especially when radar is less accurate due to low radar cross section, ground clutter, or high small vessel density. NVIT technology will work in conjunction with other wide area detection systems and allow DHS platforms to obtain additional detailed information about the target. This system would be used to augment or enhance current radar, electro-optical and infrared (EO/IR) data by providing long-range enhanced imagery of the target in question. A successful NVIT system will provide a significant improvement over currently deployed systems and techniques.

A successful system will be evaluated based on performance, but at a minimum a successful SVCT capability will provide the querying DHS platform with a unique

identifier (UID) corresponding to an observed (radar or visual) vessel. It also must be omnidirectional, i.e., the vessel will receive and return the UID in any direction.

Preference will be given to technologies which incorporate one or more of the following capabilities:

- Omnidirectional or large field-of-view query capabilities from the DHS platform.
- Ability to concurrently query/track multiple small vessel targets.
- Passive or otherwise low Size, Weight, and Power (SWaP) requirements for the small craft. Wide adoption of a notional voluntary system with small vessel operators will enhance its success.
- Technology capabilities which utilize or interoperate with existing DHS sensors, such as radar or other deployed EOIR systems. New or single-purpose equipment on the DHS platform should be minimized if possible.
- Expanded small-vessel data. In addition to the UID, it is desired that the system report the vessel name, class, registration information, country, etc. A configurable return may even provide current GPS location, origin, destination, etc.
- Extended range.
- Multisensor/multispectral systems operating in a wide range of environmental conditions.

Radio Frequency Identification (RFID) tags have been developed for similar purposes elsewhere, but may have a limited range versus other possible technologies, such as tags responsive to radar, infrared, or optical wavelengths. Acoustics, active beacons, or other methods, and combinations of several methods will all be considered.

A successful technological approach will be evaluated based on performance, but at a minimum a successful NVIS capability will:

- Obtain long range 2D imagery with the ability to read vessel name and flag, monitor vessel activity such as personnel movements, and for weapons identification.
- Provide thermal imaging.
- All weather and low-light capabilities, particularly humidity, rain, and haze common to a maritime environment.
- Imaging may be either active or passive.
- Any lasers employed must be eye-safe according to American National Standards Institute, "ANSI Z136.1: Safe Use of Lasers" (2007).
- Either the ability to generically interface with 3rd party software which receives target cues, and provides image processing capabilities such as automatic target detection, tracking, super resolution, atmospheric turbulence correction, image fusion, electronic image stabilization, optical character recognition, etc., (such as reference 2d3, "TacitView", obtained online: <http://www.2d3.com> (2010)), or incorporates embedded software which does the same in near-real time processing.

- Although the active field of view may be narrow given the desired long-range and high resolution, the NVIT technology should have 360° articulation to provide data from targets in any direction.

Enhancement of the basic capabilities of NVIT technologies may require:

- Multisensor / multispectral imaging techniques.
- Image stabilization (IS) techniques using either hardware, software or a combination thereof is strongly recommended. Particular techniques may include: a simple pan/tilt motorized mount for tracking with software stabilization, a full gyro stabilized gimbal, or other sufficient technologies.

Desired capabilities of NVIT technologies: Desired capability fulfillment should consider multi-function of the hardware required to fulfill the basic functionality. For example, any optics package or laser for active imaging (as an example approach) would ideally also be employed for any laser radar or vibrometry capabilities. The cost of incorporating the desired capabilities into the basic NVIT technology will be considered.

- Provide 3D laser radar (LADAR) imaging of the target vessel for profiling against known target database libraries. MacDonald, et al. (reference "Advances in tactical laser radar," Aerospace conference, 2009 IEEE, vol. no., pp.1-10, 7-14 March 2009)
- Provide laser doppler vibrometry characterization data. (references Michael, Rudd, U.S. patent number 4554836 and Polytecnic, "Vibration Sensors" obtained online: <http://www.polytec.com/int/products/vibration-sensors/> (2010))
- Other significant and novel data collection capabilities.

Phase I of this effort will include an engineering analysis, concept development, and as a goal, prototype evaluation. Phase II includes further development of a prototype for evaluation in the lab and a relevant maritime environment. Phase III incorporates the SVCT and/or NVIT capability into a DHS platform for evaluation in an operational environment for production readiness into the transition program.

PHASE I: Concepts for a SVCT and/or NVIT system fulfilling the above requirements shall be explored. Initial prototypes from successful concepts will be analyzed relative to the basic requirements and the qualitative degree to which a successful concept fulfills additional desired capabilities will be determined.

PHASE II: A demonstration system shall be developed for concept evaluation. The system shall be suitable for demonstration purposes in an operational environment. Evaluation will quantify the performance and suitability of the SVCT and/or NVIT. Refinements will continue to be made, with a finalized capability by the end of Phase II.

PHASE III: COMMERCIAL APPLICATIONS: The small business will produce developmental equipment integrated with DHS tracking systems for developmental and operational evaluation. The SVCT and/or NVIT capability will be evaluated for transition to DHS components.

REFERENCES:

International Telecommunications Union, "ITU-R M.1371-4: Technical characteristics for a universal ship borne automatic identification system using time division multiple access in the VHF maritime mobile band", (2005)

International Electrotechnical Commission, "IEC Standard 61993-2: Maritime navigation and radiocommunication equipment and systems – Automatic identification systems (AIS)" (2001)

Paget, Chris, "Extreme-range RFID tracking", Blackhat USA conference, Las Vegas (2010)

Pappu, Ravi, "Searching Local Spacetime: New applications for Passive RFID", Google Tech Talk (2008)

American National Standards Institute, "ANSI Z136.1: Safe Use of Lasers" (2007)

2d3, "TacitView", obtained online: <http://www.2d3.com> (2010)

MacDonald, A.; , "Advances in tactical laser radar," Aerospace conference, 2009 IEEE , vol., no., pp.1-10, 7-14 March 2009

Michael, Rudd, U.S. patent number 4554836

Polytechnic, "Vibration Sensors" obtained online: <http://www.polytec.com/int/products/vibration-sensors/> (2010)

KEY WORDS: Tracking Tagging Locating (TTL); Beacon; Transponder; Identification Friend-or-Foe (IFF); Electro-Optic (EO); Radar, Radio-Frequency (RF); Optics; RFID; Optical Taggants; Imaging, Tracking, Identification, Multispectral, Electro-Optic (EO), Optics, Thermal, Laser range gated imaging, 3D Laser Radar, Laser Vibrometry

8.2 **SBIR TOPIC NUMBER: H-SB011.1-002**

TITLE: Preparation of Environmental Samples for Biological Detection

TECHNOLOGY AREAS: Environmental sample preparation, separation and concentration

OBJECTIVE: Develop novel methods and devices for a flow-through system that prepares and concentrates biological materials from environmental samples. Incoming samples will include small inert particles (such as dirt or metals), chemicals, whole cells, viruses, and free-floating exogenous materials (e.g., toxin peptides, free DNA, and proteins). The goal is to prepare samples to allow for separate analyses of the whole cells and exogenous materials, while removing as many of the inert and chemical constituents as possible that might interfere with the downstream analysis.

DESCRIPTION: When environmental samples are collected either from aerosols or swabs, they can contain a whole host of materials and debris. However, the performance of high fidelity biomolecular analysis techniques, such as PCR, DNA sequencing, or ELISA, can degrade if exposed to some of these environmental contaminants and high particle loads. In addition, the detection speeds of many of these techniques are also related to the volume of sample that they process. Thus, to achieve maximum performance from sensitive analytical techniques, sample purification and concentration is an important and necessary aspect to the assay. Current sample preparation techniques are slow, costly, or mix the entire sample together into one aliquot, and thus offer no way to determine if a detected pathogen was part of a whole cell initially, or if the constituents were exogenous. These current techniques are not suitable for the Department of Homeland Security's (DHS) needs.

DHS has the need to be able to extract the whole cells contained in a sample into an aliquot and the exogenous biological material into a separate aliquot, all while purging as much of the background non-biological particulate and chemical materials as possible. Multiple technological approaches may be necessary to accomplish this goal and achieve efficient sample extraction. In addition, this sample purification and concentration should be compatible with fully automated detection systems that require limited consumables and maintenance, have rapid analysis cycles of less than an hour for complete sample preparation and analysis, and operate in a wide range of temperature and humidity conditions.

This topic area description is requesting proposals to research and develop a solution to the sample preparation and concentration needs of DHS. Specific success metrics are:

- Process up to 10 mL of input sample in a batch mode
- 70% desired, 50% acceptable recovery of whole cells from input sample
- 70% desired, 50% acceptable recovery of exogenous nucleic acid and protein material
- Capability of 1:100 liquid concentration ratio for either final sample aliquot

15 minute sample processing time

PHASE I: The Phase I effort should identify the functional parameters of the proposed

system and how these parameters will be incorporated into a feasible system/product. Issues to consider include: the removal of unwanted materials, the collection of desired materials, the separation of whole cell and exogenous materials, the concentration ratio of the end samples of interest to the starting sample volume, and the delivery of these end product samples into a flow through system which allows for easy integration into an overall platform design for autonomous sample collections, preparation and analysis.

Deliverables for Phase I should include a feasibility report and all relevant data. Relevant data is defined as the set of data used to make decisions about feasibility, both from in-house testing and peer reviewed literature (i.e., statements must be supported with data).

PHASE II: The Phase II research and development includes the construction and testing of a prototype sample purification and concentration system that can be integrated into an automated detection system. The component structures, materials of construction, surface area, sample buffer tolerance, sample makeup/particle load/particle characteristics, system differential pressure, sample concentration ratio, and operational scenario all play a role in how efficiently particles of interest are separated from contaminant particles. These aspects should all be considered and tested during design phases.

Tests of the system should be performed with operationally relevant materials, and the results analyzed to provide quantitative overall system efficiencies for retention of desired biological entities in each aliquot, removal of contaminant particulates, and sample concentration ratios for each aliquot.

The first deliverable for Phase II is a prototype instrument that combines the above stated requirements in an integrated flow through device. The second deliverable is a report detailing the system components and all testing and test results that were conducted during the development of the prototype. The third deliverable is a plan for the manufacturing (manufacturing plan) and transfer (transfer plan) of the components to an integrator working with other system components capable of affecting autonomous detection of pathogens.

PHASE III: COMMERCIAL APPLICATIONS: Phase III should be the integration phase where the small business involved in Phases I and II activities makes their connection with an integration company to allow their developments to be joined with those specializing in sample preparation and analysis instrument design. This may be accomplished by integration of several small companies, the development of other divisions of the same company or a partnering with a single large integration house that has other component technologies ready for integration and implementation.

REFERENCES:

Latulippe DR, Ager K, Zydney AL, 2007. Flux-dependent transmission of supercoiled plasmid DNA through ultrafiltration membranes. *J Membr Sci* 294:169–177.

Latulippe DR, Zydney AL, 2008. Salt-Induced Changes in Plasmid DNA Transmission through Ultrafiltration Membranes. *Biotechnol. Bioeng.* **99** (2):390–398.

Latulippe DR, Molek JR, Zydney AL, 2008. Importance of Biopolymer Molecular Flexibility in Ultrafiltration Processes. *Ind. Eng. Chem. Res.*

Hirasaki, T., et al., 1995. Permeation mechanism of DNA molecules in solution through cuprammonium regenerated cellulose hollow fiber (BMMTM). *J Membr Sci* 106:123-129.

Higuchi A, Kato K, Hara M, Sato T, Ishikawa G, Nakano H, Satoh S, Manabe S, 1996. Rejection of single stranded and double stranded DNA by porous hollow fiber membranes, *J. Membr Sci* 116:191–197.

Arkhangelsky E, Steubing B, Ben-Dov E, Kushmaro A, Gitis V, 2008. Influence of pH and ionic strength on transmission of plasmid DNA through ultrafiltration membranes. *Desalination* 227:111-119.

Kong S, Titchener-Hooker N, Levy MS, 2006. Plasmid DNA processing for gene therapy and vaccination: Studies on the membrane sterilization/ultrafiltration step. *J Membr Sci* 280:824–831.

KEY WORDS: Environmental Sample Preparation; DNA; RNA; Protein; Peptide

CLOSED

8.3 **SBIR TOPIC NUMBER: H-SB011.1-003**

TITLE: Public Safety Broadband Mobile Application for Mission Critical Voice

TECHNOLOGY AREAS: Broadband wireless, 700 MHz, and voice

OBJECTIVE: Develop a standardized methodology and application framework for implementing mission critical voice services on mobile broadband devices.

DESCRIPTION: Public safety has been licensed to use spectrum in the 700 MHz band to develop a nationwide public safety broadband network. The technology selected for deployment in this network is Long Term Evolution (LTE), being developed by the 3rd Generation Partnership Program (3GPP). Several cities have been granted waivers to deploy LTE systems in the 700 MHz public safety broadband spectrum, and the National Telecommunications and Information Administration (NTIA) is supporting those cities through grants from the Broadband Technology Opportunities Program (BTOP). In addition, there are two national demonstration networks currently in development, one by the Federal Communications Commission (FCC), and one by the Public Safety Communications Research Program (PSCR).

Because the initial thrust of LTE standards development has focused on providing data services, current LTE protocols do not support voice services, and those protocols in development provide services equivalent to cellular voice. Public safety, on the other hand, has several requirements beyond those of cellular voice when it comes to mission critical voice services. The National Public Safety Telecommunications Council is currently analyzing public safety requirements for mission critical voice on broadband networks. Examples of these requirements include (but are not limited to):

- One-to-many communication.
- A means of voice communication when the network is not available (aka, talkaround).
- A means of ensuring that the voice message gets through to the intended recipient and is understandable.

The successful offeror is expected to engage public safety practitioners and agencies to further understand their requirements for mission critical voice. From an understanding of those requirements, and an analysis of the current state of LTE standards, the offeror will develop a plan for incorporating those requirements into an application (and potentially an add-on device) that can be run on LTE user equipment (i.e., LTE handset). In addition to development of an application that runs on a mobile broadband device, the offeror's plan should also include a path to ensure that the underlying technology standards are on a path to facilitate meeting those requirements.

PHASE I: Engage the public safety community (possibly through NPSTC) to understand their requirements for mission critical voice and develop a plan for addressing

those requirements in the context of emerging LTE standards, LTE devices, and LTE demonstration networks.

PHASE II: Demonstrate a prototype implementation of broadband mission critical voice services on a mobile device working on one of the waiver city or national demonstration networks. This could include beta-release software, prototype hardware, or a combination of the two. Demonstrate progress on adoption of any necessary 3GPP standards needed to support the mission critical voice application.

PHASE III: COMMERCIAL APPLICATIONS: Develop a marketing plan (including cost analysis) that shows commercial viability of the broadband mission critical voice application.

REFERENCES:

<http://www.3gpp.org>

http://hraunfoss.fcc.gov/edocs_public/attachmatch/DCC-29814A1.pdf

http://www.ntia.doc.gov/frnotices/2010/FR_BTOPA_ApplicationReopening_05132010.pdf

<http://www.fcc.gov/pshs/eric.html>

http://www.pscr.gov/projects/broadband/700mhz_demo_net/700mhz_ps_demo_net.php

KEY WORDS: Mobile broadband; LTE; long term evolution; 700 MHz broadband

CLOSED

8.4 **SBIR TOPIC NUMBER: H-SB011.1-004**

TITLE: Monolithic, Electronically and Widely Tunable Semiconductor-Based Infrared Laser Sources

TECHNOLOGY AREAS: Sensors, Lasers, QCLs

OBJECTIVE: Develop a robust, high average power, monolithic, electronically tunable infrared quantum cascade laser (QCL) for explosives and chemical sensing applications.

DESCRIPTION: Both close proximity and standoff based explosives sensing applications using infra-red (MWIR) laser based systems in the 4-12 micron (μm) range are of immense interest to both DoD and DHS. Explosives molecules possess remarkably unique vibrational spectroscopic signatures in this spectral range. Recently, photoacoustic and Raman based detection systems, for low vapor pressure chemicals and explosives, have been demonstrated with remarkable sensitivity and selectivity. In these cases, external-cavity tunable (ECT) quantum cascade lasers (QCLs) were used as illumination light sources for the sensing applications. Even though ECT QCLs available in the commercial market have somewhat useable tunable ranges and output power levels, the ECT operation requires hybrid integration and mechanical movement of external optical elements. Both of these factors will adversely impact reliable operations of the lasers in demanding field environments. Additionally, the speed of the mechanical tuning element within an ECT QCL poses an undesirable upper bound on the laser tuning speed which, in turn, seriously limits the overall operating speed of a sensor system.

The goal of this topic is to seek a viable solution for a monolithic, electronically and widely tunable semiconductor-based MWIR laser source which circumvents all the shortcomings of the existing ECT QCL platforms. Fully electronically tunable semiconductor laser solutions are sought. Any proposal that requires thermal and/or mechanical tuning elements will be considered non-responsive.

PHASE I: Demonstrate theoretically and experimentally the design of an electronically tunable single-mode QCL source with a minimum average output power of 50-100 mW over the entire tunable range (at least $\pm 5\%$ of the center wavelength) in the 4 - 12 μm range. The design should enable tunable step sizes as small as 0.1 nm. A path forward for further increasing the output power of the laser operating at continuous-wave (CW) mode at room temperature (RT) should be proposed and included as part of the deliverable for Phase I.

PHASE II: Develop and experimentally demonstrate the design of an electrically and widely tunable single-mode QCL source with a minimum RT CW output power of 100 - 200 mW over the entire tunable range (at least $\pm 5\%$ of the center wavelength) in the 4 - 12 μm range. Tunable step sizes should be as small as 0.1 nm. Designs that would permit scaling to higher output powers are highly desirable.

PHASE III COMMERCIAL APPLICATIONS: In addition to homeland security and defense applications, non-contact screening and sampling capabilities are required by state and federal law enforcement entities as well as private security organizations.

REFERENCES:

Pushkarsky et al, "Sub-parts-per-billion level detection of NO₂ using room-temperature quantum cascade lasers," PNAS, Vol. 103, p. 10846, July 2006.

Van Neste et al., "Standoff Spectroscopy of Surface Adsorbed Chemicals," Analytical Chemistry, Vol. 81, No. 5, p. 1952, March, 2009.

A, Hugi *et al*, "External Cavity Quantum Cascade Laser Tunable from 7.6 to 11.4 μm ," Appl. Phys. Lett., Vol. 95, p. 61103, August 2009.

KEYWORDS: infrared; lasers; electronically tunable; explosives; chemicals; sensing; analytical

CLOSED

8.5 SBIR TOPIC NUMBER: H-SB011.1-005

TITLE: Mitigation of Contact Lens, Eye Surgery, Pupil Dilation, and Other Challenges on Iris Recognition

TECHNOLOGY AREAS: Biometrics, Iris Recognition, Human Factors

OBJECTIVE: Study, analyze, and mitigate the effects of factors such as contact lens usage, eye surgery, and varying pupil dilation on the performance of iris recognition system performance.

DESCRIPTION: As Iris recognition technologies mature and become more widespread, it is important to understand how well the technology may be applied to broad populations including people who have had eye surgery or are at the extremes on pupil dilation. In particular, although degraded iris recognition performance has been associated with the use of patterned and hard contact lenses, it has been assumed that other prescription contact lenses do not have this effect. Recent research has, however, called this assumption into question. Given that the number of people in the United States who wear contact lenses is over 25 million people (125 million worldwide) and the likely difficulty of requiring users to remove contact lenses for recognition purposes, measuring the degree of iris recognition degradation associated with contact lenses and other unusual eye conditions and developing ways to mitigate any degradation are increasingly important to the future of this technology.

This investment seeks to study, analyze and mitigate the potential adverse effects of contact lens, eye surgery, and varying pupil dilation and similar factors on iris recognition performance. The effort will include collecting or leveraging existing data collection efforts to examine potential performance variations associated with same eye iris images with and without different types of contact lenses, before and after surgery, or at varying pupil dilation. If, as expected, significant performance differences are observed, the next phase will include a more extensive examination of the issue as well as development of approaches to detect and mitigate instances in which matching performance appears to have been degraded.

PHASE I: Design and carry out a preliminary study to examine and characterize the affects of particular types of contact lenses, eye surgeries, and/or pupil dilation on iris recognition performance.

PHASE II: Conduct a detailed analysis of the specific problems associated with iris recognition identified in phase I. Develop approaches and algorithms to:

- detect if an eye is covered by a contact lens, has been subject to surgery that is likely to affect iris recognition performance, or appears to have extreme pupil dilation or other characteristics that may degrade the performance of iris recognition.

- mitigate the effects of contact lens use, vision surgery, pupil dilation, or other characteristics on the performance of iris recognition systems.

PHASE III: COMMERCIAL APPLICATIONS: The algorithms and methodology developed in phase II will be refined for integration into existing iris imaging systems as well as backend matching systems responsible for performing biometric verification and identification and will be made available through licensing or in other ways to enhance vendors' iris matching products.

REFERENCES:

Sarah E. Baker, Amanda Hentz, Kevin W. Bowyer, and Patrick J. Flynn, "Contact Lenses: Handle with Care for Iris Recognition", 2009.

Sarah Ring and Kevin Bowyer, "Detection of Iris Texture Distortions by Analyzing Iris Code Matching Results" 2008 IEEE Conference on Biometrics: Theory, Applications, and Systems. Sept. 2008.

National Institute of Standards and Technology. Iris Challenge Evaluation, 2006, <http://iris.nist.gov/ice>.

Zhaofeng He, Tieniu Tan, Zhenan Sun and Xianchao Q. "Towards Accurate and Fast Iris Segmentation for Iris Biometrics", In: IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 15 July 2008.

John Daugman, "How iris recognition works" IEEE Transactions on Circuits and Systems for Video Technology 14(1), January 2004, pp. 21–30.

KEY WORDS: Iris Recognition; Biometrics; Human Factors

8.6 SBIR TOPIC NUMBER: H-SB011.1-006

TITLE: Improved Firefighter Face Piece Lenses for Self-Contained Breathing Apparatus (SCBA)

TECHNOLOGY AREAS: Self-Contained Breathing Apparatus (SCBA) Thermal Performance, Firefighter personal protective equipment

OBJECTIVE: Develop a more durable, high heat resistant lens for self-contained breathing apparatus face pieces.

DESCRIPTION: First responders that require respiratory protection depend on self-contained breathing apparatus (SCBA) to protect them from oxygen deficient, contaminated and high heat conditions. The self-contained breathing apparatus system is made up of a number of parts. The cylinder carries the breathing air for the user. The backpack assembly is the harness that holds the cylinder and regulators on the user's back and allows the user to move in the hazardous environment. The final piece of the system is the face piece or mask that provides the user a seal between the hazardous environment and the clean air from the cylinder. The mask has a series of straps that hold the mask on the users face and a polycarbonate lens that allows the user to see, yet creates a barrier from contaminants, flying debris and heat. The maximum service temperature range for "high heat" polycarbonates is 275° - 583° F.¹ According to the National Fire Protection Association, typical room temperatures in a common dwelling unit fire can reach temperatures of 1600° F at the ceiling and several hundred at the floor.² This presents a serious danger to the over one million firefighters in the United States.³ The weakest part of their protective equipment may be the lens of their SCBA face piece. In fact, a number of firefighter fatalities have been attributed to face piece failure when exposed to excessive heat. For example, a fire instructor in Pennsylvania was killed when his mask failed as he was reloading a training fire after several other training evolutions.⁴

The development of a more durable lens that offers clarity, resistance to impacts and greater heat resistance will offer a higher degree of safety for America's firefighters.

PHASE I: Identify test materials that offer the same beneficial characteristics of current lenses with a higher resistance to heat. Include a test plan for evaluating different

¹ MatWeb, Material Property Data. *Overview of materials for Polycarbonate, High Heat.* <http://www.matweb.com/search/DataSheet.aspx?MatGUID=bfcedbb55b164a68a93acfa854fa2fe0>. Accessed 9/9/10.

² *Combustion Products and Their Effects on Life Safety*, National Fire Protection Association, Fire Protection Handbook Vol. II, 19th Ed., 2003, p 8-24.

³ U.S. Fire Administration

⁴ NIOSH

materials for their strength, durability, and resistance to extreme heat generated by a compartmentalized fire.

PHASE II: Develop a prototype of the concept. Evaluate the prototype in a simulated operational environment. Conduct tests of prototype representative operating environments at test facilities in TBD training facilities.

PHASE III: COMMERCIAL APPLICATIONS: A more robust material has significant commercial applications within the fire, public safety services and the DoD, as well as indirect related applications such as the medical, sports, telecom, and many other critical infrastructure sectors.

REFERENCES:

MatWeb, Material Property Data. *Overview of materials for Polycarbonate, High Heat.* <http://www.matweb.com/search/DataSheet.aspx?MatGUID=bfcedb65b164a68a93acfa854fa2fe0>. Accessed 9/9/10.

KEY WORDS: Self contained breathing apparatus

CLOSED

9.0 DHS SBIR FY 11.1 PHASE I SBIR CHECKLIST

Page Numbering:

- Number all pages of your proposal consecutively. The Cover Sheets count as pages 1 and 2 no matter how they print out. The Technical Proposal begins on page 3 and continues through page 24. The Cost Proposal for the base effort is page 25 (no matter how it prints out).
- Total for each Phase I proposal is 25 pages inclusive of Cover Sheets, Technical Proposal, Cost Proposal and resumes. If proposed, the Phase I Option Cost Proposal is uploaded as part of the Technical Proposal, but is not counted as part of the 25-page page limit.
- Beyond the Phase I 25-page limit, do not send appendices, attachments and/or additional references

Proposal Format:

- Cover Sheet, Technical and Cost Proposals MUST be submitted electronically at <https://www.sbir.dhs.gov>

The Technical Proposal Must Address:

- Identification and Significance of the Problem or Opportunity
- Phase I Technical Objectives
- Phase I Work Plan
- Related Work
- Relationship with Future Research or Research and Development
- Commercialization Strategy
- Key Personnel, Resumes
- Facilities/Equipment
- Subcontractors/Consultants
- Prior, Current, or Pending Support of Similar Proposals or Awards
- Phase I Option

Funding:

- The Phase I proposed cost for the base effort and option are clearly separate
- The Phase I total proposed cost for the base effort does not exceed \$100,000 and six months
- The Phase I option cost does not exceed \$50,000 and up to four months

Final Checklist:

- The Cover Sheet was prepared on-line
- The Technical Proposal was uploaded in pdf and includes the Phase I option description, budget narrative and option cost proposal (if a Phase I Option is proposed). File is not locked, password protected, or encrypted.
- The Cost Proposal (for the base effort) was submitted on-line and shows detailed cost and fee/profit breakout and the total cost and fee/profit are also listed on the Cover Sheet. The total cost and fee/profit shown on the Cost Proposal matches the cost and fee/profit listed on the Cover Sheet. The Cost Proposal for the base effort does not exceed \$100,000.
- The “Finalize/Submit Proposal” button was selected to transmit the completed proposal to DHS
- Email confirmation of the receipt of your Proposal was received
- SBIR Help Desk. Phone: 1-800-754-3043; email: sbirmail@sainc.com

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