



U.S. Department of Homeland Security (DHS)

Small Business Innovation Research (SBIR) Program

Solicitation #: HSHQDC-17-R-00010

Due Date: January 18, 2017 at 2:00 pm ET

Issued By:
DHS Office of Procurement Operations
on behalf of:
The Science and Technology Directorate
and the Domestic Nuclear Detection Office

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1.0 PROGRAM DESCRIPTION

1.1 Summary

The Department of Homeland Security (DHS) Small Business Innovation Research (SBIR) Program, comprised of the Science and Technology (S&T) Directorate's SBIR Program and the Domestic Nuclear Detection Office's (DNDO) SBIR Program, invites small business concerns (SBCs) to submit innovative proposals under this Solicitation. Eligible small businesses with the capability to conduct research or research and development (R/R&D) in any of the homeland security-related topic areas described in **Appendix A**, and to commercialize the results of that R/R&D, are encouraged to participate. The DHS SBIR Program Office encourages all small businesses, particularly small disadvantaged, women-owned, veteran-owned, service-disabled veteran-owned, and socially and economically disadvantaged small businesses to submit proposals in response to topics described in this Solicitation.

IMPORTANT:

- Please read the solicitation carefully. Failure to comply with the requirements herein will result negatively in the proposal evaluation.
- This Solicitation contains topics for both the S&T Directorate's SBIR Program and DNDO's SBIR Program. Only proposals submitted in response to topics contained in this Solicitation will be accepted and considered for awards. **Section 7.0** outlines the nine (9) research topics –seven (7) S&T topics and two (2) DNDO topics. Unsolicited proposals will not be accepted.
- While the Phase II proposal process is covered in this Solicitation, at this time this Solicitation requests Phase I proposals only. See **Section 1.3**.
- Small businesses that are majority-owned by multiple venture capital operating companies, hedge funds or private equity firms are not eligible to submit proposals in response to this Solicitation. See **Section 3.8**, Eligibility.
- Per the Small Business Administration (SBA) SBIR Policy Directive, dated February 24, 2014, to be eligible for a Phase I award, Offerors must meet or exceed the following benchmarks:
 - Phase I to Phase II Transition rate, See **Section 3.9**, DHS Phase II Transition Rate Benchmark
 - Commercialization Rate Benchmarks, See **Section 3.10**, DHS Commercialization Rate Benchmark

1.2 DHS SBIR Program, Purpose and Objectives

The statutory purpose of the SBIR Program is to strengthen the role of innovative small business concerns in Federally-funded R/R&D. Program objectives are to: (1) stimulate technological innovation; (2) strengthen the role of small business in meeting Federal R/R&D needs; (3) foster and encourage participation by socially and economically disadvantaged small businesses (SDBs) and by women-owned small businesses (WOSBs); and (4) increase private sector commercialization of innovations developed through Federal R/R&D, thereby increasing

competition, productivity, and economic growth. The federal SBIR Program is mandated by the Small Business Research and Development Act of 1982 (Public Law 97-219), the Small Business Research and Development Act of 1992 (Public Law 102-564), and the SBIR/STTR Reauthorization Act of 2011 (Public Law 112-81).

The DHS SBIR Program follows the policies and practices of the Small Business Administration (SBA) [SBIR Policy Directive](#), dated February 24, 2014. This Solicitation incorporates and uses the flexibility of the SBA SBIR Policy Directive to encourage innovative proposals in response to the research topics listed in **Section 7.0**.

In its commitment to also support Executive Order 13329 which encourages innovation in manufacturing-related research and development, DHS seeks, through its SBIR Program and topic descriptions, research related to advanced processing, manufacturing processes, equipment and systems; or manufacturing workforce skills and protection.

1.3 Three Phase Program

The SBIR Program is a three phase program. The objective of Phase I is to determine the scientific, technical, and commercial merit and feasibility of the proposed effort, and the quality of performance of the small business concern, with a relatively small agency investment prior to providing further Federal support in Phase II. Phase I proposals should concentrate on that R/R&D which will significantly contribute to proving the scientific and technical feasibility, and commercialization potential of the proposed effort, the successful completion of which is a prerequisite for further DHS support in Phase II. Offerors are encouraged to consider whether the R/R&D being proposed also has private sector potential, either for the proposed application or as a base for other applications.

The objective of Phase II is to continue the R/R&D effort from the completed Phase I. Phase II efforts further develop work from Phase I that meets particular program needs and exhibits potential for commercial application. Phase II is the principal R&D effort and is expected to produce a well-defined deliverable prototype. Phase II awards may be made to small business concerns on the basis of the results of their Phase I projects, and the scientific merit, technical merit, and commercialization potential of the Phase II proposal. Phase II awardees may receive up to one additional, sequential Phase II award to continue the work of an initial Phase II award. The additional, sequential Phase II award has the same guideline amounts and limits as an initial Phase II award. In addition, Phase II awardees may receive additional funding under the DHS SBIR Commercialization Readiness Pilot Program (see **Section 5.15**).

In accordance with the SBIR/STTR Reauthorization Act of 2011 (Section 5105, Public Law 112-81), **DHS no longer uses an invitation process for Phase II**. All small businesses awarded a Phase I contract originating from this Solicitation are eligible to submit a Phase II proposal. A Contracting Officer will notify Phase I awardees of the Phase II proposal submission requirements and the deadline for Phase II submissions.

For details on the S&T and DNDO Phase I and II Cost Proposal thresholds, see **Section 3.4**.

SBIR Phase III refers to work that derives from, extends, or completes an effort made under prior SBIR funding agreements, but is funded by sources other than the SBIR Program. Phase III work is typically oriented towards commercialization of SBIR research or technology. Under Phase III, the SBIR awardee is expected to seek contracts and obtain funding from the private sector and/or the Federal government (non-SBIR federal government sources) to develop the prototype or supply goods or services related to the work performed under the SBIR contract(s) into a viable product or non-R&D service for sale in DHS and/or private sector markets.

A Phase III award, by its nature, is an SBIR award, has SBIR status, and must be accorded SBIR data rights. Phase III proposals can only be submitted by, and made to, a Phase I and/or Phase II awardee. The competition for SBIR Phase I and Phase II awards satisfies any competition requirement of the Armed Services Procurement Act, the Federal Property and Administrative Services Act, and the Competition in Contracting Act. Therefore, an agency that wishes to fund an SBIR Phase III project is not required to conduct another competition in order to satisfy those statutory provisions.

1.4 Key Dates and Events

The following chart shows the important events and corresponding dates of the FY17.1 DHS SBIR Solicitation, HSHQDC-17-R-00010

KEY DATES	
EVENT	DATE
Pre-solicitation issued:	December 1, 2016
Direct contact with Topic POC permitted:	December 1, 2016 – December 14, 2016
Solicitation released:	December 15, 2016
Phase I proposals submission:	December 15, 2016 – January 18, 2017
Last day to submit questions:	January 5, 2017 no later than 2:00 p.m. ET
Last day Q&A Posted on FBO.gov	January 11, 2017
Deadline for receipt of proposals:	January 18, 2017, 2:00 p.m. ET

1.5 SBIR Office Contacts

For general questions about the S&T Directorate's SBIR Program, please contact STSBIR.PROGRAM@hq.dhs.gov. For general questions about the DNDO SBIR Program, please contact dndosbir@hq.dhs.gov.

1.6 Definitions

Definitions provided in SBA's SBIR Policy Directive (dated February 24, 2014) and the Federal Acquisition Regulation (FAR) apply for the purposes of this Solicitation. Terms that are unique

to the SBIR Program, this specific SBIR solicitation, or may be unfamiliar to small business concerns, are defined in **Appendix B**.

1.7 Fraud, Waste and Abuse

DHS and the SBIR Program Office are taking proactive measures to reduce the vulnerability of the SBIR Program to fraud, waste, and abuse. The SBIR Policy Directive (dated February 24, 2014), Section 9 (f)(1) (i through ix), provides examples of fraud, waste and abuse relating to the SBIR Program. To report SBIR fraud, please contact the DHS Office of the Inspector General (OIG):

- Anonymous Hotline: 1-800-323-8603
- OIG Online Allegation Form: <http://www.oig.dhs.gov/hotline/hotline.php>
- Fax: (202) 254-4297
- Mail: DHS Office of Inspector General/MAIL STOP 2600
Attention: Office of Investigations-Hotline
245 Murray Drive SW, Building 410
Washington, DC 20528

To reach someone within S&T's SBIR Program Office about fraud, waste and abuse, please contact John Pucci, DHS S&T SBIR Program Director, at john.pucci@hq.dhs.gov.

To reach someone within the DNDO SBIR Program Office about fraud, waste and abuse, please contact the DHS DNDO SBIR PM at dndosbir@hq.dhs.gov.

2.0 REGISTRATION, CERTIFICATIONS, AND DATA COLLECTION

2.1 Mandatory Registrations

In order to prepare and submit SBIR proposals to DHS under this Solicitation, Offerors must be registered in the DHS SBIR electronic online proposal submission system at <https://sbir2.st.dhs.gov>.

Company registration is also required in the U.S. Small Business Administration's (SBA) Company Registry Database at <http://sbir.gov/registration>. Prior to submitting the complete proposal to DHS, each Offeror must:

1. Affirm registration in the SBA Company Registry;
2. Input the company's SBC Control ID number in the Company Data section of the DHS SBIR Cover Sheet; and
3. Append a copy of the completed SBA Company Registration information as the last page of the Technical Proposal.

Before an SBIR contract can be awarded, proposing firms must also be registered in the System for Award Management (SAM). SAM is the official U.S. Government system that consolidated the capabilities of the Central Contractor Registration (CCR)/Federal Register, Online Representations and Certifications Application (ORCA), and the Excluded Parties List System (EPLS) databases. Although not required at the time of proposal submission to the DHS SBIR Program, it is highly recommended that Offerors register in SAM during the proposal process. To register in SAM and/or update company's records, visit <https://www.sam.gov/portal/public/SAM/>.

Offerors are encouraged, but not required, to have a DUNS number and a CAGE code at the time of proposal submission. Companies must obtain these before a contract can be awarded to the company. To obtain a DUNS number, visit <https://fedgov.dnb.com/webform>. CAGE Codes are automatically assigned upon registration in SAM. For more information about the Commercial and Government Entry (CAGE) code, please visit www.fsd.gov.

2.2 Required Certifications

At the time of proposal submission, each small business concern must certify via the Cover Sheet of the proposal that it meets the size, ownership and other requirements of the SBIR Program. In addition, the SBA SBIR Policy Directive (dated February 24, 2014) includes certifications requirements set forth in Section 5143 of the SBIR/STTR Reauthorization Act of 2011. The certifications require small businesses to certify that they are meeting the Program's requirements during the life cycle of the funding agreement.

The DHS SBIR Programs will implement the certifications as follows:

1. SBIR Funding Agreement Certification – Time of Award (**Attachment 1**) – If selected for award, this certification will be provided by the Contracting Officer to the small business for completion prior to issuing the Phase I and Phase II award.
2. SBIR Funding Agreement Certification – Life Cycle Certification (**Attachment 2**) - The Life Cycle Certification will be included in resultant Phase I and Phase II contracts and considered a deliverable.

2.3 Data Collection Requirement

Each Phase I and Phase II applicant is required to either enter information into SBA's database at www.SBIR.gov or to update previously entered information. Companies should login to www.SBIR.gov using the account created when registering for the SBA company registry database. The following are examples of data to be entered into the database:

- Any business concern or subsidiary established for the commercial application of a product or service for which an SBIR award is made.
- Revenue from the sale of new products or services resulting from the research conducted under each Phase II award;

- Additional investment from any source, other than Phase I or Phase II awards, to further the research and development conducted under each Phase II award.

The SBC 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.

In addition, each Phase II awardee is required to update the appropriate information on the award in the database upon completion of the last deliverable under the funding agreement and is requested to voluntarily update the information in the database annually thereafter for a minimum period of 5 years.

3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

3.1 Proposal Preparation and Length of Proposal

Offerors responding to this Solicitation must submit a direct, concise, and informative research or research and development proposal. Each complete proposal must be submitted via the DHS SBIR online proposal submission system portal at <https://sbir2.st.dhs.gov>. Proposals submitted with more than 20 pages for PHASE I or 40 pages for PHASE II as calculated in the table below, will be deemed **NON-COMPLIANT** and will not be evaluated. It is the responsibility of the Small Business to ensure that once the proposal is submitted and uploaded into the system, it complies with the page limit.

Complete proposals contain the following:

PROPOSAL REQUIREMENTS		
	PHASE I	PHASE II
Page Limitation	20 pages	40 pages
Cover Sheet ¹	Pages 1-2	Pages 1-2
Technical Proposal	Pages 3-19	Pages 3-39
SBA Company Registry Information ²	Mandatory	Mandatory
Cost Proposal ³	Page 20	Page 40
Briefing Chart (Attachment 3) ⁴	Mandatory	Mandatory
Commercialization Report ⁴	N/A	If Applicable
Non-disclosure Agreement ⁵	Mandatory (DNDO Topics ONLY)	(NDA from Phase I applies to Phase II)

¹ Counts as two pages regardless of print results

² Appended to the Technical Proposal (See **Section 2.1**), but not included in the page count

³ Counts as one page regardless of print results

⁴ Not included in page count

⁵ DNDO topics ONLY - NDA must not be included in the proposal, but submitted separately via provided email; See **Section 4.3**.

The Cover Sheet and the Cost Proposal are completed electronically via the DHS SBIR online proposal submissions system, while the Technical Proposal, Briefing Chart, and the Commercialization Report, if applicable, are uploaded as PDF documents.

No additional attachments, appendices or referenced material beyond the page limitations shall be considered in proposal evaluation.

3.2 Proposal Cover Sheet, Technical Abstract, Project Aims, and Summary of Results

Offerors are required to provide basic details about the proposed effort on the proposal Cover Sheet. Additionally, the Cover Sheet includes the following fillable sections: Technical Abstract, Project Aims, and Summary of Results.

The Technical Abstract is limited to 250 words. The abstract must identify the purpose of the work and briefly describe the work to be carried out, the finding or results, and the potential commercial applications of the effort. If the Offeror's proposal is selected for award, the Technical Abstract section will be publicly posted on the DHS SBIR website and on the Small Business Administration's website; therefore, do not include proprietary or classified information in the Technical Abstract section of the Cover Sheet.

The Project Aims section is limited to 500 words and is for Government use only. **For Phase I proposals only**, the Offeror must state the specific objectives of the Phase I R/R&D effort, including the technical questions the Offeror will answer to determine the Phase I feasibility of the proposed approach and the impact that the results of the proposed research will exert on the research field(s) involved. The Offeror must state concisely and realistically what the proposed research is intended to accomplish in terms of its potential for technological innovation and commercial application. The proposed product, process or service that will ultimately be developed must be defined. Milestones for each of the aims must be included, as these will be used in the evaluation process. **For Phase II proposals only (including second Phase II awards and CRPP awards)**, the Offeror must state the specific objectives of the Phase II research and development effort including the impact that the results of the proposed research will exert on the research field(s). The Offeror must state concisely and realistically what the proposed research is intended to accomplish in terms of its potential for technological innovation and commercial application. The proposed product, process or service that will ultimately be developed must be defined. Milestones for each of the aims must be included, as these will be used in the evaluation process.

The Summary of Results section is limited to 500 words, must not contain proprietary information, and is for Government use only. The Offeror must provide the anticipated results and implications of the approach (both Phases I and II) and the potential commercial applications of the research.

3.3 Technical Proposal Format and Content

Prepare the Technical Proposal in single column format, 12-point Times New Roman, with 1" margins on 8 ½" x 11" paper. Company name, topic number, and proposal number should be included in the header of each page. (The header may be included in the 1" margin.) The use of 10-point font is permissible for imbedded tables, figures and graphics. See **Section 3.1** for page limitations for Phase I and Phase II proposals.

The Technical Proposal must be a single file, including tables, figures, graphics and table of contents (if included). Do not lock, password protect, or encrypt the file to be uploaded. 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 include the following sections in the order provided:

PROPOSAL FORMAT	
PHASE I PROPOSAL	PHASE II PROPOSAL
I. Identification and Significance of the Problem or Opportunity	I. Identification and Significance of the Problem or Opportunity
II. Phase I Technical Objectives	II. Phase I Technical Objectives and Results
III. Phase I Work Plan	III. Phase II Work Plan
IV. Related R/R&D	IV. Related R/R&D
V. Key Individuals and Bibliography of Directly Related Work	V. Key Individuals and Bibliography of Directly Related Work
VI. Relationship with Future R/R&D	VI. Relationship with Future R/R&D
VII. Commercialization Strategy	VII. Commercialization Plan
VIII. Facilities/Equipment	VIII. Facilities/Equipment
IX. Subcontractors/Consultants	IX. Subcontractors/Consultants
X. Potential Post Applications	X. Prior, Current, or Pending Support of Similar Proposals or Awards
XI. Prior, Current, or Pending Support of Similar Proposals or Awards	

The following is a brief description of each section of the Technical Proposal as applicable for each Phase:

- Identification and Significance of the Problem or Opportunity – Succinctly define the specific technical problem or opportunity addressed; the proposed innovation; the relevance and significance of the proposed innovation to a need(s) within the topic description; the proposed innovation relative to the state of the art; and the importance of the work proposed.
- Technical Objectives (Phase I proposals only) – State the specific objectives of the Phase I R/R&D effort, including the technical questions that must be answered to determine the feasibility of the proposed innovation/approach.

- Technical Objectives and Results (Phase II proposals only) – State the specific objectives of the Phase I R/R&D effort including the technical questions addressed to determine the feasibility. Address the progress, results and findings of the Phase I effort.
- Work Plan (Phase I proposals only) (including the efforts of the subcontractor(s)/consultant(s), if applicable) – Provide an explicit, detailed description of the Phase I approach. The Plan must indicate what tasks are planned, how, when, and where the work will be conducted, a schedule of major events, and the final product(s) to be delivered. The Phase I effort must determine the technical feasibility of the proposed concept, and address the questions cited in the Technical Objectives immediately above. The methods planned to achieve each objective or task must be discussed explicitly and in detail. Task descriptions, schedules, resource allocations, estimated task hours for each key personnel and planned accomplishments, including project milestones, must be included. This section will be a substantial portion of the total Technical Proposal.
- Work Plan (Phase II proposals only) (including the efforts of the subcontractor(s)/consultant(s), if applicable) – Provide an explicit, detailed description of the Phase II approach. The Plan must indicate what tasks are planned, how, when, and where the work will be conducted, a schedule of major events, the final product to be delivered, and the completion date of the effort. The Phase II effort must satisfy the anticipated results, as specified in the topic description. The methods planned to achieve each objective or task must be discussed explicitly and in detail. Task descriptions, schedules, resource allocations, estimated task hours for each key personnel and planned accomplishments, including project milestones, must be included. This section must be a substantial portion of the total proposal.
- Related Research/Research and Development – Describe significant (current and/or previous) R/R&D activities that are directly related to the proposed effort, including any conducted by the principal investigator, the Offeror, consultants, or others. Discuss any planned coordination with outside sources. Describe how these activities relate to the proposed project. Describe previous efforts similar but directly related to the proposed effort. For each effort, 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. The Offeror must persuade reviewers of his or her awareness of key, recent R/R&D conducted by others in the specific topic area.
- Key Individuals and Bibliography of Directly Related Work – Identify key personnel who will be involved in the effort including information on directly related education, experience, and bibliographic information. A concise resume for the Principal Investigator and all key personnel, including a list of relevant publications (if any), must be included. All resumes will count toward the appropriate page limitation, see **Section 3.1. Offerors must identify any non-U.S. citizen(s) expected to be involved on proposed project** [including direct employees, subcontractors and consultants], their country of origin, type of visa or work permit under which they are performing, and an explanation of their anticipated level of involvement on this project. **Do not include Privacy Act Information.**

- Relationship with Future Research/Research and Development (Phase I proposals only) – State the anticipated results of the proposed approach if the project is successful through Phase I and Phase II. Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort, application and commercialization efforts (Phase III).
- Relationship with Future Research/Research and Development (Phase II proposals only) – State the anticipated results of the proposed approach if the project is successful through Phase II and Phase III. Discuss the significance of the Phase II effort in providing a foundation for Phase III commercialization efforts.
- Commercialization Strategy (Phase I proposals only) – (1) Explicitly describe the company's strategy (vision) for commercializing the proposed technology and how it will transition to the specific operational component in DHS, other Federal Agencies, and/or private sector markets. (2) Provide specific information on what related technologies, if any, already exist in the market and why the technology being proposed will be superior and how this information was ascertained. (3) Include a discussion on the Offeror's current capability to commercialize previously developed technologies, as well as how the Offeror intends to develop the proposed technology all the way to the market. Responses to (1), (2), and (3) must be specific to the technology being proposed. Failure to respond to any of the items listed will result in a lower valuation for criterion c (See **Section 4.1** for Phase I evaluation criteria). If the Offeror has no commercial experience (item (3)) this should clearly be stated and Offeror should describe how Offeror intends to bring the necessary experience to the company.
- Commercialization Plan (Phase II proposals only) – The Commercialization Plan must address the following: (Failure to address each item listed below in some detail will result in a lower valuation for criterion b (See **Section 4.1** for Phase II evaluation criteria):
 - a. *Company Information.* Focused objectives/core competencies; specialization area(s); products and significant product sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization. Does the Offeror have marketing expertise and, if not, how does the Offeror intend to bring that expertise into the company?
 - b. *Customer and Competition.* Provide a clear description of key technology objectives, current competitors, and advantages (cost and technical) compared to competing products or services; description of hurdles to acceptance of the innovation. Address who the customers will be, and for non-DHS customers explain the demand drivers for this technology. Estimate the market size. Has the Offeror made contact with anyone in the projected target customer base including DHS customers? Identify potential factors that could have positive and/or negative impacts regarding the transition of the proposed product.
 - c. *Market.* Provide milestones, target dates, analyses of market size, and the estimated market share after first and five year sales. Provide detailed explanation on the plan to obtain market share.
 - d. *Financing.* Provide detailed information on the identification and acquisition of costs associated in transitioning the proposed product/services into the market. If available,

provide brief discussion on potential financial sources. What are the plans for securing necessary funding for Phase III?

- e. *Intellectual Property (IP)*. Provide a detailed description on how the company plans to acquire and protect appropriate IP of the proposed product/service. What is the IP strategy and how will it be protected? Address patent status, technology lead, trade secrets or other demonstrations of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporal competitive advantage.
- f. *Assistance and Mentoring*. Provide plans for securing needed technical or business assistance through mentoring, partnering, or through arrangements with state assistance programs, small business development centers, Federally-funded research laboratories, Manufacturing Extension Partnership centers, or other assistance providers. Address how the product will be produced.

The Commercialization Plan must also include a schedule and the basis for that schedule showing the quantitative results from the Phase II project that the 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.).

- Facilities/Equipment – Provide information to allow the evaluators to assess the ability of the Offeror to carry out the activities of the proposed phase as well as all subsequent phases. Describe available instrumentation and physical facilities necessary to carry out the proposed effort. 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, 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.
- Subcontractors/Consultants – Involvement of any subcontractor(s) or consultant(s) (including Federal Laboratories, FFRDCs, universities, and technical assistance providers) is permitted. If such involvement is proposed, it must be described in detail in this section and also in the Cost Proposal. Subcontractors' or consultants' involvement under Discretionary Technical Assistance (see **Section 5.11**) must be clearly delineated from involvement by other subcontractors and consultants. A minimum of two-thirds (66%) of the research and/or analytical work in Phase I, as measured by total contract value, must be carried out by the proposing small business concern. A minimum of one-half (50%) of the research and/or analytical work in Phase II, as measured by total contract value, must be carried out by the proposing small business concern.

If the small business determines that it needs to acquire services from a non-U.S. source, it must fully explain in its proposal why a non-U.S. source must be used, and why no qualified U.S. source exists to perform the same services.

- Potential Post Applications – Briefly describe the following: (1) whether and by what means the proposed project appears to have potential commercial application; and (2) whether

and by what means the proposed project appears to have potential use by the Federal Government.

- **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 **Appendix B**) for consideration under numerous Federal program solicitations, it is unlawful to enter into funding agreements (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 an Offeror elects to submit identical proposals or proposals containing a significant amount of essentially equivalent work in response to this Solicitation, or other Federal program solicitations, or is substantially the same as another proposal that has been funded, is now being funded, will be submitted to other agencies for funding consideration, or is pending with DHS or another Federal Agency, the Offeror must indicate so on the Proposal Cover Sheet and provide the following information in the Technical Proposal:

- 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 or project manager 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 this section does not apply, the following statement should be included in the Technical Proposal: "No prior, current, or pending support for proposed work."

3.4 Cost Proposal

All Offerors must submit a cost proposal via <https://sbir2.st.dhs.gov>. Proposed costs must not exceed the maximum thresholds outlined below.

S&T SBIR Topics		DNDO SBIR Topics	
<u>Phase I</u>	<u>Phase II</u>	<u>Phase I</u>	<u>Phase II</u>
\$100,000	\$750,000	\$150,000	\$1,000,000
6 months	24 months	6 months	24 months

Note: Phase totals are exclusive of Discretionary Technical Assistance (**Section 5.11**) and Cost Match (**Section 5.14**), if applicable.

For additional information on the items in the Cost Proposal, reference *the DHS SBIR Cost Proposal Guide* at <https://sbir2.st.dhs.gov> under “Resources.”

Additionally, more information about cost proposals and accounting standards can be found in the DCAA publication, *Information for Contractors*, available at www.dcaa.mil/dcaam_7641.90.pdf.

Proposals submitted under this Solicitation will be considered valid for 90 days. If a proposal is selected for award, Offerors should be prepared to submit further cost/pricing documentation to the Contracting Officer in order to justify items on the cost proposal.

The following are required elements of the cost proposal:

- Direct Labor – list the name, labor category, labor hours and labor rate of each employee working on the project
- Overhead Cost – specify the current overhead rate. Use overhead rate approved by a cognizant federal agency, if available.
- Other Direct Cost – include direct material, special testing, equipment, travel, subcontracts, etc.

For Phase I planning purposes, Offerors should budget for two mandatory trips to Washington, DC – a post-award kick-off meeting and a one-day meeting to present the results in the final report. The structure of the kick-off meeting is different for S&T and DNDO topics. Refer to the table below for details:

PHASE I TRAVEL DETAILS		
Day	S&T Topics	DNDO Topics
1	(Mandatory) Session includes: <ul style="list-style-type: none"> • Program background and contracting overview • One-on-One sessions with Topic Managers 	(Mandatory) Session includes: <ul style="list-style-type: none"> • Program background and contracting overview • One-on-One sessions with Topic Managers
2	(Mandatory) Commercialization workshop	N/A
3	(Optional) Showcasing and Presentation Workshop - venue where small businesses can enhance their presentation skills in front of Government, Industry and representatives from the investment community	N/A

Phase II travel requirements will be provided to Phase I awardees at a later date.

3.5 Briefing Chart

The mandatory one-page Briefing Chart should provide a very concise summary of the overall effort. The Briefing Chart is uploaded during proposal submission and may be used in the evaluation process. The briefing chart **MUST NOT** contain proprietary or classified data. Offerors must use the Briefing Chart template provided in **Attachment 3**.

3.6 Commercialization Report

Offerors that have not received any Phase II awards should check the appropriate box on the Cover Sheet certifying that the company has not received SBIR Phase II funding from any agency. Offerors with no prior Phase II awards will not be negatively impacted in the evaluation process. Instead, such companies will be evaluated based on the Commercialization Plan, see **Section 3.3**.

All Phase II Offerors with previous Phase II awards must submit a Commercialization Report.

If applicable, the succinct Commercialization Report should be in PDF format and submitted as a separate upload during the Phase II proposal submission. The following are examples of company commercialization data expected in the Commercialization Report:

- Any business concern or subsidiary established for the commercial application of a product or service for which an SBIR award is made.
- Revenue from the sale of new products or services resulting from the research conducted under each Phase II award; delineate revenue by government, open market, prime contractors, other awards, and when this revenue event occurred.
- 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.
- Whether the Phase II technology has been used in a fielded DHS system or acquisition program, and, if so, which system or program.
- The number of patents resulting from the contractor's participation in the SBIR Program and whether any licenses based on these patents have been issued.
- Whether the company has completed an initial public offering (IPO) of stock, merged or been acquired resulting, in part, from any DHS SBIR Phase II project.

The Commercialization Report for any prior Phase II award received by the company must be current as of the end of the company's last full fiscal year (FY). 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.

3.7 Eligibility

Small business Offerors that are majority-owned by multiple venture capital operating companies, hedge funds or private equity firms are not eligible to submit proposals in response to this Solicitation nor are they eligible to receive a DHS SBIR award.

To receive SBIR funds, each awardee of a Phase I or Phase II award must qualify as a small business concern at the time of award and at any other time set forth in SBA's regulations at 13 CFR 121.701 through 121.705.

For both Phase I and Phase II, the primary employment of the principal investigator must be with the small business concern at the time of the award and during contract performance. Primary employment means that more than one-half of the principal investigator's time is spent in the employ of the small business Offeror. This precludes full-time employment with another organization.

For both Phase I and Phase II, all research or research and development must be performed by the small business concern and its subcontractors in the United States.

3.8 DHS Phase II Transition Rate Benchmark

For this Solicitation, the DHS Phase II Transition Rate benchmark requirement applies only to Offerors that have received 21 or more (more than 20) Phase I awards over the five (5) fiscal year period, from October 1, 2010 through September 30, 2015.

The Phase II Transition Rate sets the minimum required number of Phase II awards an Offeror must have received for a given number of Phase I awards during a specified period. The SBIR awardee Phase II Transition Rate is calculated using the data in SBA's TechNet database. SBA posts the company transition rates on the Company Registry at <http://www.sbir.gov>. For the purpose of this benchmark requirement, awardee firms are assessed once a year, on June 1st, using their prior SBIR and STTR awards across all agencies.

Firms applying to this Solicitation that have received 21 or more (more than 20) Phase I awards across all federal SBIR/STTR agencies over the five (5) year period (October 1, 2010 through September 30, 2015) should, prior to proposal preparation, verify that the company's Phase II Transition Rate in the Company Registry at <http://www.sbir.gov> meets or exceeds DHS' minimum benchmark. Upon verification in the Company Registry, if a firm believes that their Phase II Transition Rate was calculated incorrectly, they should notify SBA, provide the correct award information/documentation, and request a reassessment of the rate.

The Phase II Transition Benchmark that DHS will use for this Solicitation is 25%.

Companies that apply for a DHS Phase I award and do not meet or exceed the DHS Phase II Transition benchmark rate will not be eligible for a DHS Phase I award during the one-year

period beginning on June 1st and ending on May 31st of the current year.

3.9 DHS Commercialization Rate Benchmark

The DHS Commercialization Rate benchmark requirement applies only to SBIR applicants that have received 16 or more (more than 15) Phase II awards over the past 10 fiscal years, excluding the most recently completed two fiscal years. For this Solicitation, the Commercialization Rate Benchmark is calculated over the time period 2004 through 2013 since the current benchmark requirement was calculated on June 1, 2015. The Commercialization Rate benchmark went into effect June 1, 2016.

The DHS Commercialization Rate benchmark sets the minimum Phase III commercialization results a Phase I applicant must have realized from its prior Phase II awards in order to be eligible to receive a new DHS Phase I award. The Commercialization Rate benchmark establishes the commercialization results it is required to achieve from work it performed under its prior Phase II awards in order to be eligible to receive a new Phase I award.

Offerors must have received, to date, an average of at least \$100,000 of sales and/or investments per Phase II award received, or have received a number of patents resulting from the SBIR work equal to or greater than 15% of the number of Phase II awards received during the period. Firms that are notified by SBA that they failed to meet these benchmarks will not be eligible to receive a Phase I award through May 31, 2016.

3.10 Questions

General questions pertaining to the S&T's SBIR Program should be submitted to STSBIR.PROGRAM@hq.dhs.gov.

General questions pertaining to the DNDO's SBIR Program should be submitted to dndosbir@hq.dhs.gov.

Questions must be limited to technical information related to improving the understanding of a particular topic's requirements. Any other questions or inquiries seeking advice or guidance on a solution approach are unacceptable and will not receive a response. Responses to the pertinent questions received by January 5, 2017 by 2:00 p.m. ET will be posted on www.FBO.gov and the DHS SBIR Program website at <https://sbir2.st.dhs.gov> as an amendment to the Solicitation. DHS will not respond to technical questions related to the technical topics if received after the last day to submit questions.

All Offerors are advised to monitor both www.FBO.gov and the DHS SBIR Program website during the Solicitations period for supplemental posting of questions and answers, and other information relevant to the research topics in this Solicitation.

Questions about the electronic submission of proposals should be submitted to the Help Desk at (703) 480-7676, or via email to dhssbir@reisystems.com. The Help Desk may be contacted from 9:00 a.m. to 5:00 p.m. ET, Monday through Friday.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

All Phase I and Phase II proposals will be evaluated on a competitive basis. Each proposal will be evaluated on its own merit and the relevance of the specific concept as it relates to the SBIR topic rather than against other proposals submitted for the same topic area. DHS is under no obligation to fund any proposal or any specific number of proposals in a given topic. DHS may elect to fund several or none of the proposed approaches to the same topic or subtopic.

4.1 Evaluation Criteria, Factors and Ratings

The Phase I evaluation criteria, listed in decreasing order of importance, are as follows:

- a. Technical Merit – the soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution. The following elements will be considered:
 - Soundness of the technical concept and the likelihood the research is achievable as proposed;
 - Demonstrated understanding of the scope of the problem, research objectives, and performance goals;
 - Degree of innovation and potential to offer a significant increase in capability or a significant reduction in cost commensurate with the potential risk of the innovative (i.e., not incremental) proposed approach; and
 - Details of the technology development strategy to be followed for the proposed concept. Clarity, fidelity, and completeness of the proposed work plan to achieve research objectives, to include: identification of a schedule and milestones, identification of risks and mitigation strategies, and method for assessing technical progress.
- b. Staff Qualifications and Capability – the qualifications of the proposed principal investigator, key personnel, supporting staff, and consultants. Qualifications include the ability to perform the research and development. The following elements will be considered:
 - Team’s understanding of past scientific and technical accomplishments, and the current state-of-the-art of knowledge or technology in the field; and
 - Quality of the proposed team (i.e., key personnel and partners identified have the breadth/range of competencies to execute the proposed effort).
- c. Potential for Commercialization – the potential for commercial application, either in the Government or private sector, and the benefits expected to accrue from this commercialization. The following element will be considered:
 - Commercialization Strategy, as stated in **Section 3.3**.

- Ability of the proposed team and the company to commercialize the results of the research.
- d. Cost/Price – the appropriateness of the elements of the cost proposal for the proposed effort. The following elements will be considered:
- Level of effort proposed, as appropriate for Phase I; and
 - Completeness of the proposed level of effort.

The Phase II evaluation criteria, listed in decreasing order of importance, are as follows:

- a. Technical Merit – the soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution. The following elements will be considered:
- Soundness of the technical concept and the likelihood the research is achievable as proposed;
 - Understanding the scope of the problem, research objectives, and performance goals;
 - Degree of innovation and potential to offer a significant increase in capability or a significant reduction in cost commensurate with the potential risk of the innovative (i.e., not incremental) proposed approach; and
 - Details of the technology development strategy to be followed for the proposed concept. Clarity, fidelity, and completeness of the proposed work plan to achieve research objectives, to include identification of risks and mitigation strategies, and method for assessing technical progress.
- b. Potential for Commercialization – the potential for commercial application, either in the Government or private sector, and the benefits expected to accrue from this commercialization. The following element will be considered:
- Completeness of the Commercialization Plan, as stated in the Solicitation.
 - Ability of the proposed team and the company to commercialize the results of the research.

The lack of a Company Commercialization Report, due to the offeror having no prior Phase II awards, will not affect its ability to receive an award.

- c. Staff Qualifications and Capability – the qualifications of the proposed principal investigator, key personnel, supporting staff, and consultants. Qualifications include the ability to perform the research and development. The following elements will be considered:
- Teams understanding of past scientific and technical accomplishments, and the current state-of-the-art of knowledge or technology in the field; and
 - Quality of the proposed team (i.e., key personnel and partners identified have the breadth/range of competencies to execute the proposed effort).
- d. Cost/Price – the appropriateness of the elements of the cost proposal for the proposed effort. The following elements will be considered:
- Level of effort proposed, as appropriate for Phase II; and
 - Completeness of the proposed level of effort.

Evaluators will assess the strengths, weaknesses, and deficiencies of the above criteria using the following definitions:

- a. Strength – An aspect of the proposal that benefits the Government in terms of the quality of the Offeror’s performance, cost effectiveness, or reduced risk towards successful contract performance. Note: an Offeror’s approach may offer more than what the solicitation/topic description requires; however, the Government may not benefit from such approach and will not include such in its evaluation.
- b. Weakness – A flaw in the proposal that decreases the likelihood successful contract performance. A “significant weakness” is a flaw that dramatically increases the risk of unsuccessful contract performance. When weaknesses are identified, the Government will provide comment(s) on the significance of the weakness.
- c. Deficiency – A material failure of a proposal that would result in an unacceptable risk level of contractor performance.

Evaluators will use one of the following adjectival ratings for each of the Technical Merit, Staff Qualifications and Capability, and Potential for Commercialization criterion:

- a. Excellent – The proposal demonstrates a superior understanding of the requirements and an approach that significantly exceeds all topic objectives. Proposal has exceptional strengths that will significantly benefit the Government and risk of unsuccessful performance is very low.

- b. Very Good – Offeror’s proposed approach is likely to satisfy most of the topic objectives and shows a high probability of successful contract performance. Offeror’s proposal has strengths that will benefit the Government and one or more weaknesses, but no significant weaknesses.
- c. Good – Offeror’s proposed approach has a reasonable likelihood of satisfying the topic objectives and shows a good probability of successful contract performance. Offeror’s proposal has some strengths that will benefit the Government, and some weaknesses.
- d. Fair – Offeror’s proposed approach is unlikely to meet the topic objectives and shows a low probability of successful contract performance. Offeror’s proposal has weaknesses, some that may be significant, and few strengths, if any, that will benefit the Government.
- e. Unacceptable – The Offeror’s proposed approach fails to meet the topic objectives and requirements.

The Cost/Price criterion is not adjectively rated as outlined above; rather, the evaluation team will determine if the cost proposal is either acceptable or unacceptable as defined below:

- a. Acceptable - The proposed cost elements, including labor mix, labor hours, material, special testing, special equipment, travel, subcontracts, if applicable, are appropriate for the proposed effort.
- b. Unacceptable - The proposed cost elements, including labor mix, labor hours, material, special testing, special equipment, travel, subcontracts, if applicable, are not appropriate for the proposed effort.

4.2 Proposal Review Feedback

DHS will make award decisions, and notify applicants of its decisions, within 90 calendar days from the closing date of this Solicitation. Specific instructions on requesting feedback will be provided to each Offeror upon notification that their proposal was not selected for award. Requests for proposal feedback must be received within three (3) business days of the notification and will only be provided to Offerors upon request.

4.3 Contractor Support Services In Support of the Selection Process

Offerors are advised that non-federal, contract support personnel will be used to carryout administrative functions for the SBIR Program Office and topic program managers. The contract support personnel will have access to proposals. Administrative duties may include, but are not limited to, making and distributing copies of proposal, scheduling and attending meetings, taking and compiling notes, etc.

In addition to administrative functions, DNDO will use contractor support as advisors in the source selection process.

Applies to H-SB017.1-008 and H-SB016.1-009 ONLY

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TAR_SBIR_NDA_request@schafercorp.com
(978)735-4555

In accomplishing their duties related to the source selection process, the aforementioned firm may require access to proprietary information contained in the Offerors' proposals. Therefore, pursuant to FAR 9.505-4, these firms must execute an agreement with each Offeror that states that they will (1) protect the Offerors' information from unauthorized use or disclosure for as long as it remains proprietary and (2) refrain from using the information for any purpose other than that for which it was furnished. To expedite the evaluation process, each Offeror must contact the above company to effect execution of such an agreement prior to submission of proposals.

A sample company-to-company, non-disclosure agreement can be found in **Attachment 4**. Offerors submitting proposals for **Topics H-SB017.1-008** and **H-SB017.1-009** shall submit a copy of their signed agreement to dndosbir@hq.dhs.gov. Proposals submitted to these topics will not be considered complete until the submission of the dually signed non-disclosure agreement.

5.0 CONSIDERATIONS

5.1 Awards

While it is the intent of the DHS SBIR Program to award a negotiated contract for each proposal selected, selection does not guarantee award. No contracts will be awarded until all relevant proposals submitted in response to a specific topic have been evaluated and an award decision rendered. The number of S&T SBIR Phase I and Phase II awards will be consistent with the S&T SBIR budget. All DHS SBIR awards resulting from this Solicitation will be posted at <https://sbir2.st.dhs.gov>.

A firm-fixed price (FFP) contract will be awarded for all Phase I awards. Phase II contracts can either be awarded as a cost-plus fixed-fee (CPFF) contract or firm-fixed price contract; however, in accordance with FAR 16.301-3, in order to award a CPFF contract, Offerors must have an accounting system that is adequate for determining cost applicable to the contract. Additionally, certified cost and pricing data may be required for Phase II or Phase III contracts over \$750,000.00 - See FAR 15.403-4(a). Fee and profit may be included in the Cost Proposal (see **Section 5.6**).

The anticipated time between the date that this Solicitation closes and the award of the Phase I contracts is approximately four (4) months. In general, Phase II awards will be awarded as quickly as possible after proposal selection to maintain the momentum of the Phase I effort. Phase II contracts are typically awarded within 90 – 120 days after the proposal due date.

5.2 Reports and Deliverables

Monthly reports and a final comprehensive report will be required in all resultant Phase I and Phase II contracts. Additionally, Phase II awards may require an interim report at the end of 12 month of performance. Phase I and II awardees will be required to submit the *SBIR Funding Agreement Certification – Life Cycle Certification (Attachment 2)* during the contract period of performance. Other deliverables specific to the topic description may also be required.

5.3 Invoice Instructions

The specific invoicing instructions will be incorporated into the contract upon completion of negotiations between the Government and the successful Phase I or Phase II Offeror. Successful Offerors may submit invoices monthly in accordance with the negotiated price, reporting deliverables, and invoice instructions.

5.4 Innovations, Inventions and Patents

Proprietary Information. Information contained in unsuccessful proposals will remain the property of the applicant. The Government will, 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 an applicant in a proposal, which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security, it will be treated in confidence, to the extent permitted by law. This information must be clearly marked by the applicant with the term "proprietary information" and the following legend must appear on the title page of the proposal:

"These data 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 evaluation of this proposal. If a funding agreement is awarded to this applicant 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 funding agreement and pursuant to applicable law. 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 are contained on pages___of this proposal."

DHS assumes no liability for inadvertent disclosure or use of unmarked data. The Government will limit dissemination of such proprietary information to within official channels.

Marking of Proprietary Information. To properly mark proprietary information on the proposal, use an asterisk (*) in the right and left margins on pages deemed proprietary. If all information on a page is deemed proprietary, include this statement, "ENTIRE PAGE IS PROPRIETARY," in both the header and footer of the associated page. Do not label the entire proposal "proprietary." All other markings (e.g., "Company Confidential", "Business Sensitive", etc.) will not be recognized.

Rights in Data Developed Under SBIR Funding Agreements. 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. To preserve the SBIR data rights of the awardee, the legend (or statements) used in the SBIR Data Rights clause included in the SBIR award must be affixed to any submissions of technical data developed under that SBIR award. 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," which will be included in all resultant contracts.

If the Offeror's proposal is selected for funding, the Contracting Officer will contact the apparent awardee so that the apparent awardee has the opportunity to submit assertions in accordance with FAR clause 52.227-20. The assertions must be identified and assertion of use, release, or disclosure must be provided for the government's review and acceptance. Contracts cannot be awarded until assertions have been approved.

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

Patents. Small business concerns normally may retain the principal worldwide patent rights to any invention developed with Government support. In such circumstances, the Government receives a royalty-free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and may require that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 U.S.C. 205, the Government will not make public any information disclosing a Government-supported invention for a minimum 4-year period (that may be extended by subsequent SBIR funding agreements) to allow the awardee a reasonable time to pursue a patent.

Invention Reporting. SBIR awardees must report inventions to the awarding agency within 2 months of the inventor's report to the awardee. Awardees must report inventions to DHS through the NIH iEdison Invention Reporting Systems at www.iedison.gov. Use of the iEdison System satisfies all invention reporting requirements mandated by 37 CFR Part 401, with particular emphasis on the Standard Patent Rights Clauses, 37 CFR 401.14.

5.5 Cost-Sharing

Cost-sharing is permitted for proposals under this program solicitation; however, cost-sharing is not required and will not be an evaluation factor in consideration of the proposal.

5.6 Profit or Fee

In accordance with FAR 15.404-4, Offerors may include a reasonable fee or profit consistent with R/R&D work.

5.7 Joint Ventures or Limited Partnerships

Joint ventures and limited partnerships are eligible provided that the entity created qualifies as a small business in accordance with the Small Business Act, 15 U.S.C. 631.

5.8 Research and Analytical Work

For Phase I, a minimum of two-thirds (66%) of the research and/or analytical work must be performed by the proposing small business concern. For Phase II, a minimum of one-half (50%) the research and/or analytical work must be performed by the proposing small business concern. Subcontract cost will be calculated as a percentage of the total contract value.

5.9 Awardee Commitments and Summary Statements

Upon award of an SBIR contract, the awardee will be required to make certain legal commitments through acceptance of numerous clauses in the Phase I and Phase II contracts. The outline that follows is illustrative of the types of clauses to which the contractor would be committed. This list is not a complete list of clauses to be included in Phase I funding agreements, and is not the specific wording of such clauses. Copies of complete terms and conditions are available upon request.

- a. *Standards of Work*. Work performed under the funding agreement must conform to high professional standards.
- b. *Inspection*. Work performed under the funding agreement is subject to Government inspection and evaluation at all times.
- c. *Examination of Records*. The Comptroller General (or a duly authorized representative) must have the right to examine any pertinent records of the awardee involving transactions related to this funding agreement.

- d. *Default.* The Government may terminate the funding agreement if the contractor fails to perform the work contracted.
- e. *Termination for Convenience.* The funding agreement may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the awardee will be compensated for work performed and for reasonable termination costs.
- f. *Disputes.* Any dispute concerning the funding agreement that cannot be resolved by agreement must be decided by the contracting officer with right of appeal.
- g. *Contract Work Hours.* The awardee may not require an employee to work more than 8 hours a day or 40 hours a week unless the employee is compensated accordingly (for example, overtime pay).
- h. *Equal Opportunity.* The awardee will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
- i. *Affirmative Action for Veterans.* The awardee will not discriminate against any employee or application for employment because he or she is a disabled veteran or veteran of the Vietnam era.
- j. *Affirmative Action for Handicapped.* The awardee will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.
- k. *Officials Not To Benefit.* No Government official must benefit personally from the SBIR funding agreement.
- l. *Covenant Against Contingent Fees.* No person or agency has been employed to solicit or secure the funding agreement upon an understanding for compensation except bona fide employees or commercial agencies maintained by the awardee for the purpose of securing business.
- m. *Gratuities.* The funding agreement may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the award.
- n. *Patent Infringement.* The awardee must report each notice or claim of patent infringement based on the performance of the funding agreement.
- o. *American Made Equipment and Products.* When purchasing equipment or a product under the SBIR funding agreement, purchase only American-made items whenever possible.
- p. *Advertisements, Publicizing Awards, and News Releases.* All press releases or announcements about agency programs, projects, and contract awards must be cleared by the Contracting Officer's Representative (COR) and the Contracting Officer. Under no circumstances shall the Contractor, or anyone acting on behalf of the Contractor, refer to the supplies, services, or equipment furnished pursuant to the provisions of this contract in any publicity news release or commercial advertising without first obtaining explicit written consent to do so from the Program Manager/COR and the Contracting Officer. The Contractor agrees not to refer to awards in commercial advertising in such a manner as to state or imply that the product or service provided is endorsed or preferred by the Federal Government or is considered by the Government to be superior to other products or services.

- q. *E-Verify*. Contracts exceeding the simplified acquisition threshold may include the FAR clause 52.222-54 “Employment Eligibility Verification” unless exempted by the conditions listed at FAR 22.1803.
- r. *Prohibition on Contracting with Inverted Domestic Corporation*. Section 835 of the Homeland Security Act, 6 U.S.C. 395, prohibits the Department of Homeland Security from entering into any contract with a foreign incorporated entity which is treated as an inverted domestic corporation as defined in HSAR 3052.209-70. The Prohibition on Contracting with Inverted Domestic Corporation clause will be incorporated into awards resulting from this solicitation.

5.10 Release of Proposal Information

In submitting a proposal, the Offeror agrees to permit the Government to publicly disclose basic company information (eg- company size, company name, award amount, award date etc.) upon award. Other proposal data is considered to be the property of the Offeror, and DHS will protect it from public disclosure to the extent permitted by law including the Freedom of Information Act. Please note, in accordance with the Small Business Administration’s SBIR Policy Directive dated February 24, 2014 the DHS SBIR Office will provide the basic proposal information to the Small Business Administration’s Application Information database at www.SBIR.gov, as identified in the Policy Directive.

In an effort to increase the transition of SBIR technologies and facilitate partnerships between small businesses, large integrators, and program offices, the DHS SBIR Program Office may provide proposal information to the Department of the Navy’s SBIR Program Office for inclusion in its Navy SBIR/STTR search database at www.navysbirsearch.com. Awardees who do not want their proposal to be included in this database must opt out by answering “No” on the Cover Sheet.

5.11 Discretionary Technical Assistance

DHS SBIR may provide up to \$5,000.00 per year for technical assistance to a SBIR awardee. Technical Assistance funds are in addition to the maximum award amount stated in **Section 3.4**. The purpose of Technical Assistance is to assist SBIR awardees in: (1) making better technical decisions on SBIR projects; (2) solving technical problems that arise during SBIR projects; (3) minimizing technical risks associated with SBIR projects; and (4) commercializing the SBIR products or processes.

Small business concerns can receive Technical Assistance in two ways:

1. Awardees can receive Technical Assistance through the DHS SBIR Program Office. The SBIR Program Office is under contract with a company that can provide technical assistance to Phase I or Phase II awardees. Awardees will receive notification from the DHS SBIR Office on what services are available and how to obtain these services at no cost to the small business. If an Offeror would like to receive Technical Assistance

through the DHS SBIR Program Office, Technical Assistance costs should not be included in the Cost Proposal.

2. Awardees can also receive Technical Assistance outside of the SBIR Program Office. To do so, Offerors must enter into an agreement with a subcontractor for up to \$5,000.00 per year in Technical Assistance. (For example – Offerors can propose up to \$5,000 for a Phase I and up to \$10,000 for a 24 month Phase II effort). These subcontract costs must be accounted for in the Cost Proposal; however, profit or fee should not be applied to Technical Assistance costs. Offerors must provide a budget justification, an outline of the specific services technical assistance to be provided, and the detailed qualifications and experience of the proposed subcontractor/consultant being requested. Further, the Offeror must demonstrate in the Technical Proposal that the outside vendor selected can provide the specific technical services needed. Reimbursement is limited to services received that comply with 15 U.S.C. 638(q). Note, unspent funds for technical assistance services cannot be budgeted for other project costs. If all of the Technical Assistance funds are not spent, the balance will be de-obligated from the resultant contract. If an Offeror receives Technical Assistance from a vendor of its choice, they will not be eligible to receive assistance from the DHS Technical Assistance contractor on the Phase I or Phase II contract. Technical assistance from vendors other than those provided by the SBIR Program Office can be an important form of aid to the proposed project being submitted.

5.12 Classified and Unsolicited Proposals

Classified proposals are not accepted under the DHS SBIR Program. Classified proposals will be appropriately destroyed upon receipt.

The DHS SBIR Program is not a substitute for existing unsolicited proposal submissions and does not accept unsolicited proposals. The DHS SBIR Program is a competitive program designed to meet the needs of the DHS. If a proposal provides a solution or approach that is not germane to the objectives of the research topics listed in this Solicitation, the proposal will be determined “non-responsive” to the topic area.

5.13 Animal and/or Human Subjects

Funds cannot be released or used for any portion of the project involving animal and/or human subjects until all of the proper approvals have been obtained in accordance with applicable regulations. See **Appendix B** for more details concerning the use of Animal and/or Human Subjects.

5.14 Export Control

Offerors are advised that the export of any goods or technical data from the United States, and the disclosure of technical data to foreign nationals, may require some form of export license

from the U.S. Government. Failure to obtain necessary export licenses may result in criminal liability of Offerors under U.S. laws.

Offerors are responsible for ensuring compliance with the International Traffic in Arms Regulations administered by the U.S. Department of State (22 C.F.R. Parts 120 to 130), Export Administration Regulations administered by the U.S. Department of Commerce (15 C.F.R. Parts 730 to 774), and Foreign Assets Control Regulations administered by the U.S. Department of Treasury (31 C.F.R. Parts 501 to 598), as warranted, and with compliance with all recordkeeping requirements under U.S. export regulations. Offerors are responsible for compliance with any applicable export license, reporting, or other preapproval requirements by the U.S. Government. DHS neither represents that a license or preapproval shall not be required nor that, if required, it shall be issued. Nothing granted herein to Offerors provides any such export license or other preapproval.

Offerors are asked to identify any anticipated export compliance issues in their response to this solicitation. Specifically, Offerors are advised to include information in their response regarding any known equipment, software or technical data that will be developed as a result of work to be performed under this solicitation that is subject to export control restrictions.

To the extent that export-controlled information may be provided to DHS by Offerors in response to a solicitation, Offerors are responsible for ensuring that such information is appropriately marked, and are responsible for complying with all applicable export controls and regulations in the process of providing such information.

5.15 DHS SBIR Phase II Enhancement Programs

To further encourage the transition of SBIR-funded research into DHS acquisition programs as well as to the private sector, the DHS SBIR Program offers several opportunities for an SBIR Phase II awardee to receive additional funding. Specifically, the DHS S&T SBIR Program Office offers Cost Match, SBIR Commercialization Readiness Pilot Program (CRPP) awards, and potential participation in the joint DHS-NSF Innovation-Corps (I-Corps) program. The DNDO SBIR Program Office offers Cost Match. Note that the DNDO SBIR Program Office does not offer CRPP, nor I-Corps opportunities.

Cost Match. The DHS S&T and DNDO SBIR Programs include a Cost Match feature for their respective SBIR projects that attract matching funds from an outside investor for the Phase II SBIR effort. The purpose of the cost match is to focus DHS SBIR funding on those projects that are most likely to be developed into viable new products that DHS and others will purchase and that will make a major contribution to homeland security and/or economic capabilities. The cost match can occur 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 SBIR cost match, the outside investors must commit a minimum of \$100,000 up to a maximum of \$500,000. DHS will, at its discretion and subject to availability of funds, match up to 50% of funds received.

The additional work proposed for the Cost Match feature 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.

For more information about Cost Match visit <https://sbir2.st.dhs.gov>.

Commercialization Readiness Pilot Program (CRPP) Award. The SBIR/STTR Reauthorization Act of 2011 established the Civilian Commercialization Readiness Pilot Program (CRPP). The purpose of this program is to address the basic issues involved in transitioning any new product to the open market: (1) technology maturation, (2) business maturation, and (3) end-user product knowledge. The DHS SBIR Program received approval for its CRPP plan from the SBA on August 29, 2013.

At the discretion of the DHS S&T SBIR Program Office, a separate SBIR CRPP award may be issued to continue funding Phase II activities. A 12-month CRPP award will further mature the technology for inclusion into a larger DHS Program or DHS acquisition program. A project's inclusion in the CRPP is selective and at the discretion of DHS. If selected, contractors will be contacted during the SBIR Phase II period of performance.

DHS-NSF Innovation-Corps (I-Corps) Award. At the discretion of DHS, a separate award may be issued to participate in a joint DHS-NSF Innovation-Corps (I-Corps) program during the Phase I award period, or during the first six months of the Phase II award period. Selectees for this award will receive funding up to \$50,000 to cover the expense of the I-Corps program. **The request to participate in the I-Corps program must be made in either the Phase I or Phase II proposal by selecting the I-Corps checkbox located on the Cover Sheet.**

I-Corps was established to encourage entrepreneurs to learn about market opportunities for technologies generated by government funded research. For more details on the I-Corps program refer to www.nsf.gov/i-corps.

5.16 Additional Information

This 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 funding agreement, the terms of the funding agreement are controlling.

Before award of an SBIR funding agreement, the Government may request the applicant to submit certain organizational, management, personnel, and financial information to assure responsibility of the applicant.

DHS shall not be liable for any costs incurred by the Offerors prior to award of any SBIR contract.

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 the SBIR Program are contingent upon the availability of funds.

If an award is made pursuant to a proposal submitted under this Solicitation, a representative of the contractor or grantee or party to a cooperative agreement will be required to certify that the concern has not previously been, nor is currently being, paid for essentially equivalent work by any Federal agency.

In the event that DHS has a need to share sensitive information with the SBIR awardee, the contractor must clear DHS suitability.

6.0 SUBMISSION OF PROPOSALS

Proposals are due no later than 2:00 pm ET on January 18, 2017. The DHS SBIR Programs use an electronic online proposal submission system located at <https://sbir2.st.dhs.gov>. All Offerors must submit proposals through this online system. Paper submissions and proposals received by any other means will not be accepted, evaluated, or considered for award.

Offerors are strongly encouraged to read the *Portal Registration and Submissions Training Guide* and follow the instructions for proposal submission. This guide can be found at <https://sbir2.st.dhs.gov> under “Resources.” The Guide provides step-by-step instructions for company registration and proposal submission.

Questions about the electronic submission of proposals should be submitted to the Help Desk. The Help Desk may be contacted at (703) 480-7676, or dhssbir@reisystems.com from 9:00 a.m. to 5:00 p.m. ET, Monday through Friday.

Late proposals will not be accepted or evaluated. Note: As the close of the Solicitation approaches, heavy traffic on the web servers may cause delays. Plan ahead and leave ample time to prepare and submit your proposal. Offerors bear the risk of website inaccessibility due to heavy usage in the final hours before the Solicitation closing time. In accordance with the FAR clause 52.215-1, Offerors are responsible for submitting proposals, and any modifications or revisions, so as to reach the Government office designated in the Solicitation by the time specified in the Solicitation. FAR clause 52.215-1, Instructions to Offerors – Competitive Acquisition (Jan 2004) is hereby incorporated in this Solicitation by reference.

7.0 RESEARCH TOPICS

7.1 S&T Directorate Topics

The following are the topics for the FY17.1 S&T Directorate's SBIR Program:

H-SB017.1-001 - Enhanced Agent Situational Awareness in Dismounted, Low Light/Adverse Conditions

H-SB017.1-002 - **RESERVED**

H-SB017.1-003 - Do Not Spoof Services for Modern Telephony

H-SB017.1-004 - Identity Verification & Validation for Mobile Networks Authentication Enhancement

H-SB016.1-005 - Blockchain Applications for Homeland Security Missions

H-SB017.1-006 - Wearable Chemical Sensor Badge

H-SB017.1-007 - Over-the-air Authentication Technology for Messaging via Emergency Alerts

Specific details for each topic are included in this **Appendix A**.

7.2 DNDO Topics

The following are the topics for the FY17.1 DNDO SBIR Program:

H-SB017.1-008 - Accelerated Crystal-Size Scale-Up Development of Thallium-based, High Efficiency, Dual or Tri-Mode Elpasolite Scintillator

H-SB017.1-009 - Unattended Radiation Detection System

Specific details for each topic are included in **Appendix A**.

APPENDIX A – RESEARCH TOPIC DESCRIPTIONS

SBIR TOPIC NUMBER: H-SB017.1-001

TITLE: Enhanced Agent Situational Awareness in Dismounted, Low Light/Adverse Conditions

TECHNOLOGY AREA: Border Security and Surveillance

OBJECTIVE: Develop and demonstrate an innovative, agent-portable device to augment agent ability while walking, running, hiking, on ATV/motorcycles, horses, boats, and mountain bikes, to automatically detect, identify, classify, and track an item of interest in challenging border terrains comprised of heavy vegetation, mountains, hills, canyons and dry creeks, rivers, streams found in desert, shorelines, open prairies, semi-arid, and heavily forested environments that have been enshrouded with fog, blowing salt/dust, extreme haze or other naturally occurring or adversary-produced vision obscurations such as smoke and irritants encountered in twenty-four (24) hour operations

DESCRIPTION: Border Patrol Agents often encounter situations where a single individual, or groups (2 to 20+) of individuals, illegally cross the International border (fence, river, lake, and littoral) and attempt to evade apprehension into the United States territory. These individuals and groups often synchronize their border incursions during all shifts, to coincide with seasonal adverse weather (wind, dust, fog, rain, snow, sleet, and hail) and man-made (causing dust/muddy) events to also include smoke, dust, or other vision obscuring situations. These individuals also attempt to avoid detection by hiding or blending in among naturally occurring trees, shrubs, hills, draws, man-made structures. In many instances there are no access roads to enable pursuit by a patrol car or 4-wheel drive vehicle, and in most cases the agent pursues on foot.

During these pursuits, an agent must focus on immediate elements of their surroundings: avoiding tripping, falling, and colliding with hazards while simultaneously reading and interpreting 'sign' left by fleeing adversaries (footprints, disturbed soil, broken branches, human litter, etc.). The agent has to maintain eye and ear contact with these individuals, and exhibit a self-protection posture to detect and/or avoid a trap/ambush. All of this activity is repeated by an agent over and over while exerting tremendous physical effort compounded by extreme temperatures (125 ° F to -40° F) and adverse weather.

The end-state of this SBIR is to demonstrate a prototype of a man-portable, ruggedized product or device that enables the agent to detect, identify, classify, track, and apprehend individuals attempting to avoid capture while taking advantage of adverse weather and other vision or aural obscurations as described above. The device should provide agents the ability to determine if individuals are in possession of weapons (side arms, long arms, clubs, sticks, rocks, digging implements, etc.) and/or bundles. It should also allow the agent to determine if the item of interest is human or other (described in table below). The device or product should contain a high degree of automation so that agents will not have to continually focus, tune or otherwise adjust the device to rapidly changing conditions (distance focus, EO to IR/Thermal change). The device should be small enough to be carried and utilized by the average size border agent. It shall

preferably not occupy an agent's hands and integrate into the existing field kit consisting of a uniform, patrol belt, sidearm, and headgear. It should be secure enough to stay in place during strenuous and exaggerated body movements, and not be affected by sweat, brushing of low hanging tree limbs, sage brush or brief encounters against terrain while walking, running, hiking, on ATV/motorcycles, horses, boats, and mountain bikes. The device should incorporate image stability when in use. Use of this device or product should not cause an elevated user core temperature since many border environments are known to be very hot and dry and the weight of the unit should not exceed twelve (12) ounces. The device should be rugged enough to be impervious to moisture and still operate if dropped. The device should provide GPS coordinates for Individuals of Interest (IoIs) being observed and tracked by the user. The device should have a directional display (North, South, East, West, NE, etc.) for agent reference. The controls knobs or surfaces shall be of an easy to touch or feel controls (rubberized, textured surface knobs, etc.) and instructions and training for use shall be intuitive to the average agent. Battery life should span at least 8 hours (threshold) and 10 hours (objective) of constant use in the most demanding situation and the fuel cell should be rechargeable thru common means: car charger, USB port, solar, etc. The fuel cell and charging system must not be of a proprietary design and should use readily available, over the counter rechargeable batteries, and charging cable with current USB and device cable end.

Additional Desired SBIR Requirements Table:

Requirement	Threshold	Objective
Cost	≤ \$20,000	≤ \$25,000
Weight of solution	≤ 2 pounds	≤ 12 ounces
Electro-Optical/Infra-Red/Thermal imaging	24 hours	24 hours
Detection of an individual person or group (2-20) from agent/user to:	1 mile	≥ 5 miles
Identify between person or non-person (animal or conveyance) from agent/user to:	1 mile	≥ 5 miles
Classify, or distinguish between agent and adversary (armed/unarmed/carry bundles) from agent/user to:	1 mile	≥ 5 miles
Tracking of IoIs (individual walking, on a horse, on an ATV, on a boat/raft, or a vehicle) from agent/user out to:	1 mile	≥ 5 miles
Power source for device	Rechargeable COTS batteries	Rechargeable COTS battery
Power charge sustainment	≥ 8 hours	≥ 10 hours
Security	No function if lost or stolen	No function if lost or stolen
Ruggedization-device should be able to withstand being dropped from ___ feet while being used.	10 feet AGL	20 feet AGL

PHASE I: Provide a proof of concept viability with an illustrated hardware design that depicts the necessary requirements and technical solution to include, at minimum a block diagram of system, and any required on-board computing software mock-up of the main and ancillary hardware units. Briefly describe a general usage CONOP which will be used as a starting point for proposed Phase II testing and demonstration of two operational prototypes.

PHASE II: Build a functional prototype and conduct a feasibility study to identify concept impact to the stated mission and establish the necessary partnerships with industry to define integration methodologies to include hardware and software designs and required network interactions (if applicable). Test the prototype in border area operational surroundings.

PHASE III: The proposed technology refined into an appropriate design for operational use by border agents to respond to border incursions on foot, horseback or ATV. Continue Border Patrol field assessments leading to decisions for potential commercialization of the product or device.

REFERENCES:

- 1) US Customs and Border Protection, *Vision & Strategy 2020* (available for download at <https://www.cbp.gov/document/publications/vision-and-strategy-2020>)
- 2) US Customs and Border Protection, 2012 – 2016 *Border Patrol Strategic Plan*, (https://www.cbp.gov/sites/default/files/documents/bp_strategic_plan.pdf)

KEYWORDS: Augmented visual, augmented aural, border protection, border patrol, force protection, protection, self-tracking, automatic tracking, border security, situational awareness, Homeland Security, rapid response, information, interoperability, emerging technologies, search, rescue.

SBIR TOPIC NUMBER: H-SB017.1-002

-RESERVED-

Proposals will NOT be accepted under this topic.

SBIR TOPIC NUMBER: H-SB017.1-003

TITLE: Do Not Spoof Services for Modern Telephony

TECHNOLOGY AREAS: Cyber Security, Emergency Response, and Communications

OBJECTIVE: Develop tools that can be deployed in a cyber ecosystem or carrier network to detect and block spoofed phone calls.

DESCRIPTION:

The shift from land-line phones to mobile devices and Voice over IP (VoIP) has enabled new types of call spoofing where an adversary appears to be coming from a number or location. For example, an adversary attempting to defraud taxpayers may appear to be coming from an IRS 800 help number or an adversary attempting to install malware on a government system may appear to be coming from an agencies tech support number. In both cases, the adversary appears to be coming from a trusted number but in fact has no relationship to that trusted number. In a related case, the adversary may spoof the call location. For example, an adversary may falsely report being on a vessel that requires emergency assistance. By providing a false number and false location, the adversary may cause limited resources (such as search and rescue teams) to be deployed in response to a non-existent emergency. In all cases, the adversary's ability to easily spoof a caller's number and location is a substantial challenge that this SBIR effort aims to address.

PHASE I: Phase I proposals should provide an initial proof of concept design document for detecting and blocking spoofed messages. There are three use cases and a proposal could address one or more of the use cases. The first use case is an organization that wants to prevent others from spoofing its phone numbers. One can assume the organization has numbers that are known in advance and should never place outgoing calls. An example is help desk numbers where taxpayers can call the IRS, but these numbers are never used to place outgoing calls to taxpayers. The second case focuses on an organization's ability to block spoofed external calls. An example is an organization that wants to ensure no one can call its employees mobile phones and spoof a number that appears be coming from within the organization. The third use case is to identify calls whose reported location is spoofed. An example would be a call that appears to be coming from offshore when in fact the call is originating from an onshore location. The proof of concept design could consist of software systems, embedded devices, monitoring tools, or combination of each of these elements that address one or more of the use cases. Phase I deliverables will also include monthly reports, a technical demonstration, and final report.

PHASE II: A prototype device or software capable of deployment to address any of the three use cases identified above. The prototype device must be applicable to mobile devices and VoIP systems. The developed prototype will be delivered to DHS for piloting. The component should leverage applicable and operational best practices for the intended environment.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: Refine components from Phase II, and work with an agency or organization to deploy the resulting solution.

REFERENCES:

- 1) IRS Warns of Pervasive Telephone Scam - <https://www.irs.gov/uac/newsroom/irs-warns-of-pervasive-telephone-scam>
- 2) Beware of Voice Phishing or “Vishing” Calls - <http://www.ag.state.mn.us/Consumer/Publications/VoicePhishing.asp>
- 3) Coast Guard seeks serial hoaxer whose calls for help cost \$500,000 - <http://www.foxnews.com/us/2016/07/25/coast-guard-seeks-serial-hoaxer-whose-calls-for-help-cost-500000.html>

KEY WORDS: Telephony, VoIP, Spoofing, Do Not Call, Vishing, Attribution, RoboCalls

SBIR TOPIC NUMBER: H-SB017.1-004

TITLE: Identity Verification & Validation for Mobile Networks Authentication Enhancement

TECHNOLOGY AREAS: US Mobile Networks, 5G, DHS Priority Service

OBJECTIVE: Research and develop new methods for mobile network authentication enhancements by leveraging commercially available financial infrastructure to perform mobile user identity verification/validation. This new enhancement(s) shall not impact the standardized authentication procedures/process (e.g. the authentication procedures standardized in 3rd Generation Partnership Project).

DESCRIPTION:

Authentication is essential and has been implemented at different levels including user authentication, device authentication, and application authorization/authentications. In general practice, commercial mobile networks do not perform user verification/validation after the initial user (subscriber)/device activation/registration/authentication processes unless device is lost/stolen. The owner (subscriber) of a device is responsible for any services originated/terminated on this device regardless of who may be using the device at a time. A security enhancement for user identity verification/validation on-demand on top of the standardized authentication implemented in mobile networks is desired, and essential for services such as DHS Priority Services.

PHASE I: (1) Conduct feasibility study for utilizing existing financial network infrastructure to perform secure and reliable user identity verification/validation without modification of the standardized authentication procedures/process in commercial mobile networks; (2) investigate and identify other identity verification/validation on-demand solutions in conjunction with standardized mobile network authentication mechanisms, and generate solution comparison metrics.

PHASE II: (1) Out of phase-I outcomes, identify gaps/requirements on how to link/bridge/implement the user identity verification/validation in conjunction with standardized authentication solution in commercial mobile networks; (2) Develop a solution to allow Priority Service subscriber invoke/revoke priority services from any mobile device without inducing unauthorized service access attempts. (3) Perform system concept approval and demonstration in an agreed lab environment. (4) Reach out to the commercial network service provider(s) to propose and perform pilot demonstration(s). Suggest and recommend transition from the pilot solution to the commercial use in support of DHS Priority Service and/or any other potential services.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: Plan and execute transition from the pilot solution into commercial use to support DHS Priority Service and/or any other potential services.

REFERENCES:

- 1) [Public Safety Entity Control and Monitoring Requirements for the Nationwide Public Safety Broadband Network, Final Report October 2015](#)
- 2) [The State Identity Credential and Access Management Guidance and Roadmap \(SICAM\), NASCIO, 2012](#)
- 3) [3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Identity management and 3GPP security interworking; Identity management and Generic Authentication Architecture \(GAA\) interworking \(Release 12\)](#)
- 4) [NIST Special Publication 800-63-2, Electronic Authentication Guideline](#)
- 5) [Federal Identity, Credential, and Access Management \(FICAM\) Roadmap and Implementation Guidance](#)

KEY WORDS: Identity Management, Credentialing, Public Safety, FirstNet, Cellular, LTE, 4G, 5G, NPSBN.

TITLE: Blockchain Applications for Homeland Security Missions

TECHNOLOGY AREAS: Identity, encryption, authentication, cyber security, internet of things, and data analytics

OBJECTIVE: Design and prototype an ecosystem that applies blockchain technology to significantly improve DHS analytics, missions, and operations. Proposed solutions should be focused on new applications of blockchain technology and not focused purely on the analysis and characterization of Bitcoin or other cryptocurrency transactions.

DESCRIPTION: Blockchain technologies potentially offer a very flexible, low cost, and secure means of implementing data analytics architectures. In the virtual currency world, blockchains are distributed ledgers that keep track of all transactions authenticated by thousands of independent users' machines. This process, called mining, inherently makes the ledger extremely difficult and expensive to hack. The use of machines to authenticate transactions makes authentication more cost effective. Virtual currencies like bitcoin have a governing body that manages and updates the algorithms for transactions and rules for user participation. Numerous entities – banks, technology companies, etc. – are exploring blockchain applications for the future. DHS can benefit from solutions that offer this level of flexibility, security, accountability and cost. To maximize cost savings and effectiveness, blockchain applications should operate in a limited trust environment, which emphasizes need for decentralized rules, decentralized transactions, traceability, and defined ownership.

Use cases may include, but are not limited to crypto-certified transactions involving users and devices for the internet-of-things applications (IoT) such as encrypted data transactions and analytics for first responders; information sharing and analysis between state, local, and federal law enforcement; and third parties' involvement, perhaps in applications that improve security and experiences for the traveling public, or that improve bio-threat awareness. Proposers may define relevant use cases and architectural concepts where there is a significant value proposition for the homeland security enterprise.

Proposed solutions can involve open environment blockchain applications such as cryptocurrencies, where anyone can participate, and closed-permissions based environments. Regardless of the architecture, privacy is an important DHS priority for use cases that might involve any personally identifiable information (e.g., biographical, biometric). National computer and network security policies and standards are also important considerations. For scalability, solutions must also consider speed of analysis and any transaction validation capabilities.

PHASE I: Design an application ecosystem, analytics methodology and approach for applying blockchain technology to significantly improve or enable homeland security applications and use cases. Produce an architecture that leverages existing or creates algorithms and computational techniques; show how components and services function in the ecosystem; and develop an approach for building and maintaining this ecosystem. Demonstrate or discuss implementation feasibility with respect to: concept of operations, governance, algorithms, costs, and security. Identify risks to privacy, security, and technology and develop risk mitigation strategies.

PHASE II: Prototype the ecosystem(s), including purchasing or making equipment needed. Implement and refine system modules and algorithms. Demonstrate prototype(s) and algorithms in a laboratory environment with data that reflects proposed homeland security applications and use cases. Demonstrate general core capabilities by developing and demonstrating multiple but disparate applications from the same core product capabilities. Refine the architecture and technical approach based on feedback from the government and marketplace as appropriate for selected applications. Demonstrate improvements after refinements and feedback. Initiate transition/commercialization options that leverage the strengths of demonstrated results, market demand and homeland security value propositions.

PHASE III: Deploy the first version products for operational testing, verification and validation for specific homeland security use cases. Fully implement transition options for use by DHS Components, the homeland security enterprise or related dual use commercial opportunities.

REFERENCES:

- 1) <https://www.cryptocoinsnews.com/mit-digital-currency-initiative-leader-government-officials-lets-get-open-data-2-0-moving/>
- 2) <http://www.coindesk.com/block-chain-aid-fight-free-speech/>
- 3) <http://www.coindesk.com/blockchain-rise-networked-trust/>
- 4) <http://www.coindesk.com/ibm-reveals-proof-concept-blockchain-powered-internet-things/>
- 5) <http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=XB&htmlfid=GBE03620USEN>
- 6) <http://www.coindesk.com/four-genuine-blockchain-use-cases/>
- 7) <http://www.coindesk.com/8-banking-giants-bitcoin-blockchain/>
- 8) <http://www.technologyreview.com/news/539171/why-nasdaq-is-betting-on-bitcoins-blockchain/>

KEY WORDS: Identity, encryption, authentication, cyber security, internet of things, and data analytics

SBIR TOPIC NUMBER: H-SB017.1-006**TITLE:** Wearable Chemical Sensor Badge**TECHNOLOGY AREAS:** Emergency preparedness and response, smart devices, wearables, warning and notification, chemical defense

OBJECTIVE: Develop a prototype wearable chemical sensor badge that responds to multiple Toxic Industrial Chemicals (TICs). This wearable badge must be able to respond to its immediate surroundings with naturally diffused air or a sample pump of appropriate size and sound profile. This effort must thoroughly study the cross sensitivity between different target chemicals and the effect of common interferents and environmental conditions in order to minimize false alarms.

DESCRIPTION:

The wearable chemical sensor dimensions should not exceed 2x2 inches with a maximum of 0.5 inches in thickness ("badge"). Ultimately, the approach should be amenable to being configured as a button as part of a first responder uniform. The badge should have more than one type of alarm indicator (such as visible and audible alerts, visible and vibration alerts, etc). The response time of the sensor should have an objective of one second or a threshold of 30 seconds. The sensor badge should have a shelf life of at least twelve months (storage in package) and weigh less than 100g including the batteries. The cost of the badge should be affordable (objective: \$30; threshold: \$50). If appropriate, the vendor should propose disposable sensing elements at less than \$5 per element with a reusable badge casing. The developed prototype badge should respond to at least four high priority TICs down to the permissible exposure limits (PEL) with negligible false alarm rate. Suggested TICs are provided in Table 1 (priority order).

Table 1. TIC Targets in Priority Order

Toxic Industrial Chemicals
Chlorine (Cl ₂)
Carbon Monoxide
Hydrogen Sulfide
Carbon Dioxide
Nitrogen Dioxide
Methane
Ammonia
Hydrogen Cyanide
Phosphine
Methyl Bromide

PHASE I: Demonstrate the feasibility of the proposed sensing approach by providing performance data with one TIC from Table 1. The performance data must include results of the TIC in the presence of interferents (e.g., smoke) and varying environmental conditions (-20 to +50 °C) and humidity range (10-90% RH). The Phase I final report must include a Computer-Aided Design of the sensor and information on the following: (1) anticipated sensitivity and selectivity; (2) anticipated response time for the four TIC targets; (3) anticipated size and weight of final

product; (4) power requirements and length of operation time before recharge; (5) training requirements; and (6) anticipated maintenance and operation costs. The report must also include anticipated risks and mitigation strategies and ideas for commercialization.

PHASE II: Fabricate at least six prototype badges and demonstrate their operation in a simulated environment in the lab with selected TICs and interferents. The sensors must alarm at high/low conditions where low is PEL concentrations and high is Short Term Exposure Limit (STEL) or Time Weighted Average (TWA) concentrations (Table 2).

Table 2. TIC Detection Limits

	OSHA PEL (ppm)	NIOSH REL (ppm)
Ammonia	50	25 (TWA) 35 (STEL)
Carbon Dioxide	5000	5,000 (TWA) 30,000 (STEL)
Carbon Monoxide	50	35 (TWA) 200 (Ceiling)
Chlorine (Cl ₂)	1	0.5 (TWA) 1 (STEL)
Hydrogen Cyanide	10	4.7 (STEL)
Hydrogen Sulfide	20 (ceiling)	10 (Ceiling)
Methane	There are no specific exposure limits for Methane. Methane is a simple asphyxiant. Oxygen levels should be maintained above 19.5%.	
Nitrogen Dioxide	5 (ceiling)	1 (STEL)
Phosphine	0.3	1 (STEL)
Methyl Bromide	20	19 (TWA)

PHASE III: The proposed wearable chemical sensor badge would find applications in government, public and private sector as dual-use technology. The contractor shall explore the suitable engineering tests for a field evaluation of the developed prototype and identify suitable pathways for commercialization within these sectors.

REFERENCES:

- 1) Regulations and You: TICs, TIMs and Terrorism. Bennett, M. Today's Chemist at Work. American Chemical Society. Apr. 2003, Page 21-25.

- 2) Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders. U.S. Department of Homeland Security. Guide 100-06 3rd Edn. Jan. 2007.
- 3) Testing and Evaluation of Handheld Toxic Industrial Chemical Detectors. Technology Evaluation Report by EPA. Aug. 2012 EPA 600/R-12/560.
- 4) Janata, Jiri. *Principles of Chemical Sensors*, Plenum Press, New York, (1989).

KEY WORDS: Chemical Sensor, wearable sensor, smart devices,

TITLE: Over-the-air Authentication Technology for Messaging via Emergency Alerts

TECHNOLOGY AREAS: Alerts, Warnings, and Notifications (AWN); Wireless Emergency Alerts (WEA); Cybersecurity; Information Sharing; Interoperable Communications

OBJECTIVE: Develop and demonstrate a mechanism that authenticates messages sent via Wireless Emergency Alerts, notifies the recipient(s) of the authentication status of such messages, and proves resilient to spoofing of such messages.

DESCRIPTION: Wireless Emergency Alerts (WEA) use commercial cellular networks to disseminate emergency messages to cell phones in a specific geographical area. WEA notifications include child abductions (e.g., AMBER Alerts); imminent threat messages, such as severe weather, shelter-in-place, and “wanted alerts” – such as the one recently issued on September 19, 2016 following the bombings in New Jersey and New York City; and Presidential messages. WEA messages are limited to 90 characters currently and are sent securely by government alerting authorities to commercial cellular network operators using the common alerting protocol (CAP). These operators use the Cell Broadcast to send a WEA message to cell phones.

This solicitation seeks a novel approach to authenticate WEA messages received via Cell Broadcast. Such an approach will prevent potentially unauthorized messages from being mistaken for authorized WEA messages. The solution will provide a notification to the recipient of the authentication status of such messages. Additionally, the solution must be resilient to any type of spoofing of WEA messages (e.g., false messages that may originate from sources other than approved government alerting authorities). The solution shall demonstrate a strong understanding of the WEA architecture, the common alerting protocol, cellular broadcast technologies, and major cell phone operating systems. Solutions should focus on technologies that do not require changes to the underlying cellular standards but may include imminent updates to those standards. Additionally, solutions should limit dependencies on specific cell phone operating systems.

PHASE I: The vendor shall prepare an engineering concept report that (a) details a solution that meets the requirements given in the description section of this solicitation, (b) clearly describes the threat profiles that the solution will mitigate, and (c) identifies the limitations of the solution.

Phase I deliverables shall include: engineering concept report as previously described; a short monthly technical and program report that provides task descriptions, percentage completed, targeted completion date, risks, etc.; and a monthly status call to discuss the monthly report.

PHASE II: The vendor shall develop and demonstrate the solution to authenticate messages sent via Wireless Emergency Alerts. DHS S&T will work with the vendor to coordinate a meaningful demonstration environment. The demonstration not only will include the handling of genuine WEA messages but also false WEA messages according to the threat profiles described in the engineering concept report. The demonstration shall be performed on multiple cell phones types as defined in the vendor’s proposal.

Phase II deliverables shall include: a kick-off meeting; a short monthly technical and program report that provides task descriptions, percentage completed, targeted completion date, risks, etc.; a monthly status call to discuss the monthly report; an engineering reference design document for the solution; a working prototype that authenticates messages sent via Wireless Emergency Alerts, notifies the recipient(s) of the authentication status of such messages, and proves resilient to spoofing of such messages; and a demonstration that will produce a test and evaluation matrix.

Finally, vendors shall assist DHS S&T Communications, Outreach, and Responder Education (CORE) personnel develop and review communications materials related to the solution.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: A successful solution may produce intellectual property – and/or one or more specific implementations – for message authentication (of WEA messages over cell broadcast). Other types of message services using cell broadcast may also benefit from such an authentication mechanism. Thus, the radio access networks (including all cellular handsets) of participating cellular service providers in the United States become the potential addressable market for such a successful solution.

REFERENCES:

- 1) Frequently Asked Questions: Wireless Emergency Alerts (12/21/2015), <https://www.fema.gov/frequently-asked-questions-wireless-emergency-alerts>
- 2) Common Alerting Protocol (12/11/2015), (<https://www.fema.gov/common-alerting-protocol>)
- 3) Integrated Public Alert & Warning System (09/16/2016), <https://www.fema.gov/integrated-public-alert-warning-system>
- 4) Feasibility Study for WEA Cell Broadcast Geo-Targeting (12/02/2015), https://access.atis.org/apps/group_public/download.php/25924/ATIS-0700027-FeasibilityStudy.pdf
- 5) Cell Broadcast (retrieved 09/29/2016), <http://www.telecomabc.com/c/cb.html>

KEY WORDS: Wireless Emergency Alerts (WEA); Cybersecurity; Alerts and Warnings; Cell Broadcast

TITLE: Accelerated Crystal-Size Scale-Up Development of Thallium-based, High Efficiency, Dual or Tri-Mode Elpasolite Scintillator

TECHNOLOGY AREAS: Radiation detection, scintillators, Elpasolites, CLYC, technology development

OBJECTIVE: Develop multi-mode gamma/neutron detector materials with simultaneous high energy resolution and higher efficiency, as well as good particle discrimination, and especially scale up these crystal materials to sizes of 3" diameter x 3" long right cylinders or larger. Such materials are key to DHS/DNDO efforts in advancing new detector technologies for the Global Nuclear Detection Architecture (GNDA).

DESCRIPTION: Gamma-ray and neutron detection plays an important role in the identification of radiological materials and threats. Gamma-ray detectors mainly utilize crystalline scintillation materials, which are required to have good energy resolution and high detection efficiency. Dual or tri-mode crystal materials, such as Ce-doped CLYC (Cs₂LiYCl₆:Ce) have been developed and commercialized, and their sizes have been steadily increasing. The 6Li in CLYC is sensitive to thermal neutrons, whereas the Cl is sensitive to fast neutrons. By appropriately choosing whether the Lithium (Li) is enriched 6Li or enriched 7Li, one can tailor the neutron sensitivity to either predominantly thermal neutrons or fast only neutrons. In addition, CLYC offers good energy resolution for gammas in the low 4% range at 662 keV. The unique properties of CLYC has resulted in great interest from the rad/nuc community. However, comparison testing has shown that its efficiency is not as good as traditional COTS materials such as NaI or CsI. Fortunately, initial results from a variant of CLYC, namely TLYC (Tl₂LiYCl₆:Ce), wherein the Cs has been replaced with Thallium, has demonstrated potentially similar performance to CLYC but with enhanced efficiency of gamma detection. The enhanced efficiency is due to the facts that TLYC is 33% more dense, and has a higher effective Z of 71 versus 46 for CLYC. The purpose of this topic area is to leverage the learning curve from CLYC development and apply it to an accelerated scale up development effort for TLYC or TLYB (Br replacing Cl).

PHASE I: The goal of this phase is to first demonstrate the capability of producing small high performance crystals of TLYC, and secondly to show initial progress of successfully scaling up the crystal sizes without sacrificing performance. Good performance equates to better than 4.3% energy resolution for 1 cm³ or larger crystals, with FOM of 2.0 or better wherein FOM is defined as separation of gamma and neutron distribution divided by sum of FWHM of the neutron and gamma distributions in a PSD (Pulse Shaped Discrimination) plot of the vendors choosing. The progress toward scale-up needs to be demonstrated by the end of Phase I by achieving at least two crystals of 1" dia x 1" long sized with comparable performance to that of the smaller crystals.

The proposal must provide a phased technical approach leading to a feasibility demonstration at the end of Phase I addressing all critical technical issues and risks and mitigation strategies.

PHASE II: The goal of Year 1 of Phase II will be to produce 2" diameter x 2" long right cylinders of Tl-based elpasolites with comparable performance to the 1" versions. The goal of Year 2 of Phase II will be to produce 3" diameter x 3" long right cylinders of the Tl-based elpasolite with comparable performance to the 1" versions.

PHASE III - COMMERCIAL OR GOVERNMENT APPLICATIONS:

DNDO expects this technology to be utilized in targeting illicit trafficking and unauthorized use of nuclear and radiological material, and to help protect against both nuclear and radiological terrorism. Specifically, it would be integrated into passive and active detection equipment used for assessing situations in which radiation is being emitted and/or radioactive materials are expected to exist. Further uses include basic science research (nuclear, radiochemistry), astronomical gamma ray imaging and nuclear medicine (SPECT, PET) and x-ray imaging.

REFERENCES:

R. Hawrami; E. Ariesanti; L. Soundara-Pandian; J. Glodo; K. S. Shah, "Ti₂ LiYCl₆ :Ce : A New Elpasolite Scintillator," in IEEE Transactions on Nuclear Science , vol. PP, no.99, pp.1-1, doi: 10.1109/TNS.2016.2627523

J.Glodo, R.Hawrami, K. Shah, Development of Cs₂LiYCl₆ scintillator, Journal of Crystal Growth, Volume 379, 15 September 2013, Pages 73-78

KEY WORDS: Radiation detector, scintillator, spectroscopy

TITLE: Unattended Radiation Detection System

TECHNOLOGY AREAS: Radiation detection, unattended sensors, real-time detection, data fusion

OBJECTIVE: Research will support the development of an unattended radiation detection system. The product should be capable of radiation detection and analysis, capture relevant contextual information (e.g., video or pictures) from the surrounding environment at times of detection, and integrate into communications relevant to end-users for timely transmission of collected information. The system should have low-energy requirements to facilitate long periods without direct operator interface.

DESCRIPTION: A need has been recognized for radiation detection systems to be located in remote and urban environments with the ability to function fully without physical intervention from an operator. These unattended radiation detection systems should apply real-time spectral detection methods from radiation detectors and combine information from various auxiliary sensors to include, but not limited to video and still cameras. The sensor data associated with these systems can easily saturate the communication bandwidth available as well as the drain the power required to transmit the unprocessed data to a server. Thus, a new system is required to conduct real-time monitoring and analysis at low power levels, and acquire, synchronize, analyze, compress, and communicate data from the multiple sensor components only during times of threat detection. Since communication infrastructure can vary by end-users and regions, the unattended system should be able to integrate into a wide variety of communications networks. Optimized performance benefits include resourceful use of power management, reduced data storage via compression/filtering, reliable two-way communication, and ability to execute advanced algorithms from spectral and video systems.

The resulting system is envisioned to be used as an unattended and rapidly mobilized detection systems for deployment in an outdoor environment of durations exceeding 24 hours with optimized communication protocols that transmit radiation and ancillary sensor (e.g. video) information related to a spectral alarm or as requested remotely.

It is expected that approaches that are tightly configured for a specific use case may not be well-suited for another. However, approaches that are flexible across multiple operating environments are desirable. Approaches that incorporate commercial off-the-shelf (COTS) and scalable, open-source software approaches are also preferred.

PHASE I: Phase I will develop and evaluate a number of technological designs of data acquisition, computational analysis, and communication that may benefit a selected end-user environment. Phase I efforts should directly address that ability to apply the hardware design approach to run the computational applications related to the spectral sensors, auxiliary sensors, communication protocols/controls, data management/compression, and auxiliary sensor. The approach shall include a quantitative analysis of the size, weight, and power requirements and limitations associated with the proposed design. The proposed approach shall provide an estimate of the computational and communication burden and its compatibility with bandwidths available from COTS Bluetooth, Wi-Fi, cellular, and other protocols for remote applications such as satellite.

Phase I shall also look at the quantitative impact of compression, encryption, error-checking, information lag, and stability regarding the data communication to a systems outside the sensor systems such as a server or smartphone.

PHASE II: Phase II activities include the design iterations or spirals associated with selected components and shall culminate in the assessment of the system in a setting comparable to one or more end-user's environment. During Phase II, end-user assessment may provide feedback during the spiral assessment on the operational design and provide documented guidance about modifying (i.e. system must operate only in encrypted WiFi or should include additional environmental sensors).

Phase II should look to develop and demonstrate the interface of the hardware computation with COTS sensors to include the radiation detectors and demonstrate the data outside the system. During Phase II, the offeror will work with the government team to specify the threshold and objective requirements that may be tested in Phase III.

PHASE III - COMMERCIAL OR GOVERNMENT APPLICATIONS: Phase III shall entail the selection of specific application and system requirements associated with the intended end-users. Selection of multiple end-uses may be concurrently assessed in Phase III to include but not limited to existing government systems, COTS systems, or mature prototypes slated for government characterization.

REFERENCES:

Brennan, Sean M., et al. "Radiation detection with distributed sensor networks." *Computer* 37.8 (2004): 57-59.

Arlt, R., and D. E. Rundquist. "Room temperature semiconductor detectors for safeguards measurements." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 380.1 (1996): 455-461.

KEY WORDS: Radiation Detection, Networks, Inertial Measurement Unit, Global Positioning System, Application Programming Interface

APPENDIX B - DEFINITIONS

Commercialization. The processes of developing products, processes, technologies, or services and the production and delivery (whether by the originating party or others) of products, processes, technologies, or services for sale to or use by the Federal Government or commercial markets.

Conflicts of Interest. Contract awards made to small business concerns owned by or employing current or previous Federal Government employees could create conflicts of interest for those employees, which may be a violation of federal law of FAR Part 3.601 and the Ethics in Government Act of 1978, as amended. Small business Offerors that are owned by or employ current or previous Federal Government employees should seek guidance from the cognizant Ethics Counselor from the employee's Government agency.

Essentially Equivalent Work. Work that is substantially the same research, which is proposed for funding in more than one contract proposal or grant application submitted to the same Federal agency or submitted to two or more different Federal agencies for review and funding consideration; or work where a specific research objective and the research design for accomplishing an objective are the same or closely related to another proposal or award, regardless of the funding source.

Foreign National (Foreign Person). A 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 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.

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.

APPENDIX B - DEFINITIONS

Fraud, Waste and Abuse.

Fraud – Includes any false representations about a material fact or any intentional deception designed to deprive the United States unlawfully of something of value or to secure from the United States a benefit, privilege, allowance, or consideration to which an individual or business is not entitled.

Waste – Includes extravagant, careless or needless expenditure of Government funds, or the consumption of Government property, that results from deficient practices, systems, controls, or decisions.

Abuse – Includes any intentional or improper use of Government resources, such as misuse of rank, position, or authority or resources.

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, including products or services, funded in whole or in part by the Federal Government.

Joint Venture. See 13 CFR 121.103(h).

Key Individual (Key Personnel). The principal investigator/project manager and any other person named as a “key” employee in a proposal submitted in response to this program solicitation.

Principal Investigator/Project Manager. The one individual designated by the Offeror to provide the scientific and technical direction to a project supported by the funding agreement.

Proprietary Information. Proprietary information is information that is provided which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security.

Research or Research and Development (R/R&D). Any activity that is:

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

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.

APPENDIX B - DEFINITIONS

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.

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, encourages the development and deployment of anti-terrorism technologies by making available the SAFETY Act's system of "risk management" and "liability management."

Offerors submitting proposals in response to this solicitation are encouraged to submit SAFETY Act applications on their existing technologies/products 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.

SBIR Technical Data. All data generated during the performance of an SBIR award.

SBIR Technical Data Rights. The rights an SBIR awardee obtains in data generated during the performance of any SBIR Phase I, Phase II, or Phase III award that an awardee delivers to the Government during or upon completion of a Federally-funded project, and to which the Government receives a license. See FAR 52.227-20.

Small Business Concern. A concern that meets the requirements set forth in 13 C.F.R. 121.702.

State Assistance. Many states have established programs to provide services to those small business 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; and/or
- Assistance in obtaining Phase III funding.

Visit https://www2.ed.gov/programs/sbir/state_awards.html for further information.

Subcontract. 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.

ATTACHMENT 1: SBIR FUNDING CERTIFICATION – TIME OF AWARD

All small businesses that are selected for award of an SBIR funding agreement must complete this certification at the time of award and any other time set forth in the funding agreement that is prior to performance of work under this award. This includes checking all of the boxes and having an authorized officer of the awardee sign and date the certification each time it is requested.

Please read carefully the following certification statements. The Federal government relies on the information to determine whether the business is eligible for a Small Business Innovation Research (SBIR) Program award. A similar certification will be used to ensure continued compliance with specific program requirements during the life of the funding agreement. The definitions for the terms used in this certification are set forth in the Small Business Act, SBA regulations (13 C.F.R. Part 121), the SBIR Policy Directive and also any statutory and regulatory provisions referenced in those authorities.

If the funding agreement officer believes that the business may not meet certain eligibility requirements at the time of award, they are required to file a size protest with the U.S. Small Business Administration (SBA), who will determine eligibility. At that time, SBA will request further clarification and supporting documentation in order to assist in the verification of any of the information provided as part of a protest. If the funding agreement officer believes, after award, that the business is not meeting certain funding agreement requirements, the agency may request further clarification and supporting documentation in order to assist in the verification of any of the information provided.

Even if correct information has been included in other materials submitted to the Federal government, any action taken with respect to this certification does not affect the Government's right to pursue criminal, civil or administrative remedies for incorrect or incomplete information given in the certification. Each person signing this certification may be prosecuted if they have provided false information.

The undersigned has reviewed, verified and certifies that (all boxes must be checked):

1. The business concern meets the ownership and control requirements set forth in 13 C.F.R. §121.702.

☐ Yes ☐ No

- (2) If a corporation, all corporate documents (articles of incorporation and any amendments, articles of conversion, by-laws and amendments, shareholder meeting minutes showing director elections, shareholder meeting minutes showing officer elections, organizational meeting minutes, all issued stock certificates, stock ledger, buy-sell agreements, stock transfer agreements, voting agreements, and documents relating to stock options, including the right to convert non-voting stock or debentures into voting stock) evidence that it meets the ownership and control requirements set forth in 13 C.F.R. §121.702.

☐ Yes ☐ No ☐ N/A Explain why N/A: _____

- (3) If a partnership, the partnership agreement evidences that it meets the ownership and control requirements set forth in 13 C.F.R. §121.702.

☐ Yes ☐ No ☐ N/A Explain why N/A: _____

- (4) If a limited liability company, the articles of organization and any amendments, and operating agreement and amendments, evidence that it meets the ownership and control requirements set forth in 13 C.F.R. §121.702.

☐ Yes ☐ No ☐ N/A Explain why N/A: _____

(5) The birth certificates, naturalization papers, or passports show that any individuals it relies upon to meet the eligibility requirements are U.S. citizens or permanent resident aliens in the United States.

☐ Yes ☐ No ☐ N/A Explain why N/A: _____

(6) It has no more than 500 employees, including the employees of its affiliates.

☐ Yes ☐ No

(7) SBA has not issued a size determination currently in effect finding that this business concern exceeds the 500 employee size standard.

☐ Yes ☐ No

(8) During the performance of the award, the principal investigator will spend more than one half of his/her time as an employee of the awardee or has requested and received a written deviation from this requirement from the funding agreement officer.

☐ Yes ☐ No ☐ Deviation approved in writing by funding agreement officer: ____%

(9) All, essentially equivalent work, or a portion of the work proposed under this project (check the applicable line):

☐ Has not been submitted for funding by another Federal agency.

☐ Has been submitted for funding by another Federal agency but has not been funded under any other Federal grant, contract, subcontract or other transaction.

☐ A portion has been funded by another grant, contract, or subcontract as described in detail in the proposal and approved in writing by the funding agreement officer.

(10) During the performance of award, it will perform the applicable percentage of work unless a deviation from this requirement is approved in writing by the funding agreement officer (check the applicable line and fill in if needed):

☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research.

☐ SBIR Phase II: at least half (50%) of the research.

☐ Deviation approved in writing by the funding agreement officer: %

(11) During performance of award, the research/research and development will be performed in the United States unless a deviation is approved in writing by the funding agreement officer.

☐ Yes ☐ No ☐ Waiver has been granted

(12) During performance of award, the research/research and development will be performed at my facilities with my employees, except as otherwise indicated in the SBIR application and approved in the funding agreement.

☐ Yes ☐ No

(13) It has registered itself on SBA's database as majority-owned by venture capital operating companies, hedge funds or private equity firms.

☐ Yes ☐ No ☐ N/A Explain why N/A: _____

(14) It is a Covered Small Business Concern (a small business concern that:

(a) was not majority-owned by multiple venture capital operating companies (VCOs), hedge funds, or private equity firms on the date on which it submitted an application in response to an SBIR solicitation; and (b) on the date of the SBIR award, which is made more than 9 months after the closing date of the solicitation, is majority-owned by multiple venture capital operating companies, hedge funds, or private equity firms).

☐ Yes ☐ No

☐ It will notify the Federal agency immediately if all or a portion of the work proposed is subsequently funded by another Federal agency.

☐ I understand that the information submitted may be given to Federal, State and local agencies for determining violations of law and other purposes.

ΔI am an officer of the business concern authorized to represent it and sign this certification on its behalf. By signing this certification, I am representing on my own behalf, and on behalf of the business concern that the information provided in this certification, the application, and all other information submitted in connection with this application, is true and correct as of the date of submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. §1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. §3729 *et seq.*); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. §3801 *et seq.*); (4) civil recovery of award funds, (5) suspension and/or debarment from all Federal procurement and nonprocurement transactions (FAR Subpart 9.4 or 2 C.F.R. part 180); and (6) other administrative penalties including termination of SBIR/STTR awards.

<i>Signature</i>	<i>Date</i>
<i>Print Name (First, Middle, Last)</i>	
<i>Title</i>	
<i>Business Name</i>	

ATTACHMENT 2: SBIR FUNDING CERTIFICATION – LIFE CYCLE CERTIFICATION

All SBIR Phase I and Phase II awardees must complete this certification at all times set forth in the funding agreement (see §8(h) of the SBIR Policy Directive). This includes checking all of the boxes and having an authorized officer of the awardee sign and date the certification each time it is requested.

Please read carefully the following certification statements. The Federal government relies on the information to ensure compliance with specific program requirements during the life of the funding agreement. The definitions for the terms used in this certification are set forth in the Small Business Act, the SBIR Policy Directive, and also any statutory and regulatory provisions referenced in those authorities.

If the funding agreement officer believes that the business is not meeting certain funding agreement requirements, the agency may request further clarification and supporting documentation in order to assist in the verification of any of the information provided.

Even if correct information has been included in other materials submitted to the Federal government, any action taken with respect to this certification does not affect the Government's right to pursue criminal, civil or administrative remedies for incorrect or incomplete information given in the certification. Each person signing this certification may be prosecuted if they have provided false information.

The undersigned has reviewed, verified and certifies that (all boxes must be checked):

(1) The principal investigator spent more than one half of his/her time as an employee of the awardee or the awardee has requested and received a written deviation from this requirement from the funding agreement officer.

ΔYes ΔNo ΔDeviation approved in writing by funding agreement officer: ____%

(2) All, essentially equivalent work, or a portion of the work performed under this project (check the applicable line):

ΔHas not been submitted for funding by another Federal agency.

ΔHas been submitted for funding by another Federal agency but has not been funded under any other Federal grant, contract, subcontract or other transaction.

ΔA portion has been funded by another grant, contract, or subcontract as described in detail in the proposal and approved in writing by the funding agreement officer.

(3) Upon completion of the award it will have performed the applicable percentage of work, unless a deviation from this requirement is approved in writing by the funding agreement officer (check the applicable line and fill in if needed):

ΔSBIR Phase I: at least two-thirds (66 2/3%) of the research.

ΔSBIR Phase II: at least half (50%) of the research.

ΔDeviation approved in writing by the funding agreement officer: ____%

(4) The work is completed and it has performed the applicable percentage of work, unless a deviation from this requirement is approved in writing by the funding agreement officer (check the applicable line and fill in if needed):

ΔSBIR Phase I: at least two-thirds (66.6%) of the research.

ΔSBIR Phase II: at least half (50%) of the research.

ΔDeviation approved in writing by the funding agreement officer: _____%

ΔN/A because work is not completed

(5) The research/research and development is performed in the United States unless a deviation is approved in writing by the funding agreement officer.

ΔYes ΔNo ΔWaiver has been granted

(6) The research/research and development is performed at my facilities with my employees, except as otherwise indicated in the SBIR application and approved in the funding agreement.

ΔYes ΔNo

ΔIt will notify the Federal agency immediately if all or a portion of the work proposed is subsequently funded by another Federal agency.

ΔI understand that the information submitted may be given to Federal, State and local agencies for determining violations of law and other purposes.

└ I am an officer of the business concern authorized to represent it and sign this certification on its behalf. By signing this certification, I am representing on my own behalf, and on behalf of the business concern, that the information provided in this certification, the application, and all other information submitted in connection with the award, is true and correct as of the date of submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. §1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. §3729 *et seq.*); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. §3801 *et seq.*); (4) civil recovery of award funds, (5) suspension and/or debarment from all Federal procurement and nonprocurement transactions (FAR Subpart 9.4 or 2 C.F.R. part 180); and (6) other administrative penalties including termination of SBIR/STTR awards.

Signature	Date
Print Name (First, Middle, Last)	
Title	
Business Name	

ATTACHMENT 3: BRIEFING CHART TEMPLATE

<u>Proposal Title</u> <u>Company</u> <u>City, State</u> <u>Proposal Number:</u>	
<p>Place a clear photograph, drawing, graphic or diagram of the concept related to innovation here</p> <p><i>Provide a simple, legible, but sufficiently detailed graphic to convey the main concept or idea of the research effort and/or development prototype.</i></p>	<p><u>Relevance and Goals and Commercialization</u></p> <p>Relevance and Goals:</p> <ul style="list-style-type: none"> • Research goals and desired end state including performance targets • Advantages over other state-of-the-art solutions • Key technical challenges <p>Commercialization Strategy:</p> <ul style="list-style-type: none"> • Describe the current market potential for product/service development and estimated unit cost of the product • Identify end user interests or agreements
<p><u>Technical Objectives and Work Plan</u></p> <p>Address:</p> <ul style="list-style-type: none"> • Technological innovations supporting the approach, as appropriate • How the problem will be addressed • The current status of the proposed effort • The key technical challenges and/or risks • The planned technical accomplishments/key milestones <p><u>Estimate the Technology Readiness Level (TRL 1 – 9) at beginning and end of contract</u></p>	<p><u>Milestones, Deliverables, Schedule and Team</u></p> <p>Milestones, Deliverables and Schedule:</p> <ul style="list-style-type: none"> • Provide milestones, primary deliverables, and task durations for Phase I and Phase II, as appropriate <p>Team:</p> <ul style="list-style-type: none"> • List the proposing organization and principal investigator • List subcontractors
<p align="center">NON-PROPRIETARY, UNCLASSIFIED DATA</p>	

ATTACHMENT 4: SAMPLE NON-DISCLOSURE AGREEMENT

NON-DISCLOSURE AGREEMENT
SOLICITATION HSHQDC-16-R-00012

The Parties to this Agreement agree that Schafer Corporation may have access to proprietary information of [Insert Name of Offeror] contained within the technical and cost proposals, solely to perform technical advisory services for the Government, in evaluating proposals submitted in response to this Solicitation.

The Parties agree to protect the proprietary information from unauthorized use or disclosure for as long as it remains proprietary, and to refrain from using the information for any purpose other than that for which it was furnished.

Company Name (Offeror)

Name of Company Official, Printed

Signed

Dated

Name of Schafer Corporation Official, Printed

Signed

Dated