



U.S. Department of Homeland Security (DHS)

Small Business Innovation Research (SBIR)

Program

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The Science and Technology Directorate
and the Countering Weapons of Mass
Destruction 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 Countering Weapons of Mass Destruction Office's (CWMD) SBIR Program, invites small business concerns (SBCs) to submit innovative proposals under this Solicitation. Eligible small business concerns with the capability to conduct research or research and development (R/R&D) in any of the homeland security-related topic areas described in **Appendix A**, and to commercialize the results of that R/R&D, are encouraged to participate. The DHS SBIR Program Office encourages all small business concerns, including small disadvantaged, women-owned, veteran-owned, service-disabled veteran-owned, and socially and economically disadvantaged small business concerns 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 likely result negatively in the proposal evaluation or elimination from consideration.
- This Solicitation contains topics for both the S&T Directorate's SBIR Program and CWMD'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 ten (10) research topics – eight (8) S&T topics and two (2) CWMD 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 business concerns 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 1.5**, 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 benchmark:
 - Phase I to Phase II Transition rate, See **Section 3.7**, DHS Phase II Transition 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 concerns 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 and Improvement Act of 2016 (Public Law 114-328).

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 **Appendix A**.

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.

In accordance with the SBIR/STTR Reauthorization Act of 2016 (Public Law 114- 328), **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.

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 or successor in interest. 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 FY19.1 DHS SBIR Solicitation:

KEY	
EVENT	DATE*
Pre-solicitation issued:	November 30, 2018
Direct contact with Topic POC	November 30, 2018 – December 18, 2018
Solicitation released:	December 19, 2018
Phase I proposals submission:	December 19, 2018 – January 23, 2019
Last day to submit questions:	January 9, 2019 12:00 NOON. ET

Q&A Posted on FBO.gov	January 16, 2019
Deadline for receipt of proposals:	January 23, 2019, 12:00 NOON. ET
Phase I POP	~May 2019 - Oct 2019
Phase II Proposals Due	~November 2019
Phase II Begins	~March 2020
The dates in the table above are approximate dates and are subject to change without notice.	

1.5 Eligibility

Small Business Concerns 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 concern. 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.

1.6 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 CWMD SBIR Program, please contact CWMD.SBIR@hq.dhs.gov.

1.7 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**.

1.8 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 0305
Attention: Office of Investigations-Hotline
245 Murray Drive SW,
Washington, DC 20528

To reach someone within S&T's SBIR Program Office about fraud, waste and abuse, please contact DHS S&T SBIR Program PM, STSBIR.PROGRAM@hq.dhs.gov

To reach someone within the CWMD SBIR Program Office about fraud, waste and abuse, please contact the DHS CWMD SBIR PM at CWMD.SBIR@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 the SBIR/STTR Reauthorization and Improvement Act of 2016. The certifications require small business concerns 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 concern 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 portal at <https://sbir2.st.dhs.gov>.

The small business concern will need to submit all the mandatory proposal sections. Some sections will be generated by the proposal submission portal and some will require a PDF upload (CWMD topics will also require documents submitted via email). Some sections which required PDF upload have a page limit.

The table below describes each mandatory section and, when applicable, page limitations. Proposals submitted which do not contain all mandatory sections and/or exceed page limitations as described in the table below, will be deemed **NON-RESPONSIVE** and will not be evaluated. It is the responsibility of the Small Business Concern to ensure that once the proposal is submitted and uploaded into the system, it complies with the page limits.

Mandatory Proposal Requirements		Phase I	Phase II
System Generated	Cover Sheet	As generated by system	
	Cost Proposal	As generated by system	
PDF Uploads	Technical Proposal (Final page of the Technical Proposal shall contain the SBA Registration and no other content)	Limited to 20 pages	Limited to 40 pages
	Briefing Chart ¹	Limited to 1 page	Limited to 1 page
	Commercialization Report	N/A	No Page Limit- if applicable
Email Submissions	Non-disclosure Agreement ²	CWMD Topics ONLY	CWMD Topics Only NDA from Phase I applies to Phase II

¹ Briefing Chart Template is Attachment 3 in the solicitation.

² CWMD 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

It is a requirement for the Offeror 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 should 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 should 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 should be included, as these will be used in the evaluation process.

For Phase II proposals only, the Offeror should 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 should 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 should 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 should 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 must 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	
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	V. Key Individuals and Bibliography of Directly
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 should 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 should 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 should be discussed explicitly and in detail. Task descriptions, schedules, resource allocations, estimated task hours for each key personnel and planned accomplishments, including project milestones, should 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 should 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 should satisfy the anticipated results, as specified in the topic description. The methods planned to achieve each objective or task should be discussed explicitly and in detail. Task descriptions, schedules, resource allocations, estimated task hours for each key personnel and planned accomplishments, including project milestones, should be included. This section should 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 should 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), should 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) should 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 should 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 should 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, should 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 should be described in detail in this section and also in the Cost Proposal. Subcontractors' or consultants' involvement under Technical and Business Assistance (see **Section 5.11**) should 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, should 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, should be carried out by the proposing small business concern.

If the small business concern 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.

SBIR Topic Structure

<u>Phase I</u>	<u>Phase II</u>
\$150,000	\$1,000,000
6 months	24 months

Note: Phase totals are inclusive of Business and Technical Assistance (**Section 5.11**)

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 CWMD topics. Refer to the table below for details:

PHASE I TRAVEL		
Day	S&T	CWMD
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 business concerns can enhance their presentation skills in front of Government, Industry and representatives from the investment community	N/A

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

All Phase II Offerors with previous Phase II awards must submit a Commercialization Report. It is important to note that this is a separate document from the Commercialization Plan required as part of the Phase II Technical Proposal.

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**.

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 DHS Phase II Transition Rate Benchmark

The Phase I to Phase II Transition Rate requirement applies only to SBIR and STTR Phase I applicants that have received more than 20 (21 or more) Phase I awards over the past 5 fiscal years, excluding the most recent year. These companies must meet the required benchmark rate of transition from Phase I to Phase II. The current Transition Rate requirement, agreed upon and established by all 11 SBIR agencies and

published for public comment at 77 FR 63410 (link is external) in October 2012 and amended at 78 FR 30951 (link is external) in May 2013, is that an awardee must have received an average of one Phase II for every four Phase I awards received during the most recent 5-year time period (which excludes the most recently-completed fiscal year) to be eligible to submit a proposal for a new Phase I (or Direct-to-Phase II) award. That is, the ratio of Phase II to Phase I awards must be at least 0.25.

For SBIR/STTR awardees that have received more than 20 Phase I awards during the time period, SBA calculates the company Transition Rate and displays it on the company registry page at www.sbir.gov. Companies with less than that number of past Phase I awards will only see “N/A” because the benchmark requirement does not apply to them. To calculate the company Transition Rate, SBA divides the total number of SBIR and STTR Phase II awards a company received from all agencies during the past 5 fiscal years by the total number of SBIR and STTR Phase I awards it received during the past 5 fiscal years excluding the most recently-completed year. The 5-year period over which Phase I awards are counted excludes the most recently completed fiscal year because not all Phase II awards can occur within the same year as the Phase I award.

3.8 Questions

General questions

Question pertaining to the S&T’s SBIR Program should be submitted to STSBIR.PROGRAM@hq.dhs.gov.

Questions pertaining to the CWMD’s SBIR Program should be submitted to CWMD.sbir@hq.dhs.gov.

Technical Questions

Questions related to specific topics must be received by 12:00 (NOON) ET January 9, 2019. Technical Questions received after this date will not be considered.

These questions are limited to technical information related to improving the understanding of a particular topic’s requirements. Any questions or inquiries seeking advice or guidance on a solution approach are unacceptable and will not receive a response.

Responses to the questions received by 12:00 (NOON) ET January 9, 2019, 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.

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.

Electronic Submission Questions

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

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.
- 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.
- 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.
- d. Cost/Price – Cost/Price – The reasonableness of the cost proposal. The evaluation of cost/price will include whether the level of effort and other direct costs are appropriate for the proposed work.

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.
- 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 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.
- d. Cost/Price – Cost/Price – The reasonableness of the cost proposal. The evaluation of cost/price will include whether the level of effort and other direct costs are appropriate for the proposed work.

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.
- 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, CWMD will use contractor support as advisors in the source selection process.

Applies to H-SB019.1-010 though H-SB019.1-011 ONLY

Schafer, a Belcan Company
BGS_TAR_NDA@belcan.com
 (703) 516-6000

Applies to H-SB019.1-011 ONLY

Engility

Rose.Rovitti@Engility.com

(703) 984-5164

Ben.Dawson@Engility.com

(703) 984-5065

In accomplishing their duties related to the source selection process, the aforementioned firms may require access to proprietary information contained in the Offerors' proposals. Therefore, pursuant to FAR 9.505-4, this firm 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. For Topics H-SB019.1-010 through H-SB019.1-011, each Offeror must contact the company listed above at BGS_TAR_NDA@belcan.com at least four weeks prior to the proposal submission deadline to effect execution of such an agreement. For Topic H-SB019.1-011 only, each Offeror must contact the company listed above at Rose.Rovitti@Engility.com and Ben.Dawson@Engility.com at least four weeks prior to the proposal submission deadline to effect execution of such an agreement.

CWMD highly recommends that the Offerors use the standard one page company-to-company, non-disclosure agreements found in Attachment 4. It is imperative that Offerors submitting proposals for Topics H-SB019.1-010 through H-SB019.1-011 submit a copy of their signed agreement to CWMD.SBIR@hq.dhs.gov. **Proposals submitted to these topics will not be considered complete until the submission of the dually signed non-disclosure agreement. Failure to execute such an agreement with the above company will result in the Offeror's proposal submission being found non-compliant. Non-compliant submissions will not be reviewed or evaluated.**

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. The number of Phase I awards is estimated to be 33. 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 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**).

5.2 Reports and Deliverables

Monthly reports (Phase I), Quarterly Reports (Phase II) and a final comprehensive report (both Phase I and Phase II) will be required in all SBIR awards.

In addition, if you are proposing and awarded a contract with Technical and Business Assistance an

additional report is required (see **Section 5.11**)

Other deliverables appropriate to the proposed effort will be identified in the topic area description. Phase I and II awardees will be required to submit the *SBIR Funding Agreement Certification – Life Cycle Certification (Attachment 3)* during the contract period of performance.

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.

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 with permission of the contractor. These rights may be extended beyond the initial

four year period in accordance with paragraph 8(b)(2) of the SBIR Policy Directive update of February 24, 2014.

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 considered in evaluation of proposals.

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 concern 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 (e.g.- 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 business concerns, 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 Technical and Business Assistance

DHS SBIR may provide up to \$6,500.00 during Phase I and \$50,000 during Phase II for Technical and Business Assistance to an SBIR awardee. Technical and Business Assistance funds are inclusive of the maximum award amount stated in **Section 3.1**. The purpose of Technical and Business 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.

To receive Technical and Business Assistance, Offerors must enter into an agreement with a subcontractor for up to \$6,500.00 in Phase I or up to \$50,000 in Phase II. Regardless of whether the Offerer proposes Technical and Business Assistance, the funding and period of performance thresholds for the proposal remain the same. Proposals submitted which exceed the funding or period of performance thresholds in Section 3.4 will be deemed NON-RESPONSIVE and will not be evaluated. These subcontract costs must be accounted for in the Cost Proposal; however, profit or fee should not be applied to Technical and Business 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 or business services needed. Reimbursement is limited to services received that comply with 15 U.S.C. 638(q). Note, unspent funds for technical or business 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.

Awardees that receive Technical and Business Assistance during a fiscal year shall submit a Technical and Business Assistance report with a description of the technical or business assistance received and the benefits and results of the technical or business assistance.

5.12 Commercialization Assistance Program

Awardees can receive Commercialization Assistance through the DHS SBIR Program Office. The SBIR Program Office is under contract with a company that can provide commercialization assistance to 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 concern.

5.13 Classified Proposals

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

5.14 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.

5.15 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.

5.16 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 offer offers Cost Match

Cost Match. The DHS S&T and CWMD 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 only 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 concern, their family members, and/or affiliates of the small business concern. In order to be considered for DHS SBIR cost match, the outside investors must commit a minimum of \$100,000. DHS will, at its discretion and subject to availability of funds, match up to 50% of funds received, for a maximum DHS SBIR contribution of \$250,000.

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>.

5.17 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 12:00 noon ET on January 23, 2019. 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 Topic

The following are the topics for the FY19.1 S&T Directorate’s SBIR Program:

H-SB019.1-001 - Reach-Back Capability for Fielded Rapid DNA Systems

H-SB019.1-002 - ICAM On-the-Fly

H-SB019.1-003 - On Body Power Module for First Responders

H-SB019.1-004 – Modelling-based Design of Sensors for Chemical Detection in Complex Environment

H-SB019.1-005 - Synthetic Training Data for Explosive Detection Machine Learning Algorithms

H-SB019.1-006 - Cybersecurity Peer-to-Peer Knowledge/Lessons Learned Tool

H-SB019.1-007 - Network Modeling for Risk Assessment

H-SB019.1-008 - Blockchain Applications for Homeland Security Forensic Analytics

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

7.2 CWMD Office Topics

The following are the topics for the FY19.1 CWMD SBIR Program:

H-SB019.1-009 - Detector Integration with Current and Emerging Networked Systems

H-SB019.1-010 - Unmanned Aerial System Autonomous Search of Limited Area for Radiological Threats

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

APPENDIX A – RESEARCH TOPIC DESCRIPTIONS

SBIR TOPIC NUMBER: H-SB019.1-001

TITLE: Reach-Back Capability for Fielded Rapid DNA Systems

TECHNOLOGY AREAS: *Enhanced Border Security, Prevention of Human Trafficking and Smuggling, Multimodal Biometric Collection*

OBJECTIVE: Development of an accredited DHS reach-back capability to review results from fielded Rapid DNA systems using the OBIM DNA Store/Match/Share capability.

DESCRIPTION: The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) developed Rapid DNA technology under a prior Small Business Innovative Research (SBIR) program to provide family relationship verifications in the field, a capability that no other biometric provides. Rapid DNA is an innovative technology that reduces the testing and analysis time for Deoxyribonucleic Acid (DNA) from the classical three to six months down to 90 minutes using a printer-size portable device. Rapid DNA also internally analyses the DNA profiles and with OBIM Store/Match/Share software can verify family relationship claims of biological relatedness (kinship). This has direct application to improving processes and reducing fraud in immigration, human trafficking/ smuggling at the borders, and for reunification of families following a mass casualty event. This SBIR topic builds on the established Rapid DNA capability, adding the necessary capability to provide for reach-back review of Rapid DNA results in an accredited environment.

DHS S&T has had a significant role in developing, overseeing, testing and evaluating the Rapid DNA technology and it is now commercially available and ready to be implemented. Better than 90% of the time Rapid DNA produces a DNA profile capable of supporting a match and the instrument returns a green checkmark. But the remaining 8% of the time, the profiles receive either a yellow or red flag and need to be reviewed. Some of these yellow or red flags are due to issues with the DNA profile that will not impact the kinship analysis and some are due to processing issues by the technology. Either way, DHS needs an ability to reach-back to a DNA analyst to review the DNA profiles and to re-run a DNA sample when necessary. The DNA analyst and the facility also need to be accredited so that the fielded Rapid DNA results and those of the reach-back capability are shown to be repeatable and accurate to stand up in court, if challenged.

The DHS Customs and Border Protection (CBP) Laboratories and Scientific Services Directorate (LSSD) has multiple regional laboratories and satellite offices for the processing of multiple forensic sample types, but does not currently have a human DNA laboratory. We are seeking any innovative/alternative solutions that would provide a reach-back capability for fielded Rapid DNA systems, anticipating that the developed solution would ultimately transition into the LSSD laboratory for long-term operational support to DHS field components.

The research into potential reach-back solutions would need to address the analysis of innovative or potential solutions to provide reach-back support for Rapid DNA, the interface an analyst uses to review and annotate Rapid DNA field results, the use of DNA data sharing standards, the accreditation of the reach back capability, location/staffing/costs for the reach-back capability, and the eventual transition of the new capability to DHS LSSD facilities.

Once the alternative reach-back solutions are proposed, a pilot solution would be developed to implement the reach back capability. This would include specifying and acquiring the appropriate technology, developing the detailed documentation to establish and maintain accreditation, researching and developing training materials,

establishing performance metrics and risk mitigation recommendations and measurement plans, and addressing access and privacy protection solutions.

PHASE I: The offeror shall research the feasibility of providing a reach-back solution for fielded Rapid DNA systems. A Phase I final technical report shall be submitted addressing the analysis of potential solutions to reach-back support for Rapid DNA, the use of DNA data sharing standards, the accreditation of the reach back facility or laboratory, facility location, staffing, costs, and the eventual transition of the new capability to DHS LSSD facilities. In addition to the final technical report, monthly progress reports shall be submitted.

PHASE II: Phase II continues the R&D that began in Phase I and develops a pilot solution to implement the reach back capability. This includes specifying and acquiring the appropriate technology for an analyst to review and annotate Rapid DNA results, developing the detailed documentation to establish and maintain laboratory or facility accreditation, researching and developing staff training materials, establishing performance metrics and risk mitigation recommendations and measurement plans, and addressing facility access and privacy protection solutions. Deliverables include monthly progress reports, a final technical report detailing the developed solutions, and a prototype reach-back capability that connects to at least one government provided Rapid DNA instrument.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: Phase III would transition the pilot solution into a DHS LSSD laboratory or other Government operational environment that would provide the ongoing operational reach-back for fielded Rapid DNA systems. All technical and operational policies and procedures would be established and validated and accreditation of the solution would be achieved. This will directly support DHS in the establishment of DNA as a biometric that supports family relationship testing for immigration, border patrol human trafficking/smuggling prevention and reunification of families following mass casualty events.

State and local law enforcement, medical examiners, and disaster preparedness agencies are all evaluating the use of Rapid DNA in their operations. This reach-back capability is necessary in all of those applications to ensure that their solutions are validated and accredited, and that a human analyst has the ability to review the results.

REFERENCES:

- Rapid DNA Fact Sheet: <https://www.dhs.gov/publication/rapid-dna>
- Rapid DNA Snapshot Article: <https://www.dhs.gov/science-and-technology/news/2017/06/16/snapshot-rapid-dna-technology-makes-verifying-relationships>
- Rapid DNA News: <https://www.dhs.gov/science-and-technology/rapid-dna>

KEY WORDS: Identity Management, Biometrics, DNA, Kinship, Accreditation, Reach-back Support

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-002

TITLE: ICAM On-the-Fly

TECHNOLOGY AREAS: *ICAM, Identity Proofing, Automatically Provisioning*

OBJECTIVE: Develop / demonstrate an ICAM solution that will allow all first responders supporting a multi-jurisdictional event to be able to safely and securely share information.

DESCRIPTION: The Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) Project Responder 5 Report identified key capabilities to help first responders be more effective in their mission. Among the findings included the need to securely share information, validate responders from other organizations, and securely maintain records. These challenges only increase as responders rely on more data. There is a critical need for responders to securely validate users and share information. Identity, Credential, & Access Management (ICAM) principles can mitigate these challenges.

ICAM is a framework of policies built into an organization's IT infrastructure that allows system owners to have assurance that the right person is accessing the right information at the right time for the right reason. First Responders need to safely and securely share information between jurisdictions, but first responder organizations do not currently have federations set up to aid in information sharing. Instead, during multi-jurisdictional responses, organization might be forced to manually provision an un-vetted new user or take days to vet a new user's identity and certificates. Lead agencies require quick and secure solutions to vet identities and credentials in real time as well as auto-provision users into information sharing applications. ICAM On-the-Fly would allow new users to show up to assist in a public safety event, bringing their own credential, their own device and the role they are to provide during the event.

Fundamentally, ICAM On-The-Fly must:

- Perform Quick Identity Proofing;
(e.g. validate that the user is who they says they are)
- Validate applicable certifications and attributes required to access the information to be shared;
(e.g. EMT Certified, sworn law enforcement)
- Automatically Provision (register) New Users;
- Be built using open standards to preserve interoperability;
- Be cross platform (iOS/Android) compatible; and
- Recognize a broad array of credential attributes in diverse environments (i.e. multiple types of LDAP, Active Directory, etc.)

PHASE I: Period of Performance: 6 months

During this phase, the SBIR performer will conduct a technical analysis and propose a development road map for constructing an ICAM On-The-Fly solution. .

The technical analysis will identify the state-of-the-art identity proofing, application validation and automatic provisioning technologies using its own or industry R&D resources. This technical analysis must identify the technical gaps that the performer will incorporate as part of its proposed solution architecture. At a minimum, the performer shall cover the following:

- Identification of Public Safety stakeholder requirements

- Evaluation of current services, tools and commercial capabilities
- Determination of open standards and connectors to enable interoperability to maintain compatibility with NIST SP 800-63-3

The development roadmap to construct an ICAM On-The-Fly system must show the steps necessary to produce a minimum viable product (MVP) including at a minimum:

- A system architecture, inclusive of multifactor authentication using open standards such as FIDO U2F and NIST SP 800-63A (built to at least, IAL2: remote proofing);
- A complete set of system policies, including but not limited to, credential attestations to be harmonized across entities, and aggregate and weighted values for credentials being vetted from multiple truth sources; and
- A development work plan clearly demonstrating the path to completion.

PHASE II: Period of Performance: 24 months

Phase II continues the R&D that began in Phase I and will deliver a prototype implementation designed to meet the ICAM On-The-Fly needs. The prototype will be demonstrated in test and evaluation in an operational exercise to demonstrate the capability. At a minimum, Phase II should include the following:

- A MVP;
- Build proof of concepts to integrate commercially available products with the MVP;
- Simulate and demonstrate an operational environment;
- Document implementation guides, lessons learned, and custom code.

In addition, deliverables should include monthly progress reports and a final technical report detailing the technical analysis and proposed solution architecture.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS:

Phase III may include further technical development to address gaps discovered during the T&E and further end-user feedbacks. The R&D efforts from Phase III will result in the commercial or government application in which at least one agency will take delivery of the tool and its services. Example may include:

- Delivery of the automated tool via network-as-a-service or software-as-a-service to a designated public safety agency for end-user application
- Standalone tool delivered to designated commercial or public safety agency with standard tool training and technical support

REFERENCES:

- FIDO U2F - <https://fidoalliance.org/download/>
- NIST SP 800-63 - <https://pages.nist.gov/800-63-3/>
- NIST SP 800-63A - <https://pages.nist.gov/800-63-3/sp800-63a.html>
- NIST SP 800-63-3 - <https://pages.nist.gov/800-63-3/sp800-63-3.html>
- NIST SP 800-53 - <https://nvd.nist.gov/800-53>

KEY WORDS: Identity

- ❖ Credentials
- ❖ Access Management

- ❖ Multifactor Authentication
- ❖ Federation
- ❖ Cyber Security
- ❖ Information Sharing

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-003

TITLE: On Body Power Module for First Responders

TECHNOLOGY AREAS: *Communications, Sensors, Internet Of Things (IoT), Power Systems, Batteries, Rechargeable*

OBJECTIVE: Develop a module that can power/charge and provide effective power management of all on-body electronics including sensors, communications systems, and peripheral devices for all first responder mission areas including: EMS, fire and law enforcement.

DESCRIPTION: First responders will need to carry many more devices such as sensors (environmental, physiological monitoring, hazard), IoT devices in addition to their cell phones and radios and peripheral devices (e.g., heads up displays) that require power. Each of these devices may have different power requirement (e.g., USB, USB-C, Apple,microUSB) and may need to be charged at different intervals depending on battery life and use. Requiring first responders to charge and track battery levels for all these devices would be an additional burden and work load. The innovation sought here is to develop a power module for first responders (PMFR) that would service all the current and emerging requirements of on-body devices. The Power Module would provide long-term, exchangeable and rechargeable battery, or viable alternative such as fuel cell, power to the various modules for extended use.

Currently, DHS is aware of some power modules/battery packs that have been developed for Department of Defense (DoD) applications but none for the first responder civilian applications. It is anticipated that in the future if these power modules are deployed ubiquitously then sensors and peripheral devices no longer need built in power systems and can rely on the PMFR for power. Use of external power subsystems would then reduce the costs, size and form factor of sensors and peripheral devices.

The PMFR should be:

- Flexible to support a number of devices and power requirements (IoT devices, sensor modules, cellular and radio systems)
- Swappable (swap out a unit with low charged with a fully charged device); ideally hot swappable
- Portable (low size and weight for use on day to day applications and for carrying)
- Low cost (objective \$50/threshold \$100 for non-intrinsic models)
- Available for different applications (intrinsically safe for fire applications or standard ruggedized for EMS or law enforcement IP68 or CSA for intrinsic applications)
- Operate for 24 hours (objective) or 8-12 hours (threshold))
- Rechargeable through 110 Volts or 12 volts (from vehicle)
- Capable of providing battery status, report run-time remaining and alert when charge falls below a threshold
- Capable of using standard battery or batteries (for backup)
- Capable of detecting and reporting modules connected to the Power Module and provide battery status
- Power status application with low-power alert function;

PHASE I:

Phase I will have the following outputs:

- Determine current and future power requirements for first responder applications by assessing what equipment may be connected and power requirements
- Develop an architecture that uses as reference the Next Generation First Responder handbook

- Develop a design and proof of concept including defining size (dimensions and weight) and form factor; design should account for minimal impact to user profile
- Propose battery or viable alternative type and safety considerations
- Define packaging and specifications for both the intrinsically safe and standard configuration (IP68, CSA 157)
- Develop a cost model to determine the approximate costs of each of the two types (intrinsically safe and standard); cost model should also define required volume discounts

PHASE II

Develop a minimum of 10 standard and 5 intrinsically safe (CSA) power modules. During Phase II, detailed testing shall be conducted to assess and demonstrate performance of the unit both in a laboratory environment and field demonstration to assess form fit function. Detailed test report on charge/discharge cycles along with battery life should be documented. Final report should include an evaluation of the prototypes against all the requirements documented above and in Phase I.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS:

Applications of this product and prototypes should provide the capability of low cost power module for use by all first responders (federal, state and local). This product could also expand and be used for DoD applications as well.

REFERENCES:

- [1] NGFR Integration Handbook version 3.0 developed by DHS S&T; <https://www.dhs.gov/publication/st-frag-ngfr-integration-handbook-version-20>;
- [2] Smart battery definition, <http://smartbattery.org/specs/sbdat110.pdf>
- [3] CSA C22.2 NO 157 Intrinsically safe and non-incendive equipment or use in hazardous locations

KEY WORDS:

Power Systems, Batteries, Rechargeable, portable power

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-004**TITLE:** Modeling-based Design of Sensors for Chemical Detection in Complex Environment**TECHNOLOGY AREAS:** chemical detection, chemical sensors, molecular-based modeling, Monte Carlo**OBJECTIVE:** Develop sensors for chemical analyte detection based on existing theoretical models and compare their selectivity and sensitivity characteristics with the model predictions.**DESCRIPTION:** DHS and first responders need low cost, high performance sensors that can be used to detect chemical materials in different environments. A persistent problem in chemical sensing is the inability of the sensor system to reliably address complex sensing tasks and environments. Such conditions are regularly encountered in situations involving environmental monitoring, industrial process control, toxic chemical and fire detection. Often, these tasks are centered on the detection of chemical signatures rather than individual chemical compounds. However, detection of individual analytes is often complicated significantly by environmental conditions that exist in backgrounds with multiple potentially interfering chemical species. This can lead to surprisingly poor performance in real-world environments after excellent results have been demonstrated in the laboratory. Hence understanding the surrounding details of a chemical sensing problem is critical to finding a solution, together with knowing and addressing the target analytes themselves.

Different types of sensors, a large number of them being based on molecular sensing capability and coupled with nanostructured surfaces, are being developed. However, most of these sensor developments are empirical and their performance, particularly the interplay between sensitivity and selectivity, cannot be predicted until the sensors are fully tested in a real-world environment. The costs to the user are therefore quite substantial for each sensor development before an objective assessment with regards to their usability can be made. On the other hand, a modeling-based approach, which would allow design of surfaces as well as the sensing device diagnostics, could allow for an inexpensive, user friendly approach to designing sensor materials that can be integrated with electronics to produce any type of sensor – chemical or biological, with parts per trillion (ppt) sensitivity and fast (seconds) response times. The reduction in cost compared to the current sensor development approaches which are empirical in design is expected to be at least an order of magnitude.

Many current sensor developments involve different types of polymers like those used in surface acoustic wave (SAW) mode or molecular imprinted polymer (MIP) configurations. A recurring problem with regards to sensing of chemical vapors is the issue of addressing complex sensing tasks and environments that are routinely encountered in most real-world situations. Even detection of individual analytes is almost always complicated significantly by these unavoidable environmental conditions. This can lead to surprisingly poor performance in environments relevant to first responders [1,2]. The same selectivity problem exists even in the case of arrays of sensors [1]. Theoretically based strategies for design and optimization of chemical sensors are rarely adopted by sensor developers. The same situation also exists for molecularly imprinted polymers. Molecular imprinting is the process whereby a polymer matrix is cross-linked in the presence of molecules with surface sites that can bind selectively to certain ligands on the polymer. Recent theoretical work [3,4] has discussed a model that accounts for the key features of this molecular recognition approach. Using a combination of analytical calculations and Monte Carlo simulations, it has been shown that the model can account for the binding of rigid particles to an imprinted polymer matrix with valence-limited interactions. It has also been shown as to how the binding multivalency and the polymer material properties affect the efficiency and selectivity of molecular imprinting. These calculations also indicate pathways to formulate design criteria for optimal molecular imprinting. While theoretical models for rational design of sensors and sensors arrays do exist, there has not been any sensor development which are explicitly based on these models. The goal of the project is to develop sensors based on the rational designs of the theoretical models and evaluate the sensor performance in both pristine and complex environments relevant to the needs of the user community.

PHASE I: The Offeror shall design and develop one type of sensor based on the rational design of the sensor based on any one of the existing theoretical models [1-4]. The Offeror shall demonstrate that the sensor can have high selectivity (better than 0.1 parts per billion) for the detection of chemical vapors of a chemical agent simulatant or a toxic industrial chemical in the vapor phase. The Offeror shall demonstrate that the sensitivity is not compromised by the simultaneous presence of three different types of interfering gas molecules. The interfering gases should possess chemical, physical or spectral properties similar to the target chemical vapor. The matrix for success will be a demonstration of less than a factor of 10 reduction of sensitivity for the detection of the target chemical vapor in presence of the contaminant gases. Standard deliverables for the Phase I effort include monthly progress reports and a final technical report.

PHASE II: The primary prototype to be developed in this project is the computational model that can be used in future sensor development efforts. The Offeror must demonstrate the capability of the model by fabricating 8x8 sensor arrays with integrated measuring electronics. The Offeror shall compare the sensor array response performance in terms of the response to different analytes and different contaminant gases, specific identifies of which will be selected during Phase I. The Offeror shall assess the sensitivity benefit when combining two or more sensors with the same sensitivity. The goal of Phase II is to show that the sensor array is capable of detecting different types of chemical analytes with the same sensitivity in the simultaneous presence of different types of contaminant molecules. Ten (10) prototype 8x8 sensor arrays shall be produced. A major goal of the Phase II is to prove that by using the selected model, future sensor design processes will be more efficient and reduce development time and costs.

In addition to the field testable prototype, deliverables include; monthly technical reports, a quad chart (template will be provided), a one pager (template will be provided), monthly status calls to discuss monthly technical report. A commercialization plan must be completed, identifying specific customers, completed outreach to those customers, licensing requirements, pricing and future upgrades. Finally, since S&T publishes findings from its research, we encourage selected awardees to work with S&T Communications and Outreach Division to disseminate the information from SBIR awards.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: The results of this effort would establish a computational method to more efficiently design sensor materials significantly impacting the time and cost to development and commercialization of sensors for both chemical and biological environmental contaminants. First responders have a need for detection systems for situational awareness as well as several DHS components (e.g., Customs and Borders Protection, United States Coast Guard) used during daily operations.

REFERENCES:

- [1] Kevin Johnson and Adam Knapp, "Selectivity Measure for Arrays of Non-Specific Sensors", *Sensors and Actuators B* 251, 1076-1088 (2017).
- [2] Kevin Johnson and Susan L. Rose-Pehrsson, "Sensor Array Design for Complex Sensing Tasks", *Ann. Rev. Anal. Chem.* 8:14.1-14.24 (2015).
- [3] Tine Curk, Jure Dobnikar and Daan Frenkel, "Rational Design of Molecularly Imprinted Polymers", *Soft Matter*, 12, 35-44 (2016).
- [4] Dumitru Pavel, Jolanta Lagowski and Carmela Jackson Lepage, "Computationally Designed Monomers for Molecular Imprinting of Chemical Warfare Agents – Part V", *Polymer* 47, 8389-8399 (2006).
- [5] Braden C. Giordano and Greg E. Collins, "Synthetic Methods Applied to the Detection of Chemical Warfare Nerve Agents", *Current Organic Chemistry*, 11, 255-265 (2007).

KEY WORDS:

- Chemical Sensor
- Rational design of sensor

- Model based sensor design
- Sensors for complex environment
- Molecular Imprinting of Polymer
- Surface Acoustic Wave Sensor

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-005

TITLE: Synthetic Training Data for Explosive Detection Machine Learning Algorithms

TECHNOLOGY AREAS: Millimeter-Wave (MMW) and X-Ray explosive detection systems, passenger checkpoint, checked baggage

OBJECTIVE: Development of methods for creating synthetic human subject/baggage object models for creating realistic image-based machine learning training data

DESCRIPTION: Currently fielded explosive detection equipment uses electromagnetic signals, such as X-rays or MMWs to interrogate passengers and their belongings. Automatic algorithms process the images generated by the screening hardware either to clear the passenger/property or to identify specific anomalies for further investigation. The use of machine learning and deep learning approaches to develop these algorithms have shown significant promise in improving overall system performance. The DHS S&T/TSA Passenger Screening Algorithm results showed the effectiveness of deep learning applied to passenger screening. Development of the equipment and its associated detection algorithms is time consuming and expensive because system screening performance is difficult to accurately model. Currently:

- Prototype systems must be built and tested to measure and understand the interaction of X-rays/MMWs with explosives in various containment configurations.
- Development requires physical test articles to be fabricated or acquired. Suitable test articles may even be impossible to create if the explosives involved are unsafe to synthesize.
- If machine learning or deep learning algorithms are developed for detection, many test articles must be created and scanned to build datasets for algorithm development, training, and testing. This is particularly labor intensive in order to generate large, representative datasets.

In order to accelerate the advancement of explosive detection equipment, the DHS S&T Directorate seeks to develop tools to create virtual models of human travelers, their baggage and its contents. These models:

- Should be representative of the stream of commerce.
- Should be capable of including simulated explosives and prohibited items.
- Should be able to be generated in large numbers (many thousands or millions) in a reasonable amount of time (under 1 second per image).
- Should be useable by researchers and vendors to predict the performance of emerging explosive detection technologies and to train machine learning-based detection algorithms. The predictions and training will make use of tools (see, for example, <https://www1.aps.anl.gov/science/scientific-software>) that simulate the propagation of X-rays/MMWs through simulated objects.
- Should be useable for assessing a system's ability to detect emerging threats that are unsafe to synthesize.
- Should be useable for a variety of electromagnetic interrogation methods including synthetic aperture radar, computed tomography, and single and multi-view (AT2) line scanners. These technologies use transmission, diffraction, and phase contrast to detect explosives and prohibited items.

The tools should:

- Include methods to create shape descriptions for explosives and other objects, and methods to insert these items into representative scans. The mathematical descriptions may be based on the union of geometric primitives, polygon meshes, and sampled three-dimensional volumes.
- Include parametric descriptions for the features of explosives, so that users do not require access to classified information.
- Be compatible with tools in the public domain for simulating X-ray/MMW interactions with objects.
- Be compatible with script- or code-based algorithms targeting open-source multi-dimensional modeling software (*e.g.*, MakeHuman and Blender)

- Provide for a real-time means of dynamic configurability, especially as regards the physical properties of virtual materials to be used in the modeling and the system's input/output file pathways (e.g., use of "config files")

PHASE I: Applicable publicly and commercially available tools for X-ray and electromagnetic simulation as well as for generating stream of commerce objects shall be evaluated. Initial simulations shall be performed combining selective tools with additional algorithms to determine whether data representative of existing human subject, bags and cargo containers can be created. Build a small number of simulated passengers and bags. Write a project plan, including system requirements, technical approach, estimated costs and schedule, for Phase II. The deliverables include technical reports reviewing available tools and describing how existing passengers and bags are matched and a project plan for Phase II.

PHASE II: Develop software to simulate human subjects and checked baggage with all appropriate ancillaries (clothing, shoes, hair and, in the case of baggage, typical contents). Create at least 200 human subjects and 200 bags meeting the 1 second per image requirement. Deliverables include prototype software for the simulation programs, technical reports describing how the tools operate and how they were validated, and mathematical descriptions of the simulated human subjects, bags (and contents) and cargo containers, and scripts for generating the models of human subjects, ancillaries (clothing, shoes, hair, *etc...*), virtual baggage and contents.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: The tools could be sold commercially for use by screening equipment vendors. The provider could sell services to help vendors use the tools. There will be on-going expenses to modify the tools based on user feedback. DHS could supply the tools, or test sets of simulated baggage created using the tools, to vendors as part of future programs.

REFERENCES:

1. Schmidt, *Tools For Simulating CT Scanners*, in *Algorithm Development for Security Applications, Eighth Workshop (ADSA08), Automated Threat Recognition (ATR) Algorithms for Explosion Detection Systems*, Northeastern University, Boston, October 24-25, 2012, http://myfiles.neu.edu/groups/ALERT/strategic_studies/ALERT_ADSA08_final_report.pdf
2. *FORBILD phantoms (standard for medical CT)*. <http://www.imp.uni-erlangen.de/phantoms/>
3. *Geant4 - a toolkit for the simulation of the passage of particles through matter*, <http://geant4.cern.ch/>
4. Kak and Slaney, *Principles of Computerized Tomography*, IEEE Press, released into the public domain at: <http://www.slaney.org/pct/>
5. DHS S&T/TSA Passenger Screening Algorithm Challenge: <http://www.kaggle.com/c/passenger-screening-algorithm-challenge/>

KEY WORDS: x-ray, millimeter-wave, simulation, computerized tomography, diffraction, synthetic data

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-006

TITLE: Cybersecurity Peer-to-Peer Knowledge/Lessons Learned Tool

TECHNOLOGY AREAS: Cybersecurity, Information Sharing, Risk Analysis

OBJECTIVE: Develop a collaboration tool for medium/small organizations to help them identify key cybersecurity information and lessons-learned of most significance to them.

DESCRIPTION:

Organizations throughout the American economy and government are faced with designing and then operating cybersecurity risk management, in a complicated and dynamic environment. They have been provided with a useful starting point, a cybersecurity risk management framework, developed by NIST, supported by DHS, and filled out in some detail by different critical infrastructure sectors and organizations. But sustaining risk management operations is more difficult, as organizations must somehow blend a great deal of technical input (vulnerability reports, incident reports, threat analysis, technical guidance, etc.) with their own organizational experience. The cybersecurity “knowledge management” challenge is significant for any particular organization, regardless of size or critical infrastructure domain.

Additionally, several million organizations and companies across the country are faced with this challenge, continuously. Most information sharing systems assume that these many organizations and companies should report their cybersecurity experiences vertically to commercial and governmental centers, which are to synthesize these various reports and report back analytical insight. But what does not yet exist is a peer-to-peer version of this reporting activity, where an organization can directly leverage related experiences of thousands of organizations and companies, through a tool that can capture and report their own experiences and connect them with comparable experience of other organizations and companies, to better help them understand and manage their cybersecurity risk.

The end product of this effort should address capabilities such as:

- Key internal risk assessment elements
- The time/dynamics of internal risk assessment elements
- Outside context for these assessments (vulnerabilities, operating data, etc.)
- Multiple information sharing mechanisms (one to one, one to many, collaboration drafts, etc.)

The key requirement is that this tool must be able to support enterprise consideration of cybersecurity risk, by bringing into the process valuable insight from other enterprise’ consideration of risk

PHASE I:

The expected focus of the Phase I effort is to assess (A) relevant knowledge management practices and capabilities, and (B) peer-to-peer information sharing principles, systems and experiences, both with respect to the cybersecurity information sources and the technical and operating environment. The Phase I effort must develop a tool design and architecture, a technical CONOPS for how the tool would be used in realistic business environments, and a development strategy that involves substantial operational participation, i.e. how would Phase II be conducted in partnership with real companies and organizations and their operational environments. Phase I deliverables must include a final technical report addressing tool design/architecture, expected CONOPS and the proposed development strategy, and a presentation addressing this need and work.

PHASE II:

The Phase II effort will develop the prototype peer-to-peer information sharing tool, demonstrate/pilot the use of this tool for 60-90 days by at least five small to medium sized organizations or companies, and revise the tool

design and architecture reflecting the Phase II experience. Phase II deliverables will include monthly progress reports, a prototype tool, a final technical report that includes both a revised tool design/architecture and the initial operating experience of the five (or more) small to medium sized organizations, and a revised presentation addressing this need and work.

PHASE III (COMMERCIAL OR GOVERNMENT APPLICATIONS):

Phase III will include several different activities, all of which are intended to expand awareness, development and application of this capability, via sustained user engagement.

- ❖ Further development of the tool (both technical elements and operational experience), and placing this tool out on GitHub for open use.
- ❖ Application of this tool to several different critical infrastructure sectors, via Information Sharing & Analysis Centers/Organizations.
- ❖ Application of this tool to several different government organizational environments, such as the Federal CISO Council.
- ❖ “Uptake” of this tool into existing commercial cybersecurity capabilities operating in the market now.

KEY WORDS: Cybersecurity, Information Sharing, Peer-to-Peer, Expert System, Risk Assessment, Lessons Learned.

REFERENCES:

<https://www.us-cert.gov/Information-Sharing-Specifications-Cybersecurity>

<https://www.cisecurity.org/ms-isac/ms-isac-toolkit/>

<https://its.ny.gov/eiso/local-government>

<https://bc2m2.pnnl.gov/>

<https://www.cooperative.com/remagazine/articles/Pages/Cybersecurity-Research-at-NRECA.aspx>

http://130.18.86.27/faculty/warkentin/BIS9613papers/Baskerville1991_EJIS_1_2_risk_analysis.pdf

<https://www.hSDL.org/?view&did=808477>

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-007

TITLE: Network Modeling for Risk Assessment

TECHNOLOGY AREAS: modeling of systems, risk assessment, counterfactual analysis

OBJECTIVE: Develop models of networks to identify risks associated with the network, tool development for counterfactual analysis (what-if scenarios), and risk assessment

DESCRIPTION

Networks, and systems of networks are ubiquitous in modern technology used throughout society today. Identification of risk in these networks often requires a model to be developed for the network or system of networks. These models range from the simple to the mathematically complicated models used for large networks. Some risks, such as cascading failures in a network, are difficult to identify. The goal for this effort is to develop the tools necessary to identify these risks, with a potential to identify mitigation strategies with an initial focus on emergency communications networks.

The tool should be capable of including information about the network, such as number and type of nodes, appropriate labels for nodes, and known risks or defects for the network. The tools will also be capable of performing counterfactual or “what-if” analysis, to identify risks in the network, such as the potential for cascading failures. The tool shall be able to incorporate information about the network or system from the PARIDINE project. PARIDINE is intended to provide disruptive event information for large networks or the Internet. This includes: 1) a definition of a disruptive event; 2) identification of data to identify disruptive events; 3) identification and operational reporting via an API for disruptive events and 4) attribution or root cause analysis of the disruptive events, with a measure of attribution accuracy. At least three state space models will be produced under the phase I effort.

PHASE I: The final deliverable for Phase I proposals is an initial proof of concept design for a risk assessment tool that incorporates state space models of networks or systems of networks. At least one state space network model shall be of a large network, the size of a multinational corporation network or government agency network. All models will include modeling of privacy in the network. At least one model shall be of an emergency communications network, or part of an emergency communications network. Examples include call flow within a 9-1-1 system of various sizes (e.g. small, less than 5 seats).

The proof of concept design shall include algorithms to identify risks in the state space models produced under the phase I effort.

PHASE II: The deliverable for Phase II is a prototype software or device/software combination that implements the proof of concept design in Phase I. The prototype should be applicable to government and enterprise communication networks or systems of networks, and ideally include mobile devices. The developed prototype will be delivered for piloting, within DHS components, other government organizations, or enterprises. Additional state-space system or network models may be required for the pilot implementation. The risk assessment tool will include analysis for privacy risks in the network.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS

Although the focus of this effort is for emergency communications networks, and call flow within 9-1-1 systems in particular, the tool(s) developed under this project will have many applications in both industry and government. Enterprise networks are compromised on a regular basis. Identification of risks associated with government and enterprise networks will benefit the entire internet ecosystem to enable protection and mitigation activities.

1. **REFERENCES:**

2. 9-1-1: https://www.911.gov/pdf/OEC_NG911_Cybersecurity_Primer_May_2018.pdf
3. 5 Steps to Perform a Cyber Security Risk Assessment on Your Network
<https://peoplesec.org/2018/02/25/5-steps-perform-cyber-security-risk-assessment-network/>
4. NIST risk assessment framework: <https://csrc.nist.gov/publications/detail/sp/800-30/rev-1/final>

KEY WORDS:

Network Modeling, Cyber Risk Assessment, Counterfactual Analysis, Network Risk Assessment, Privacy risk, 9-1-1 cyber risk

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

TOPIC NUMBER: H-SB019.1-008

TITLE: Blockchain Applications for Homeland Security Forensic Analytics

TECHNOLOGY AREAS: Encryption, authentication, cyber security, internet of things, and data analytics, blockchain

OBJECTIVE: Design a product to support the implementation of block chain based forensics, data analysis, and information sharing.

DESCRIPTION: Blockchain and Distributed Ledger Technology (DLT) are emerging technologies being leveraged for a wide range of commercial and governmental applications. The most well-known use case would likely be Bitcoin, within the newly emerged cryptocurrency arena, which has spurred further interest and developments. Prior efforts have addressed Bitcoin analytics, which covers only a limited scope within the realm of cryptocurrencies. This proposal seeks applications of blockchain forensic analytics for newer cryptocurrencies, such as Zcash and Monero. And, ongoing research within the field also contributes to new technological implementations and techniques that continue to multiply the specific types of consensus, privacy, security, and proof mechanisms.

A key feature underlying these newer blockchain platforms that is frequently emphasized is the capability for anonymity and privacy protection. While these features are desirable, there is similarly a compelling interest in tracing and understanding transactions and actions on the blockchain of an illegal nature. To that end, this proposal calls for solutions that enable law enforcement investigations to perform forensic analysis on blockchain transactions. This analysis can be approached in any number of ways and may consider different data situation use cases depending on whether additional data from off-chain sources are available. Furthermore, with the proliferation of new blockchain variants, the desired solution should either attempt to show generality or extensibility, or at least provide working approaches to treating newer blockchain implementations.

PHASE I: Design a blockchain analysis ecosystem or modify an existing one, that enables forensic analysis for homeland security and law enforcement applications for cryptocurrencies, such as Zcash and Monero. Produce an architecture that shows how system components can be upgraded or interchanged for an extensible and forward-looking solution that can be maintained for use with emerging blockchain networks. 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 and demonstrate the blockchain forensic technologies designed during Phase I. The demonstrations will include three (3) use cases determined by DHS/S&T and will involve the analysis of suspicious transaction without external data, with external data, and on another blockchain platform. A technical report detailing the results and improvements made to enhance the technology will be provided after each demonstration. A final report detailing the findings under Phase II will be delivered at the end of Phase II.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: The proliferation of blockchain technology beyond the cryptocurrency arena has drawn interest from all other sectors, with new proposed blockchains for everything from banking, charitable donations, supply chain tracking, to automatically executing "smart contracts". These technologies stand to radically transform operations in government and the private sector. Because of the significant impact in areas such as governance, data sharing agreement enforcement, and encrypted analytics interchanges, there are a wide variety of applications in government and the commercial marketplace that can benefit from successful product development. Blockchain forensic

analytics for the homeland security enterprise can help the DHS law enforcement and security operations across components as well as state and local law enforcement operations. Private financial institutions can likewise benefit from such capabilities in enforcing “know your customer” and anti-money laundering compliance.

REFERENCES:

<https://www.technologyreview.com/s/610807/sitting-with-the-cyber-sleuths-who-track-cryptocurrency-criminals/>

<https://coincenter.org/entry/how-can-law-enforcement-leverage-the-blockchain-in-investigations>

<https://cointelegraph.com/news/how-law-enforcement-can-investigate-bitcoin-related-crimes-and-why-thats-good>

<https://www.inc.com/will-yakowicz/startups-law-enforcement-agencies-catch-criminals-who-use-cryptocurrency.html>

<https://www.bloomberg.com/news/articles/2018-06-27/fbi-has-130-cryptocurrency-related-investigations-agent-says>

KEY WORDS: Encryption, crypto-certification, encrypted data analytics, authentication, cyber security, internet of things, blockchain, and data analytics

POINT OF CONTACT: Tanisha Walcott Tanisha.Walcott@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-009

TITLE: Detector Integration with Current and Emerging Networked Systems

TECHNOLOGY AREAS: Data Communication Networks, Cloud Computing, Radiation Sensing, Internet of Sensors.

OBJECTIVE: Survey current radiation instruments/sensors used for preventative radiological/nuclear (R/N) detection missions. For selected systems, develop appropriate interfaces that permit integration with current and emerging networked systems.

DESCRIPTION: This topic seeks the development of relevant communications protocols, application programming interfaces (APIs), and interface control documentation (ICDs) to allow legacy and emerging radiation detection systems in operational use to be integrated into current and emerging networked systems. The effort would encompass surveying commonly deployed legacy radiation detection systems, cost-benefit analyses to assess the relative importance of which detection systems merit integration, and subsequent development of the required interfaces to permit integration of those systems.

The effort must include the ability to transmit/stream the data from the sensor(s) to current and emerging networked systems. It should take into account that there are a multitude of sensors that can be categorized as permanent, deployable, and roving, all of which can be in GPS-denied environments. Proposed technical solutions must provide near-real-time transmission of sensor data when cellular or WiFi communication is unavailable. These capabilities are critical to operational environments where cellular is not readily available, such as U.S. Coast Guard operations, and U.S. Customs and Border Protection (CBP) U.S. Border Patrol (BP) operations. Solutions should be proposed that are capable of high bandwidth, secured, rugged, scalable, cost effective, and low size, weight, and power. Additionally, solutions that allow transmission of data while minimizing signatures for geolocation of the transmitter would also permit a wider range of CONOPS.

Proposers should expect to develop working relationships with original equipment manufacturers (OEMs) of deployed legacy R/N detection systems and current performers supporting the current networked system.

PHASE I: Phase I efforts should lead to an initial demonstration of the detection system communicating with a current or emerging network and displaying appropriate responses to detected radiation source. This includes the following:

- Conduct a survey of deployed legacy radiation detection systems, and potentially other radiation sensors in addition to a preliminary cost-benefit analyses to assess the relative important of which detection systems merit integration. The following criteria must be factored into the cost-benefit analysis, along with any supplemental proposed criteria:
 - Prevalence of use of the legacy system
 - Cost of the system.
 - Performance of the system as compared to existing systems.
 - Existing communications capabilities of the system.
- Down-select a sample of these detection systems that are prioritized to integration with current networked systems.
- Develop and document required ICDs and/or APIs to support integration of the highest priority detection system.

Phase I deliverables include monthly progress reports and a final Phase I report addressing the items above with particular emphasis on the cost-benefit analysis. Project review meetings will be held at the initiation, mid-point and completion of the Phase I effort.

PHASE II: This phase will expand upon Phase I, conducting the actual research and development to integrate three or more detection systems into the emerging network edge. This phase will conclude in demonstrated integration of several detection systems into the emerging network framework. This demonstration will include:

- Continuous, reliable communications of the instruments with current and emerging networked systems over an extended period of time (weeks).
- Effective ingestion and, as appropriate, analysis of detector data by the receiving network, including sensor state of health

Phase II deliverables include monthly progress reports and annual technical reports. Summary reports on three or more detection systems being successfully integrated on current and emerging networked systems are also required. Project review meetings will be held throughout the project period as needed to include but not limited to the initiation, mid-point and completion of the Phase II effort.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS: This topic's Phase III activities would include a successful commercialization strategy for supporting the integration of other detection systems into the current/emerging network system and supporting their optimal use within the network.

REFERENCES:

1. Android Windows Tactical Assault Kit (<https://atakmap.com/>)
2. ArcGIS (<http://www.arcgis.com/index.html>)
3. Defense Advanced Research Projects Agency (DARPA) SIGMA project (See: <https://www.darpa.mil/program/sigma>; <https://www.darpa.mil/news-events/2017-03-01>; <https://www.darpa.mil/news-events/2016-10-11>; <https://www.darpa.mil/news-events/2016-08-23>)

KEY WORDS: Data Communication Networks, Cloud Computing, Radiation Sensing, Internet of Things.

POINT OF CONTACT: CWMD.SBIR@hq.dhs.gov

SBIR TOPIC NUMBER: H-SB019.1-010

TITLE: Unmanned Aerial System Autonomous Search of Limited Area for Radiological Threats

TECHNOLOGY AREAS: radiation detection, cost effective equipment, autonomous robotics, unmanned aerial system, UAS, unmanned aerial vehicle, UAV

OBJECTIVE: Integrate commercially-available radiation detection equipment into a commercially-available Unmanned Aerial System (UAS) to meet the objective of performing an automated search of a defined limited area (Cargo Container Yard, Stadium, Parking Lot, etc.) for radiological threats.

DESCRIPTION: The goal of this effort is to prove the concept of automated UAS to conduct radiation detection operations in a cluttered three-dimensional environment such as a cargo container yard, stadium, or parking lot. The only operator action will be to define the boundaries of the environment to be searched, to include defining basic search parameters (e.g. minimum separation distance from obstacles and flight line spacing). The UAS may include multiple small unmanned aerial vehicles. UAS capabilities must include:

1. Operation within 2 m of objects to be inspected during flight.
2. Detection of anomalous gamma-ray and neutron radiation. The onboard radiation detection systems will meet the radiological test detection requirements of the ANSI N42.48.
3. Production of a real-time “heat map” for radiation as flight is conducted.
4. Dwelling at locations where radiation anomalies are identified for as little as 30 seconds and no more than 5 minutes.
5. Optimization of search pattern to minimize search time while maintaining the ability to localize and identify radiological threats, including the ability to provide the operator with search time and battery usage estimates based on the definition of optimized search area and flight parameters provided by the operator.
6. LIDAR for collision avoidance and to map search area and using that information to develop an optimized search pattern.
7. Visual cameras to provide live feed of flight profile.
8. The ability to transmit location information of one small unmanned aerial vehicle (UAV) relative to the object being scanned and other unmanned aerial vehicles (if applicable).
9. Logging and transmitting to the operator and/or a designated reachback center geo-referenced gamma-ray spectra, visual imagery, LIDAR profile, and all flight parameters when the UAS records either a gamma-ray or neutron alarm.
10. Flexible communications (Satellite, Cellular Tower, Wireless, hardwired, etc.) depending on what is available at a given deployment location.
11. The ability to launch from a designated site, perform search, and return before running out of power or when “mission” is complete.
12. Communication of system health status back to operator (“heartbeat”).
13. Recharging for subsequent assignment.
14. A human interface that allows for all automated functions to be controlled manually.
15. A “kill” button for emergency power-down on both the human interface and the unmanned aerial vehicle itself.

16. Field repairs on limited life components prone to deteriorate due to the nature of their function/design.
17. Running full diagnostics on the UAS platform for maintenance purposes as well as firmware updates, etc.

PHASE I: The end product of the Phase I effort should be a conceptual design for a UAS autonomous search system capable of detecting radiological threats in a complex 3-D environment such as a cargo container yard, stadium, or parking lot. The system should be capable autonomous operations in a cluttered 3-D environment. The design should identify commercial components that can be procured in Phase II and the design of the control component of the integrated system that will orchestrate the operation of the UAS vehicle and radiation detection system to carry out the screening. A simulation of the automated system is desired but not required. Other Phase I deliverables will be monthly progress reports and a final conceptual design report.

Phase I proposals should identify threshold and objective parameters for system cost, inspection time in clear weather, inspection time in “inclement” (as defined by the proposal) weather, detection distances and activity, system size and weight, system operation time, as well as any other performance parameters which are key to the specific UAV chosen. Proposals should emphasize integration of systems and components which are already commercially available, and should not contain significant R&D of UAVs or radiation detection systems.

Project review meetings will be held at the initiation, mid-point and completion of the Phase I effort.

PHASE II:

The end product of the Phase II effort should be the demonstration of UAS autonomous search system capable of detecting radiological threats in a complex 3-D environment such as a cargo container yard, stadium, or parking lot. After designating the optimized search area and flight parameters provided by the operator, the UAS prototype should carry out the screening, including transmission of the findings and spectra to a designated reachback center without further human intervention.

Phase II deliverables include monthly progress reports and annual technical reports. Two prototype systems will be delivered to CWMD (or its partners, as directed) at the end of Phase II. (This deliverable may be reduced or waived, depending on anticipated system cost.) Project review meetings will be held throughout the project period as needed to include but not limited to the initiation, mid-point and completion of the Phase II effort.

PHASE III: COMMERCIAL OR GOVERNMENT APPLICATIONS:

Should the concept be proven successful for a complex 3-D environment, the system could be modified to explore other Homeland Security applications, to include border screening.

REFERENCES:

1. ANSI N42.48- *American National Standard Performance Requirements for Spectroscopic Personal Radiation Detectors (SPRDs) for Homeland Security*. IEEE (New York) May 2018.
2. Bürkle, A., Segor, F. & Kollmann, M. J (Jan. 2011) Towards Autonomous Micro UAV Swarms.
 - a. *Journal of Intelligent & Robotic Systems*. Volume 61, Issue 1–4, pp 339–353.
3. Cortez, R. A. (2008, Sept.). Smart Radiation Sensor Management. *IEEE Robotics & Automation Magazine*, pp. 85 - 93.

KEY WORDS: radiation, search, optimal, automated, unmanned aerial vehicles

POINT OF CONTACT: CWMD.SBIR@hq.dhs.gov

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 Concerns 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 business concerns 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.

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 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.

Yes No Deviation 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):

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.

(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):

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: ___%

(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):

- SBIR Phase I: at least two-thirds (66.6%) of the research.
- SBIR Phase II: at least half (50%) of the research.
- Deviation approved in writing by the funding agreement officer: _____%
- N/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.

- Yes
- No
- Waiver 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.

- 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.
- 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.

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

ATTACHMENT 3: BRIEFING CHART TEMPLATE

<u>Proposal Title</u> <u>Company</u> <u>City, State</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> 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>NON-PROPRIETARY, UNCLASSIFIED DATA</p>	

ATTACHMENT 4: SAMPLE NON-DISCLOSURE AGREEMENT

**NON-DISCLOSURE AGREEMENT
SOLICITATION 70RSAT19R00000003A**

The Parties to this Agreement agree that Schafer Government Services, LLC, a Belcan Company, and its supporting consultants and subcontractors also under non-disclosure agreement, may have access to proprietary information 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 Company Official, Printed
Schafer Government Services, LLC
A Belcan Company

Signed

Dated

Related Party Individual Non-Disclosure Agreement

NON-DISCLOSURE AGREEMENT
SOLICITATION **70RSAT19R0000003A**

I, _____ (“Related Party”), an employee of Engility Corporation may have access to proprietary information 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.

I 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 (Offeror)

Name/Title

Signature

Dated

Engility Corporation
Company

Name

Signature

Dated